ADDENDUM – No. 1

PROJECT	LOWER D2 DITCH FLOOD MITIGATION PROJECT
BID DATE	BY 4:00 PM ON 9/18/2024
BID LOCATION	Office of the Board of County Commissioners, Room 345, City-County Building, 316 N. Park Avenue, Helena, MT 59623
ISSUE DATE	9/12/2024
NOTICE	Failure to acknowledge all addenda in the BID may cause rejection of the BID. See updated Bid Proposal Worksheet.

SCOPE OF THIS ADDENDUM

This addendum was prepared to address questions and comments discussed during the pre-bid meeting held September 10, 2024. Minutes from the meeting and sign in sheet are attached to this Addendum.

The following becomes a part of the original project manual and drawings, taking precedence over the items that may conflict. The bidder shall note receipt and make acknowledgment of the Addendum on his/her bid form, incorporating its provision in their bid.

No bidder questions will be accepted or responded to after the publish date of this addenda.

PROJECT MANUAL

The following additions, changes and clarifications have been made to the Project Manual.

Section 00520 – Agreement Form, Article 4 – Contract Times, 4.02 Contract Times: Dates

Delete:

4.02.A The Work will be substantially completed on or before March 15, 2024, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before April 15, 2024.

Insert:

4.02.A The Work will be substantially completed on or before March 15, 2025, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before April 15, 2025.

Section 00910 - Special Provisions, Section 12. Utilities Coordination

Delete from second paragraph:

As shown on the plans, overhead and underground utilities may be in conflict with certain components of the project. However, several service line utility conflicts will require the Contractor's coordination with relevant utility companies to relocate their utility as the project progresses.

Insert in second paragraph:

There is the possibility additional public utilities exist that are not shown in the Drawings.

Delete from third paragraph:

Known public utility conflicts exist at Arrowhead Crossing and Glass Drive #1 but additional public or private utility conflicts may exist at other crossings. Communicate with each utility company immediately following execution of this contract in the vicinity of each utility conflict. Develop and

implement a plan with public utility company's crews to relocate any conflicting utilities concurrent to the execution of work under this contract after approval from the Engineer.

Section 00910 - Special Provisions, Section 19. Survey Markers and Monuments

Insert new first paragraph:

Survey control to be established by the engineer prior to start of construction. Survey control to be provided to contractor after execution of contract.

Section 01275 - Measurement and Payment – Part 3 – Execution – 3.1 List of Bid Items – Base Bid

Delete:

Bid Item 2.a. Description: This bid item includes providing local horizontal and vertical survey control for all construction activities."

Bid Item 2.b.i Furnish local benchmarks at each work item location in Montana State Plane horizontal coordinates and North American Vertical Datum 1988 (NAVD88);".

Insert:

Bid Item 2.a. Description: This bid item includes horizontal and vertical survey for all construction activities."

Section 01275 - Measurement and Payment – Part 3 – Execution – 3.2 List of Bid Items – Bid Alternate 1

Delete:

Bid Item 12b.a. Description: This bid item includes providing local horizontal and vertical survey control for all construction activities."

Bid Item 12b.bi Furnish local benchmarks at each work item location in Montana State Plane horizontal coordinates and North American Vertical Datum 1988 (NAVD88);".

Insert:

Bid Item 12b.a. Description: This bid item includes horizontal and vertical survey for all construction activities."

Section 01275 - Measurement and Payment – Part 3 – Execution – 3.3 List of Bid Items – Bid Alternate 2

Delete:

Bid Item 13b.a. Description: This bid item includes providing local horizontal and vertical survey control for all construction activities."

Bid Item 13b.bi Furnish local benchmarks at each work item location in Montana State Plane horizontal coordinates and North American Vertical Datum 1988 (NAVD88);".

Insert:

Bid Item 13b.a. Description: This bid item includes horizontal and vertical survey for all construction activities."

Division 06 – Miscellaneous Construction

Insert new Section 06100 – Revegetation technical specification.

This specification has been attached to provide seed mixes to be used on the project. One seed mix is specified for streambanks and one for non-streambanks. The specification also removes the requirement for drill seeding.

DRAWINGS

The following additions, changes and clarifications have been made to the Drawings.

Drawing Sheet G-03: CONSTRUCTION QUANTITIES – CROSSING B

Replace: Sheet G-03 with Sheet G-03R

This sheet has been replaced with the attached Sheet G-03R to reflect reduced quantities of unclassified excavation, riprap procurement and placement, stabilization geotextile, and haul off associated with reduced riprap installation extents and to remove requirement for drill seeding.

Drawing Sheet G-05: CONSTRUCTION QUANTITIES – CROSSING D

Replace: Sheet G-05 with Sheet G-05R

This sheet has been replaced with the attached Sheet G-05R to reflect reduced quantities of unclassified excavation, riprap procurement and placement, stabilization geotextile, and haul off associated with reduced riprap installation extents and to remove requirement for drill seeding.

Drawing Sheet G-06: CONSTRUCTION QUANTITIES – CROSSING E

Replace: Sheet G-06 with Sheet G-06R

This sheet has been replaced with the attached Sheet G-06R to reflect reduced quantities of unclassified excavation, riprap procurement and placement, stabilization geotextile, and haul off associated with reduced riprap installation extents and to remove requirement for drill seeding.

Drawing Sheet G-07: CONSTRUCTION QUANTITIES – CROSSING F

Replace: Sheet G-07 with Sheet G-07R

This sheet has been replaced with the attached Sheet G-07R to reflect reduced quantities of unclassified excavation, riprap procurement and placement, stabilization geotextile, and haul off associated with reduced riprap installation extents and to remove requirement for drill seeding.

Drawing Sheet G-08: CONSTRUCTION QUANTITIES – GLASS DRIVE #2

Replace: Sheet G-08 with Sheet G-08R

This sheet has been replaced with the attached Sheet G-08R to reflect reduced quantities of unclassified excavation, riprap procurement and placement, stabilization geotextile, and haul off associated with reduced riprap installation extents and to remove requirement for drill seeding.

Drawing Sheet G-09: CONSTRUCTION QUANTITIES – GLASS DRIVE #1

Replace: Sheet G-09 with Sheet G-09R

This sheet has been replaced with the attached Sheet G-09R to reflect reduced quantities of unclassified excavation, riprap procurement and placement, stabilization geotextile, and haul off associated with reduced riprap installation extents and to remove requirement for drill seeding.

Drawing Sheet C-01: GLASS DRIVE 1 – CULVERT DETAIL

Replace: Sheet C-01 with Sheet C-01R

This sheet has been replaced with the attached Sheet C-01R to reflect reduced riprap installation extents.

Drawing Sheet C-02: GLASS DRIVE 2 – CULVERT DETAIL

Replace: Sheet C-02 with Sheet C-02R

This sheet has been replaced with the attached Sheet C-02R to reflect reduced riprap installation extents.

Drawing Sheet C-04: CROSSING F – CULVERT DETAIL

Replace: Sheet C-04 with Sheet C-04R

This sheet has been replaced with the attached Sheet C-01R to reflect reduced riprap installation extents.

Drawing Sheet C-05: CROSSING E – CULVERT DETAIL

Replace: Sheet C-05 with Sheet C-05R

This sheet has been replaced with the attached Sheet C-05R to reflect reduced riprap installation extents.

Drawing Sheet C-06: CROSSING D – CULVERT DETAIL

Replace: Sheet C-06 with Sheet C-06R

This sheet has been replaced with the attached Sheet C-06R to reflect reduced riprap installation extents.

Drawing Sheet C-09: CROSSING B – CULVERT DETAIL

Replace: Sheet C-09 with Sheet C-09R

This sheet has been replaced with the attached Sheet C-09R to reflect reduced riprap installation extents.

Drawing Sheet D-03: INLET AND OUTLET RIPRAP TYPICAL DETAILS

Replace: Sheet D-03 with Sheet D-03R

This sheet has been replaced with the attached Sheet D-03R to reflect reduced riprap installation extents.

Drawing Sheet D-04: CROSSING SURFACE REPLACEMENT TYPICAL DETAILS

Replace: Sheet D-04 with Sheet D-04R

This sheet has been replaced with the attached Sheet D-04R to reflect added "NOTE 1. BACKFILLING RIPRAP IN CULVERT BARREL NOT REQUIRED. USE NATIVE CHANNEL

MATERIAL AT CULVERT INLET AND OUTLET TO FEATHER INTO FG RIPRAP AT 2:1 SLOPE WITHIN CULVERT BARREL."

ATTACHMENTS

1. Prebid meeting minutes
2. Section 06100 – Revegetation specification
3. Drawing Sheet G-03R
4. Drawing Sheet G-05R
5. Drawing Sheet G-06R
6. Drawing Sheet G-07R
7. Drawing Sheet G-08R
8. Drawing Sheet G-09R
9. Drawing Sheet C-01R
10. Drawing Sheet C-02R
11. Drawing Sheet C-04R
12. Drawing Sheet C-05R
13. Drawing Sheet C-06R
14. Drawing Sheet C-09R
15. Drawing Sheet D-03R
16. Drawing Sheet D-04R

LEWIS AND CLARK COUNTY
Lower D2 Ditch Flood Mitigation Project – PRE-BID MEETING
September 10th, 2024, 10:00 AM

MEETING MINUTES ADDED IN BOLD, ITALIC FONT

1. Project Overview:
    a. Sign-in sheet please
    b. Introduction, background.
        i. Helena Valley Flood Mitigation Master Plan Update 2022 - Lower D2 Ditch Flood Mitigation Project
        ii. Dispersed individual construction sites
        iii. Work items consist of but are not limited to clearing, grubbing, and topsoil stripping, installation of new precast concrete box culverts and their associated road crossing reconstruction, installation of culvert inlet and outlet protection (riprap), placement of salvaged topsoil, and revegetation of work areas. All precast materials were purchased separately and will be furnished to each site in coordination with the precast supplier.
    c. Funding – ARPA grant. Note, the project has a finite budget and has been separated into a base bid and two bid alternates. All awarded work will be awarded to a single bidder. Bid alternates will be included if available funding allows. Davis Bacon Wages. ***UEI NUMBER IS AN ARPA REQUIREMENT THAT CONTRACTOR IS REQUIRED TO HAVE TO GET UNDER CONTRACT. THIS NUMBER REPLACES THE PREVIOUS FED ID FOR SAM. UEI NOT REQUIRED ON BID BUT MUST.***

        ANOTHER REQUIREMENT TO GET UNDER CONTRACT IS SIGNING THE TWO CERTIFICATION FORMS IN THE APPENDIX.

    d. Reinforced Concrete Box Culverts with Sloped End Sections, Cutoff Walls.
        i. Seven RCBs at 12’ x 6’ ***QUESTION OF WEIGHTS WAS ASKED. RINKER RELAYED THAT EACH SECTION WAS 27,500 POUNDS.***
        ii. One RCB at 20’ x 8’ (Arrowhead Drive) ***QUESTION OF WEIGHTS WAS ASKED. RINKER RELAYED THAT EACH SECTION WAS 63,500 POUNDS.***

            RINKER PRECAST SPECIFIED THAT OPENDING WIDTH IS 20’-8”, WHICH WAS APPROVED DURING PRECAST BID PHASE.

            BOTH BOX SIZES HAVE 2 END SECTION PIECES EACH, AS WELL AS CUTOFF WALLS BUT NO CURBS.

            WEIGHTS OF LAYS INCLUDED IN THE PRECAST MATERIALS SHOP DRAWINGS AND IT WAS QUESTIONED IF THE SHOP DRAWINGS COULD BE PROVIDED. THE PRECAST MATERIALS SHOP DRAWINGS HAVE BEEN ATTACHED TO THESE MEETING MINUTES THAT ARE INCLUDED WITH ADDENDUM #1.

        iii. One existing crossing is a complete removal (Crossing C)
        iv. One of the seven 12’ x 6’ RCB crossings moving upstream to new adjacent location (Crossing D)
    e. Construction Drawings - 2 sets.

i. RESPEC drawings (All crossings except Arrowhead Drive)
ii. Great West drawings (Arrowhead Drive) ***A QUESTION WAS ASKED SINCE ARROWHEAD BOX HAS AN EARLIER READY DATE FOR CONSTRUCTION, IF IT CAN BE INSTALLED EARLIER. REPLADCEMENT OF THIS CROSSING REQUIRES A DETOUR OVER NEW CROSSING D SO CROSSING D MUST BE COMPLETED BEFORE DETOUR IS ESTABLISHED. THE EXISTING CROSSING D OWNER HASN'T GRANTED PERMISSION FOR A DETOUR THERE.***

f. Schedule/Contract Time
i. Sealed bids must be received at the Office of the Board of County Commissioners, Room 345, City-County Building, 316 N. Park Avenue, Helena, MT 59623 no later than 4:00 p.m. local time on Wednesday, September 18. ***IF MAILING YOUR BID, INCLUDE BID IN SEPARATE SEALED ENVELOPE LABELED PER INVITATION TO BID. THE OUTER ENVELOPE SHOULD BE LABELD WITH "SEPARATE SEALED BID ENCLOSED". COUNTY MAIL RECIPENT IS REQUIRED TO OPEN ALL MAIL SO THIS AVOIDS PREMATURE BID OPENING AND DISQUALIFICATION.***
ii. Bids will be opened and read aloud at the public meeting of the County Commissioners on Tuesday, September 19 at 9:00 a.m. local time in Room 330 of the City-County Building, 316 N. Park Avenue, Helena, MT.
iii. Bids Tabulated, Successful bidder verified, and Notice of Award shortly thereafter. ***A NOTICE OF INTENT TO AWARD WILL BE POSTED WITH THE BID TABULATIONS ON THE COUNTY BIDS WEBSITE. THIS POSTING LIFTS THE CONE OF SILENCE AND AFTER 5 DAYS, NOTICE OF AWARD CAN BE ISSUED, APPROXIMATELY 2 WEEKS AFTER BIDS OPENED.***
iv. Construction to start Fall 2024 (October), see Appendix C for approximate construction schedule in coordination with Rinker precast supplier. Coordinate with **Rinker** on schedule of production and delivery of precast materials for installation schedule. ***CONTRACTOR WILL DICTATE DELIVERY DATE OF PRECAST MATERIALS ONCE THEY ARE READY. BIDDER MAY TRANSPORT PRECAST MATERIALS THEMSELVES FROM RINKER PRECAST. SELF-HAUL BY CONTRACTOR IS AN OPTION THAT WOULD REFUND THE COUNTY A NEGOTIATED AMOUNT, PAID BACK TO CONTRACTOR THROUGH A CHANGE ORDER.***

A QUESTION WAS ASKED OF HOW MANY DAYS WOULD DELIVERY OF ARROWHEAD CULVERT TAKE COMING FROM BILLINGS RINKER PLANT. IT WAS STATED BY RINKER THAT DEPENDS ON NUMBER OF TRUCKS AVAILABLE BUT LIKELY 2 DAYS BUT COULD BE 5 DAYS.

v. Agreement Form Article 4 Contract Time – replace 2024 with 2025 ***THIS CORRECTION IS INCLUDED IN ADDENDUM #1.***
1. Substantial Completion – March 15, 2025
2. Final Payment – April 15, 2025

2. Bid

a. Bid Items - See Measurement and Payment Section 01275 for description of the

work/expectations for each Lump Sum Bid Item (not all listed here).

i. Survey And Staking
    1. Responsibility of contractor.

ii. Utilities Coordination
    1. NW Energy gas line at Glass Drive #1
    2. NW Energy gas line and overhead power at Arrowhead Drive ***OVERHEAD POWER CONCERNS WITH ABILITY TO USE CRANE. DAN KARLIN CONFIRMED WITH NORTHWESTERN ENERGY AFTER THE MEETING THAT THE OVERHEAD POWER UTILITY WILL BE MOVED PRIOR TO INSTALLATION AT ARROWHEAD. THIS CLARIFICATION IS INCLUDED IN ADDENDUM #1.***

       THE NORTHWESTERN ENERGY GAS LINE AT ARROWHEAD CROSSING HAS ALREADY BEEN RELOCATED BUT WHETHER RELOCATED FAR ENOUGH WAS QUESTIONED. THE COUNTY CONFIRMED THAT THE GAS LINE WILL NOT CONFLICT WITH THE WORK.
    3. Private utility conflicts may exist at other crossings, communicate with landowner to verify any conflicts and/or resolution

iii. Install Culverts - broken out by location, lump sum for complete installation, includes revegetation.

    1. Dewatering ***BMPS WITHIN CONSTRUCTION LIMITS. ANY DEWATERING OR CONSTRUCTION OPERATIONS IN GENERAL THAT NEED TO GO BEYOND CONSTRUCTION LIMITS MUST BE APPROVED BY LANDOWNER, COUNTY, AND THE ENGINEER. COSTS TO RECLAIM THOSE AREAS WILL NOT BE PAID AND ARE INCIDENTAL TO THE BID.***

    2. Sloped End Sections, Cutoff Walls ***A QUESTION WAS ASKED WHAT SHOULD BE DONE AT THE CULVERT CHANNEL INTERFACE WITH THE CULVERT BEING COUNTERSUNK 1'. IT WAS ACKNOWLEDGED THAT BACKFILLING RIPRAP IN CULVERT BARREL WAS NOT REQUIRED BUT THAT NATIVE CHANNEL MATERIAL SHOULD BE PLACED AT 2:1 SLOPE FROM TOP OF RIPRAP IN CHANNEL DOWNWARD INTO THE CULVERT BARREL AT THE CULVERT INLET AND OUTLET. THIS MODIFICATION WILL BE REFLECTED IN ADDENDUM #1.***
    3. MDT Class II Riprap
    4. Crossing D – includes road realignment and bank treatment for embankment removal.

iv. Remove Culvert – Crossing C (Bid Item No. 7).
    1. Bank treatment

b. Bid Proposal
    i. See "Bid Submittal Package"
        1. Complete bid form

a. Acknowledgement of addenda (posted to website, email/sign-in sheet)
b. Bid proposal -
c. Signature page (notarized)

2. Bid Bond - 10%

ii. The envelope containing the sealed bid will be labeled with the bidder's name, address, and "Lower D2 Ditch Flood Mitigation Project".

3. Special Provisions
   a. Specifications:
      i. Montana Public Works Standard Specifications, Seventh Edition, April 2021
      ii. Montana Department of Transportation Standard Specifications for Road and Bridge Construction 2020 Edition V5.1 ***A QUESTION WAS ASKED IF LIFTING HOLES MUST BE GROUTED. IT WAS STATED THAT THE CULVERT INSTALLATION MUST FOLLOW MONTANA DEPARTMENT OF TRANSPORTATION SPECIFICATIONS UNLESS OTHERWISE OVERRIDDEN BY DETAILS INCLUDED IN APPROVED SHOP DRAWINGS (ATTACHED TO THESE MINUTES) OR OTHER CONTRACT DOCUMENTS.***
      iii. Specifications developed by the Engineer (Bid Specifications and Technical Specifications)
      iv. American Society for Testing Materials (ASTM) specifications.
   b. Detour, Staging, Easements, Private Property
      i. This project contains several dispersed construction sites on private property via easement. The easement area aligns with construction limits shown in Drawings. Conduct construction operations within the easement and construction limits.
      ii. Staging areas have not been designated. Contractor to coordinate staging for each site with owner, landowner, and engineer, as well as a primary staging area, if one is desired.
      iii. The Contractor will establish a functional detour route for residents on the south side of ditch at Arrowhead Crossing to cross the ditch at the new Crossing D during replacement of Arrowhead Road crossing.
      iv. At all times during construction, ensure property owners have access to their property to the highest degree.

THE NEED FOR TRAFFIC CONTROL WAS DISCUSSED AND IT WAS REMINDED THAT THE NEED AND SCALE OF ANY TRAFFIC CONTROL MUST BE DETERMINED BY THE BIDDER.

A QUESTION WAS ASKED REGARDING SIZE OF CONSTRUCTION LIMITS. IT WAS STATED THAT THE LIMITS WERE ESTABLISHED 10' BACK FROM TOP OF DITCH BANK. IT WAS DISCUSSED THAT SIZE MAY NOT ACCOMMODATE A CRANE AND/OR STAGING. IT WAS STATED THAT ANY ADDITIONAL SPACE NEEDED MUST BE COORDINATED WITH LANDOWNERS AND APPROVED BY THE ENGINEER. THE COUNTY STATED LANDOWNERS WILL BE NOTIFIED THAT ADDITIONAL SPACE MAY BE NEEDED AND THAT PROSPECTIVE BIDDERS MAY CONTACT THEM TO UNDERSTAND LIMITS.

A QUESTION WAS ASKED IF LANDOWNER CONTACT INFORMATION CAN BE PROVIDED. LANDOWNER CONTACT INFORMATION WILL BE EMAILED TO THOSE IN ATTENDENCE AND HAS ALSO BEEN ATTACHED TO THESE MEETING MINUTES THAT ARE INCLUDED WITH ADDENDUM #1.

c. Permits
    i. Floodplain Development (pending)
    ii. Section 404 (pending)
    iii. SPA 124 and 318 Authorization
    iv. DEQ Stormwater – contractor responsibility.
        1. Transfer permit to County at closeout. ***WILL BE REQUIRED BECAUSE TOTAL PROJECT IS MORE THAN 1 ACRE IN SIZE.***

d. Record Drawings (as-built survey): responsibility of contractor, must be approved before final payment ***A QUESTION WAS ASKED HOW COULD A CONTRACTOR PROVIDE AS-BUILT SURVEY AND RECONRD DRAWINGS IF SURVEY CONTROL INFORMATION WAS NOT PROVIDED BY THE ENGINEER. SURVEY CONTROL INFORMATION WILL BE ESTABLISHED AT EACH CROSSING AND PROVIDED TO THE SELECTED CONTRACTOR AFTER THE AWARD. THIS WILL BE REFLECTED IN ADDENDUM #1.***

4. Payment Procedures MPW Standard Form, submit complete application to Engineer, monthly. ***IT WAS CLARIFIED BY THE COUNTY THAT THE PAY APPLICATION FORM IN THE PROJECT MANUAL IS AN EJCDC STANDARD FORM AND THE ELECTRONIC VERSION CAN BE MADE AVAILBLE UPON REQUEST.***
5. Questions, Comments, and Discussion

Notes:

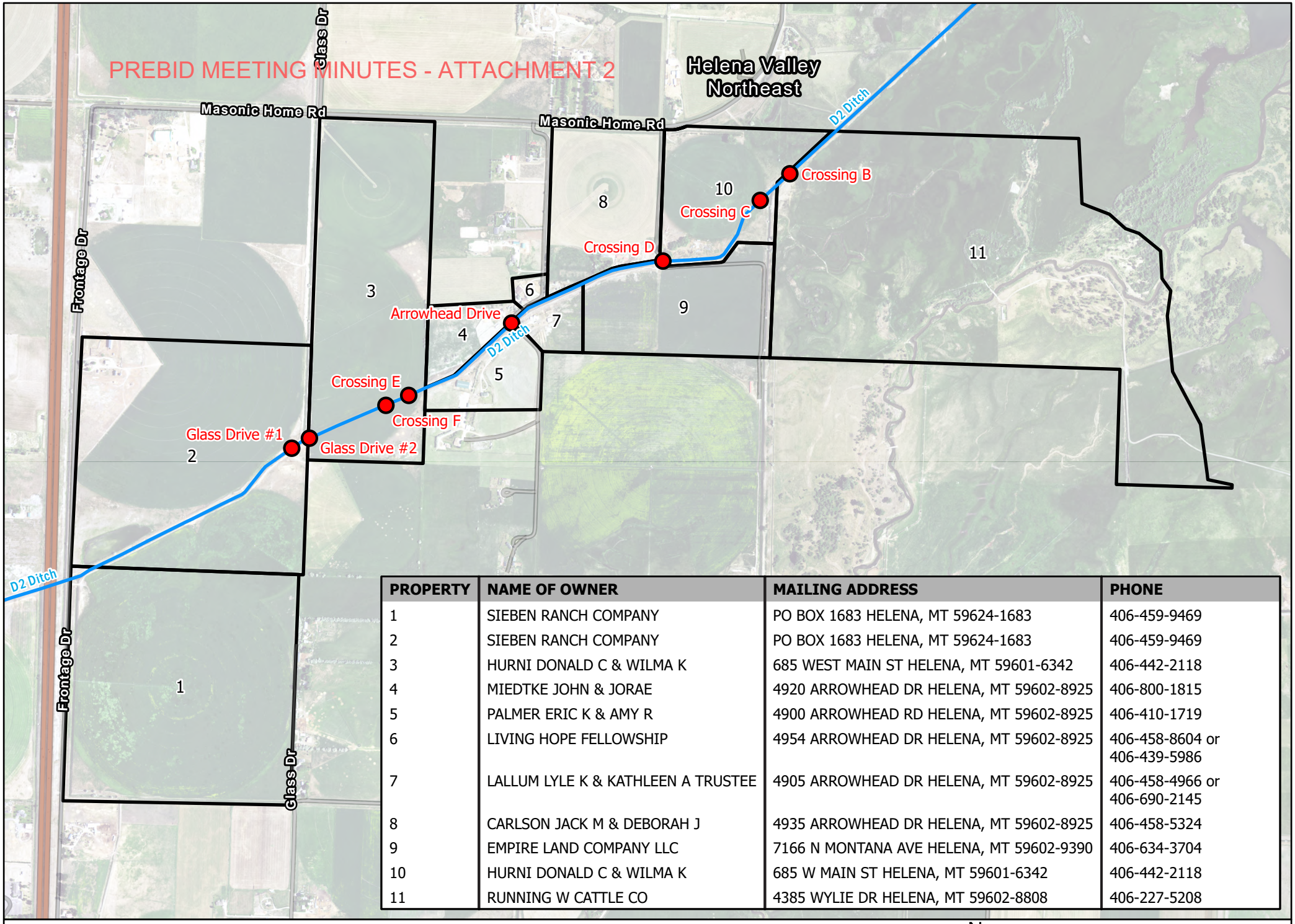
ATTACHMENTS TO MEETING MINUTES:

1. ***PRE-BID MEETING SIGN-IN SHEET***
2. ***LANDOWNER CONTACT INFORMATION MAP***
3. ***APPROVED PRECAST MATERIALS SHOP DRAWINGS***

Lower D2 Ditch Flood Mitigation Project – PRE-BID MEETING

9/10/24 10:00 AM — **Sign-in Sheet**

Name	Position Title	Organization	Location	Phone	E-mail
Tim Schoedel	MANAGER	Gregori Const	Sarver, PA	406-417-1065	TSCHOEDEL@Gregori-Inc.com
Joe Delan	PM / Estimator	MT Civil Contractors	Belgrade, MT	406-388-1740	joe@montanacivil.com
Taylor Shillingsburg	PM	MT Civil	Belgrade, MT	307-653-5492	Taylor@montanacivil.com
Dan Karlin	County Engineer	LCC	Helena	447-8034	dkarlin@lccountymt.gov
Lance Vossler	owner	Vossler Excavating	Jefferson City	4064391736	vossler35@yahoo.com
Jason Kreith	PM	HSG	Helena MT	406-594-5904	Jason.Kreith@helenasg.com
Buster Ballock	member	Ballock	Helena	406 225 3594	BSBallock@bellsouth.com
Matt Johnson	Engineer	Respec	Helena, MT	406 599 2187	matthew.johnson@respec.com
Jacob Lacy	Engineer	RESPEC	Bozeman	303-641-065[illegible]	Jacob.Lacy@respec
MIKE MEREDITH	Precast Sales Mngr	RINKER	HELENA	465-4860	MIKE.MEREDITH@Rinkerpipe.com
Tony Gehring	Precast Plant Mngr	Rinker	Helena	442-6503	tony.gehring@rinkerpipe.com
Rob Leland	PM	Mockel	E. Helena	459 1769	rob@mockelprecast.com
Josh McKenzie	Project Manager	CK May Excavating	Belgrade, MT	406-404-0233	joshmckmayexcavating.com



PROPERTY	NAME OF OWNER	MAILING ADDRESS	PHONE
1	SIEBEN RANCH COMPANY	PO BOX 1683 HELENA, MT 59624-1683	406-459-9469
2	SIEBEN RANCH COMPANY	PO BOX 1683 HELENA, MT 59624-1683	406-459-9469
3	HURNI DONALD C & WILMA K	685 WEST MAIN ST HELENA, MT 59601-6342	406-442-2118
4	MIEDTKE JOHN & JORAE	4920 ARROWHEAD DR HELENA, MT 59602-8925	406-800-1815
5	PALMER ERIC K & AMY R	4900 ARROWHEAD RD HELENA, MT 59602-8925	406-410-1719
6	LIVING HOPE FELLOWSHIP	4954 ARROWHEAD DR HELENA, MT 59602-8925	406-458-8604 or 406-439-5986
7	LALLUM LYLE K & KATHLEEN A TRUSTEE	4905 ARROWHEAD DR HELENA, MT 59602-8925	406-458-4966 or 406-690-2145
8	CARLSON JACK M & DEBORAH J	4935 ARROWHEAD DR HELENA, MT 59602-8925	406-458-5324
9	EMPIRE LAND COMPANY LLC	7166 N MONTANA AVE HELENA, MT 59602-9390	406-634-3704
10	HURNI DONALD C & WILMA K	685 W MAIN ST HELENA, MT 59601-6342	406-442-2118
11	RUNNING W CATTLE CO	4385 WYLIE DR HELENA, MT 59602-8808	406-227-5208

Lower D2 Ditch Flood Mitigation Project - Adjacent Property Map

Coordinate System: NAD 1983 (2011) State Plane Montana FIPS 2500 (Intl Feet)

N

0 1,000 2,000

Feet

Scale: 1:16,500

PREBID MEETING MINUTES - ATTACHMENT 3

Brian S. Jenner
PO Box 1620
Rapid City, SD 57709-1620
605-737-5211 (TEL)
605-718-0808 (FAX)
Brian.Jenner@RinkerPipe.com

To: **Lewis & Clark County**
Dan Karlin
dkarlin@lccountymt.gov

Date: **9/9/2024**
Project: **Lewis & Clark Co. Arrowhead Dr.**
Project#
Contractor: **Lewis & Clark County**
R/S # : **6024057BX5**

1	Set of	**6024057BX5 Submittal Review 240909**	sheets	1-33

X For your approval. Please return 1 set to: **RINKER MATERIALS**
PO BOX 1620, RAPID CITY, SD 57709-1620

X ***PRODUCTION CANNOT BE SCHEDULED OR BEGIN UNTIL APPROVALS ARE RECEIVED.***

____ For production as noted ____ For jobsite use X For your files

____ Per your request ____ For your information ____ Other

Dan,

6024057BX5 Submittal Review 240909 for your review.

Please forward to the engineer for review.

Production cannot begin until approvals are received.

Please respond by September 23, 2024.

Thanks

Brian

CONTRACTOR SUBMITTAL REVIEW

DATE SUBMITTED 09/11/2024 DUE DATE 09/23/2024

CHECKING IS ONLY FOR GENERAL CONFORMANCE WITH DESIGN CONCEPT OF THE PROJECT AND GENERAL CONFORMANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRECTED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF CONTRACTORS WORK WITH THAT OF ALL OTHER TRADES; AND SATISFACTORY PERFORMANCE OF CONTRACTORS WORK.

X APPROVED, NO EXCEPTIONS TAKEN
☐ APPROVED, AS NOTED
☐ REVISE AND RESUBMIT
☐ SUBMIT SPECIFIED ITEMS
☐ REJECTED

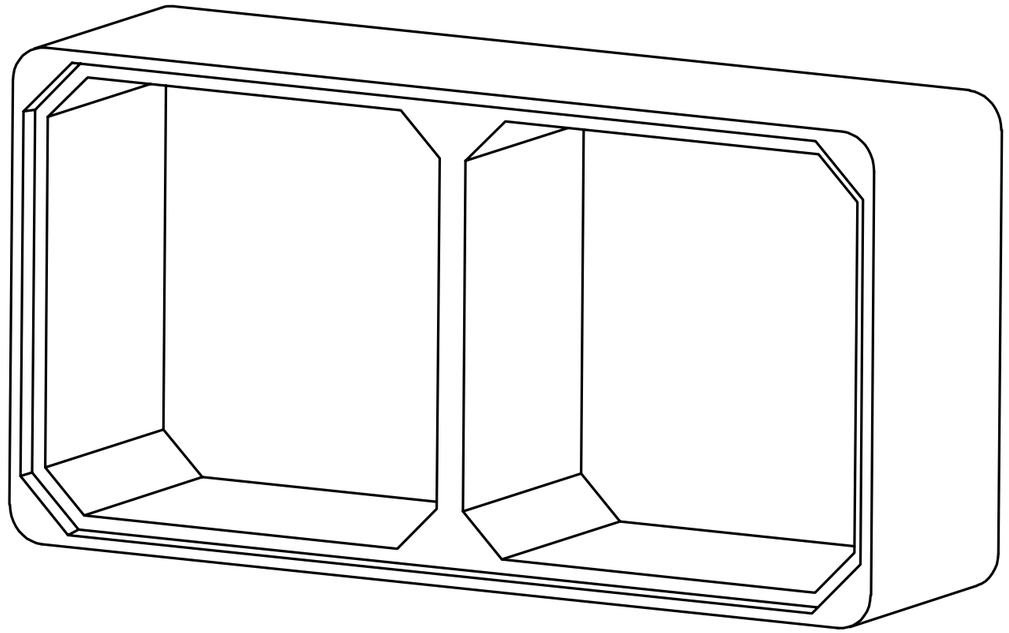
RESPEC
REVIEWER Jacob Lacy
DATE 09/11/2024

Copy:
1 Billings Plant, Proj. File

Sincerely,
RINKER MATERIALS

Brian S. Jenner, PE
Brian S. Jenner, PE - Project Engineer

RECOMMENDED INSTALLATION PROCEDURES FOR PRECAST CONCRETE BOX CULVERT

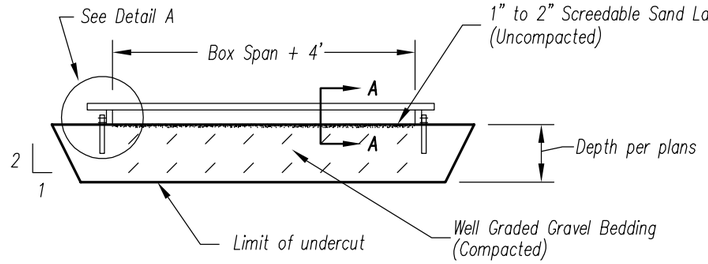


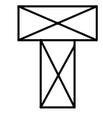
Rinker MATERIALS™
A QUIKRETE® COMPANY

MONTANA

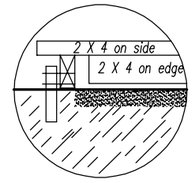
INSTALLATION

BED PREPARATION





Section A–A

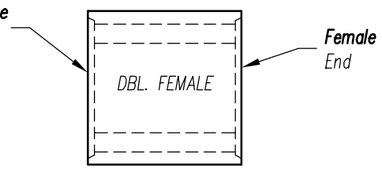


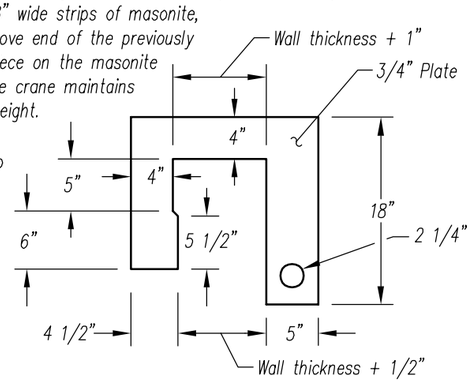
Detail A

1) Bedding material shall be a well graded material with a maximum particle size of 1" and placed to a uniform thickness and compaction as specified by engineer.
2) The top surface shall be a 1" to 2" thick screedable sand layer as a leveling course.
3) If installation equipment operates on top of bedding material the resulting compaction caused by the equipment shall not be greater than that of the bedding at any other location.

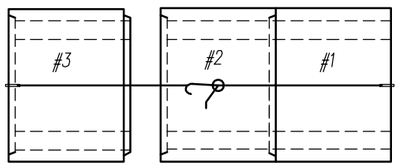
INSTALLATION SEQUENCE

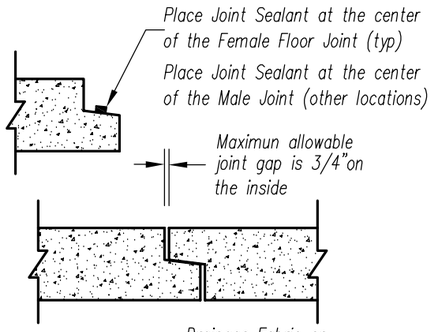
1) Set section w/ double female first (if applicable). See detail at right.
2) When staged construction is required, place dbl. female @ ℄ of road to allow installation of barrel sections in both directions.
3) Place joint sealant at the center of the female joint from top of haunch to top of haunch.
4) Dig a groove approximately 1" deep and 2"–3" wide in front of the female joint for the entire width of the bed so bedding material does not push into the joint. An alternate option to dig would be to cut 18" wide strips of masonite, place them under the groove end of the previously set piece, set the next piece on the masonite and pull together while the crane maintains the majority of the box weight.
5) Prior to setting each box section, use the screed to reshape the bed and remove the material from step #4.
6) Use pulling bracket and come–along system to pull joints together. See Detail.





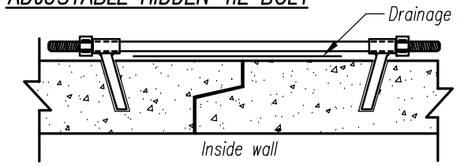
Bracket Detail



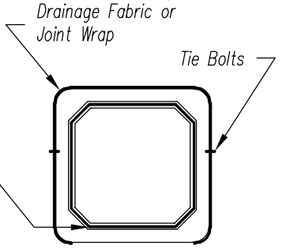


7) Check joint gap. If gap is larger than 3/4", pull joint apart and check for obstructions and check flatness of bedding surface. This maximum gap does not apply to the center wall of double cell boxes.
8) Install Tie Bolts and Drainage Fabric OR External Joint Wrap as specified.

ADJUSTABLE HIDDEN TIE BOLT



1) Tie Bolts should not be used to pull the joint together.
2) Tension adjusting nut 1/2 turn past snug.

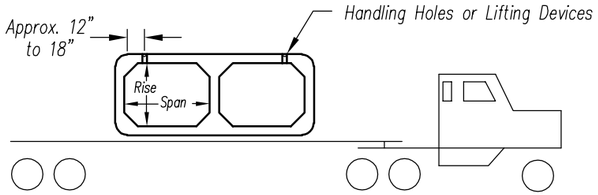


Use joint sealant in the entire joint all around box culvert section.

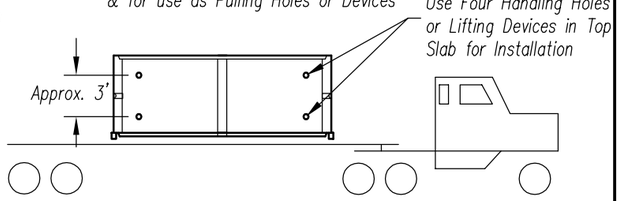
If premolded joint sealant is used in cold weather, it should be kept warm until applied.

HANDLING

TRUCKING POSITION



On Box Sections where the rise is 9' or less, sections will be shipped in the laying position.



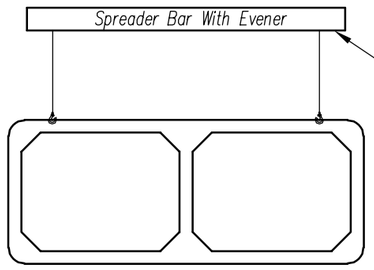
On Box Sections where the rise is greater than 9', sections will be shipped on end.

All Box Culverts will have 4 handling holes or lifting devices in top slab.
Boxes with 8' or greater rise will have 2 handling holes or lifting devices in ea. ext. wall.

Box Sections will need to be tipped on the job site to the laying position when shipped on end.

Contractor will need to prepare a soft landing area for tipping.

LIFTING DEVICE LIFTING DETAIL

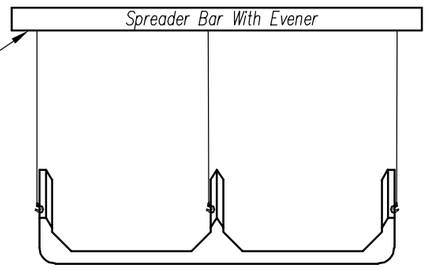


BARREL SECTIONS

Use Spreader Bars or other Lifting Jigs to maintain an Equalized Pick and a Vertical Pick unless otherwise specified on lifting device cut sheet.

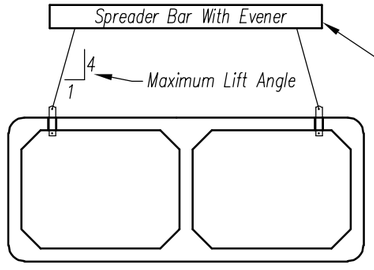
Rigging suppliers may have more stringent requirements based on section weights and cable size.

CONTRACTOR TO PROVIDE ANY DEVICES NECESSARY FOR LIFTING BARREL AND/OR END SECTIONS



END SECTIONS

LIFTING HOLE LIFTING DETAIL

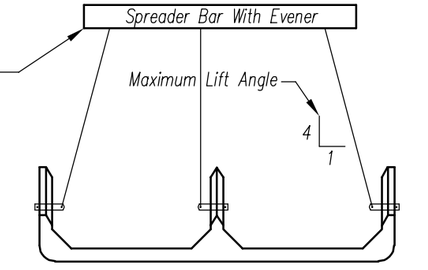


BARREL SECTIONS

Use Spreader Bar long enough to allow a Vertical Pick if possible.
If not, do not exceed maximum lift angle shown.

Rigging suppliers may have more stringent requirements based on section weights and cable size.

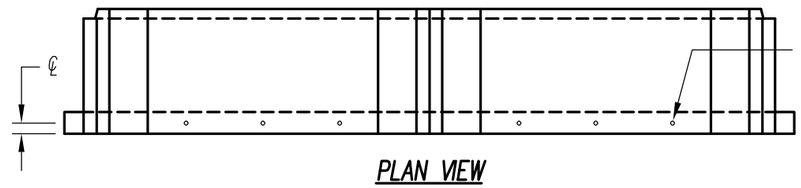
CONTRACTOR TO PROVIDE ANY DEVICES NECESSARY FOR LIFTING BARREL AND/OR END SECTIONS



END SECTIONS

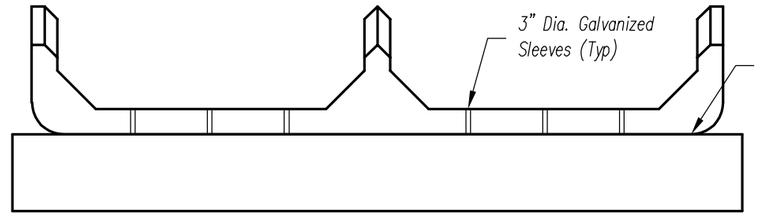
INSTALLATION

CUTOFF WALL CONNECTION



Contractor to drill 7/8" diameter x 6" deep holes thru the 3" sleeves into the cutoff wall and install #6 x 12" rebar dowels (provided). Fill sleeves completely with non-shrink grout (provided).

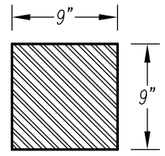
PLAN VIEW



ELEVATION VIEW

HANDLING HOLES / PULL HOLES (If used)

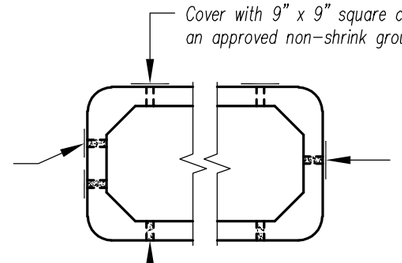
Lifting Holes are formed to be 3" Dia. when used



Lift Hole Cover

Self-adhering cover material provided with first shipment of box culvert sections.

(2) Pull Holes in bbl walls w/ 8' or greater rise.
– Cover with 9" x 9" square cover.
Fill holes w/ an approved non-shrink grout if specified on shops

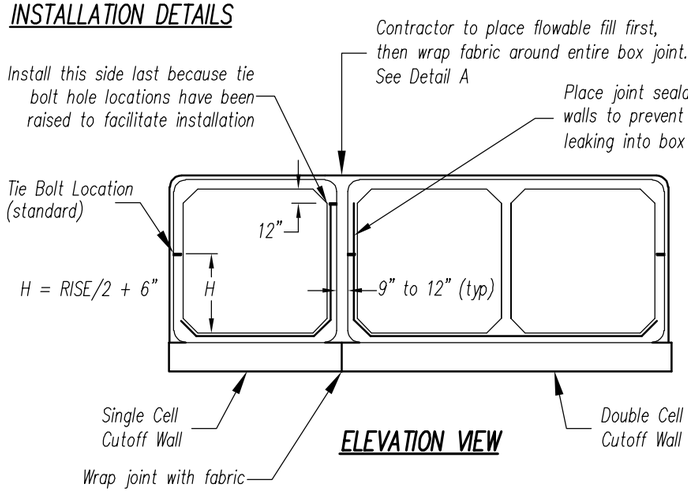


Lift Holes – (4) in TOP Slab.
Cover with 9" x 9" square cover. Fill holes w/ an approved non-shrink grout if specified on shops

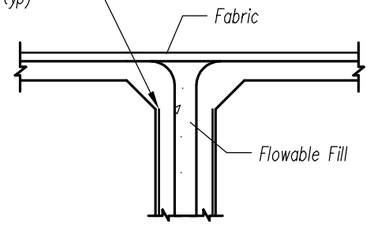
Lift Holes in end section walls or (1) Pull Holes in bbl walls w/ 7' or less rise.
– Cover with 9" x 9" square cover.
Fill holes w/ an approved non-shrink grout if specified on shops

Lift Holes – (2) in BOTTOM slab only when specified.
Fill holes w/ an approved non-shrink grout if specified on shops

MULTIPLE CELL INSTALLATION DETAILS

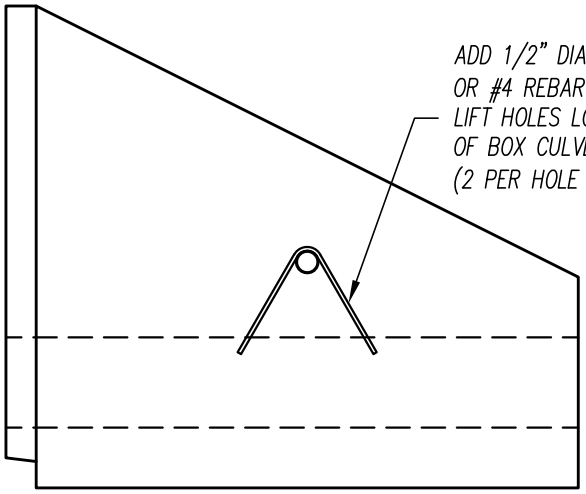


ELEVATION VIEW

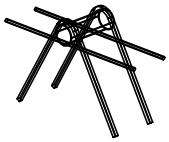


DETAIL 'A'

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

** FOR ES#1 W/ 10' RISE OR GREATER, ADJUST DISTANCE FROM END AS SPECIFIED IN END SECTION DETAIL

Holes shall be formed from 3" EMT Tubing
*** DO NOT REMOVE TUBING**

Rinker MATERIALS™ A QUIKRETE® COMPANY

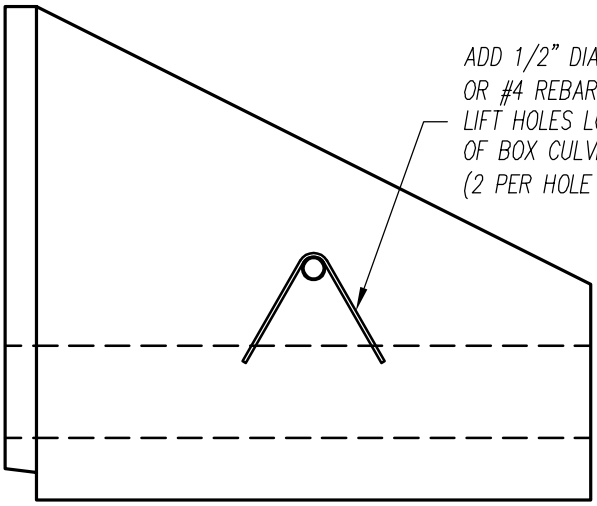
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

02/17/16 JWB 11/27/17 JWB 05/31/18 JWB 11/29/18 JWB 01/02/19 JWB 06/07/21 JWB	SCALE: NONE DATE: 02/06/16 DR'N BY: JWB REV: 07/27/21 JWB

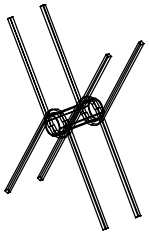
PROJECT:
BOX CULVERT LIFT HOLE SPECIAL DETAIL
PRESTRESS CABLE LOOPS
MT ALTERNATIVE

DWG NAME: BOX LIFT HOLE - PS CABLE (MT ONLY)

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

** FOR ES#1 W/ 10' RISE OR GREATER, ADJUST DISTANCE FROM END AS SPECIFIED IN END SECTION DETAIL

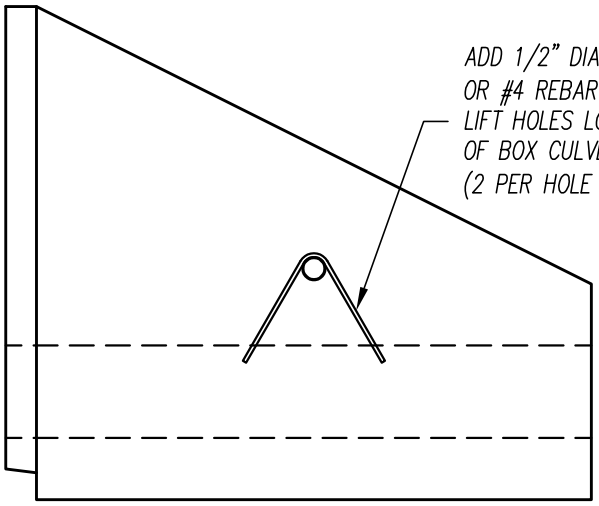
Holes shall be formed from 3" EMT Tubing
**** DO NOT REMOVE TUBING***

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

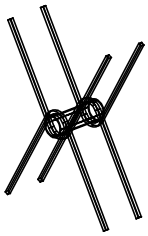
SCALE: NONE	PROJECT: BOX CULVERT LIFT HOLE SPECIAL DETAIL PRESTRESS CABLE LOOPS
DATE: 02/06/16	
DR'N BY: JWB	
REV: 01/02/19 JWB	DWG NAME: BOX LIFT HOLE - PS CABLE (MT ONLY)

02/17/16 JWB
11/27/17 JWB
05/31/18 JWB
11/29/18 JWB

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

FOR RISE 8' OR GREATER UNLESS OTHERWISE SPECIFIED

Holes shall be formed from 3" EMT Tubing
* DO NOT REMOVE TUBING

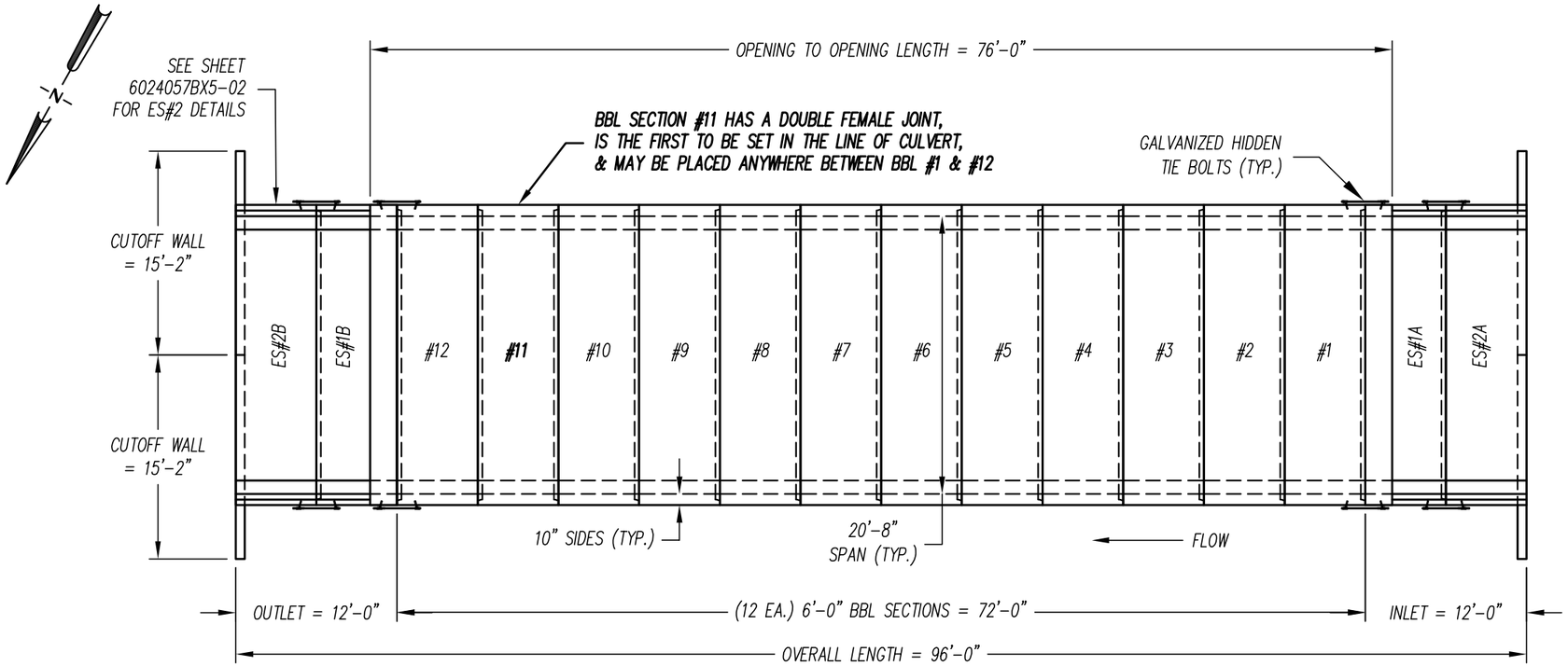
LIFTING HOLES TYP. FOR ALL BARREL SECTIONS
EXCEPT WHEN SHOWN OTHERWISE

02/16/16 JWB
11/27/17 JWB

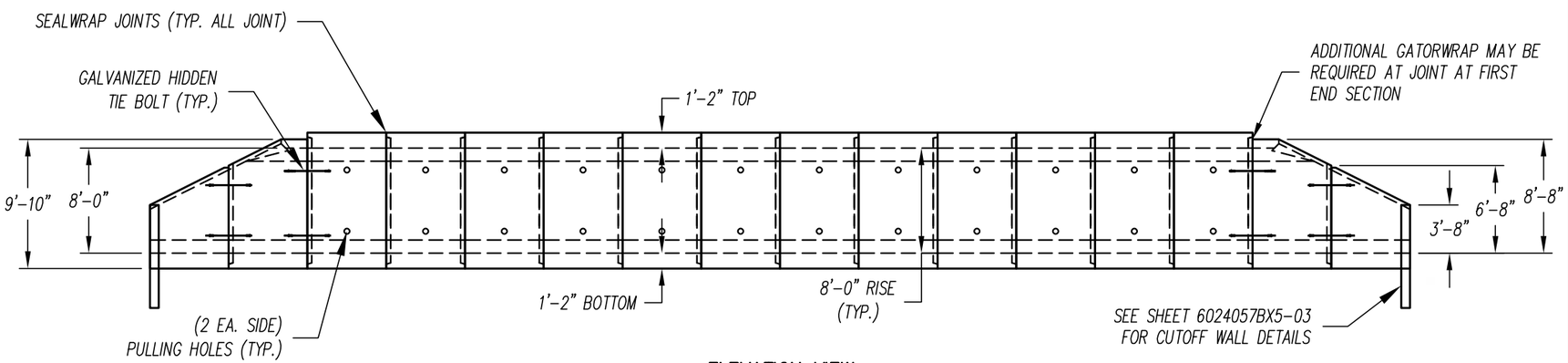
Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: BOX CULVERT PULLING HOLE PRESTRESS CABLE LOOPS
DATE: 02/06/16	
DR'N BY: JWB	
REV: 11/30/18 JWB	DWG NAME: BOXPULLINGHOLE2



PLAN VIEW



ELEVATION VIEW

TOLERANCES – PER ASTM C913	
DIMENSIONAL (UP TO 5')	± 1/4"
DIMENSIONAL (5'-10')	± 3/8"
DIMENSIONAL (10' & UP)	± 1/2"
SQUARENESS (UP TO 10')	± 1/2"
SQUARENESS (10' & UP)	± 3/4"
MIN. WALL OR SLAB THICKNESS	GREATER OF 3/8" OR 5% OF THICKNESS
REINF. LOCATION FROM DESIGN	± 1/4"
REINF. COVER	1" MIN.

MATERIAL LIST	
ITEM	QTY.
GALVANIZED HIDDEN TIE BOLTS	16
JOINT SEALANT (1.25" X 14.5')	77
GATORWRAP (12" X 50')	14
SEALWRAP SQUARE (9" X 9")	144
SET GROUT (0.4 CU. FT.)	34
REBAR DOWELS (#6 X 12")	32
CUTOFF WALL CONNECTION PLATES	4

SECTION WEIGHTS

6'-0" BBL SECTION = 64,000 LBS.
END SECTION #1 = 44,000 LBS.
END SECTION #2 = 33,000 LBS.
CUTOFF WALL U SHAPED = 6,475 LBS.

PLACE OF FABRICATION	BILLINGS, MT
CONTRACTOR	LEWIS & CLARK COUNTY
RINKER PROJECT #	6024057BX5
STATE TEST (Y OR N)	N
CONCRETE STRENGTH	5000 PSI

NOTES

1. Stencil each box with information as listed below. Center stencil on the inside face of the top haunch of each box culvert section.

DATE OF MANUFACTURE
Rinker MATERIALS™ A QUIKRETE® COMPANY
BILLINGS
20.67 X 8/ARROWHEAD DR.
STA. 54+75.18 TO 55+69.18
HL-93 / 0'-2' FILL HT.
LEWIS AND CLARK CO., MT

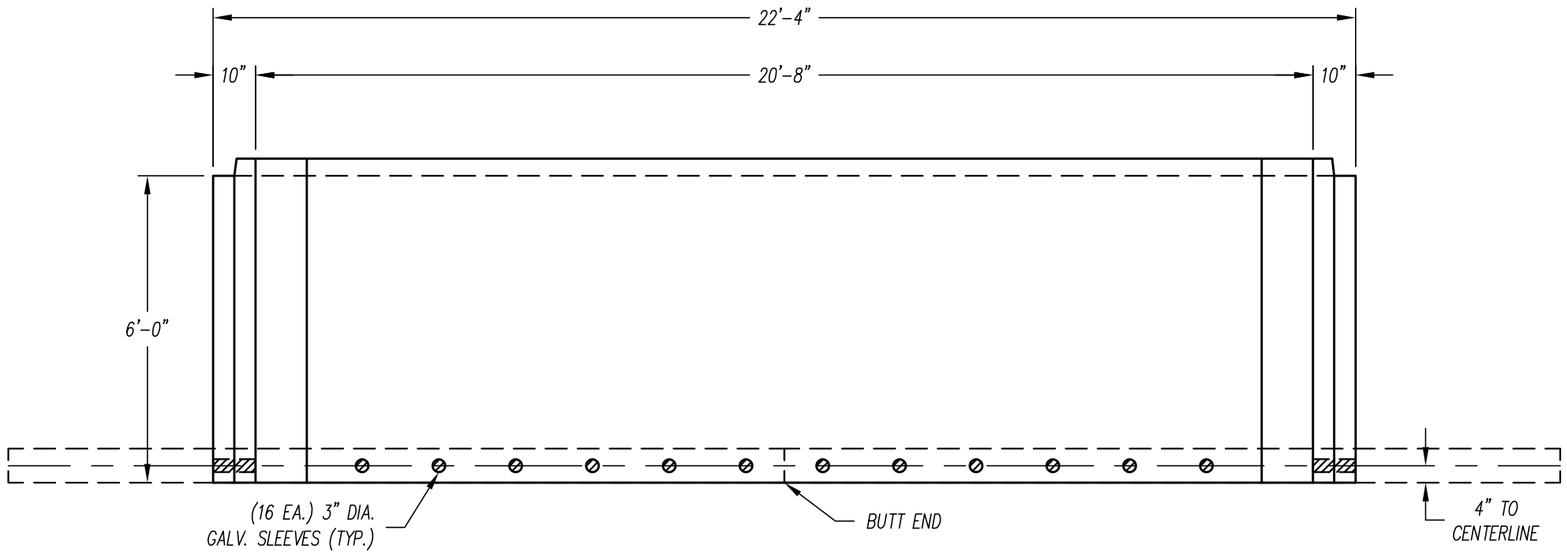
2. Lifting holes are formed by 3 3/16" Dia. Galvanized Tubing.
   - Lifting holes located in the TOP slab of the culvert shall be covered with a 9" x 9" EDM Patch (provided).
   - Lifting holes located in the SIDE WALLS & pull holes of the culvert shall be grouted with an approved non-shrink grout & covered with a 9" x 9" EDM Patch (provided).
   - Lifting holes located in the BOTTOM slab of the culvert shall grouted with an approved non-shrink grout (provided).
3. Section **#11** has a double female joint. This piece is the first to be set in a line of box culvert. ***Consult the "Box Culvert Installation Guide" for suggested installation practices.***

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

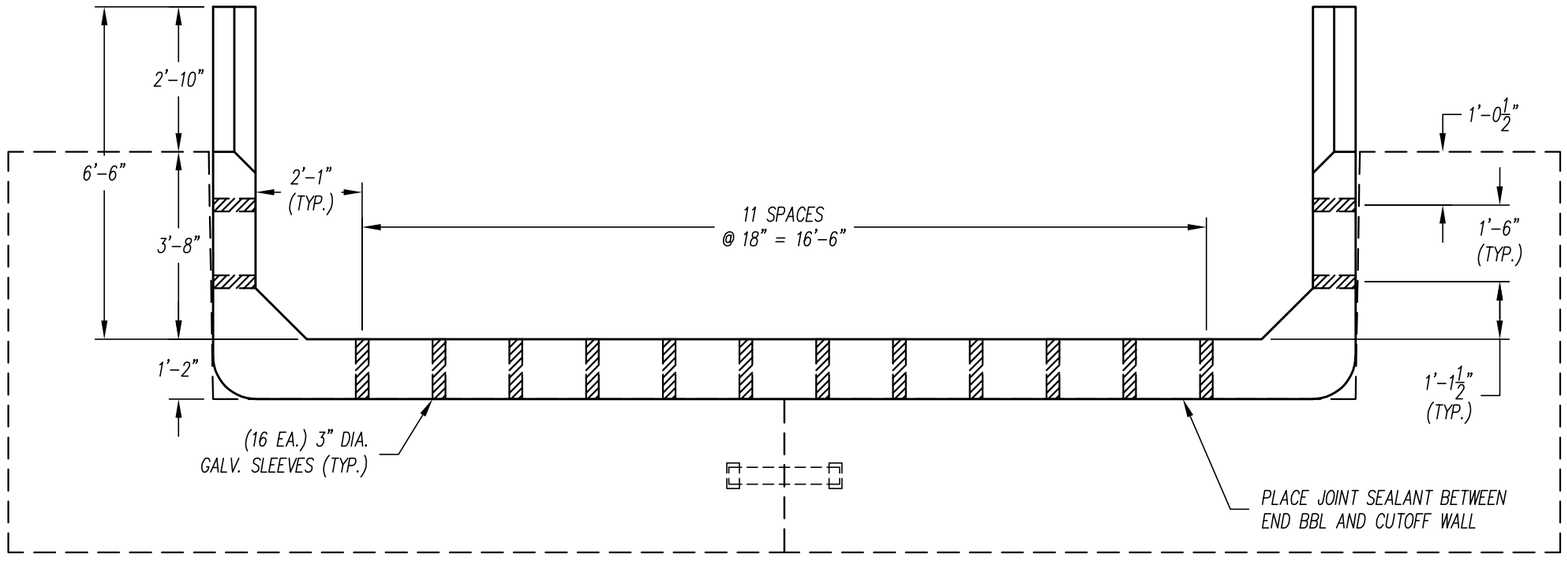
SCALE: NONE	PROJECT: 20'-8" X 8'-0" BOX CULVERT STA. 54+75.18 TO 55+69.18 LEWIS AND CLARK COUNTY, MT
DATE: 8-28-24	
OR#: 6024057BX5	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX5-01

SPACING FOR 3" DIAMETER GALVANIZED SLEEVES.
CONTRACTOR TO DRILL 1 ½" DIAMETER X 6" DEEP HOLES IN THE CUTOFF WALL AND INSTALL #6 X 12" REBAR DOWELS (PROVIDED)
(FILL SLEEVES COMPLETELY WITH NON-SHRINK GROUT – PROVIDED)

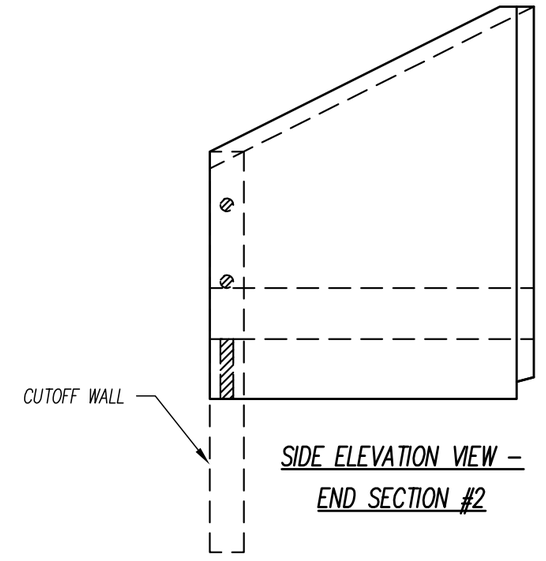
NOTE:
SEE SPECIAL PROVISIONS FOR INSTALLATION REQUIREMENTS FOR BOTH CUTOFF WALL AND CONCRETE SLOPE PROTECTION.



PLAN VIEW – END SECTION #2



ELEVATION VIEW – END SECTION #2

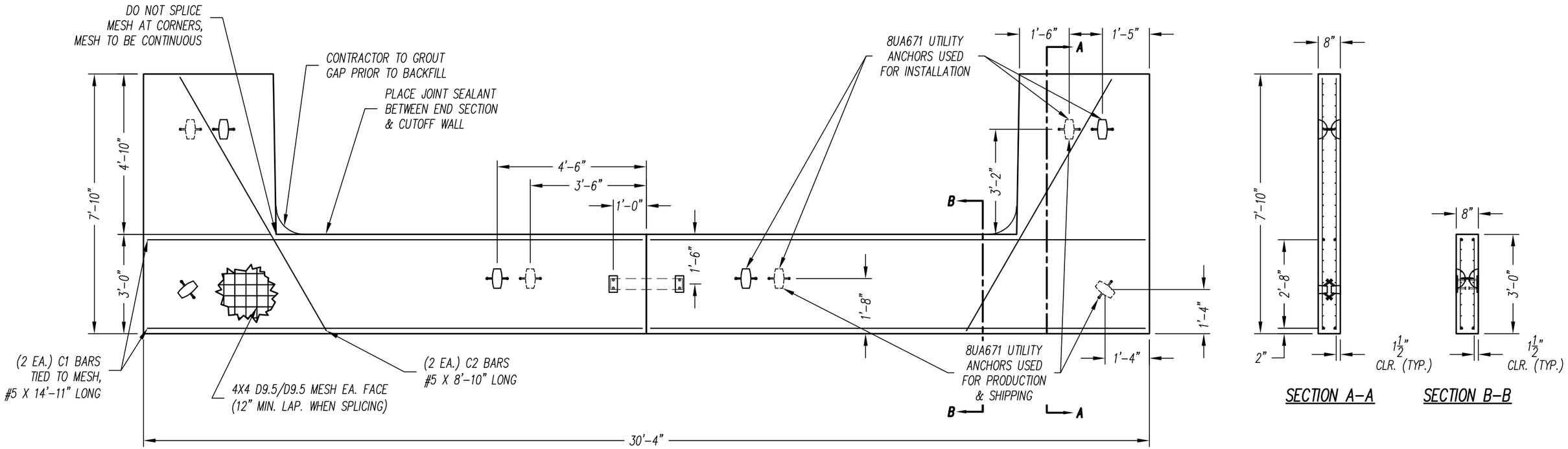


SIDE ELEVATION VIEW – END SECTION #2

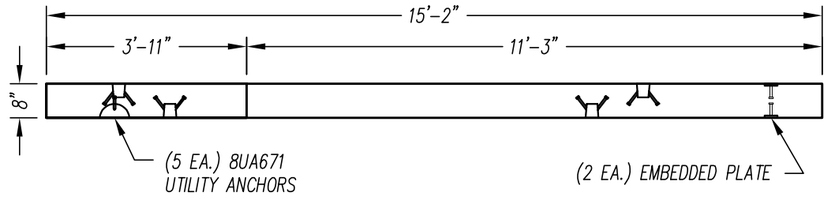
Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

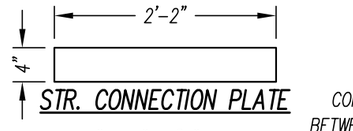
SCALE: NONE	PROJECT: 20'-8" x 8'-0" BOX CULVERT STA. 54+75.18 TO 55+69.18 LEWIS AND CLARK COUNTY, MT
DATE: 8-28-24	
OR#: 6024057BX5	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX5-02



ELEVATION VIEW – CUTOFF WALL (2 PIECES SHOWN)



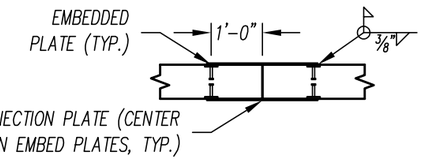
PLAN VIEW – CUTOFF WALL

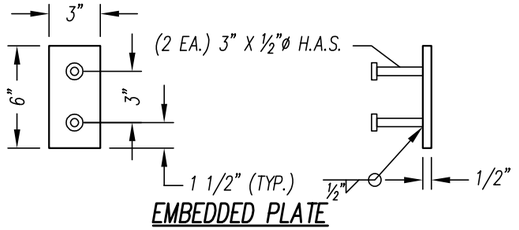


STR. CONNECTION PLATE

26" X 4" X ⅜" PLATE

(4 TOTAL NEEDED)





EMBEDDED PLATE

(8 TOTAL NEEDED)

4 PIECES REQUIRED

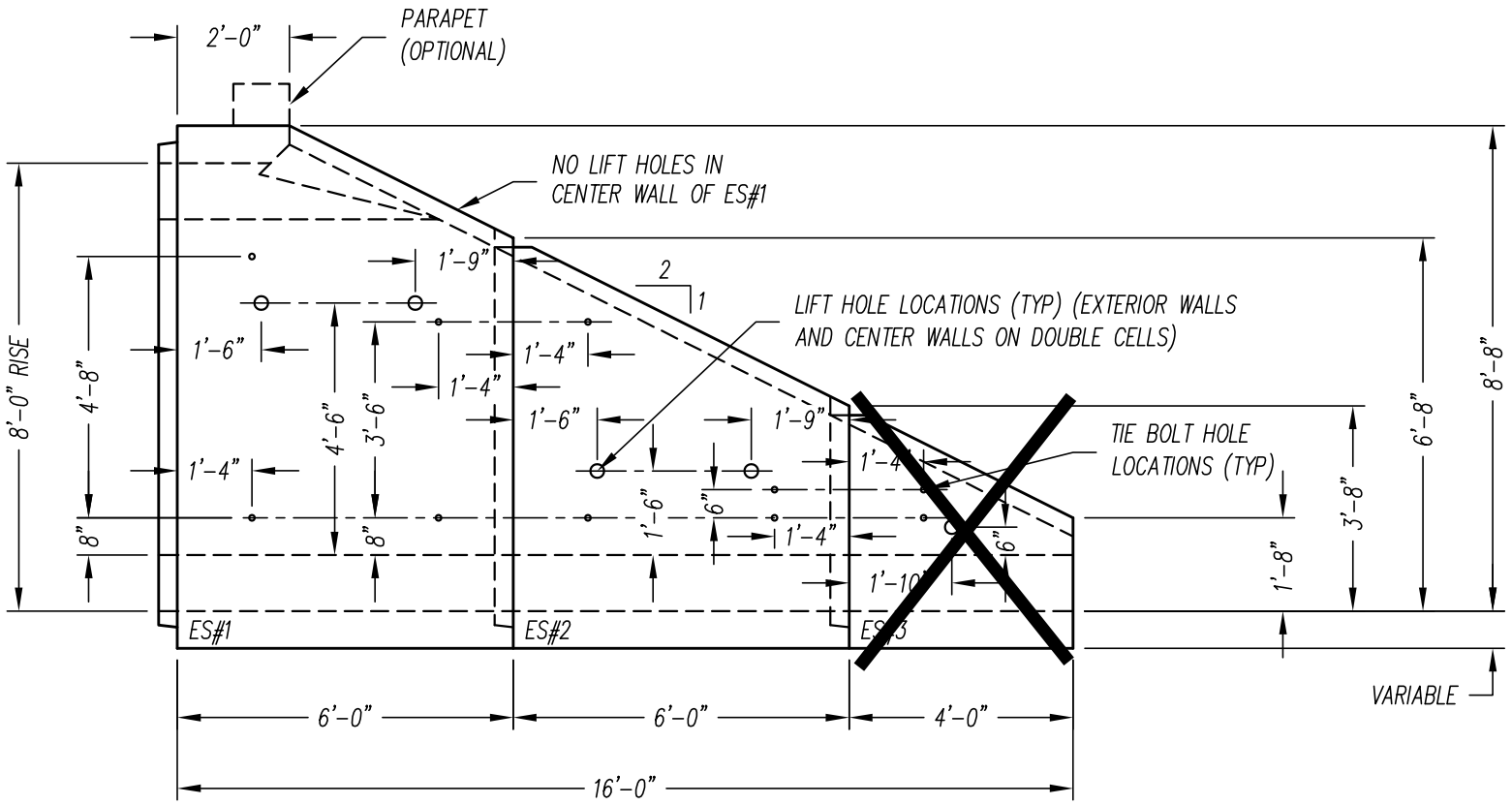
CUTOFF WALL = 6,475 LBS.

SPACING FOR 3" DIAMETER GALVANIZED SLEEVES. CONTRACTOR TO DRILL 1 ½" DIAMETER X 6" DEEP HOLES IN THE CUTOFF WALL AND INSTALL #6 X 12" REBAR DOWELS (PROVIDED) (FILL SLEEVES COMPLETELY WITH NON-SHRINK GROUT – PROVIDED)

NOTE: SEE SPECIAL PROVISIONS FOR INSTALLATION REQUIREMENTS FOR BOTH CUTOFF WALL AND CONCRETE SLOPE PROTECTION.

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: 20'-8" X 8'-0" BOX CULVERT STA. 54+75.18 TO 55+69.18 LEWIS AND CLARK COUNTY, MT
DATE: 8-28-24	
OR#: 6024057BX5	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX5-03

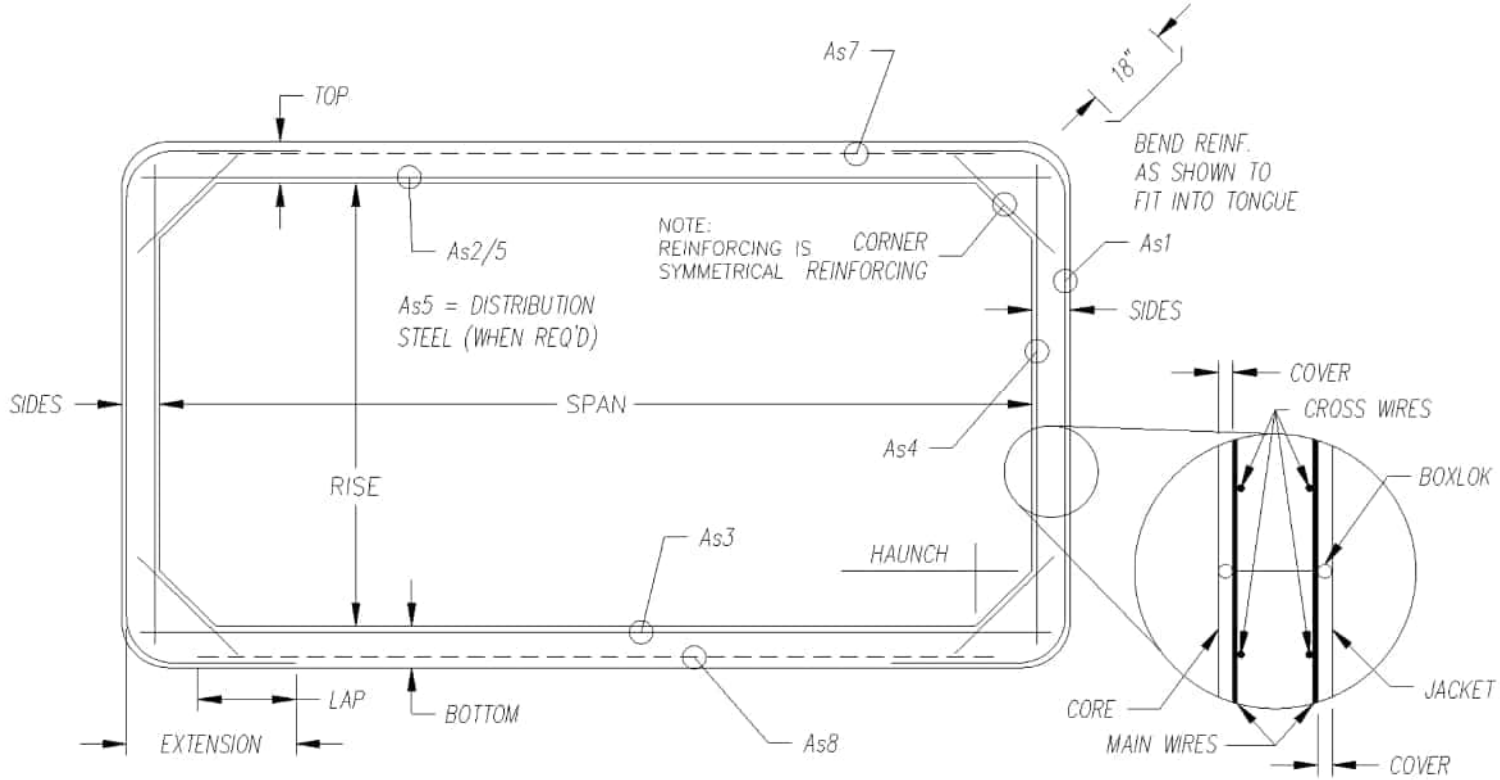


NOTES – LIFT HOLES TO BE 3-1/4" DIA.
TIE BOLT HOLES TO BE 1-1/4" DIA.

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: 8' RISE TYPE 1 END SECTION TIE BOLT AND LIFT HOLE LOCATIONS
DATE: 03/03/16	
DR'N BY: JWB	
REV: 07/28/21 JWB	DWG NAME: LIFT TIE – 8 RISE (MODIFIED)

11/21/17 JWB
06/22/18 JWB
08/31/18 JWB
02/19/19 JWB



Note:
Leg = 9"
for 6" haunch

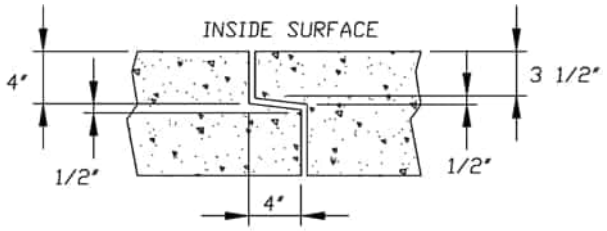
Location	Wire Diameter (in.)	Area Req'd (sq.in./ft.)	Area Prov'd (sq.in. / ft.)	Style	Overall Sheet Length	Sheet Width W/O Overhang
As1	0.366	0.63	0.63	2x8 D10.5/D4.5	16-8	70"
As2/5	0.437	0.9 / 0.336	0.9 / 0.345	2x4 D15.0/D11.5	21-0	70"
As3	0.422	0.840	0.840	2x6 D14.0/D6.0	21-0	70"
As4	0.276	0.336	0.36	2x8 D6.0/D4.0	8-8	70"
As7	0.276	0.336	0.36	2x8 D6.0/D4.0	18-0	70"
As8	0.276	0.336	0.36	2x8 D6.0/D4.0	18-0	70"
					Width Top Overhang =	1/2"
					Width Bottom Overhang =	1/2"
HAUNCH				#3 REBAR OR P/S CABLE X 2'-6" @ 12" O.C.		

Slab Sizes		Box Loks @ 18inch O.C.
TOP Slab Size	14 in	2.0 x 10.8 x 1.0 (70)
BTM Slab Size	14 in	1.0 x 11.8 x 1.0 (70)
SIDES size	10 in	1.0 x 7.75 x 1.0 (50)

Cover			
TOP INSIDE (As2)	1.00	SIDE INSIDE (As4)	1.00
TOP OUTSIDE (As1/7)	2.00	SIDE OUTSIDE (As1)	1.00
BTM INSIDE (As3)	1.00		
BTM OUTSIDE (As1/8)	1.00		

ALL STEEL TO BE OF DOMESTIC ORIGIN OF THE U.S.A.

EXTENSION: 40 inches
LAP: 10 inches
HAUNCH: 12 inches
DESIGN: HL93
STEEL WT: 1853 lbs / 6' SECTION
PRODUCT WT: 64000 lbs / 6' SECTION
CONCRETE: 5000 psi
STEEL YIELD: 70000 psi (ASTM A1064)

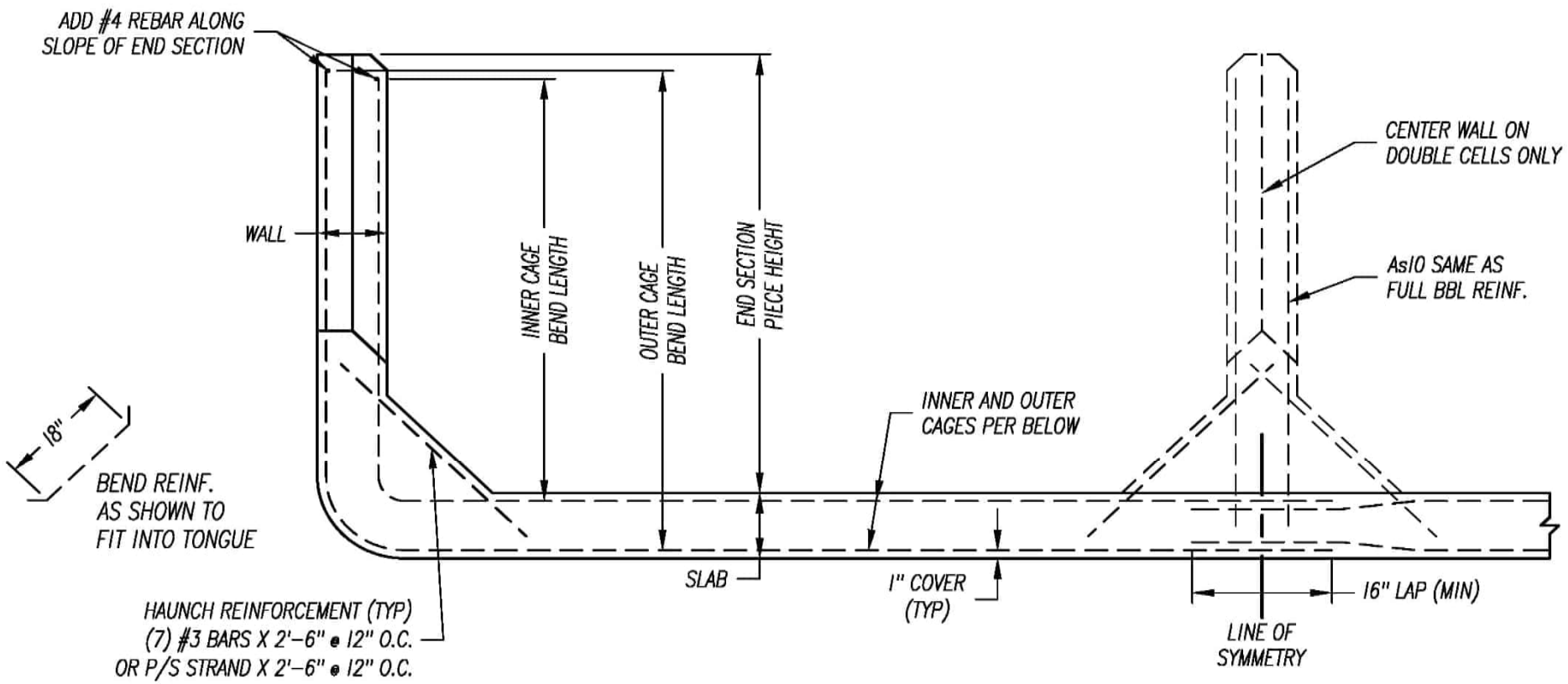


TYPICAL JOINT DETAIL

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701

SCALE	NONE	SGL 20.67x8 BOX CULVERT	
DATE	6/12/24	DESIGN FILL = 0 FT - 2 FT	
DRN BY	BSJ	INSTALLED FILL = 0 FT - 2 FT	
RS#	6024057BX5	CUSTOMER	Lewis and Clark County
REV DATE		DWG NAME	



Size (ft)		
Span	x	Rise
20.7	x	8
Single Cell		

Steel Areas (sq.in. / ft.)					(inches)	
ES#1	ES#2	ES#3	ES#4	ES#5	SLAB	WALL
Full BBL	0.97	*	*	*	14	8
44000	33000	*	*	*	Conc lbs/pc	
1853	1623	*	*	*	Steel lbs/pc	

Total ES Length (ft)	Sheet Length	# Sheets per End
12	18.67	4

Mesh Style Used							
2	x	8	D	16.5	/	D	7.0

Sht Weight (lbs)
406

Section Lengths (ft)				
ES#1	ES#2	ES#3	ES#4	ES#5
6	6	0	0	0

Inner Cage Bend (in)				
ES#1	ES#2	ES#3	ES#4	ES#5
0	76	40	0	0

End Section Piece Heights (ft)				
ES#1	ES#2	ES#3	ES#4	ES#5
8.67	6.67	0.00	0	0

Outer Cage Bend (in)				
ES#1	ES#2	ES#3	ES#4	ES#5
0	85	49	0	0

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701

SCALE	NONE	SGL 20.67x8 BOX CULVERT	
DATE	6/12/24	END SECTION REINFORCEMENT DETAILS	
DRN BY	BSJ	STANDARD 2:1 END SECTION DESIGN	
RS#	6024057BX5	CUSTOMER	Lewis and Clark County
REV DATE		DWG NAME	

Sht:____of____
By:BSJ Chk:____

Eriksson Culvert v6.2.4

Filename: SGL 20.67X08 HL93 00-02 fill.etcx
6/12/2024 1:25:39 PM
Culvert p. 1 of 14

Project: 20.67x08 HL93 00-02 fill
Task :
Client :
Job No.:

CULVERT PROPERTIES
==========
Type of Culvert: Precast Specification : LRFD 9th Edition
Operating Mode : Design

Physical Dimensions

No. of Boxes: 1 Name: BoxCulvert
Clear Span : 20.6700 ft
Clear Height: 8.0000 ft Skew Angle : 0.00 deg
Length : 6.0000 ft Bottom Slab Support: Full Slab
Fill Depth Range: Maximum : 2.00 ft Minimum : 0.00 ft Increment : 2.00 ft
Haunches: Top, Length: 12.0000 in Height: 12.0000 in
Bottom, Length: 12.0000 in Height: 12.0000 in
Minimum Thicknesses: Top Slab: 14.0000 in Bot Slab: 14.0000 in
Ext Wall: 10.0000 in
Wall Joint: None

Material Properties

Concrete: Strength,f'c : 5.000 ksi Density : 0.150 kcf Elasticity,Ec: 4287 ksi
Type : Normal Weight Density Modification Factor : 1.00
Fr Factor : 0.24 Gamma1 : 1.60 Gamma3 : 1.00 (user defined)
Steel: Yield,fy : 70.00 ksi fss Limit : 0.60fy Elasticity,Es: 29000 ksi
Yield,fyv : 60.00 ksi Diameter : 1.000 in Type : Mesh
Soil: Density : 0.120 kcf Slope Factor: 1.150
Poisson's : 0.5
Fe Factor : 1.150 (Maximum for Compacted Fill)
Serviceability, Gamma-e: 0.75

Loads

Live Load: Vehicle: (AA) HL-93 - Design Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	8.00	0.00
2	32.00	14.00
3	32.00	14.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: yes
Tandem: Axle 1: 25.00 k, Axle 2: 25.00 k, Axle Spacing: 4.00 ft
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Inventory Rating Load Factor: 1.75 Operating Rating Load Factor: 1.35
Design Load Combinations: Strength I
Override MPF: no
Override DLA: no
Include Lane Load : no Max. No. of Lanes: Computed by Program
Traffic Direction : Lanes Parallel to Main Reinforcement
Neglect Live Load if: Fill > 8 ft and Fill > Clear Span
Apply Surcharge at Fill Depths > 2 ft : yes
Compute Surcharge Depth: yes
Dead Load: Future Wearing Surface : 0.00 klf Add. Dead Load : 0.00 klf
Concentrated Loads : none
Lateral Soil Loads: Max. Equiv. Fluid Press.: 60.00 pcf Min. Equiv. Fluid Press. : 30.00 pcf
Include Additional Uniform Horiz. Load: no
Include Additional Uniform Vert. Load: no
Buoyancy Check : no
Fluid Pressures : Apply Water Press. : yes, interior only
: Interior Pressure Head : 0.00 ft
Foundation Model : Uniform Loads
Seismic Analysis : Do not include

Load and Resistance Factors

	Max	Min
DC:	1.250	0.900
DW:	1.500	0.650
EV:	1.300	0.900
EH:	1.350	0.900
WA:	1.000	
EQ:	1.000	

LL I : 1.750 LL II : 1.350 LL Legal : 1.750 LL Extreme : 0.500
Ductility: 1.000 Importance: 1.000 Redundancy, non-earth: 1.000 Redundancy, earth: 1.000
Condition: 1.000 System : 1.000
Phi Shear: 0.900 Phi Moment: 1.000 PM Compression: 0.750 PM Tension : 0.900

Sht:____of____
By:BSJ Chk:____

Eriksson Culvert v6.2.4

Filename: SGL 20.67X08 HL93 00-02 fill.etcx
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Load Factor Multipliers, Design Mode: 1.00 Analysis Mode: 1.00

Reinforcement

Reinforcement Covers : Exterior Interior
Top Slab: 2.0000 in 1.0000 in
Walls : 1.0000 in 1.0000 in
Bot Slab: 1.0000 in 1.0000 in

Design Options

Member Thickness : Top Slab : Fixed Bottom Slab: Fixed
Ext. Wall: Fixed
LL Analysis : Automatically Set Traffic Direction to Account for Skew Effects: no
Limit LL Distribution Width to Culvert Length for: None
Combine Longitudinal Axle Distribution Overlaps: Yes, Max of 2 Axles
Combine Transverse Axle Distribution Overlaps: No
Axle Placement Increment for Moving Load Analysis: 20
Include Impact on Bottom Slab: yes
Always Distribute Wheel Load: yes
Deflection Criteria : 1/800
Approach Slab will be Used: no
Reinforcement : Always Include Distribution Steel: no
Distribution Slab Provided: no
User Defined Longitudinal Steel: no, Always Use % of Area
Ind. Top and Bottom Slab Design: yes
Max. As used in Vc Calcs: 2.00 in2/ft
Distribute Minimum Reinforcement per Face: yes
Use individual Member Thicknesses for Min Steel: no
Epoxy coat steel: no
Use M-dimension for bar length calcs.: no
Slenderness : Checked K Factor: 2.00
Analysis Modeling : Use Haunches in the Structural Analysis Model: yes
Critical Sections : Flexure critical section location: end of haunch
Shear critical section location: dv beyond support
Use Max. Moment with Max. Shear at the Critical Section for Shear: no
Include depth of haunch for critical sections: no
Flexure : Ignore Axial Thrust: no
Use Eq. 12.10.4.2.4a-1: yes Nu Multiplier: 1.00
Shear : Always Check Iterative Beta Method
Environmental : Apply duribility factors: no
Load Combinations : LRFD min/min: no

DESIGN RESULTS
==============

Top Slab Thickness = 14.00 in
Bottom Slab Thickness = 14.00 in
Exterior Wall Thickness = 10.00 in

Modular Ratio (N) = 6.76 Max. Steel Ratio = 0.020
Design Span = 21.50 ft Design Height = 9.17 ft

Volume of Concrete: 2.498 cy/ft

Note: Design and analysis results do not include force effects from stipping and handling stages

M dimension = 3' 4" (method of equivalent capacity)
= 6' 7" (method of contraflexure - ASTM)

Reinforcing Steel Schedule

Location	Mat Mark	Sheets Included	Layers	As,prv (in2/ft)	As,str (in2/ft)	Truck	Fill (ft)
Top Slab (int)	A100 (AS2)	Top	1	0.900	0.805	AA	2.00
Bot Slab (int)	A200 (AS3)	Bot	1	0.840	0.719	AA	2.00
Top Slab (ext)	A300 (AS7)	Top	1	0.336	0.336	AA	0.00
Bot Slab (ext)	A400 (AS8)	Bot	1	0.336	0.336	AA	0.00
Corner Top-U	A1 (AS1)	Top	1	0.630	0.509	AA	2.00
Corner Bottom-U	A2 (AS1)	Bot	1	0.630	0.543	AA	2.00
Ext Wall (int)	B1 (AS4)	L&R	1	0.336	0.336	AA	0.00
Ext Wall (ext)	B2 (AS1)	L&R	1	0.630	0.483	AA	2.00
Top Slab (int- 1)	C100 (AS5)	Top	1	0.336	0.336	AA	0.00
Bot Slab (int- 1)	C200	Bot	1	0.336	0.336	AA	0.00
Temperature (1)	C1 (AS6)	Top	1	0.336	0.336	AA	0.00
Temperature (1)	C1 (AS6)	Bot	1	0.336	0.336	AA	0.00
Temperature (1)	C1 (AS6)	L&R	1	0.336	0.336	AA	0.00
Temperature (1)	C1 (AS6)	L&R	1	0.336	0.336	AA	0.00

Note: A denotes flexural steel, B denotes vertical steel, C denotes longitudinal steel

AS Bar Marks

Location	Governing Mode	As Gvrn in2/ft
Transverse Side Wall - Outside Face (AS1)	a	0.630
Transverse Top Slab - Inside Face (AS2)	a	0.900
Transverse Bottom Slab - Inside Face (AS3)	a	0.840
Transverse Side Wall - Inside Face (AS4)	c	0.336
Distribution Top Slab - Inside Face (AS5)		0.336
Distribution Top Slab - OutSide Face (AS6)		0.336
Transverse Top Slab - Outside Face (AS7)	c	0.336
Transverse Bottom Slab - Outside Face (AS8)	c	0.336

Notes: 1.) Final areas of steel provided must be checked in analysis mode
2.) As Controlled By: a - Flexure, b - Crack Control, c - Minimum Steel, d - Fatigue

Sheet Inventory

Interior sheets - 4 sheet layout with laps located in the wall

Sheet Loc.	Mat Mark	Zone	Size	Spac. (in)	Length (ft-in)	Area (in2/ft)	H leg (ft-in)	V leg (ft-in)	Mat Mark	Size	Spac. (in)	Area (in2/ft)	Wgt (lbs)
Top	A100	Base	D15	2.00	23-11	0.900	20-10	1- 6	C100	D28	10.00	0.336	579
										(1) sheets, Total weight:			579
L&R	B1	Base	D28	10.00	8- 2	0.336			C1	D28	10.00	0.336	176
										(2) sheets, Total weight:			352
Bot	A200	Base	D14	2.00	23- 9	0.840	20-10	1- 6	C200	D28	10.00	0.336	549
										(1) sheets, Total weight:			549

Exterior sheets - 4 sheet layout with laps located in the slab

Sheet Loc.	Mat Mark	Zone	Size	Spac. (in)	Length (ft-in)	Area (in2/ft)	H leg (ft-in)	V leg (ft-in)	Mat Mark	Size	Spac. (in)	Area (in2/ft)	Wgt (lbs)
Top	A300	Base	D28	10.00	22- 2	0.336			C1	D28	10.00	0.336	169
										(1) sheets, Total weight:			169
L&R	A1	Base	D10.5	2.00	12- 7	0.630	1- 3	10- 1	C1	D28	10.00	0.336	162
	B2	Base	D10.5	2.00	12- 7	0.630	1- 3	10- 1	C1	D28	10.00	0.336	147

	A2	Base	D10.5	2.00	12- 7	0.630	1- 3	10- 1	C1	D28	10.00	0.336	-----		
										(2) sheets, Total weight:			618		
Bot	A400	Base	D28	10.00	22- 2	0.336			C1	D28	10.00	0.336	434		
										(1) sheets, Total weight:			434		

Weight of Steel: 450 lb/ft Total weight of all sheets: 2701

Notes:
Epoxy coating may be needed for A1, A300, and some C1 reinforcement, check with governing agency.
L&R - left and right, TC - top corner, BC - bottom corner, INT - interior walls, EXT - exterior walls
Nested line wires are additive to the base line wires, but nested cross wires replace base cross wires.
Adder sheets may require cross wires, check with mesh supplier.

Summary of Ratings Table:

	Flexure					Shear				
Truck	Fill	Member	Location	IR	OR	Fill	Member	Location	IR	OR
(AA) HL-93	2.00	2	MID	1.22	1.58	1.99	2	LT	1.25	1.62

Critical Sections Summary: Flexure

Member 1: (Exterior Wall), Thickness = 10.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
BOT	19.00	-31.38	16.55	30.81	8.82	36.29	1.00	0.63 a	14.31	1.30	1.68	AA	2.00
MID	55.00	0.18	1.82	16.60	8.70	17.29	1.00	0.34 c	14.31	9.54	12.36	AA	0.00
MID-	55.00	-28.78	16.55	30.81	8.82	36.29	1.00	0.63 a	14.31	1.46	1.89	AA	2.00
TOP	19.00	-29.90	16.55	30.81	8.82	36.29	1.00	0.63 a	14.31	1.35	1.76	AA	2.00

Member 2: (Top Slab), Thickness = 14.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	17.00	-18.24	3.83	41.84	11.82	43.78	1.00	0.63 c	28.05	2.99	3.87	AA	2.00
MID	129.02	55.60	-1.09	63.86	12.78	63.34	1.00	0.90 a	28.05	1.22	1.58	AA	2.00
MID-	129.02	0.35	3.00	22.48	11.70	24.11	1.00	0.34 c	28.05	NC	NC	AA	2.00
RT	17.00	-18.24	3.83	41.84	11.82	43.78	1.00	0.63 c	28.05	2.99	3.87	AA	2.00

Member 4: (Bottom Slab), Thickness = 14.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	17.00	-17.45	6.01	45.51	12.82	48.56	1.00	0.63 c	28.05	4.57	5.92	AA	2.00
MID	129.02	50.29	-0.11	59.84	12.79	59.79	1.00	0.84 a	28.05	1.36	1.76	AA	2.00
MID-	129.02	0.58	4.98	24.44	12.70	27.14	1.00	0.34 c	28.05	NC	NC	AA	2.00
RT	17.00	-17.45	6.01	45.51	12.82	48.56	1.00	0.63 c	28.05	4.57	5.92	AA	2.00

As Controlled By: a - Flexure, b - Crack Control, c - Minimum Steel, d - Fatigue

Critical Sections Summary: Vertical Shear

Member 1: (Exterior Wall), Thickness = 10.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
BOT	14.65	4.56	31.8	16.55	8.38	12.80	2.000	14.22 b	0.00	0.00	0.00	5.45	7.07	AA	2.00
MID	55.00	1.97	0.2	1.82	8.47	23.22	3.592	25.80 a	0.00	0.00	0.00	16.65	21.58	AA	0.00
MID-	55.00	0.77	23.3	14.45	8.38	12.92	2.019	14.36 a	0.00	0.00	0.00	11.52	14.94	AA	0.00
TOP	14.65	-3.15	30.3	16.55	8.38	12.80	2.000	14.22 b	0.00	0.00	0.00	5.35	6.93	AA	2.00

Member 2: (Top Slab), Thickness = 14.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	15.35	14.95	19.7	3.82	11.38	17.38	2.000	19.31 b	0.00	0.00	0.00	1.25	1.62	AA	1.99
MID	129.02	5.07	46.9	-1.93	12.16	14.97	1.613	16.63 a	0.00	0.00	0.00	2.95	3.82	AA	0.00
MID-	129.02	5.07	3.6	2.35	11.47	21.69	2.478	24.10 a	0.00	0.00	0.00	4.27	5.54	AA	0.00
RT	15.35	14.95	19.7	3.82	11.38	17.38	2.000	19.31 b	0.00	0.00	0.00	1.25	1.62	AA	1.99

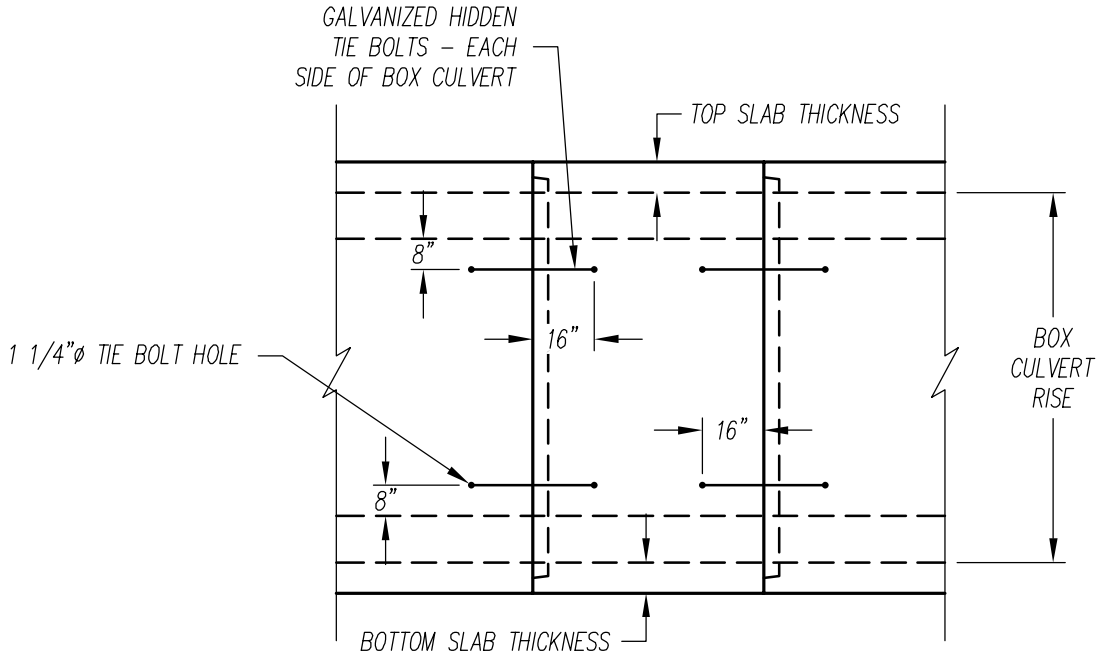
Member 4: (Bottom Slab), Thickness = 14.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	16.25	13.46	18.2	6.01	12.38	18.90	2.000	21.00 b	0.00	0.00	0.00	1.77	2.30	AA	1.99
MID	129.02	0.15	40.7	-0.56	12.21	16.04	1.721	17.82 a	0.00	0.00	0.00	NC	NC	AA	0.00

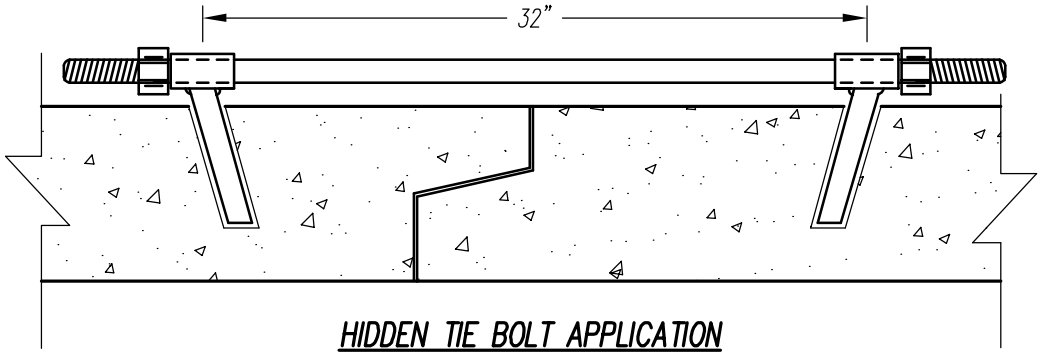
Eriksson Culvert v6.2.4 Sht:____of____
 By:BSJ Chk:____
Filename: SGL 20.67X08 HL93 00-02 fill.etcx 6/12/2024 1:25:39 PM
Culvert p. 5 of 14

MID-	129.02	0.14	0.0	4.98	12.70	38.65	4.835	42.94	a	0.00	0.00	0.00	NC	NC	AA	2.00
RT	16.25	13.46	18.2	6.01	12.38	18.90	2.000	21.00	b	0.00	0.00	0.00	1.77	2.30	AA	1.99

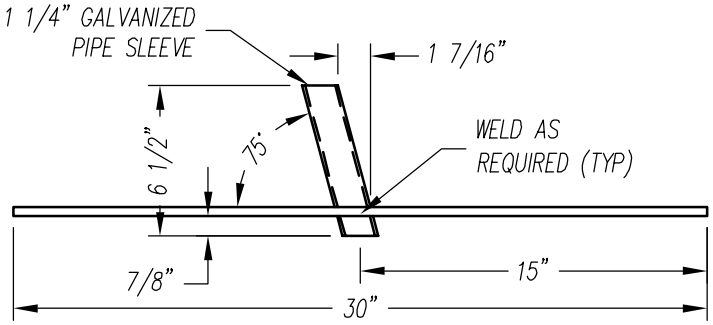
Vc Calculation By: a - Iterative Beta, b - Constant Beta, c - Box Culvert, d - Standard/Arema



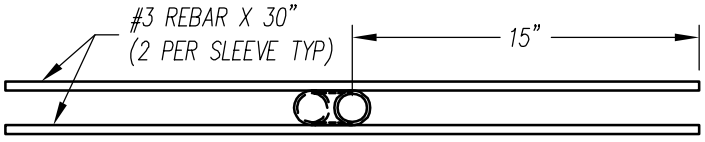
ELEVATION VIEW – BARREL SECTIONS WITH HIDDEN TIE BOLT



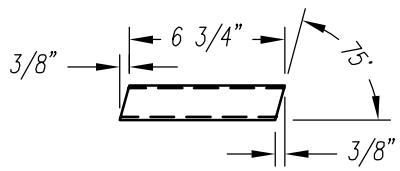
HIDDEN TIE BOLT APPLICATION



TOP VIEW



END VIEW



SLEEVE DETAIL

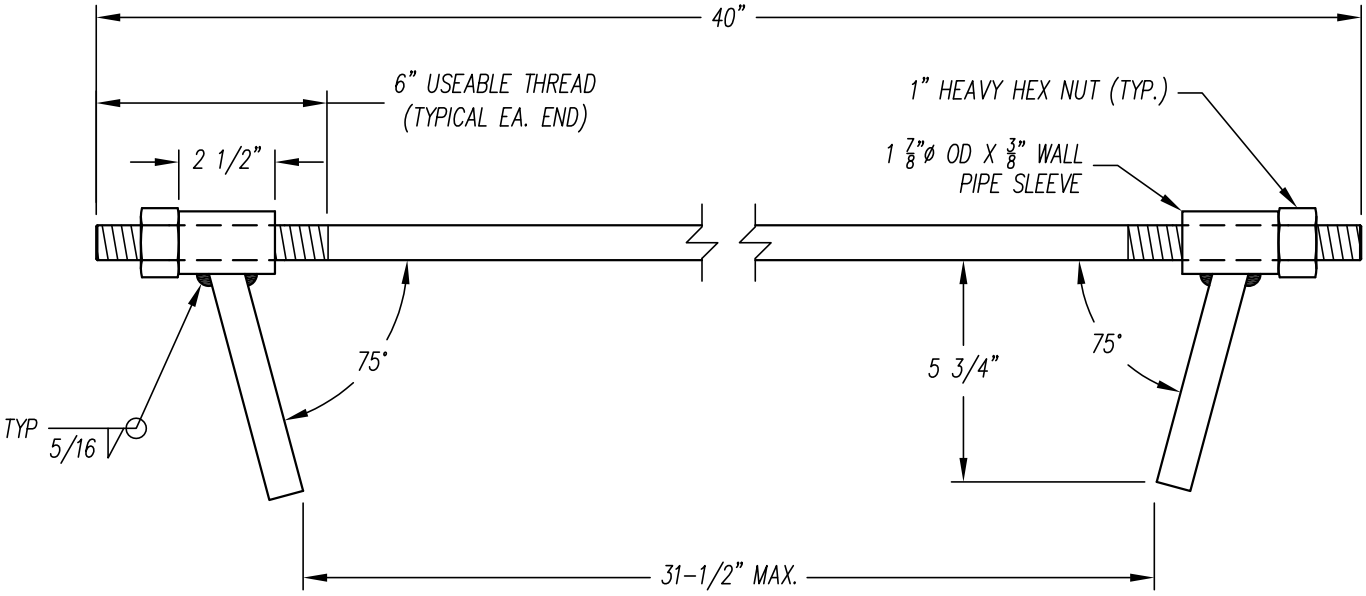
1) Tie Bolts should not be used to pull the joint together.
2) Tension adjusting nut 1/2 turn past snug.

02/17/16 JWB

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: TIE BOLT HOLE LOCATION DETAIL
DATE: 02/06/16	
DR'N BY: JWB	
REV: 11/27/17 JWB	DWG NAME: TIE BOLT HOLE LOCATION – 2



1. Tie bolts are manufactured from 29/32" diameter material conforming to ASTM A36.
2. Standard 1" diameter threads are rolled on adjusting bolts.
3. Heavy Hex Nuts conform to ASTM A563.
4. The welded pipe sleeve conforms to ASTM A519
5. Welding and weld inspection are done in accordance with AWS/ANSI D1.1-94 Structural Welding Code.
6. Tie bolt assembly is hot dip galvanized in accordance with ASTM A153 / ASTM F2329.

FORTERRA™
Rapid City, South Dakota
2046 Samco Road, Suite 2
Rapid City, SD 57702
(605) 718-4111

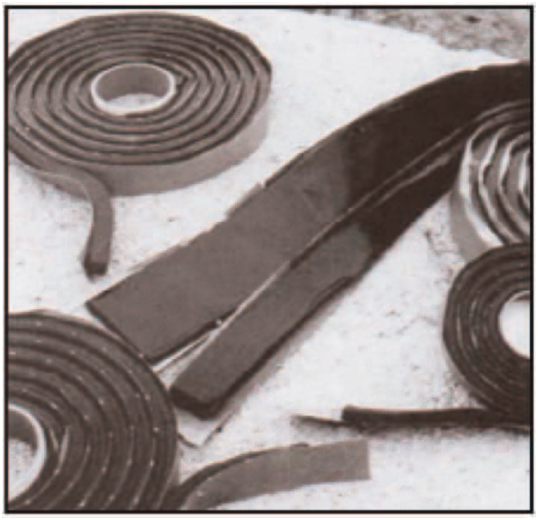
SCALE: NONE	PROJECT: GALVANIZED HIDDEN TIE BOLT
DATE: 2/4/13	
DR'N BY: TDE	
REV: 1/14/16 REM	DWG NAME: HIDDEN TIE BOLT

EZ-STIK

PREMIUM BUTYL JOINT SEALANT

What It Is

EZ-STIK is a premium preformed butyl joint sealant that is supplied in rope form. Containing a higher proportion of butyl rubber, EZ-STIK It is carefully blended from uncured butyl rubber and other solids and will not shrink, crack, or dry out. Although clean to handle, it provides excellent adhesion and cohesion to a wide variety of surfaces - concrete, metal, most concrete coatings, glass, wood, and painted surfaces.



Why It's Better

- Increased proportion of butyl rubber content.
- Premium packaging.
- Wide variety of sizes and styles.
- All-weather performance.
- Good adhesion to dry concrete, commonly specified concrete coatings, steel, glass, or painted surfaces.
- Coated release paper for easy installation.
- Long service life.
- Cohesive properties allow for joint movement.
- Compatible for use with rubber O-Ring designs.
- Low moisture vapor transmission rate (MVTR).
- Special primers available for use on damp, contaminated, or difficult surfaces.

How It Performs

EZ-STIK BUTYL JOINT SEALANT *meets or exceeds all requirements of the following Standards, Specifications and/or Test Methods:*

ASTM C 990 - *Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants; Section 6.2 Butyl Rubber Sealants*

AASHTO M 198 - *Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets*

Typical Applications

- Sanitary Manhole Joints
- Stormwater Manhole Joints
- Irrigation and Drainage Systems
- Box Culverts
- Elliptical/Arch Pipe
- Architectural Foundations
- Underground Utility Vaults
- Stormwater Treatment Structures
- Stormwater Inlet Structures
- On-Site Treatment Tanks
- Grease Interceptors
- Wet Wells

Scan (or click) Here To View More Info On This Product On The Web!

PRESS-SEAL GASKET CORPORATION
Protecting Our Planet's Clean Water Supply
Press-Seal Gasket is an ISO 9001:2008 Registered & ISO 14001:2004 Compliant Company

800-348-7325 Fax (260) 436-1908
email: sales @press-seal.com
web: www.press-seal.com

Made in USA

EZ-STIK

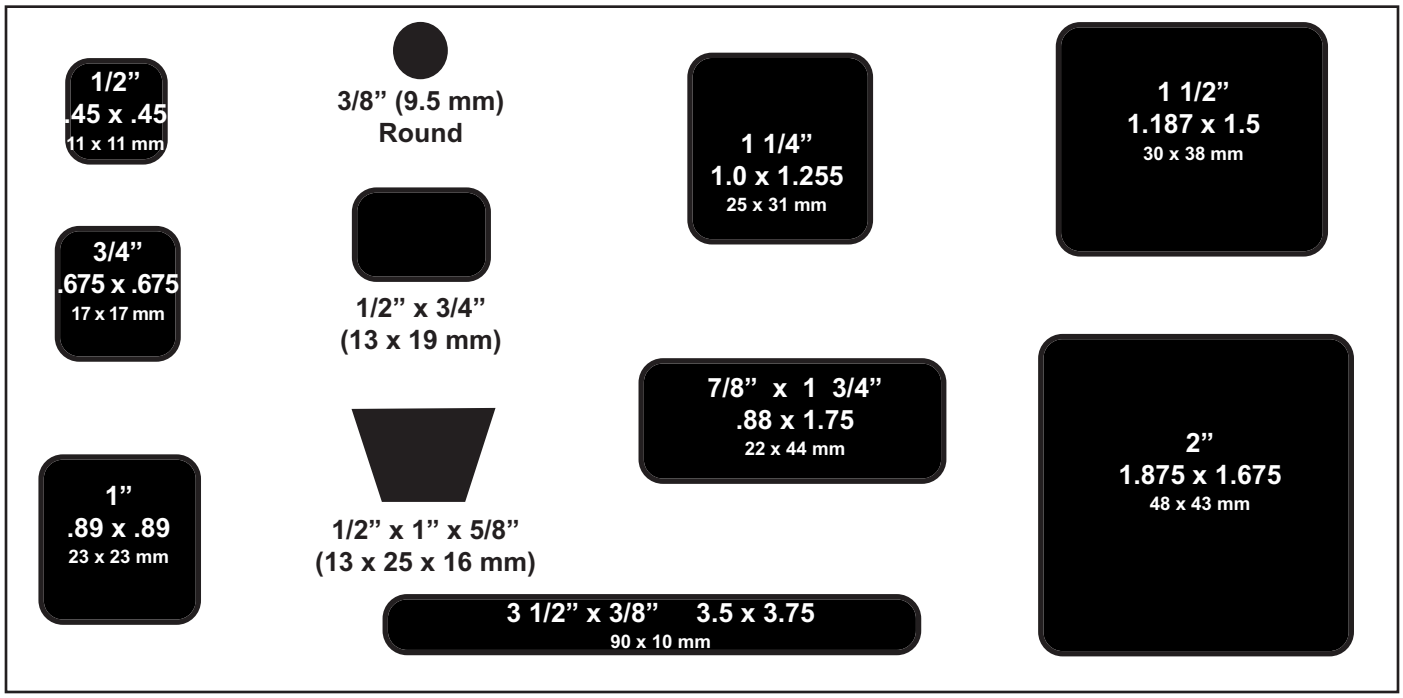
SPECIFICATION and SELECTION GUIDE

Submittal Specification

The joints and/or joint surfaces of the structures shall be sealed with a butyl-rubber-based preformed flexible sealant conforming to ASTM C-990, paragraph 6.2. The material shall be PRO-STIK or EZ-STIK as supplied by PRESS-SEAL GASKET CORPORATION, Fort Wayne, Indiana, or approved equal. The butyl material shall consists of 50% (min.) butyl rubber and shall contain 2% or less volatile matter.

For preformed joint sealants, the sealant shall be sized such that the joint is filled to 50% (min.) of its annular volume when fully assembled, and the sealant shall have the ends kneaded together at the overlap. Primer and/or adhesive as recommended by the sealant supplier shall be employed for adverse, critical, or other applications.

Testing of joints and compliance with construction requirements shall be conducted in strict conformance with the requirements of the sealant supplier.



Custom Sizes Available Upon Request

Also Available in Trowelable Bulk and Easy to Pump Bulk

All sizes sold 40 cartons per pallet. All pallets are shrink wrapped for outside storage.
Quantity discounts available - contact our Customer Service Department.

PRESS-SEAL GASKET CORPORATION
Protecting Our Planet's Clean Water Supply
Press-Seal Gasket is an ISO 9001:2008 Registered & ISO 14001:2004 Compliant Company
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email: sales @press-seal.com
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Made in USA

VERSION 9.13

EZ-STIK

PHYSICAL PROPERTIES TEST RESULTS

Description

EZ-STIK is a butyl-rubber-based sealant designed to be permanently flexible, tacky and resistant to moisture and deterioration by exposure to dilute chemical solutions. EZ-STIK meets ASTM C-990, Section 6.2 requirementsfor Butyl Rubber Sealant, and AASHTO M 198.

Typical Properties

The following values represent typical test results and are manufacturing specifications.

		SPEC.	REQUIRED	EZ-STIK
Butyl Rubber (Hydrocarbon Content %)		ASTM D4	50% min.	62%
Ash Inert Mineral Filler %		AASHTO T111	30% min.	45-48%
Volatile Matter	(AASHTO T47)	ASTM D6	2% max.	0.5-1.0%
Specific Gravity @ 77ºF (25 C)	(AASHTO T229)	ASTM D71	1.15 - 1.50	1.25 - 1.35
Ductility @ 77ºF (25 C), cm	(AASHTO T51)	ASTM D113	5.0 min.	meets requirement
Flash Point C.O.C.		ASTM D92	350º (177 C) min.	375ºF (191 C)
Fire Point C.O.C.		ASTM D92	375º min. (191 C)	385ºF (196 C)
Compression Test				
@77ºF (25 C), lbf/in^3		ASTM C972	100 max.	40 - 55 lbf/in^3
@32ºF (0 C), lbf.in^3			200 max.	130 - 160 lbf/in^3
Low Temperature Flexibility				
@-10ºF (-23 C)		ASTM C765	180º bend, no cracking, nor loss of adhesion.	Pass - no cracking or adhesion loss.
Elevated Temperature Flexibility				
14 days @ 157ºF (69 C)		ASTM C776	No sag, nor change in extruded shape.	Pass - no sag or shape change.
Adhesion After Impact		ASTM C776-84	No greater loss than 50% of adhesion.	Pass - no loss of adhesion.
Cone Penetration				
@ 77ºF (25 C), dmm		ASTM D217	50 - 100 dmm	55 - 85 dmm
@ 32ºF (0 C), dmm			40 min.	45 - 55 dmm
Chemical Resistance			No deterioration, no cracking, no swelling.	Pass - no visible change after 30 days immersion in 5% solutions HCl, H_2SO_4,NaOH,KOH,H_2S

Application Properties

Service Temperature Range	-40F to 250F (-40 to 121 C)
Application Temperature	20F to 120F (-7 to 49 C)
Storage Temperature	Under 120F (49 C)
Shelf Life	2 Years minimum

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GATOR WRAP

Infi-Shield® External Gator Wrap

Infi-Shield® Gator Wrap prevents infiltration by providing a water-tight seal around any manhole, catch basin or concrete pipe joint. Gator Wrap resists harsh soil conditions and also provides a root barrier for any crack or joint. Infi-Shield® Gator Wrap installs easily with no special tools and can be immediately backfilled.

Infi-Shield® Gator Wrap Specification

Each manhole, catch basin or pipe joint shall be sealed with an external rubber sleeve similar to the Infi-Shield Gator Wrap as manufactured by Sealing Systems Inc (763-478-2057). The seal shall be made of a Stretchable, Self-Shrinking, Intra-Curing Halogenated based rubber with a minimum thickness of 30 mils. The back side of each unit shall be coated with a cross-linked re-enforced butyl adhesive. The butyl adhesive shall be non-hardening sealant with a minimum thickness of 30 mils. The seal shall be designed to stretch around the joint and then overlapped creating a cross-link and fused bond between the rubber and butyl adhesive. Gator Wrap forms a continuous rubber seal on a manhole joint which prevents water and soil from infiltrating through the manhole, catch basin or concrete pipe joint.

INFI-SHIELD GatorWrap® is available in 6” and 9” widths and comes in a 50 foot roll or in a user-friendly kit which has six sixteen foot rolls. Upon special order, we can also manufacture a 12” width but please allow four weeks for delivery.

EPDM Rubber Specifications

Physical Properties	ASTM Test Method	Typical Value
Sheer Strength	D816	15 lb. PSI min
Tensile, PSI	D412	50 PSI
Elongation %	D412	500 %
Penetration	D217	40/120 MM
Low Temperature	D746	Minus 49º F flexibility
Heat Aging	D573 7 days @ 90 degrees C	
Tensile Strength	minimum, PSI (MPa) > 100 PSI	Pass
Fusion	5/64” (0.2) max	Pass
Elongation %	minimum 300% at break	Pass
Ozone Resistance	no visible signs of cracking	Pass
Aging and Storage	300% elongation applied (10 Years)	Pass
UV Resistance	No visible signs of cracking	Pass

Material meets ASTM C923 and C877 – Mastic Meet ASTM C990.
Disclaimer: This technical data information and recommendations offered are based on test results, and findings we believe to be reliable and complete.

Sealing Systems, Inc.
9350 County Road 19 ♦ Loretto, MN 55357 ♦ 763-478-2057 ♦ 800-478-2054 ♦ Fax 763-478-8868 ♦ www.infi-shield.com

Infi-Shield GATOR WRAP

INSTALLATION INSTRUCTIONS

1. Expose the area that is to be sealed. Clean the entire area around the joint with a wire brush and whisk broom. Remove any sharp protruding edges around the joint with an abrasive tool. When finished cleaning, the entire area must be dry and free of any dirt.

2. Remove the first foot of paper backing from the mastic. Center and place the Gator Wrap around the joint. Continue to remove paper backing as you apply the Gator Wrap to the entire structure.

3. Seal the overlapping area with a 6" overlap. Be sure not to stretch material at the overlap area.

4. Cut excess material using a utility knife. Using a rubber mallet or hand held roller, firmly flatten the Gator Wrap 360 degrees around joint.

Material: Rubber meets ASTM C923 and C877 – Mastic Meet ASTM C990

Disclaimer: This technical data information and recomedations offered are based on test result, and findings we believe to be reliable and complete.

S.S.I. SEALING SYSTEMS, INC.

Sealing Systems, Inc.

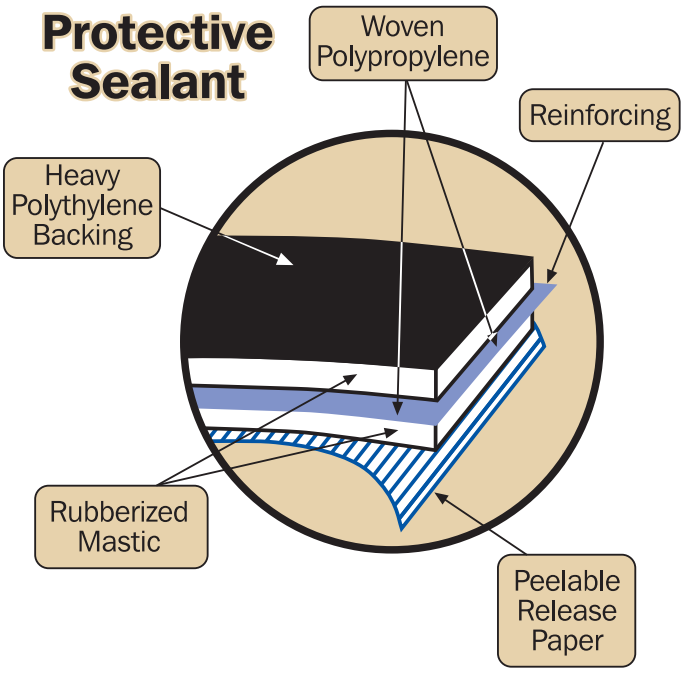
9350 County Road 19 • Loretto, MN 55357 • 763-478-2057 • 800-478-2054 • Fax 763-478-8868 • www.infi-shield.com

SEAL PLUGS

High-Performance, Water-Tight Seals For Sealing Lift Holes In Concrete Pipe

This two-ply seal plug is designed to adhere to concrete with its aggressive rubberized mastic. The plug is reinforced with a tough, puncture-resistant woven polypropylene with an outer layer of impervious polyethylene, resistant to most acids and alkalines.

Seal plugs are available in easy to apply 9”x9” squares with a peel-able protective paper for faster application without the waste or extra tools.



TYPICAL PROPERTIES

POLYETHYLENE BACKING		
Tensile strength, min, psi	4,000	D882, Method A
Elongation at break, min, %	100	D882, Method A
Tear resistance, min, psi	1,500	D624, Die C
Water absorption, max, %	0.01	D570

REINFORCING MESH ELEMENT		
Tensile strength min, lb., in.		D1682
	Warp 75	
	Fill 75	
Elongation at break, min, %		
	Warp 20	
	Fill 20	

RUBBERIZED MASTIC		
	Minimum	Maximum
Ash-inert matter, %	80	15
Volatiles, %	0.1	2
Softening Temp., min, F	175	-
Specific gravity	0.95	1.05
Penetration, dmm	60	90
Flow, mm	10	10

CERTIFICATION

SEAL WRAP MATERIALS AND PERFORMANCE REQUIREMENTS.

I hearby certify that Seal Wrap is produced in accordance to the following specifications:

9" seal plugs, 9"and 12" master rolls, consists of an outer backing of polyethylene film with a minimum tensile strength, 4000 lb. psi, when tested in accordance to test method D 882. We further certify that the rubberized mastic component of Seal Wrap is reinforced with a mesh element with a minimum, 75 lb./in, warp and fill when tested in accordance to test method D 1682.

Seal Wrap is made of the same high performance components, excluding the steel straps, as our Mac Wrap collar which meets ASTM standard C-877 Type II.

Robert L. Weir
President Construction Products Division

P.O. Box 447 • US Hwy. #1 North • McBee, SC 29101 • Phone: (877) 962-7622 • (843) 335-5814 • Fax: (843) 335-5909
www.marmac.com info@marmac.com

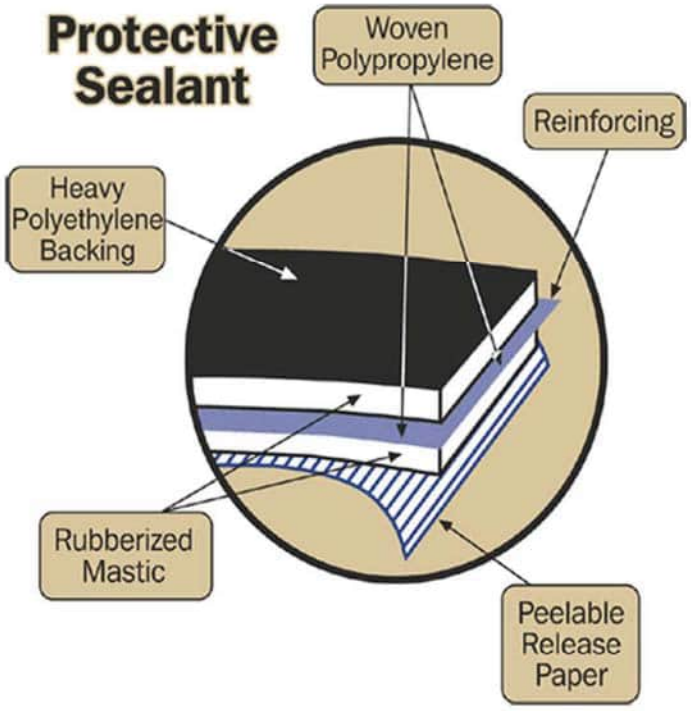
Seal Wrap

High-performance water-proofing membrane for culvert structures

Mar Mac Seal Wrap is a two-ply made with heavy-duty water-proofingmaterials essential for sealing boxed, arched and span culverts.

Seal Wrap is made of two layers of rubberized mastic, reinforced with a sheet of strong, puncture-resistant woven polypropylene. The outside backing is constructed with impervious polyethylene a material resistant to most acids and alkalines.

Seal Wrap is available in 60' rolls lined with peelable release paper for easy application without the waste.



TYPICAL PROPERTIES

POLYETHYLENE BACKING		
Tensile strength, min, psi	4,000	D882, Method A
Elongation at break, min, %	100	D882, Method A
Tear resistance, min, psi	1,500	D624, Die C
Water absorption, max, %	0.01	D570

REINFORCING MESH ELEMENT		
Tensile strength min, lb., in.		D1682
	Warp 75	
	Fill 75	
Elongation at break, min, %		
	Warp 20	
	Fill 20	

RUBBERIZED MASTIC		
	Minimum	Maximum
Ash-inert matter, %	80	15
Volatiles, %	0.1	2
Softening Temp., min, F	175	-
Specific gravity	0.95	1.05
Penetration, dmm	60	90
Flow, mm	10	10

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www.marmac.com info@marmac.com

INSTALLATION INSTRUCTIONS FOR SEALWRAP

- SURFACE PREPARATION:

Sweep or brush the external portion of the joint to insure that dirt, dust and other foreign matter do not interfere with direct contact between the mastic sealer and the concrete joint. If ambient temperature is below 40°F and/or wet conditions are present primer is recommended. Mar Mac RB Quick Dry Primer can be applied by brush or roller at the rate of 1 gallon per 250-350 sq. ft. depending on the porosity of the surface. Cure time is approximately 15-60 minutes dependent on temperature and humidity. Apply primer too exceed the width of the Sealwrap by a minimum of 2 inches.

- INSTALLATION

Peel away the silicon coated release liner to expose 1 ft of the mastic adhesive. Center the exposed mastic over the joint and using the palm of the hand, apply pressure to achieve a uniform bond of the Sealwrap to the concrete. Continue to peel the release liner while unrolling the Sealwrap **KEEP CENTERED OVER JOINT**. For Sealwrap splicing, overlap a minimum of 4 inches. If primer is used, allow for full cure before Sealwrap installation.

MAR MAC RB ADHESIVE PRIMER

DESCRIPTION:

MAR MAC RB LIQUID ADHESIVE PRIMER is a rubber based adhesive in solvent solution which is specifically formulated to provide excellent adhesion with Macwrap, Sealwrap and Sealing Tape under may kinds of surface conditions.

USES: RB ADHESIVE PRIMER....

- Used to prime all precast structures on which Macwrap and/or Sealwrap will be installed. Including: round, arch, elliptical pipe and box culverts and span bridges.
- Designed to be used on applications down to 25ºF. (-4ºC).

APPLICATION:

MARMAC RB LIQUID ADHESIVE PRIMER may be applied with roller or brush. A roller with a heavy nap should be used, such to carry sufficient material to the area being primed.

Apply all ***MAR MAC RB LIQUID ADHESIVE PRIMER*** to a clean, dry, dust free, and frost free surface at a coverage of approximately 250 to 350 square feet per gallon on concrete. The liquid adhesive should be spread sufficiently to avoid areas of access material. Areas of excess material will lengthen the curing time on the application of the ***MAR MAC RB LIQUID ADHESIVE PRIMER.***

For best results ***MAR MAC RB LIQUID ADHESIVE PRIMER*** should be applied and allowed to become tacky to the touch, timing may vary due to atmospheric conditions. At this point Sealwrap/Macwrap should be applied. If primer dries and is no longer tacky, reapply primer.

SAFETY, STORAGE AND HANDLING INFORMATION:

MAR MAC RB LIQUID ADHESIVE PRIMER vapors are flammable. User should review Material Safety Data Sheet (MSDS) for this product and follow safety instructions listed within.

This information is based on our best knowledge, but MAR MAC cannot guarantee the results to be obtained

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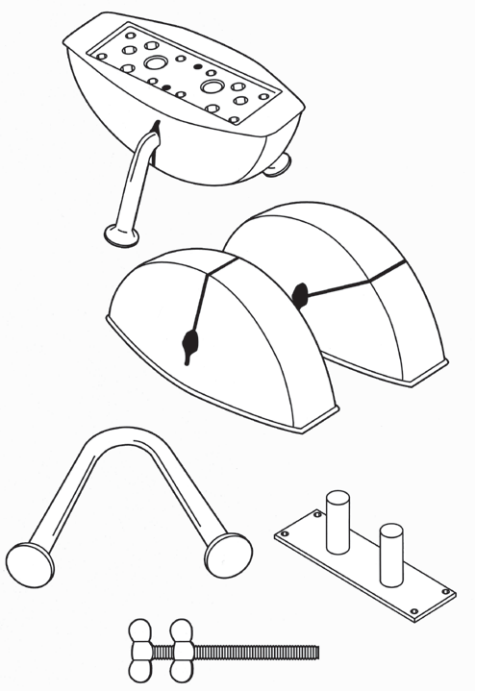
WWW.MARMAC.COM

DAYTON SUPERIOR®

Utility Anchor®

Utility Anchor System

The Dayton Superior Utility Anchor System is designed to economically simplify the lifting and handling of precast concrete elements. Its economics, ease of use and versatility will be a welcome addition to your precast operations.



Key Advantages

- High strength – up to 24,000 lbs. SWL
- No special lifting hardware required
- Uses a standard hook or clevis
- Easy to install and use
- Utilizes reusable 90° and 45° polyurethane recess plugs
- Eliminates "through holes" in the precast element
- An economical and versatile system – applicable to any precast concrete element

Added Benefit

Utility contractors can use the utility anchor effectively as a pulling iron. When used as a pulling iron, the safe working loads may be increased by 33%, based on the use of a 3 to 1 factor of safety.

The design of the Dayton Superior Utility Anchor Utility System assures the precaster of an economical, user-friendly system for lifting and handling precast concrete elements.

Utilize the Utility Anchor System to:

- Remove precast elements from their forms
- Handle in the precast yard
- Load for shipment
- Unload and place at the job site

The precaster is able to do it all without the need for any special lifting equipment or hardware. Simply use a standard hook or shackle to connect slings to the utility anchor for a safe lift.

The Utility Anchor System uses a polyurethane recess plug to create a void in the concrete. The concrete void created for the P75H utility anchor is sufficiently large to accept the following:

1. 6-ton Grade 8 alloy hook or
2. 7-ton forged alloy shackle

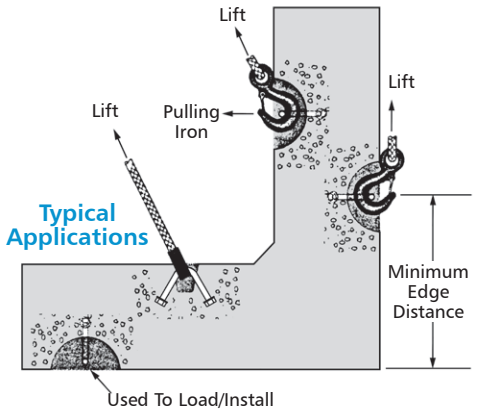
For the P75S Utility Anchors:

3. 15-ton cast/alloy hook or
4. 15-ton forged alloy shackle

DO NOT use larger hooks or shackles; they will apply additional and unintended loads to the utility anchor and could cause a premature failure of the concrete or anchor.

Anchor Placement

Placement of the Utility Anchor is dependent on the structural shape of the precast element. Utility anchors are not designed for thin edge installation. Always maintain minimum edge distances. For special conditions, contact the nearest Dayton Superior Technical Service Department for assistance.

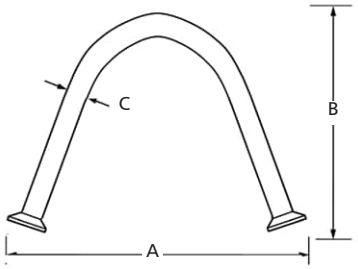


DAYTON SUPERIOR

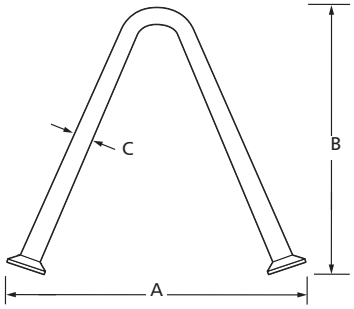
P75 and P75H Utility Anchor®

The Dayton Superior Utility Anchors are available in three diameters and a series of lengths for specific concrete thickness. The utility anchor can be set in either a 90° or a 45° anchor orientation using the appropriate setting plug.

P75 and P75H Utility Anchor						
Anchor	Type	Product Code No.	A	B	C	End Shape
P75	4UA444	121877	5-1/4"	3-1/8"	0.444"	Swift Lift
	5UA444	123442	6"	3-3/4"	0.444"	Swift Lift
	6UA444	121888	7-3/8"	4-3/4"	0.444"	Swift Lift
	5UA671	123441	6-7/16"	3-3/4"	0.671"	Swift Lift
	6UA671	121889	7-3/8"	4-3/4"	0.671"	Swift Lift
	8UA671	121891	9-3/4"	6-3/4"	0.671"	Swift Lift
P75H	12UA875	124738	15-7/8"	11"	0.875"	Swift Lift



P75 Utility Anchor



P75-H Utility Anchor

Anchor	Type	Product Code No.	Minimum Panel Thickness	Safe Working Load Tension 90	Safe Working Load Shear 90	Safe Working Load Tension/ Shear 45	Minimum Edge Distance
P75	4UA444	121877	4"	3,200	5,800	2,260	9"
	5US444	123442	5"	3,860	7,710	2,730	10"
	6UA444	121888	5 5/8"	4,460	9,460	3,150	12"
	5UA671	123441	5"	4,560	8,430	3,220	10"
	6UA671	121880	5 5/8"	7,320	15,780	5,170	12"
	8UA671	121801	7 5/8"	10,830	18,850	7,660	16"
P75H	12UA875	124738	12"	24,000	24,000	24,000	30"

To Order:

Specify: (1) quantity, (2) name, (3) product code.

Example:

200, P75 Utility Anchors, 5UA444.

Note:

1. Compressive strength of normal weight concrete to be 4,000 psi at time of initial lift.
2. Safe working loads provide an approximate factor of safety of 4 to 1.
3. Utility anchors to be installed at 90° to surface of the concrete.
4. Shear safe working loads are based on loading in the direction of the top of the precast concrete element.

P75C Utility Anchor® with Clip

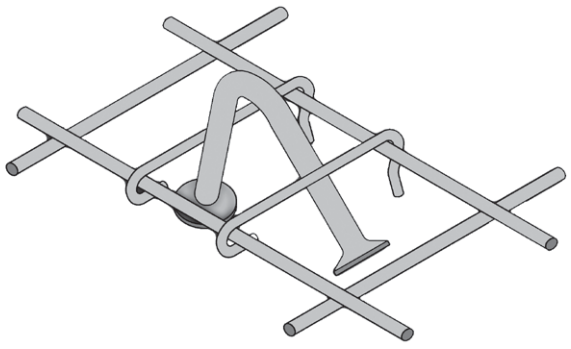
The Dayton Superior Utility Anchor with Clip is designed to allow the Utility Anchor to be secured to the wire mesh cage. This product utilizes the P75 Utility Anchors with 2 wire clips welded to opposite legs of the anchor. These wire clips are positioned to hold the utility anchor with Void to the wire mesh in the proper position in the wall for lifting your precast product. Both the 5UA and 6UA anchors in 0.444 and 0.671 diameters for 9" wire spacing are in stock. Other anchor and wire spacing are readily available.

To Order:

Specify: (1) quantity, (2) name, (3) product code (4) anchor size, (5) wire spacing (6) wall thickness.

Example:

200, P75C, #121443, 5UA444anchor, 9" wire spacing, 5" wall.



Product Code	Utility Anchor	Wire Clip Lengths	Wall Thickness
123443	5UA444	9"	5"
121890	5UA671	9"	5"
121892	6UA444	9"	6"
121893	6UA671	9"	6"
127446	8UA671	9"	8"

P76 Utility Anchor® Setting Plugs

Utility Anchor Setting Plugs a polyurethane plastic in 90° and 45° orientation.

The reusable setting plug properly sets the anchor approximately 1/2" below the surface of the concrete and provides an adequate recess for easy sling attachment. After final positioning of the concrete element, the recess formed by the recess member can be easily grouted or conveniently covered by the Utility Anchor Cover/Patch.

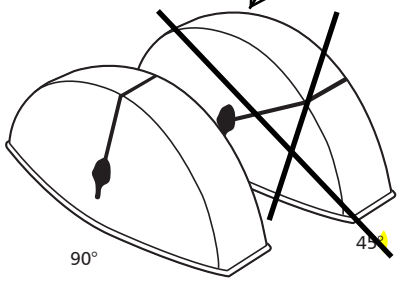
The 90P875 Setting Plug used with the P75-H 24,000 lb. anchor requires 2 each P101 holding rods to attach setting plug to the form. No holding plate or magnetic plate are available for this setting plug.

NOT USED

NOT USED

P76 Utility Anchor Setting Plug					
Type	Product Code No.	Length	Width	Depth	Color
90P444	123175	8.00"	3.25"	3"	Blue
~~45P444~~	~~123176~~	~~8.00"~~	~~3.25"~~	~~3"~~	~~Blue~~
90P671	123177	8.00"	3.25"	3"	Orange
90P671	127786	9.00"	4.58"	3.35"	Orange
~~45P671~~	~~123178~~	~~8.00"~~	~~3.25"~~	~~3"~~	~~Orange~~
90P875	124685	15.00"	6.13"	5"	Blue

45° NOT USED



P76 Utility Anchor Setting Plugs

To Order:
Specify: (1) quantity, (2) name, (3) product code.

Example:
200, P76 Utility Anchor Setting Plugs, 90P444.

BLUE PLUG USED FOR UA444
ORANGE PLUG USED FOR UA671
LARGE BLUE PLUG USED FOR UA875

P76D Disposable Setting Plugs

The Disposable Setting Plug is manufactured to offer the precaster an inexpensive alternate to urethane setting plugs. This 2 piece high density polyethylene plastic setting plug is used with the 0.671 Dayton Superior Utility Anchors. The two piece design snaps tightly together around the legs of the anchor eliminating concrete entering the void. The setting plug is installed to the formwork using nail holes on each end of the plug. This plug can also be used with the P77 Double Tee Anchors.

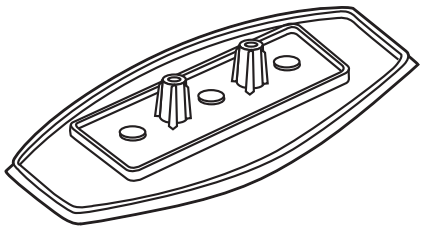
To Order:
Specify: (1) quantity, (2) name, (3) product code.

Example:
200, P76D, #126214.

P76D Disposable Utility Anchor Setting Plugs 0.671

P76C Utility Anchor Cover/Patch

The P76C Utility Anchor Cover/Patch installs over the back of the setting plug to protect the unit without the use of duct tape. The cover/patch can be installed on the setting plug/anchor assembly prior to setting the assembly in the form. This protects the assembly from concrete leakage through the concrete placement sequence. It can also be used later as a temporary or permanent cover for the recess. The P76C cover is gray in color and will blend with most concrete. It can be painted to match other color schemes.



P76C Utility Anchor Cover/Patch

Brian S. Jenner
PO Box 1620
Rapid City, SD 57709-1620
605-737-5211 (TEL)
605-718-0808 (FAX)
Brian.Jenner@RinkerPipe.com

To: **Lewis & Clark County**
Dan Karlin
dkarlin@lccountymt.gov

Date: **9/4/2024**
Project: **Lewis & Clark Co. Crossing F**
Project#
Contractor: **Lewis & Clark County**
R/S # : **6024057BX3**

1	Set of	**6024057BX3 Submittal Review 240904**	sheets	1-33

X For your approval. Please return 1 set to: **RINKER MATERIALS**
PO BOX 1620, RAPID CITY, SD 57709-1620

X ***PRODUCTION CANNOT BE SCHEDULED OR BEGIN UNTIL APPROVALS ARE RECEIVED.***

____ For production as noted ____ For jobsite use X For your files
____ Per your request ____ For your information ____ Other

Dan,

6024057BX3 Submittal Review 240904 for your review.

Please forward to the engineer for review.

Production cannot begin until approvals are received.

Please respond by September 18, 2024.

Thanks

Brian

CONTRACTOR SUBMITTAL REVIEW

DATE SUBMITTED 09/10/2024 DUE DATE 09/18/2024

CHECKING IS ONLY FOR GENERAL CONFORMANCE WITH DESIGN CONCEPT OF THE PROJECT AND GENERAL CONFORMANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRECTED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF CONTRACTORS WORK WITH THAT OF ALL OTHER TRADES; AND SATISFACTORY PERFORMANCE OF CONTRACTORS WORK.

X APPROVED, NO EXCEPTIONS TAKEN
☐ APPROVED, AS NOTED
☐ REVISE AND RESUBMIT
☐ SUBMIT SPECIFIED ITEMS
☐ REJECTED

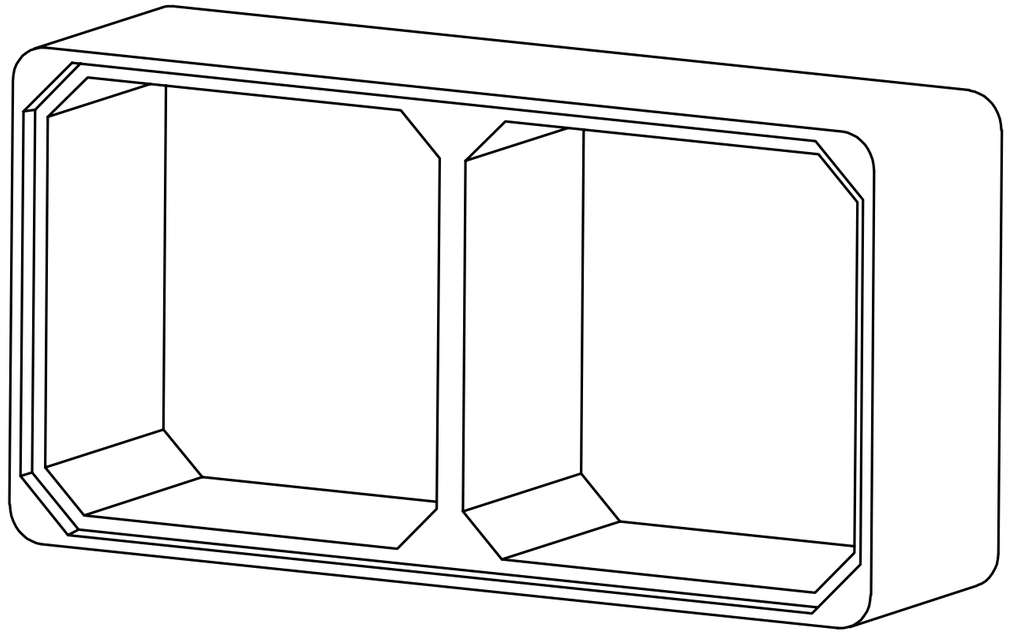
RESPEC
REVIEWER Jacob Lacy
DATE 09/09/2024

Copy:
1 Helena Plant, Proj. File
1 Mike Meredith

Sincerely,
RINKER MATERIALS

Brian S. Jenner, PE
Brian S. Jenner, PE - Project Engineer

RECOMMENDED INSTALLATION PROCEDURES FOR PRECAST CONCRETE BOX CULVERT

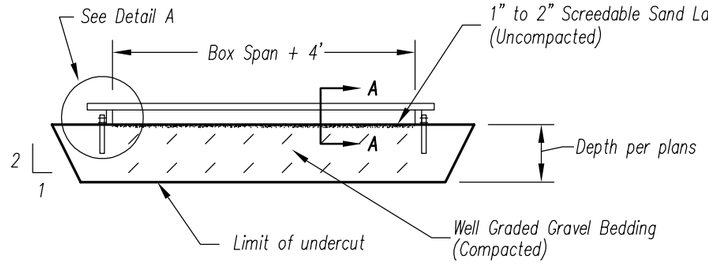


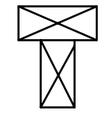
Rinker MATERIALS™
A QUIKRETE® COMPANY

MONTANA

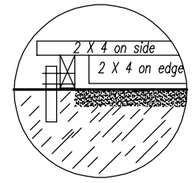
INSTALLATION

BED PREPARATION





Section A–A

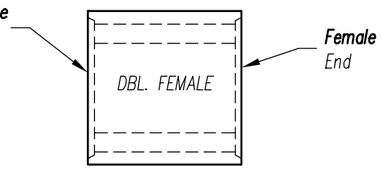


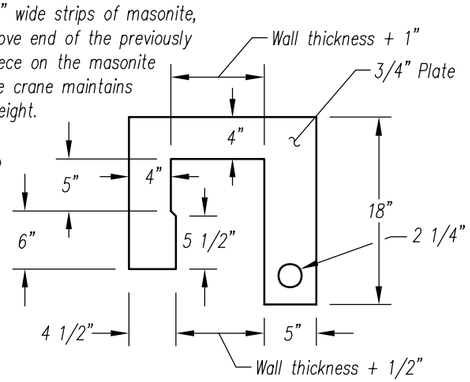
Detail A

1) Bedding material shall be a well graded material with a maximum particle size of 1" and placed to a uniform thickness and compaction as specified by engineer.
2) The top surface shall be a 1" to 2" thick screedable sand layer as a leveling course.
3) If installation equipment operates on top of bedding material the resulting compaction caused by the equipment shall not be greater than that of the bedding at any other location.

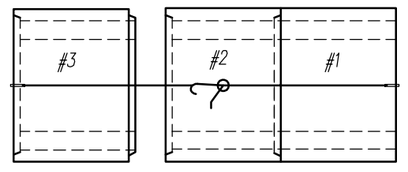
INSTALLATION SEQUENCE

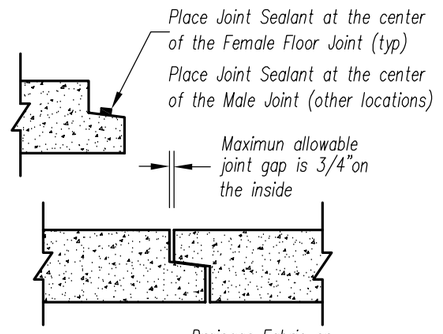
1) Set section w/ double female first (if applicable). See detail at right.
2) When staged construction is required, place dbl. female @ ℄ of road to allow installation of barrel sections in both directions.
3) Place joint sealant at the center of the female joint from top of haunch to top of haunch.
4) Dig a groove approximately 1" deep and 2"–3" wide in front of the female joint for the entire width of the bed so bedding material does not push into the joint. An alternate option to dig would be to cut 18" wide strips of masonite, place them under the groove end of the previously set piece, set the next piece on the masonite and pull together while the crane maintains the majority of the box weight.
5) Prior to setting each box section, use the screed to reshape the bed and remove the material from step #4.
6) Use pulling bracket and come–along system to pull joints together. See Detail.





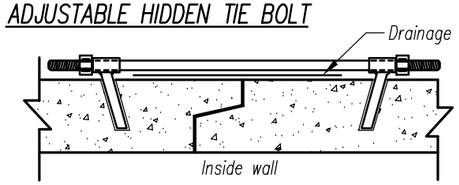
Bracket Detail



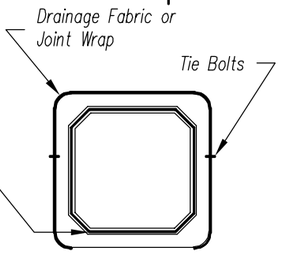


7) Check joint gap. If gap is larger than 3/4", pull joint apart and check for obstructions and check flatness of bedding surface. This maximum gap does not apply to the center wall of double cell boxes.
8) Install Tie Bolts and Drainage Fabric OR External Joint Wrap as specified.

ADJUSTABLE HIDDEN TIE BOLT



1) Tie Bolts should not be used to pull the joint together.
2) Tension adjusting nut 1/2 turn past snug.

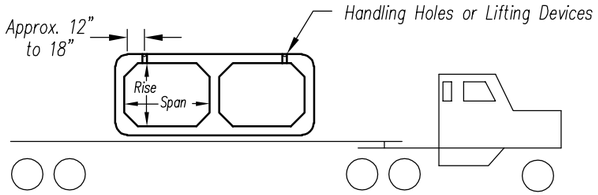


Use joint sealant in the entire joint all around box culvert section.

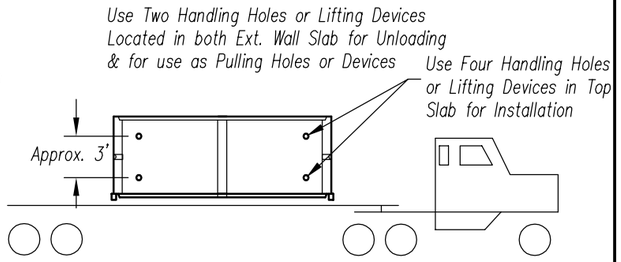
If premolded joint sealant is used in cold weather, it should be kept warm until applied.

HANDLING

TRUCKING POSITION



On Box Sections where the rise is 9' or less, sections will be shipped in the laying position.



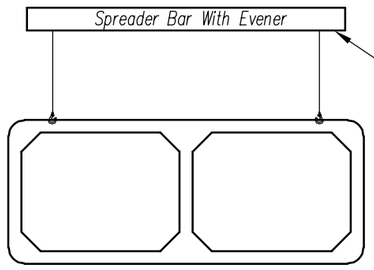
On Box Sections where the rise is greater than 9', sections will be shipped on end.

Box Sections will need to be tipped on the job site to the laying position when shipped on end.

Contractor will need to prepare a soft landing area for tipping.

All Box Culverts will have 4 handling holes or lifting devices in top slab.
Boxes with 8' or greater rise will have 2 handling holes or lifting devices in ea. ext. wall.

LIFTING DEVICE LIFTING DETAIL

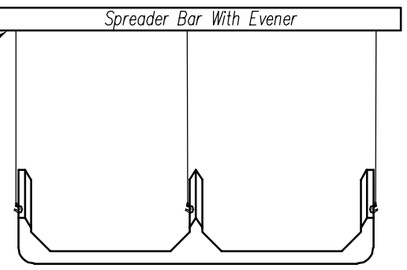


BARREL SECTIONS

Use Spreader Bars or other Lifting Jigs to maintain an Equalized Pick and a Vertical Pick unless otherwise specified on lifting device cut sheet.

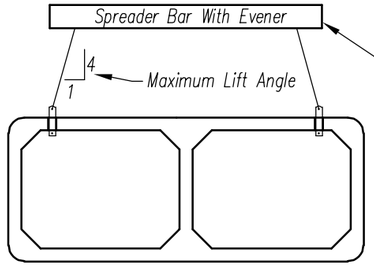
Rigging suppliers may have more stringent requirements based on section weights and cable size.

CONTRACTOR TO PROVIDE ANY DEVICES NECESSARY FOR LIFTING BARREL AND/OR END SECTIONS



END SECTIONS

LIFTING HOLE LIFTING DETAIL

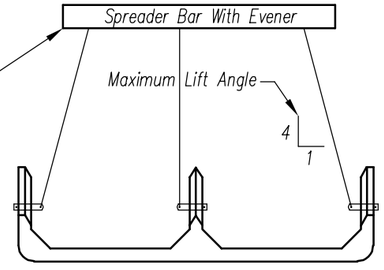


BARREL SECTIONS

Use Spreader Bar long enough to allow a Vertical Pick if possible.
If not, do not exceed maximum lift angle shown.

Rigging suppliers may have more stringent requirements based on section weights and cable size.

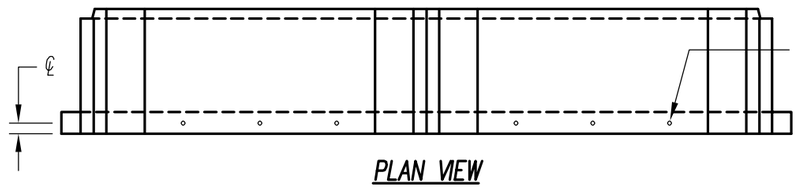
CONTRACTOR TO PROVIDE ANY DEVICES NECESSARY FOR LIFTING BARREL AND/OR END SECTIONS



END SECTIONS

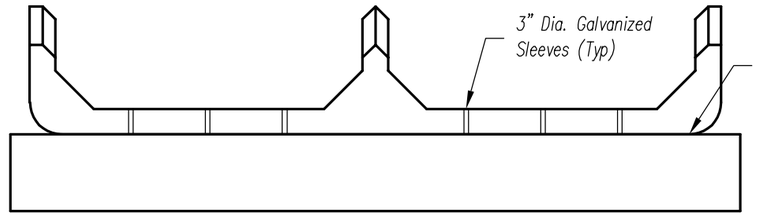
INSTALLATION

CUTOFF WALL CONNECTION



Contractor to drill 7/8" diameter x 6" deep holes thru the 3" sleeves into the cutoff wall and install #6 x 12" rebar dowels (provided). Fill sleeves completely with non-shrink grout (provided).

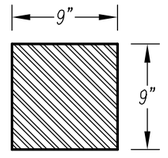
PLAN VIEW



ELEVATION VIEW

HANDLING HOLES / PULL HOLES (If used)

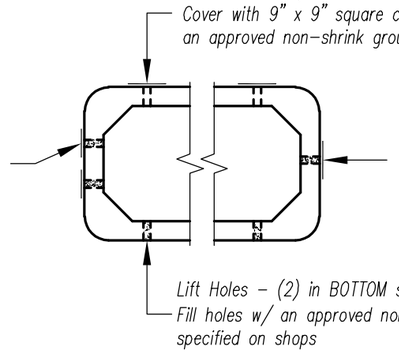
Lifting Holes are formed to be 3" Dia. when used



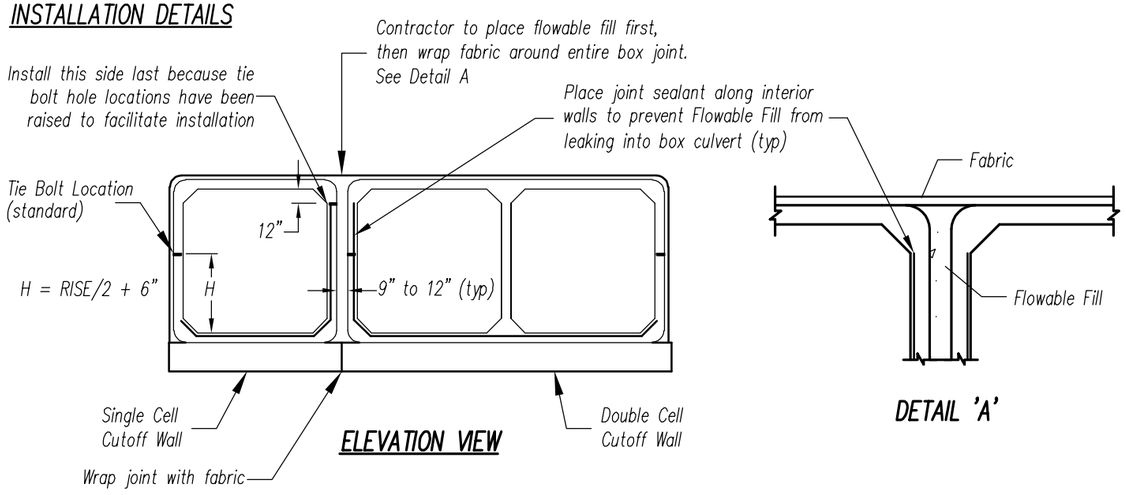
Lift Hole Cover

Self-adhering cover material provided with first shipment of box culvert sections.

(2) Pull Holes in bbl walls w/ 8' or greater rise.
– Cover with 9" x 9" square cover.
Fill holes w/ an approved non-shrink grout if specified on shops



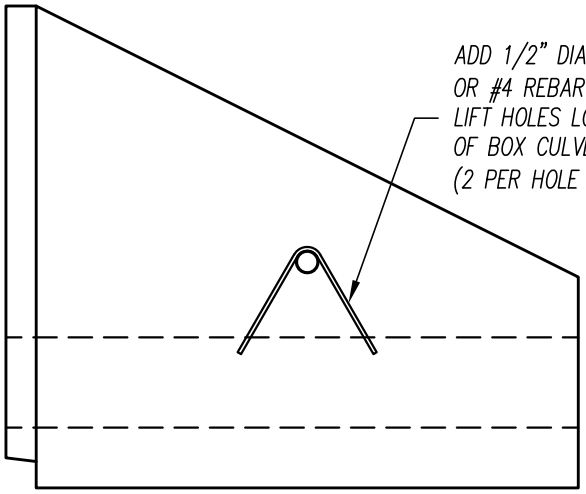
MULTIPLE CELL INSTALLATION DETAILS



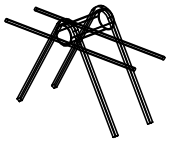
ELEVATION VIEW

DETAIL 'A'

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

** FOR ES#1 W/ 10' RISE OR GREATER, ADJUST DISTANCE FROM END AS SPECIFIED IN END SECTION DETAIL

Holes shall be formed from 3" EMT Tubing
*** DO NOT REMOVE TUBING**

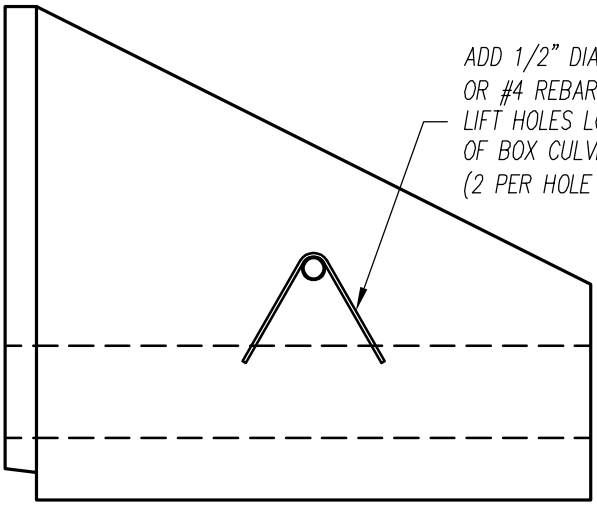
02/17/16 JWB	
11/27/17 JWB	
05/31/18 JWB	
11/29/18 JWB	
01/02/19 JWB	
06/07/21 JWB	

Rinker MATERIALS™ A QUIKRETE® COMPANY

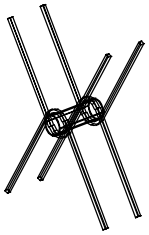
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: BOX CULVERT LIFT HOLE SPECIAL DETAIL PRESTRESS CABLE LOOPS MT ALTERNATIVE
DATE: 02/06/16	
DR'N BY: JWB	
REV: 07/27/21 JWB	DWG NAME: BOX LIFT HOLE - PS CABLE (MT ONLY)

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

** FOR ES#1 W/ 10' RISE OR GREATER, ADJUST DISTANCE FROM END AS SPECIFIED IN END SECTION DETAIL

Holes shall be formed from 3" EMT Tubing
**** DO NOT REMOVE TUBING***

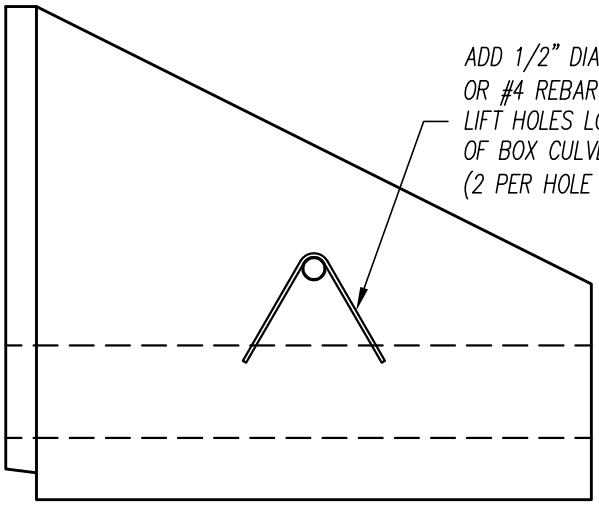
Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

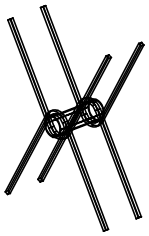
SCALE: NONE	PROJECT: BOX CULVERT LIFT HOLE SPECIAL DETAIL PRESTRESS CABLE LOOPS
DATE: 02/06/16	
DR'N BY: JWB	
REV: 01/02/19 JWB	DWG NAME: BOX LIFT HOLE - PS CABLE (MT ONLY)

02/17/16 JWB
11/27/17 JWB
05/31/18 JWB
11/29/18 JWB

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

FOR RISE 7' OR LESS UNLESS OTHERWISE SPECIFIED

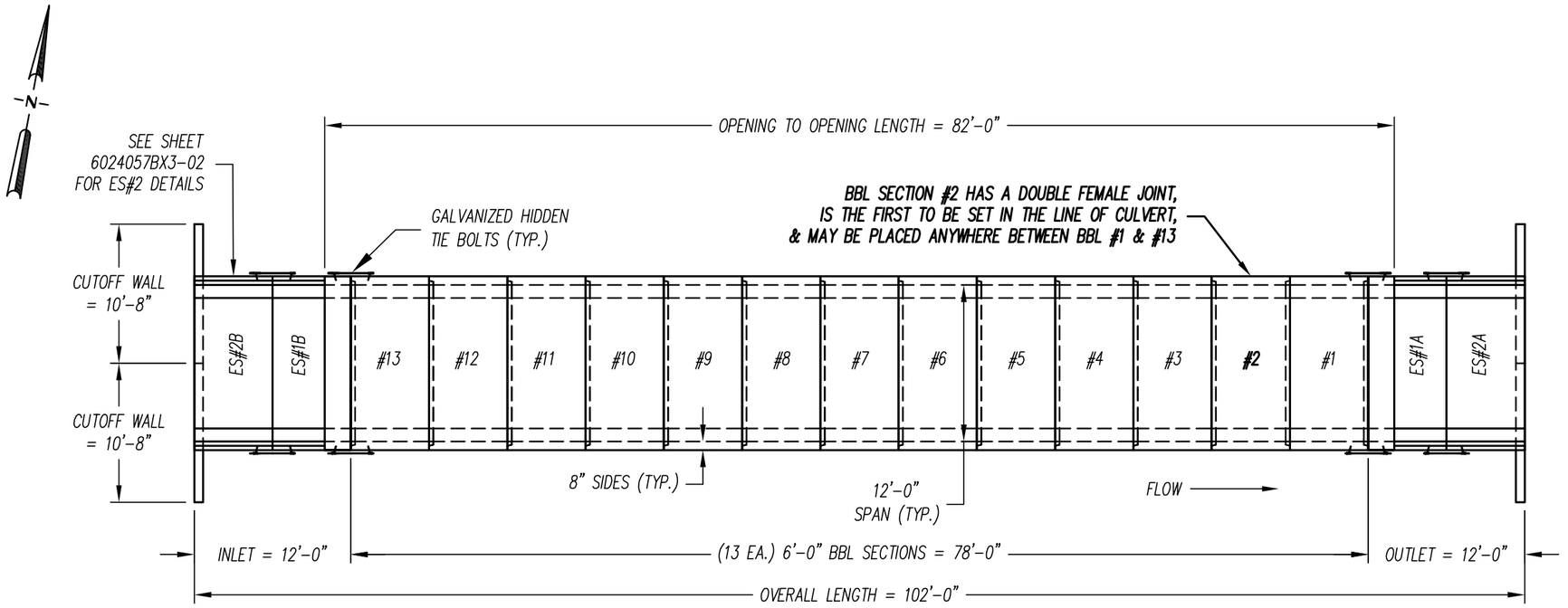
Holes shall be formed from 3" EMT Tubing
** DO NOT REMOVE TUBING*

LIFTING HOLES TYP. FOR ALL BARREL SECTIONS EXCEPT WHEN SHOWN OTHERWISE

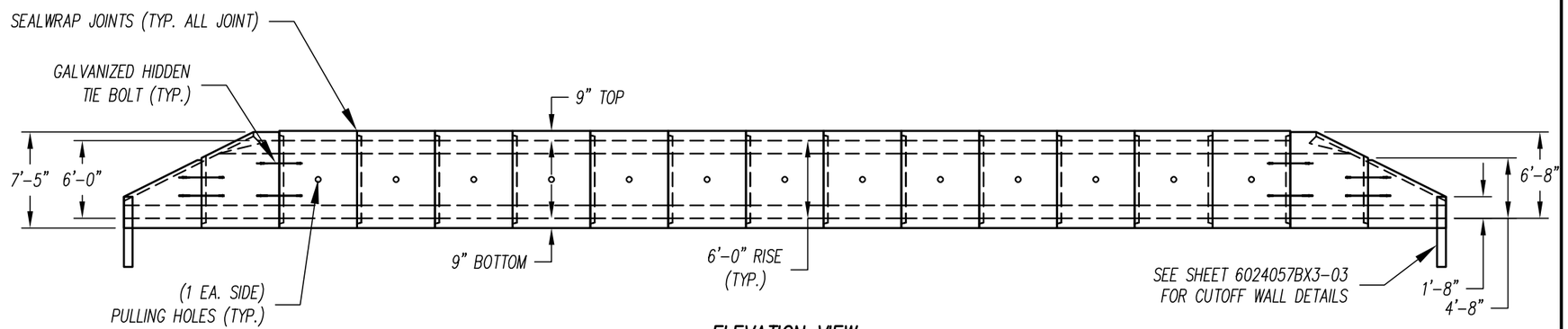
11/27/17 JWB

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: BOX CULVERT PULLING HOLE PRESTRESS CABLE LOOPS
DATE: 02/06/16	
DR'N BY: JWB	
REV: 11/30/18 JWB	DWG NAME: BOXPULLINGHOLE



PLAN VIEW



ELEVATION VIEW

TOLERANCES – PER ASTM C913	
DIMENSIONAL (UP TO 5')	± 1/4"
DIMENSIONAL (5'-10')	± 3/8"
DIMENSIONAL (10' & UP)	± 1/2"
SQUARENESS (UP TO 10')	± 1/2"
SQUARENESS (10' & UP)	± 3/4"
MIN. WALL OR SLAB THICKNESS	GREATER OF 3/8" OR 5% OF THICKNESS
REINF. LOCATION FROM DESIGN	± 1/4"
REINF. COVER	1" MIN.

MATERIAL LIST	
ITEM	QTY.
GALVANIZED HIDDEN TIE BOLTS	16
JOINT SEALANT (1.25" X 14.5')	53
GATORWRAP (12" X 50')	13
SEALWRAP SQUARE (9" X 9")	102
SET GROUT (0.4 CU. FT.)	25
REBAR DOWELS (#6 X 12")	16
CUTOFF WALL CONNECTION PLATES	4

MONTANA
BRIAN S. JENNER
9-4-2024
No. 17275 PE
LICENSED PROFESSIONAL ENGINEER

SECTION WEIGHTS

6'-0" BBL SECTION = 27,500 LBS.
END SECTION #1 = 20,500 LBS.
END SECTION #2 = 14,000 LBS.
CUTOFF WALL U SHAPED = 4,150 LBS.

PLACE OF FABRICATION	HELENA, MT
CONTRACTOR	LEWIS & CLARK COUNTY
RINKER PROJECT #	6024057BX3
STATE TEST (Y OR N)	N
CONCRETE STRENGTH	5000 PSI

NOTES

1. Stencil each box with information as listed below. Center stencil on the inside face of the top haunch of each box culvert section.

DATE OF MANUFACTURE
Rinker MATERIALS™ A QUIKRETE® COMPANY
HELENA
12 X 6 – CROSSING F
STA. 39+39.25 TO 40+17.17
HL-93 / 1'-3' FILL HT.
LEWIS AND CLARK CO., MT

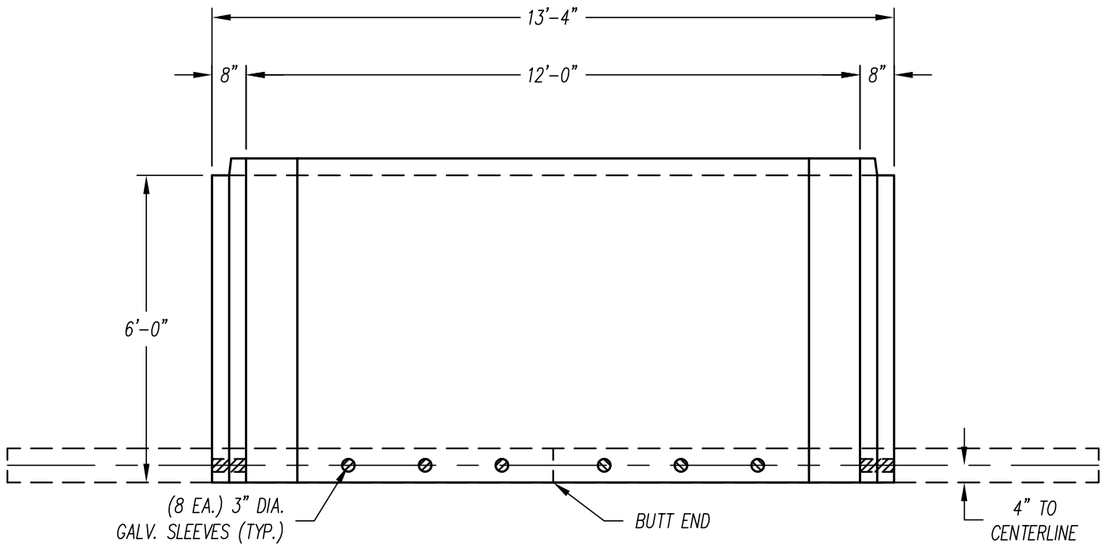
2. Lifting holes are formed by 3 3/16" Dia. Galvanized Tubing.
   - Lifting holes located in the TOP slab of the culvert shall be covered with a 9" x 9" EDM Patch (provided).
   - Lifting holes located in the SIDE WALLS & pull holes of the culvert shall be grouted with an approved non-shrink grout & covered with a 9" x 9" EDM Patch (provided).
   - Lifting holes located in the BOTTOM slab of the culvert shall grouted with an approved non-shrink grout (provided).
3. Section **#2** has a double female joint. This piece is the first to be set in a line of box culvert. **Consult the "Box Culvert Installation Guide" for suggested installation practices.**

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

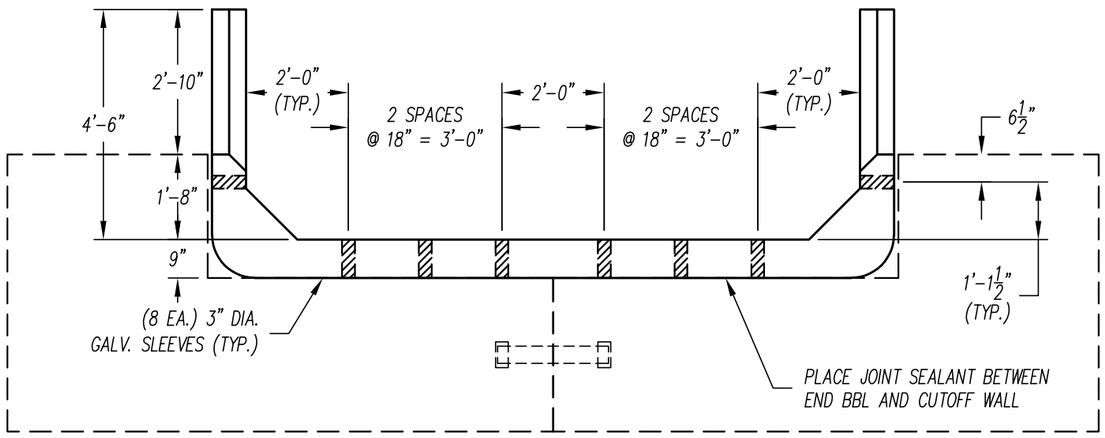
SCALE: NONE	PROJECT: 12'-0" X 6'-0" BOX CULVERT/CROSSING F STA. 39+39.25 TO 40+17.17 LEWIS AND CLARK COUNTY, MT
DATE: 8-15-24	
OR#: 6024057BX3	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX3-01

SPACING FOR 3" DIAMETER GALVANIZED SLEEVES.
CONTRACTOR TO DRILL 1 ½" DIAMETER X 6" DEEP HOLES IN THE CUTOFF WALL AND INSTALL #6 X 12" REBAR DOWELS (PROVIDED)
(FILL SLEEVES COMPLETELY WITH NON-SHRINK GROUT – PROVIDED)

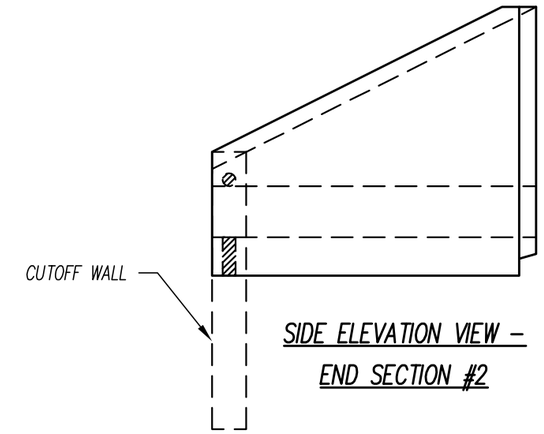
NOTE:
SEE SPECIAL PROVISIONS FOR INSTALLATION REQUIREMENTS FOR BOTH CUTOFF WALL AND CONCRETE SLOPE PROTECTION.



PLAN VIEW – END SECTION #2



ELEVATION VIEW – END SECTION #2

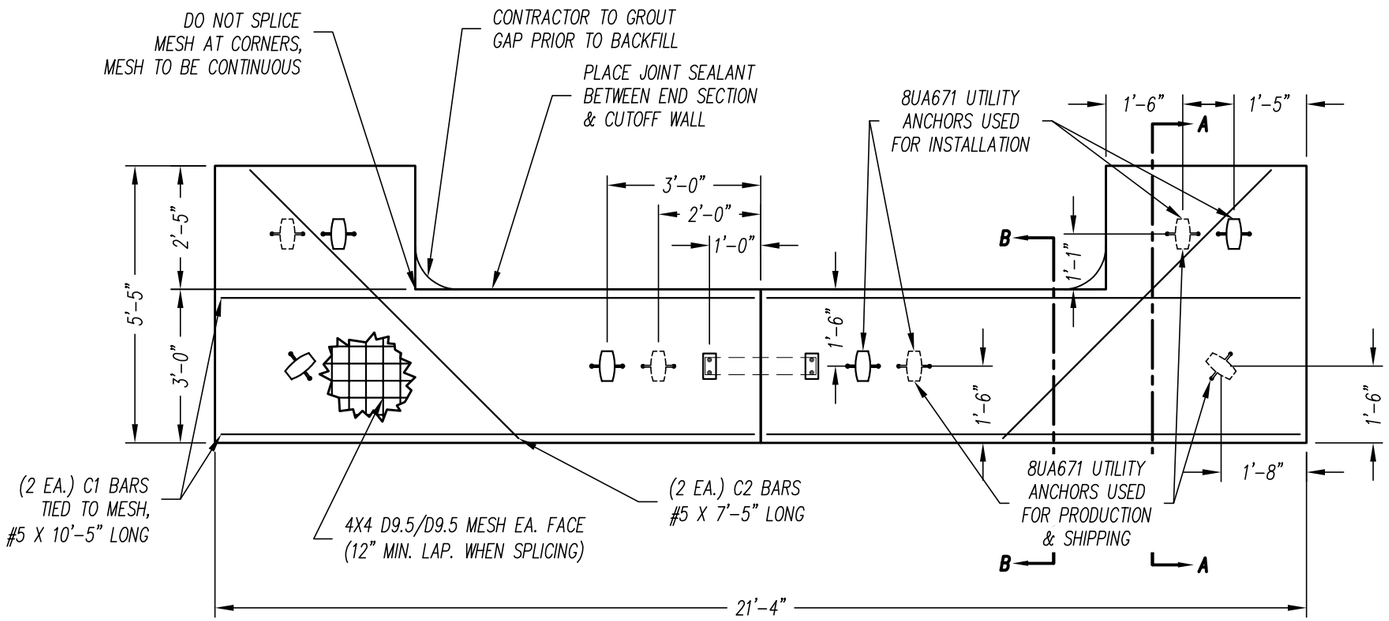


SIDE ELEVATION VIEW – END SECTION #2

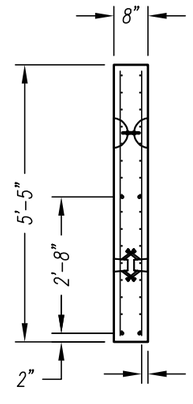
Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

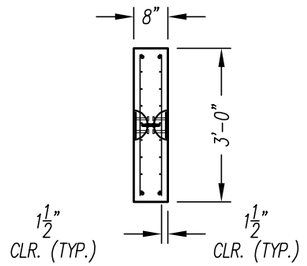
SCALE: NONE	PROJECT: 12'-0" x 6'-0" BOX CULVERT/CROSSING F STA. 39+39.25 TO 40+17.17 LEWIS AND CLARK COUNTY, MT
DATE: 8-15-24	
OR#: 6024057BX3	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK
CHK'D BY: BSJ	DWG NAME: 6024057BX3-02



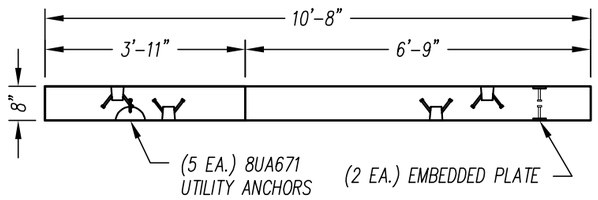
ELEVATION VIEW – CUTOFF WALL (2 PIECES SHOWN)



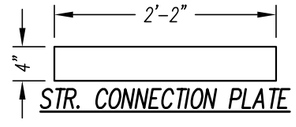
SECTION A–A



SECTION B–B



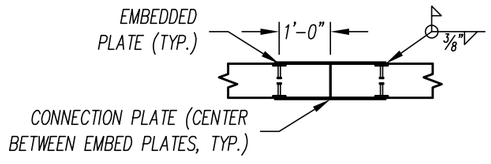
PLAN VIEW – CUTOFF WALL

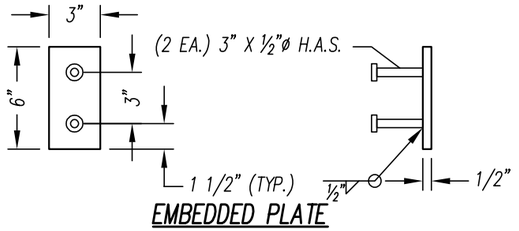


STR. CONNECTION PLATE

26" X 4" X ⅜" PLATE

(4 TOTAL NEEDED)





EMBEDDED PLATE

(8 TOTAL NEEDED)

4 PIECES REQUIRED

CUTOFF WALL = 4,150 LBS.

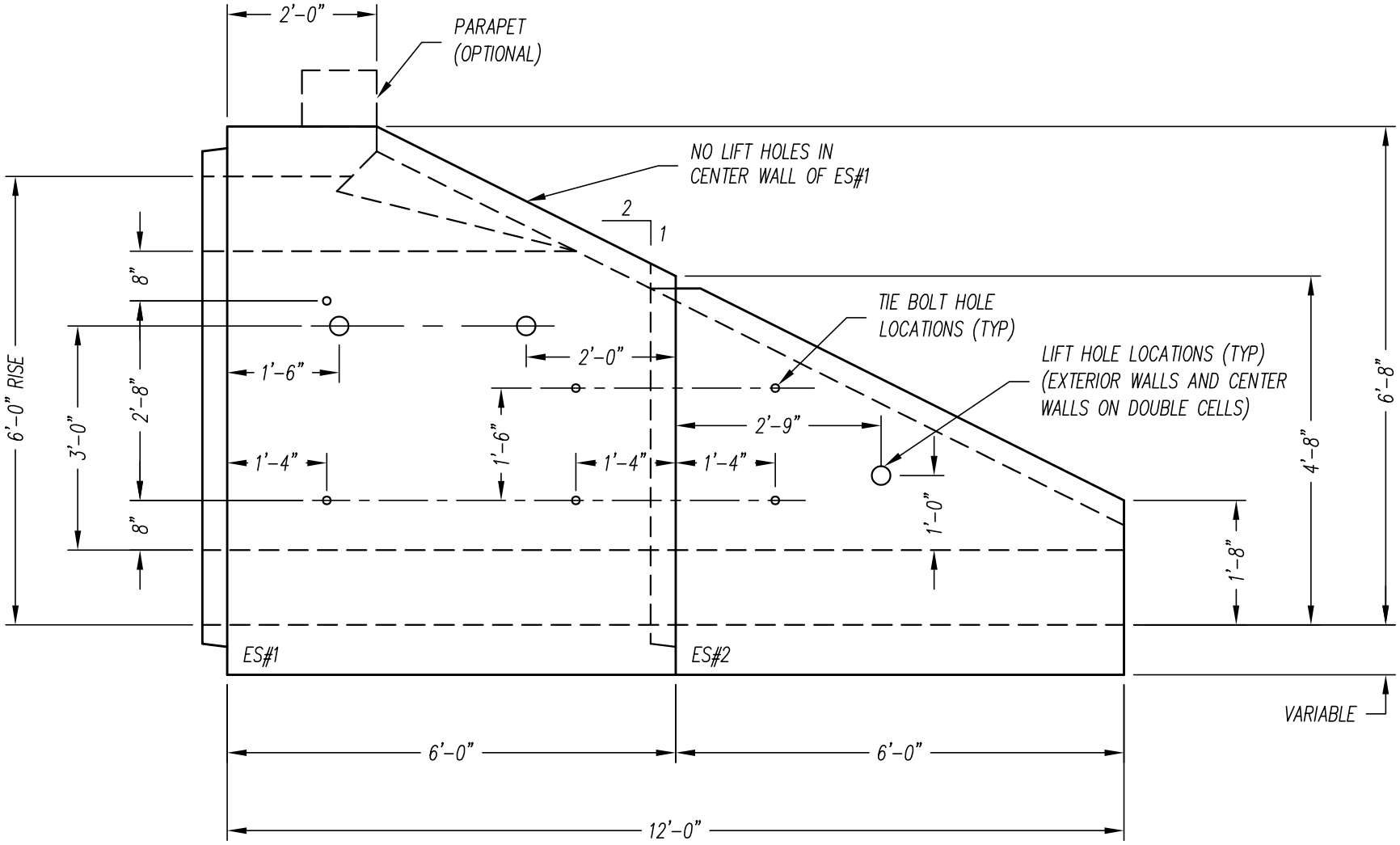
SPACING FOR 3" DIAMETER GALVANIZED SLEEVES.
CONTRACTOR TO DRILL 1 ½" DIAMETER X 6" DEEP HOLES IN THE CUTOFF WALL AND INSTALL #6 X 12" REBAR DOWELS (PROVIDED)
(FILL SLEEVES COMPLETELY WITH NON-SHRINK GROUT – PROVIDED)

NOTE:
SEE SPECIAL PROVISIONS FOR INSTALLATION REQUIREMENTS FOR BOTH CUTOFF WALL AND CONCRETE SLOPE PROTECTION.

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: 12'–0" X 6'–0" BOX CULVERT/CROSSING F STA. 39+39.25 TO 40+17.17 LEWIS AND CLARK COUNTY, MT
DATE: 8–15–24	
OR#: 6024057BX3	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX3–03



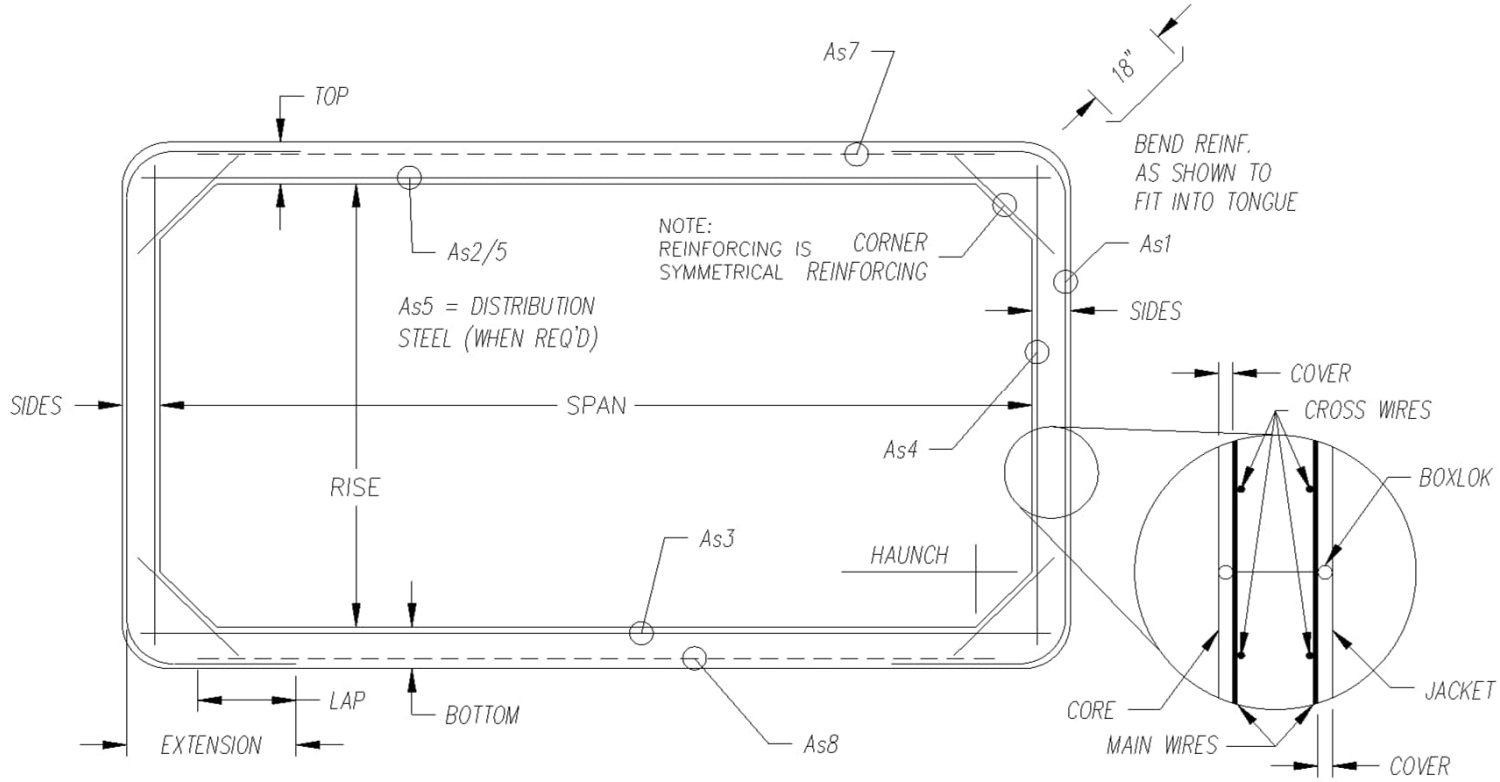
NOTES – LIFT HOLES TO BE 3-1/4" DIA.
TIE BOLT HOLES TO BE 1-1/4" DIA.

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: 6' RISE TYPE 1 END SECTION TIE BOLT AND LIFT HOLE LOCATIONS
DATE: 02/17/16	
DR'N BY: JWB	
REV: 07/26/21 JWB	DWG NAME: LIFT TIE – 6 RISE (MODIFIED)

11/21/17 JWB
01/25/18 JWB
06/27/18 JWB
02/18/19 JWB



Note:
Leg = 9"
for 6" haunch

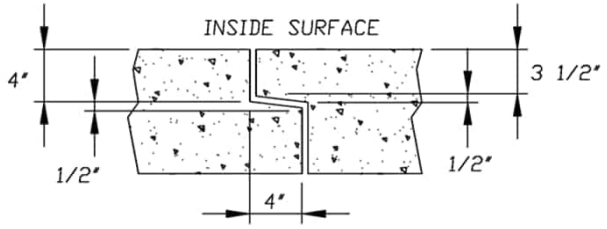
Location	Wire Diameter (in.)	Area Req'd (sq.in./ft.)	Area Prov'd (sq.in. / ft.)	Style	Overall Sheet Length	Sheet Width W/O Overhang
As1	0.299	0.397	0.42	2x8 D7.0/D4.0	13-4	70"
As2/5	0.329	0.51 / 0.216	0.51 / 0.225	2x4 D8.5/D7.5	12-4	70"
As3	0.309	0.450	0.450	2x8 D7.5/D4.0	12-8	70"
As4	0.309	0.216	0.225	4x8 D7.5/D4.0	6-8	70"
As7	0.309	0.216	0.225	4x8 D7.5/D4.0	9-4	70"
As8	0.309	0.216	0.225	4x8 D7.5/D4.0	9-4	70"
					Width Top Overhang =	1/2"
					Width Bottom Overhang =	1/2"
HAUNCH				#3 REBAR OR P/S CABLE X 2'-6" @ 12" O.C.		

Slab Sizes		Box Loks @ 18inch O.C.
TOP Slab Size	9 in	2.0 x 5.75 x 1.0 (40)
BTM Slab Size	9 in	1.0 x 6.75 x 1.0 (40)
SIDES size	8 in	1.0 x 5.75 x 1.0 (40)

Cover			
TOP INSIDE (As2)	1.00	SIDE INSIDE (As4)	1.00
TOP OUTSIDE (As1/7)	2.00	SIDE OUTSIDE (As1)	1.00
BTM INSIDE (As3)	1.00		
BTM OUTSIDE (As1/8)	1.00		

ALL STEEL TO BE OF DOMESTIC ORIGIN OF THE U.S.A.

EXTENSION: 36 inches
LAP: 10 inches
HAUNCH: 12 inches
DESIGN: HL93
STEEL WT: 771 lbs / 6' SECTION
PRODUCT WT: 27500 lbs / 6' SECTION
CONCRETE: 5000 psi
STEEL YIELD: 70000 psi (ASTM A1064)

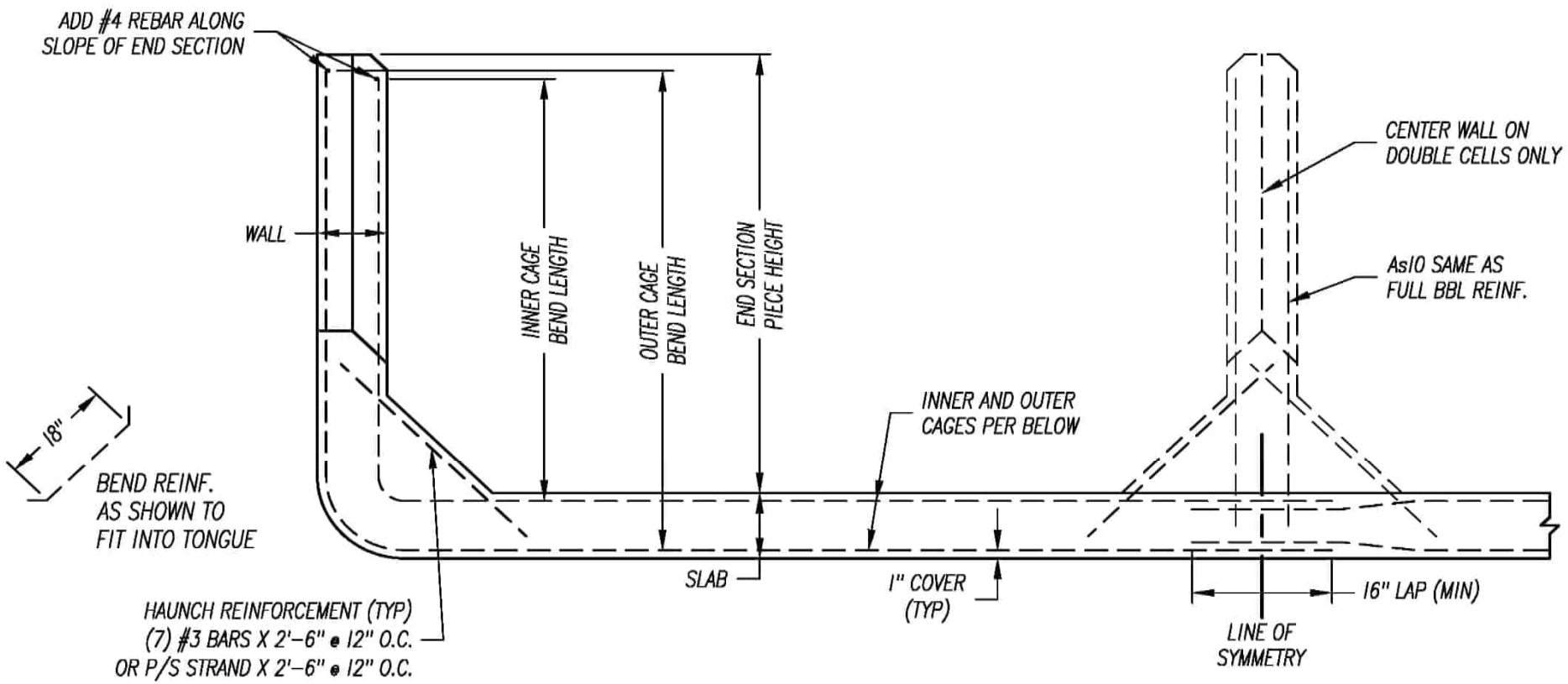


TYPICAL JOINT DETAIL

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701

SCALE	NONE	**SGL 12x6 BOX CULVERT**	
DATE	8/9/24	**DESIGN FILL = 1 FT - 3 FT**	
DRN BY	BSJ	**INSTALLED FILL = 1 FT - 3 FT**	
RS#	6024057BX3	**CUSTOMER**	Lewis and Clark County
REV DATE		**DWG NAME**	



Size (ft)		
Span	x	Rise
12	x	6
Single Cell		

Steel Areas (sq.in. / ft.)					(inches)	
ES#1	ES#2	ES#3	ES#4	ES#5	SLAB	WALL
Full BBL	0.73	*	*	*	9	8
20500	14000	*	*	*	Conc lbs/pc	
771	786	*	*	*	Steel lbs/pc	

Total ES Length (ft)	Sheet Length	# Sheets per End
12	12.00	4

Mesh Style Used							
2	x	8	D	12.5	/	D	5.0

Sht Weight (lbs)
197

Section Lengths (ft)				
ES#1	ES#2	ES#3	ES#4	ES#5
6	6	0	0	0

Inner Cage Bend (in)				
ES#1	ES#2	ES#3	ES#4	ES#5
0	52	0	0	0

End Section Piece Heights (ft)				
ES#1	ES#2	ES#3	ES#4	ES#5
6.67	4.67	0.00	0	0

Outer Cage Bend (in)				
ES#1	ES#2	ES#3	ES#4	ES#5
0	61	0	0	0

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701

SCALE	NONE	SGL 12x6 BOX CULVERT	
DATE	8/9/24	END SECTION REINFORCEMENT DETAILS	
DRN BY	BSJ	STANDARD 2:1 END SECTION DESIGN	
RS#	6024057BX3	CUSTOMER	Lewis and Clark County
REV DATE		DWG NAME	

Sht:____of____
By:BSJ Chk:____
8/9/2024 11:28:14 AM
Culvert p. 1 of 14

Eriksson Culvert v6.3.1

Filename: SGL 12x6 HL93 01-03 fill.etcx

Project: SGL 12x6 HL93 01-03 fill
Task :
Client :
Job No.:

CULVERT PROPERTIES
==========
Type of Culvert: Precast Specification : LRFD 9th Edition
Operating Mode : Analysis

Physical Dimensions

No. of Boxes: 1 Name: BoxCulvert
Clear Span : 12.0000 ft
Clear Height: 6.0000 ft Skew Angle : 0.00 deg
Length : 6.0000 ft Bottom Slab Support: Full Slab
Fill Depth Range: Maximum : 3.00 ft Minimum : 1.00 ft Increment : 2.00 ft
Haunches: Top, Length: 12.0000 in Height: 12.0000 in
Bottom, Length: 12.0000 in Height: 12.0000 in
Member Thicknesses: Top Slab: 9.0000 in Bot Slab: 9.0000 in
Ext Wall: 8.0000 in
Wall Joint: None

Material Properties

Concrete: Strength,f'c : 5.000 ksi Density : 0.150 kcf Elasticity,Ec: 4592 ksi
Type : Normal Weight Density Modification Factor : 1.00
Fr Factor : 0.24 Gamma1 : 1.60 Gamma3 : 0.75 (user defined)
Steel: Yield,fy : 70.00 ksi fss Limit : 0.65fy Elasticity,Es: 29000 ksi
Yield,fyv : 60.00 ksi Diameter : 1.000 in Type : Mesh
Soil: Density : 0.120 kcf Slope Factor: 1.150
Poisson's : 0.5
Fe Factor : 1.150 (Maximum for Compacted Fill)
Serviceability, Gamma-e: 1.00

Loads

Live Load: Vehicle: (AA) HL-93 - Design Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	8.00	0.00
2	32.00	14.00
3	32.00	14.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: yes
Tandem: Axle 1: 25.00 k, Axle 2: 25.00 k, Axle Spacing: 4.00 ft
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Inventory Rating Load Factor: 1.75 Operating Rating Load Factor: 1.35
Design Load Combinations: Strength I
Override MPF: no
Override DLA: no
Include Lane Load : no Max. No. of Lanes: Computed by Program
Traffic Direction** : Lanes Parallel to Main Reinforcement
Neglect Live Load for Large Fill Depths: no
Apply Surcharge at Fill Depths > 2 ft : yes
Compute Surcharge Depth: yes
Dead Load: Future Wearing Surface : 0.00 klf Add. Dead Load : 0.00 klf
Concentrated Loads : none
Lateral Soil Loads: Max. Equiv. Fluid Press.: 60.00 pcf Min. Equiv. Fluid Press. : 30.00 pcf
Include Additional Uniform Horiz. Load: no
Include Additional Uniform Vert. Load: no
Buoyancy Check : no
Fluid Pressures : Apply Water Press. : yes, interior only
: Interior Pressure Head : 0.00 ft
Foundation Model : Uniform Loads
Seismic Analysis : Do not include

Load and Resistance Factors

	Max	Min
DC:	1.250	0.900
DW:	1.500	0.650
EV:	1.300	0.900
EH:	1.350	0.900
WA:	1.000	
EQ:	1.000	

LL I : 1.750 LL II : 1.350 LL Legal : 1.750 LL Extreme : 0.500
Ductility: 1.000 Importance: 1.000 Redundancy, non-earth: 1.000 Redundancy, earth: 1.000
Condition: 1.000 System : 1.000
Phi Shear: 0.900 Phi Moment: 1.000 PM Compression: 0.750 PM Tension : 0.900

Load Factor Multipliers, Design Mode: 1.00 Analysis Mode: 1.00

Reinforcement

Reinforcement Covers	Exterior	Interior
Top Slab:	2.0000 in	1.0000 in
Walls :	1.0000 in	1.0000 in
Bot Slab:	1.0000 in	1.0000 in

Assigned reinforcement:

Location	Mark	Size	Spacing (in)	# of Layers
Top Slab Inside	A100 (AS2)	D8.5	2.0000	1
Bottom Slab Inside	A200 (AS3)	D7.5	2.0000	1
Top Slab Outside	A300 (AS7)	D7.5	4.0000	1
Bottom Slab Outside	A400 (AS8)	D7.5	4.0000	1
Top Corner	A1 (AS1)	D7	2.0000	1
Bottom Corner	A2 (AS1)	D7	2.0000	1
Ext. Wall Inside	B1 (AS4)	D7.5	4.0000	1
Ext. Wall Outside	B2 (AS1)	D7	2.0000	1
Longitudinal	C1 (AS6)	D4	8.0000	1
Top Distribution	C100 (AS5)	D7.5	4.0000	1
Bottom Distribution	C200	D4	8.0000	1

Analysis Options

LL Analysis	: Automatically Set Traffic Direction to Account for Skew Effects: yes
	Limit LL Distribution Width to Culvert Length for: None
	Combine Longitudinal Axle Distribution Overlaps: Yes, Max of 2 Axles
	Combine Transverse Axle Distribution Overlaps: No
	Axle Placement Increment for Moving Load Analysis: 20
	Include Impact on Bottom Slab: yes
	Always Distribute Wheel Load: yes
	Deflection Criteria : 1/800
	Approach Slab will be Used: no
Reinforcement	: Always Include Distribution Steel: no
	Distribution Slab Provided: no
	User Defined Longitudinal Steel: yes
	Max. As used in Vc Calcs: 2.00 in2/ft
	Distribute Minimum Reinforcement per Face: yes
	Use individual Member Thicknesses for Min Steel: no
	Epoxy coat steel: no
	Use M-dimension for bar length calcs.: no
Slenderness	: Checked K Factor: 2.00
Analysis Modeling	: Use Haunches in the Structural Analysis Model: yes
Critical Sections	: Flexure critical section location: end of haunch
	Shear critical section location: dv beyond haunch
	Use Max. Moment with Max. Shear at the Critical Section for Shear: no
	Include depth of haunch for critical sections: no
Flexure	: Ignore Axial Thrust: no
	Use Eq. 12.10.4.2.4a-1: yes Nu Multiplier: 1.00
Shear	: Always Check Iterative Beta Method
Environmental	: Apply duribility factors: no
Load Combinations	: LRFD min/min: no

Sht:____of____
By:BSJ Chk:____

Eriksson Culvert v6.3.1

Filename: SGL 12x6 HL93 01-03 fill.etcx

8/9/2024 11:28:14 AM
Culvert p. 3 of 14

ANALYSIS RESULTS
==========

Top Slab Thickness = 9.00 in
Bottom Slab Thickness = 9.00 in
Exterior Wall Thickness = 8.00 in

Modular Ratio (N) = 6.32 Max. Steel Ratio = 0.020
Design Span = 12.67 ft Design Height = 6.75 ft

Volume of Concrete: 1.111 cy/ft

Note: Design and analysis results do not include force effects from stipping and handling stages

M dimension = 2' 10" (method of equivalent capacity)
= 4' 12" (method of contraflexure - ASTM)

Reinforcing Steel Schedule

Location	Mat Mark	Sheets Included	Layers	As,prv (in2/ft)
Top Slab (int)	A100 (AS2)	Top	1	0.510
Bot Slab (int)	A200 (AS3)	Bot	1	0.450
Top Slab (ext)	A300 (AS7)	Top	1	0.225
Bot Slab (ext)	A400 (AS8)	Bot	1	0.225
Corner Top-U	A1 (AS1)	Top	1	0.420
Corner Bottom-U	A2 (AS1)	Bot	1	0.420
Ext Wall (int)	B1 (AS4)	L&R	1	0.225
Ext Wall (ext)	B2 (AS1)	L&R	1	0.420
Top Slab (int- 1)	C100 (AS5)	Top	1	0.225
Bot Slab (int- 1)	C200	Bot	1	0.060
Temperature (1)	C1 (AS6)	Top	1	0.060
Temperature (1)	C1 (AS6)	Bot	1	0.060
Temperature (1)	C1 (AS6)	L&R	1	0.060
Temperature (1)	C1 (AS6)	L&R	1	0.060

Note: A denotes flexural steel, B denotes vertical steel, C denotes longitudinal steel

AS Bar Marks

Location	As prv in2/ft
Transverse Side Wall - Outside Face (AS1)	0.420
Transverse Top Slab - Inside Face (AS2)	0.510
Transverse Bottom Slab - Inside Face (AS3)	0.450
Transverse Side Wall - Inside Face (AS4)	0.225
Distribution Top Slab - Inside Face (AS5)	0.225
Distribution Top Slab - OutSide Face (AS6)	0.060
Transverse Top Slab - Outside Face (AS7)	0.225
Transverse Bottom Slab - Outside Face (AS8)	0.225

Notes: 1.) Final areas of steel provided must be checked in analysis mode

Sheet Inventory

Interior sheets - 4 sheet layout with laps located in the wall

Sheet Loc.	Mat Mark	Zone	Line Wires Size	Spac. (in)	Length (ft-in)	Area (in2/ft)	H leg (ft-in)	V leg (ft-in)	Cross Wires(L,tot= 5-11) Mat Mark	Size	Spac. (in)	Area (in2/ft)	Wgt (lbs)
Top	A100	Base	D8.5	2.00	14-12	0.510	12- 2	1- 5	C100	D7.5	4.00	0.225	223
										(1) sheets, Total weight:			223
L&R	B1	Base	D7.5	4.00	6- 2	0.225			C1	D4	8.00	0.060	47
										(2) sheets, Total weight:			94
Bot	A200	Base	D7.5	2.00	14-12	0.450	12- 2	1- 5	C200	D4	8.00	0.060	156
										(1) sheets, Total weight:			156

Exterior sheets - 4 sheet layout with laps located in the slab

Sheet Loc.	Mat Mark	Zone	Line Wires Size	Spac. (in)	Length (ft-in)	Area (in2/ft)	H leg (ft-in)	V leg (ft-in)	Cross Wires(L,tot= 5-11) Mat Mark	Size	Spac. (in)	Area (in2/ft)	Wgt (lbs)
Top	A300	Base	D7.5	4.00	13- 2	0.225							61
										(1) sheets, Total weight:			61
L&R	B2	Base	D7	2.00	14- 3	0.420	3- 6	7- 3	C1	D4	8.00	0.060	141
	A1	Base	D7	2.00	14- 3	0.420	3- 6	7- 3	C1	D4	8.00	0.060	18
	A2	Base	D7	2.00	14- 3	0.420	3- 6	7- 3	C1	D4	8.00	0.060	18

Eriksson Culvert v6.3.1 Sht:____of____
 By:BSJ Chk:____
Filename: SGL 12x6 HL93 01-03 fill.etcx 8/9/2024 11:28:14 AM

(2) sheets, Total weight: 354

Bot	A400	Base	D7.5	4.00	13- 2	0.225		C1	D4	8.00	0.060		79

(1) sheets, Total weight: 79

Weight of Steel: 161 lb/ft Total weight of all sheets: 967

Notes:
Epoxy coating may be needed for A1, A300, and some C1 reinforcement, check with governing agency.
L&R - left and right, TC - top corner, BC - bottom corner, INT - interior walls, EXT - exterior walls
Nested line wires are additive to the base line wires, but nested cross wires replace base cross wires.
Adder sheets may require cross wires, check with mesh supplier.

Summary of Ratings Table:

			Flexure					Shear				
Truck	ILF	OLF	Fill	Member	Location	IR	OR	Fill	Member	Location	IR	OR
(AA)HL-93	1.75	1.35	1.99	2	MID	1.07	1.39	1.00	2	LT	1.02	1.32

Critical Sections Summary: Flexure

Member 1: (Exterior Wall), Thickness = 8.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
BOT	16.50	-16.86	13.18	16.08	6.85	19.70	1.00	0.42	6.87	1.25	1.62	AA	1.99
MID	40.50	0.35	1.45	8.78	6.85	9.23	1.00	0.23	6.87	7.51	9.74	AA	1.00
MID-	40.50	-17.17	13.18	16.08	6.85	19.70	1.00	0.42	6.87	1.19	1.54	AA	1.99
TOP	16.50	-17.98	13.18	16.08	6.85	19.70	1.00	0.42	6.87	1.13	1.46	AA	1.99

Member 2: (Top Slab), Thickness = 9.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	16.00	-7.90	2.64	16.08	6.85	16.94	1.00	0.42	8.69	2.28	2.96	AA	1.00
MID	76.00	20.90	-0.72	22.27	7.84	22.04	1.00	0.51	8.69	1.07	1.39	AA	1.99
MID-	76.00	0.20	2.35	8.78	6.85	9.60	1.00	0.23	8.69	NC	NC	AA	3.00
RT	16.00	-7.90	2.64	16.08	6.85	16.94	1.00	0.42	8.69	2.28	2.96	AA	1.00

Member 4: (Bottom Slab), Thickness = 9.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	16.00	-5.77	3.94	18.53	7.85	19.80	1.00	0.42	8.69	5.13	6.65	AA	1.99
MID	76.00	18.59	-0.22	19.78	7.85	19.71	1.00	0.45	8.69	1.09	1.41	AA	1.99
MID-	76.00	0.29	3.43	10.09	7.85	11.28	1.00	0.23	8.69	NC	NC	AA	3.00
RT	16.00	-5.77	3.94	18.53	7.85	19.80	1.00	0.42	8.69	5.13	6.65	AA	1.99

Critical Sections Summary: Vertical Shear

Member 1: (Exterior Wall), Thickness = 8.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
BOT	22.35	2.24	15.9	13.14	6.56	10.02	2.000	11.13 b	0.00	0.00	0.00	6.56	8.50	AA	1.00
MID	40.50	1.22	0.3	1.45	6.69	19.59	3.836	21.76 a	0.00	0.00	0.00	21.88	28.36	AA	1.00
MID-	40.50	0.64	16.3	13.14	6.56	10.02	2.000	11.13 b	0.00	0.00	0.00	12.10	15.68	AA	1.00
TOP	22.35	-1.67	17.8	13.18	6.56	10.02	2.000	11.13 b	0.00	0.00	0.00	7.31	9.48	AA	1.99

Member 2: (Top Slab), Thickness = 9.00 in

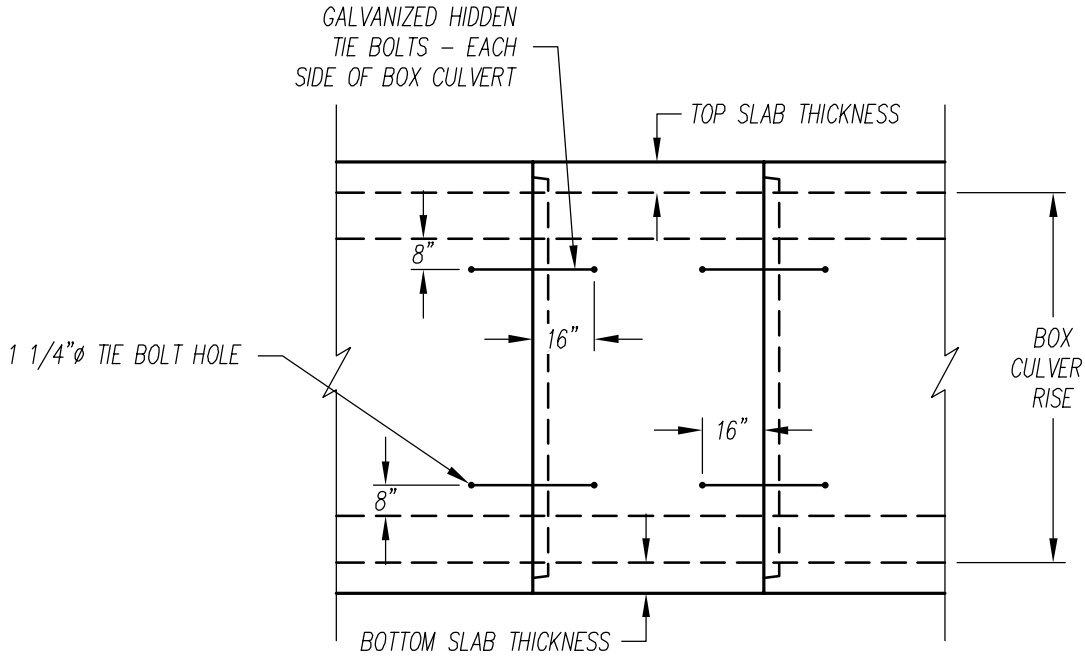
Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	22.48	10.26	7.5	2.64	6.56	10.40	2.076	11.55 a	0.00	0.00	0.00	1.02	1.32	AA	1.00
MID	76.00	3.80	20.1	-1.08	7.49	10.32	1.806	11.46 a	0.00	0.00	0.00	2.72	3.52	AA	1.00
MID-	76.00	3.80	1.2	1.93	6.69	13.42	2.628	14.91 a	0.00	0.00	0.00	3.53	4.58	AA	1.00
RT	22.48	10.26	7.5	2.64	6.56	10.40	2.076	11.55 a	0.00	0.00	0.00	1.02	1.32	AA	1.00

Member 4: (Bottom Slab), Thickness = 9.00 in

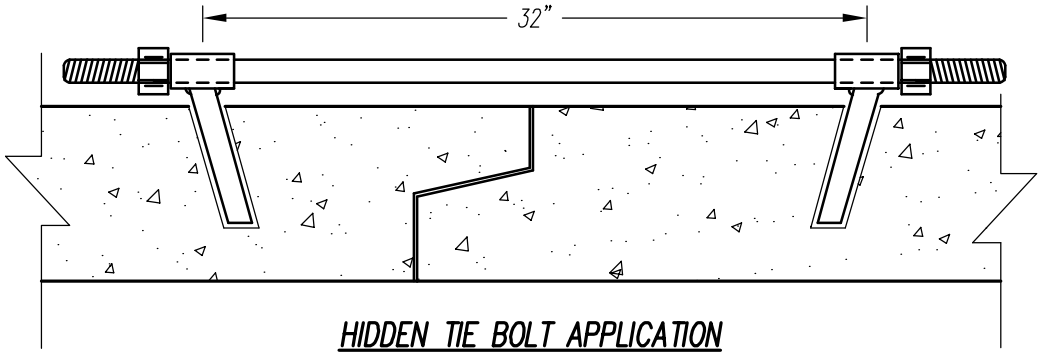
Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	22.75	7.74	3.1	3.94	7.56	14.46	2.506	16.07 a	0.00	0.00	0.00	2.35	3.04	AA	1.99
MID	76.00	0.17	17.4	-0.42	7.54	10.37	1.803	11.52 a	0.00	0.00	0.00	61.32	79.50	AA	1.00
MID-	76.00	0.17	0.0	3.01	7.69	29.53	5.031	32.81 a	0.00	0.00	0.00	NC	NC	AA	1.00
RT	22.75	7.74	3.1	3.94	7.56	14.46	2.506	16.07 a	0.00	0.00	0.00	2.35	3.04	AA	1.99

Eriksson Culvert v6.3.1 Sht:____of____
 By:BSJ Chk:____
Filename: SGL 12x6 HL93 01-03 fill.etcx 8/9/2024 11:28:14 AM

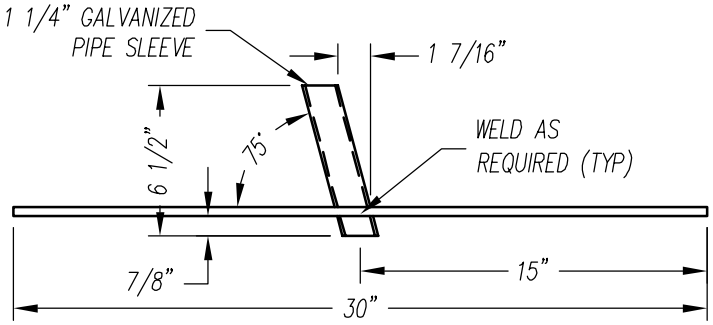
Vc Calculation By: a - Iterative Beta, b - Constant Beta, c - Box Culvert, d - Standard/Arema



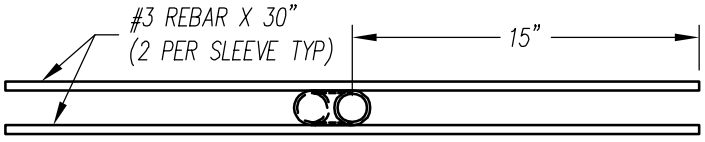
ELEVATION VIEW – BARREL SECTIONS WITH HIDDEN TIE BOLT



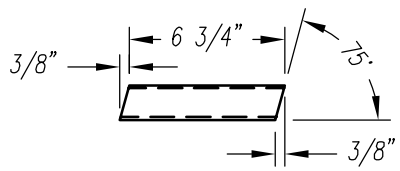
HIDDEN TIE BOLT APPLICATION



TOP VIEW



END VIEW



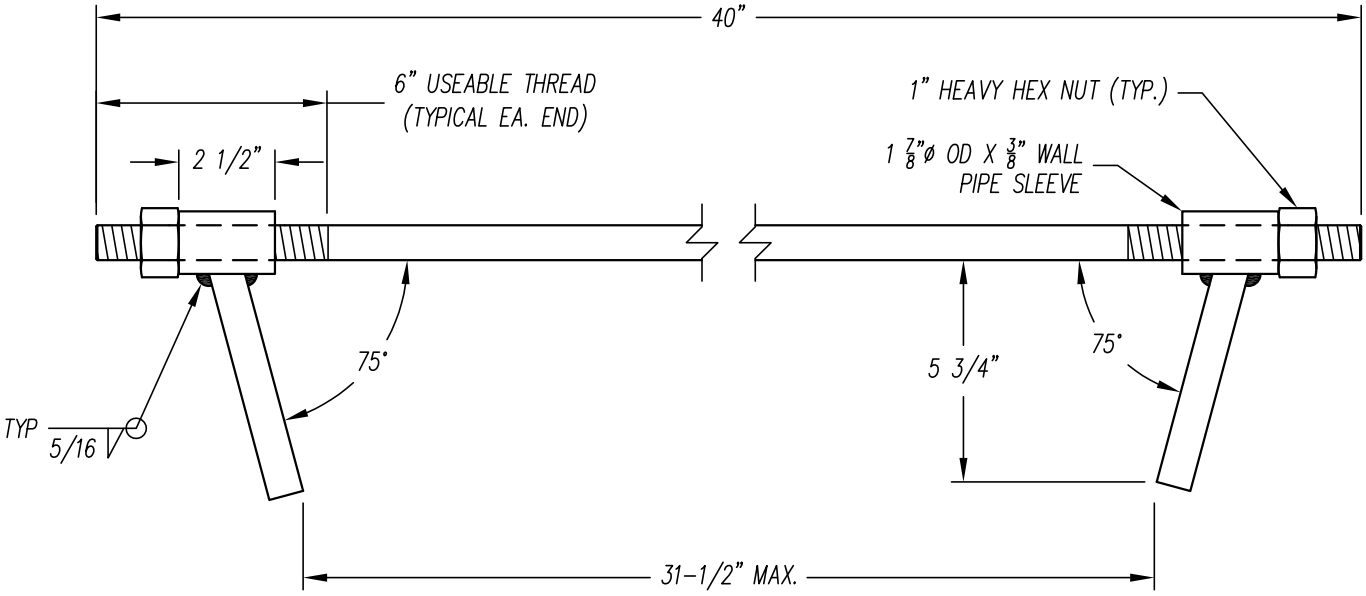
SLEEVE DETAIL

1) Tie Bolts should not be used to pull the joint together.
2) Tension adjusting nut 1/2 turn past snug.

02/17/16 JWB

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: TIE BOLT HOLE LOCATION DETAIL
DATE: 02/06/16	
DR'N BY: JWB	
REV: 11/27/17 JWB	DWG NAME: TIE BOLT HOLE LOCATION – 2



1. Tie bolts are manufactured from 29/32" diameter material conforming to ASTM A36.
2. Standard 1" diameter threads are rolled on adjusting bolts.
3. Heavy Hex Nuts conform to ASTM A563.
4. The welded pipe sleeve conforms to ASTM A519
5. Welding and weld inspection are done in accordance with AWS/ANSI D1.1-94 Structural Welding Code.
6. Tie bolt assembly is hot dip galvanized in accordance with ASTM A153 / ASTM F2329.

FORTERRA™
Rapid City, South Dakota
2046 Samco Road, Suite 2
Rapid City, SD 57702
(605) 718-4111

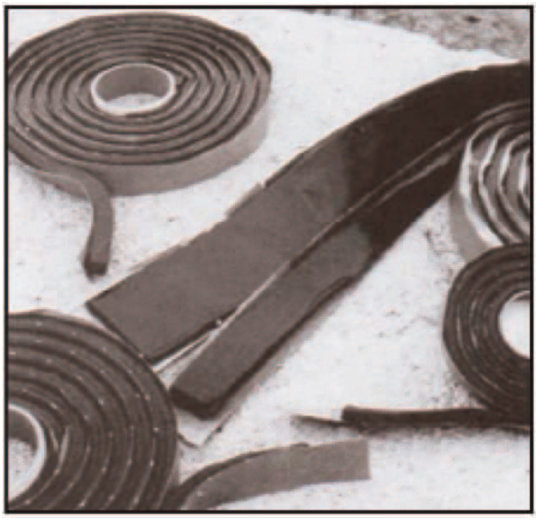
SCALE: NONE	PROJECT: GALVANIZED HIDDEN TIE BOLT
DATE: 2/4/13	
DR'N BY: TDE	
REV: 1/14/16 REM	DWG NAME: HIDDEN TIE BOLT

EZ-STIK

PREMIUM BUTYL JOINT SEALANT

What It Is

EZ-STIK is a premium preformed butyl joint sealant that is supplied in rope form. Containing a higher proportion of butyl rubber, EZ-STIK It is carefully blended from uncured butyl rubber and other solids and will not shrink, crack, or dry out. Although clean to handle, it provides excellent adhesion and cohesion to a wide variety of surfaces - concrete, metal, most concrete coatings, glass, wood, and painted surfaces.



Why It's Better

- Increased proportion of butyl rubber content.
- Premium packaging.
- Wide variety of sizes and styles.
- All-weather performance.
- Good adhesion to dry concrete, commonly specified concrete coatings, steel, glass, or painted surfaces.
- Coated release paper for easy installation.
- Long service life.
- Cohesive properties allow for joint movement.
- Compatible for use with rubber O-Ring designs.
- Low moisture vapor transmission rate (MVTR).
- Special primers available for use on damp, contaminated, or difficult surfaces.

How It Performs

EZ-STIK BUTYL JOINT SEALANT *meets or exceeds all requirements of the following Standards, Specifications and/or Test Methods:*

ASTM C 990 - *Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants; Section 6.2 Butyl Rubber Sealants*

AASHTO M 198 - *Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets*

Typical Applications

- Sanitary Manhole Joints
- Stormwater Manhole Joints
- Irrigation and Drainage Systems
- Box Culverts
- Elliptical/Arch Pipe
- Architectural Foundations
- Underground Utility Vaults
- Stormwater Treatment Structures
- Stormwater Inlet Structures
- On-Site Treatment Tanks
- Grease Interceptors
- Wet Wells

Scan (or click) Here To View More Info On This Product On The Web!

PRESS-SEAL GASKET CORPORATION
Protecting Our Planet's Clean Water Supply
Press-Seal Gasket is an ISO 9001:2008 Registered & ISO 14001:2004 Compliant Company

800-348-7325 Fax (260) 436-1908
email: sales @press-seal.com
web: www.press-seal.com

Made in USA

VERSION 9.13

EZ-STIK

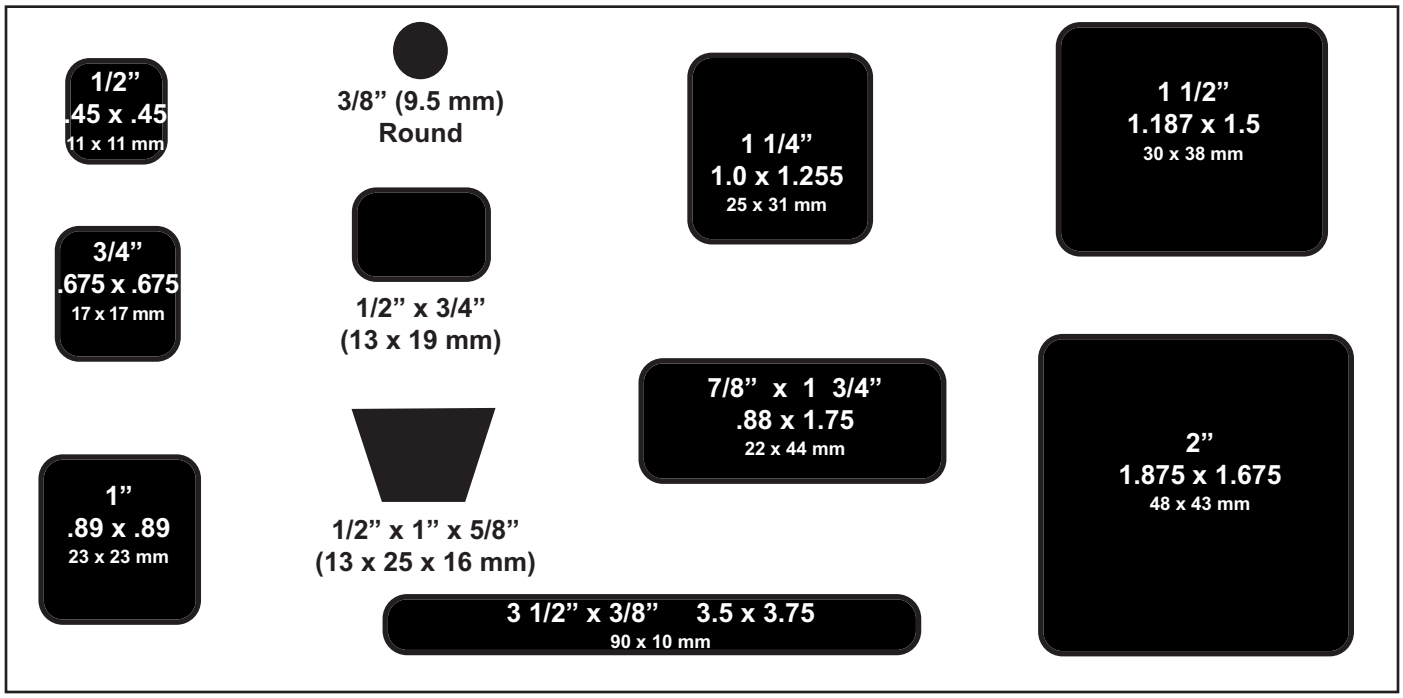
SPECIFICATION and SELECTION GUIDE

Submittal Specification

The joints and/or joint surfaces of the structures shall be sealed with a butyl-rubber-based preformed flexible sealant conforming to ASTM C-990, paragraph 6.2. The material shall be PRO-STIK or EZ-STIK as supplied by PRESS-SEAL GASKET CORPORATION, Fort Wayne, Indiana, or approved equal. The butyl material shall consists of 50% (min.) butyl rubber and shall contain 2% or less volatile matter.

For preformed joint sealants, the sealant shall be sized such that the joint is filled to 50% (min.) of its annular volume when fully assembled, and the sealant shall have the ends kneaded together at the overlap. Primer and/or adhesive as recommended by the sealant supplier shall be employed for adverse, critical, or other applications.

Testing of joints and compliance with construction requirements shall be conducted in strict conformance with the requirements of the sealant supplier.



Custom Sizes Available Upon Request

Also Available in Trowelable Bulk and Easy to Pump Bulk

All sizes sold 40 cartons per pallet. All pallets are shrink wrapped for outside storage.
Quantity discounts available - contact our Customer Service Department.

PRESS-SEAL GASKET CORPORATION
Protecting Our Planet's Clean Water Supply
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email: sales @press-seal.com
web: www.press-seal.com
Made in USA

EZ-STIK

PHYSICAL PROPERTIES TEST RESULTS

Description

EZ-STIK is a butyl-rubber-based sealant designed to be permanently flexible, tacky and resistant to moisture and deterioration by exposure to dilute chemical solutions. EZ-STIK meets ASTM C-990, Section 6.2 requirementsfor Butyl Rubber Sealant, and AASHTO M 198.

Typical Properties

The following values represent typical test results and are manufacturing specifications.

		SPEC.	REQUIRED	EZ-STIK
Butyl Rubber (Hydrocarbon Content %)		ASTM D4	50% min.	62%
Ash Inert Mineral Filler %		AASHTO T111	30% min.	45-48%
Volatile Matter	(AASHTO T47)	ASTM D6	2% max.	0.5-1.0%
Specific Gravity @ 77ºF (25 C)	(AASHTO T229)	ASTM D71	1.15 - 1.50	1.25 - 1.35
Ductility @ 77ºF (25 C), cm	(AASHTO T51)	ASTM D113	5.0 min.	meets requirement
Flash Point C.O.C.		ASTM D92	350º (177 C) min.	375ºF (191 C)
Fire Point C.O.C.		ASTM D92	375º min. (191 C)	385ºF (196 C)
Compression Test				
@77ºF (25 C), lbf/in^3		ASTM C972	100 max.	40 - 55 lbf/in^3
@32ºF (0 C), lbf.in^3			200 max.	130 - 160 lbf/in^3
Low Temperature Flexibility				
@-10ºF (-23 C)		ASTM C765	180º bend, no cracking, nor loss of adhesion.	Pass - no cracking or adhesion loss.
Elevated Temperature Flexibility				
14 days @ 157ºF (69 C)		ASTM C776	No sag, nor change in extruded shape.	Pass - no sag or shape change.
Adhesion After Impact		ASTM C776-84	No greater loss than 50% of adhesion.	Pass - no loss of adhesion.
Cone Penetration				
@ 77ºF (25 C), dmm		ASTM D217	50 - 100 dmm	55 - 85 dmm
@ 32ºF (0 C), dmm			40 min.	45 - 55 dmm
Chemical Resistance			No deterioration, no cracking, no swelling.	Pass - no visible change after 30 days immersion in 5% solutions HCl, H_2SO_4,NaOH,KOH,H_2S

Application Properties

Service Temperature Range	-40F to 250F (-40 to 121 C)
Application Temperature	20F to 120F (-7 to 49 C)
Storage Temperature	Under 120F (49 C)
Shelf Life	2 Years minimum

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web: www.press-seal.com
Made in USA

GATOR WRAP

Infi-Shield® External Gator Wrap

Infi-Shield® Gator Wrap prevents infiltration by providing a water-tight seal around any manhole, catch basin or concrete pipe joint. Gator Wrap resists harsh soil conditions and also provides a root barrier for any crack or joint. Infi-Shield® Gator Wrap installs easily with no special tools and can be immediately backfilled.

Infi-Shield® Gator Wrap Specification

Each manhole, catch basin or pipe joint shall be sealed with an external rubber sleeve similar to the Infi-Shield Gator Wrap as manufactured by Sealing Systems Inc (763-478-2057). The seal shall be made of a Stretchable, Self-Shrinking, Intra-Curing Halogenated based rubber with a minimum thickness of 30 mils. The back side of each unit shall be coated with a cross-linked re-enforced butyl adhesive. The butyl adhesive shall be non-hardening sealant with a minimum thickness of 30 mils. The seal shall be designed to stretch around the joint and then overlapped creating a cross-link and fused bond between the rubber and butyl adhesive. Gator Wrap forms a continuous rubber seal on a manhole joint which prevents water and soil from infiltrating through the manhole, catch basin or concrete pipe joint.

INFI-SHIELD GatorWrap® is available in 6” and 9” widths and comes in a 50 foot roll or in a user-friendly kit which has six sixteen foot rolls. Upon special order, we can also manufacture a 12” width but please allow four weeks for delivery.

EPDM Rubber Specifications

Physical Properties	ASTM Test Method	Typical Value
Sheer Strength	D816	15 lb. PSI min
Tensile, PSI	D412	50 PSI
Elongation %	D412	500 %
Penetration	D217	40/120 MM
Low Temperature	D746	Minus 49º F flexibility
Heat Aging	D573 7 days @ 90 degrees C	
Tensile Strength	minimum, PSI (MPa) > 100 PSI	Pass
Fusion	5/64” (0.2) max	Pass
Elongation %	minimum 300% at break	Pass
Ozone Resistance	no visible signs of cracking	Pass
Aging and Storage	300% elongation applied (10 Years)	Pass
UV Resistance	No visible signs of cracking	Pass

Material meets ASTM C923 and C877 – Mastic Meet ASTM C990.
Disclaimer: This technical data information and recommendations offered are based on test results, and findings we believe to be reliable and complete.

Sealing Systems, Inc.
9350 County Road 19 ♦ Loretto, MN 55357 ♦ 763-478-2057 ♦ 800-478-2054 ♦ Fax 763-478-8868 ♦ www.infi-shield.com

Infi-Shield GATOR WRAP

INSTALLATION INSTRUCTIONS

1. Expose the area that is to be sealed. Clean the entire area around the joint with a wire brush and whisk broom. Remove any sharp protruding edges around the joint with an abrasive tool. When finished cleaning, the entire area must be dry and free of any dirt.

2. Remove the first foot of paper backing from the mastic. Center and place the Gator Wrap around the joint. Continue to remove paper backing as you apply the Gator Wrap to the entire structure.

3. Seal the overlapping area with a 6" overlap. Be sure not to stretch material at the overlap area.

4. Cut excess material using a utility knife. Using a rubber mallet or hand held roller, firmly flatten the Gator Wrap 360 degrees around joint.

Material: Rubber meets ASTM C923 and C877 – Mastic Meet ASTM C990

Disclaimer: This technical data information and recomedations offered are based on test result, and findings we believe to be reliable and complete.

S.S.I. SEALING SYSTEMS, INC.

Sealing Systems, Inc.

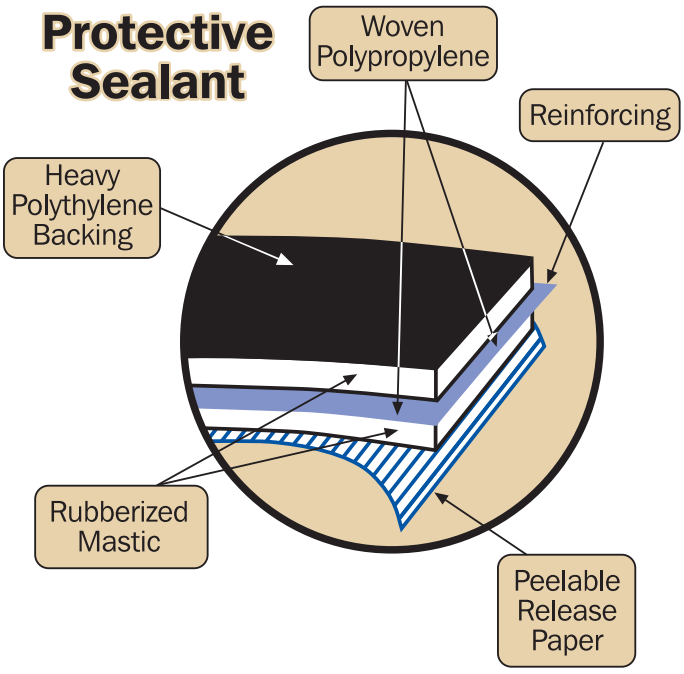
9350 County Road 19 • Loretto, MN 55357 • 763-478-2057 • 800-478-2054 • Fax 763-478-8868 • www.infi-shield.com

SEAL PLUGS

High-Performance, Water-Tight Seals For Sealing Lift Holes In Concrete Pipe

This two-ply seal plug is designed to adhere to concrete with its aggressive rubberized mastic. The plug is reinforced with a tough, puncture-resistant woven polypropylene with an outer layer of impervious polyethylene, resistant to most acids and alkalines.

Seal plugs are available in easy to apply 9”x9” squares with a peel-able protective paper for faster application without the waste or extra tools.



TYPICAL PROPERTIES

POLYETHYLENE BACKING		
Tensile strength, min, psi	4,000	D882, Method A
Elongation at break, min, %	100	D882, Method A
Tear resistance, min, psi	1,500	D624, Die C
Water absorption, max, %	0.01	D570

REINFORCING MESH ELEMENT		
Tensile strength min, lb., in.		D1682
	Warp 75	
	Fill 75	
Elongation at break, min, %		
	Warp 20	
	Fill 20	

RUBBERIZED MASTIC		
	Minimum	Maximum
Ash-inert matter, %	80	15
Volatiles, %	0.1	2
Softening Temp., min, F	175	-
Specific gravity	0.95	1.05
Penetration, dmm	60	90
Flow, mm	10	10

CERTIFICATION

SEAL WRAP MATERIALS AND PERFORMANCE REQUIREMENTS.

I hearby certify that Seal Wrap is produced in accordance to the following specifications:

9" seal plugs, 9"and 12" master rolls, consists of an outer backing of polyethylene film with a minimum tensile strength, 4000 lb. psi, when tested in accordance to test method D 882. We further certify that the rubberized mastic component of Seal Wrap is reinforced with a mesh element with a minimum, 75 lb./in, warp and fill when tested in accordance to test method D 1682.

Seal Wrap is made of the same high performance components, excluding the steel straps, as our Mac Wrap collar which meets ASTM standard C-877 Type II.

Robert L. Weir
President Construction Products Division

P.O. Box 447 • US Hwy. #1 North • McBee, SC 29101 • Phone: (877) 962-7622 • (843) 335-5814 • Fax: (843) 335-5909
www.marmac.com info@marmac.com

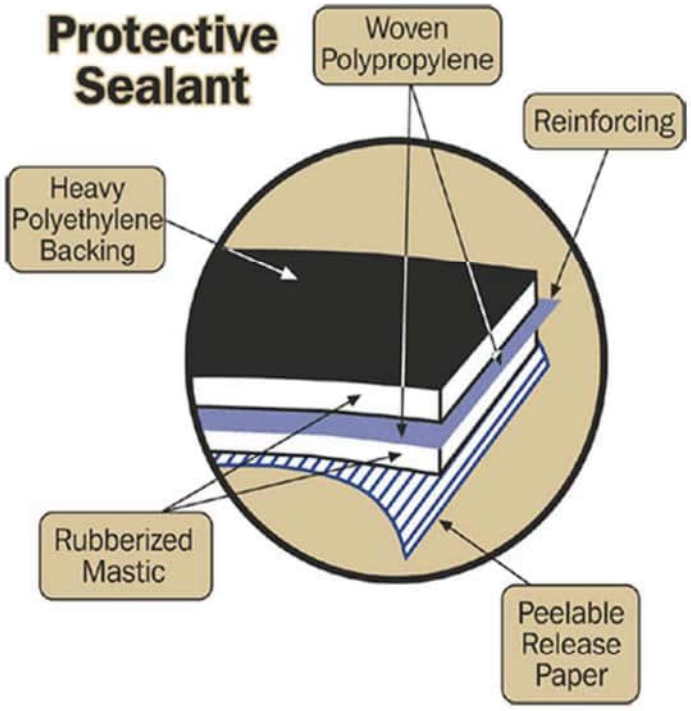
Seal Wrap

High-performance water-proofing membrane for culvert structures

Mar Mac Seal Wrap is a two-ply made with heavy-duty water-proofingmaterials essential for sealing boxed, arched and span culverts.

Seal Wrap is made of two layers of rubberized mastic, reinforced with a sheet of strong, puncture-resistant woven polypropylene. The outside backing is constructed with impervious polyethylene a material resistant to most acids and alkalines.

Seal Wrap is available in 60' rolls lined with peelable release paper for easy application without the waste.



TYPICAL PROPERTIES

POLYETHYLENE BACKING		
Tensile strength, min, psi	4,000	D882, Method A
Elongation at break, min, %	100	D882, Method A
Tear resistance, min, psi	1,500	D624, Die C
Water absorption, max, %	0.01	D570

REINFORCING MESH ELEMENT		
Tensile strength min, lb., in.		D1682
	Warp 75	
	Fill 75	
Elongation at break, min, %		
	Warp 20	
	Fill 20	

RUBBERIZED MASTIC		
	Minimum	Maximum
Ash-inert matter, %	80	15
Volatiles, %	0.1	2
Softening Temp., min, F	175	-
Specific gravity	0.95	1.05
Penetration, dmm	60	90
Flow, mm	10	10

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www. marmac.com

CERTIFICATION

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Seal Wrap is made of the same high performance components, excluding the steel straps, as our Mac Wrap collar which meets ASTM standard C-877 Type II.

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President Construction Products Division

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www.marmac.com info@marmac.com

INSTALLATION INSTRUCTIONS FOR SEALWRAP

- SURFACE PREPARATION:

Sweep or brush the external portion of the joint to insure that dirt, dust and other foreign matter do not interfere with direct contact between the mastic sealer and the concrete joint. If ambient temperature is below 40°F and/or wet conditions are present primer is recommended. Mar Mac RB Quick Dry Primer can be applied by brush or roller at the rate of 1 gallon per 250-350 sq. ft. depending on the porosity of the surface. Cure time is approximately 15-60 minutes dependent on temperature and humidity. Apply primer too exceed the width of the Sealwrap by a minimum of 2 inches.

- INSTALLATION

Peel away the silicon coated release liner to expose 1 ft of the mastic adhesive. Center the exposed mastic over the joint and using the palm of the hand, apply pressure to achieve a uniform bond of the Sealwrap to the concrete. Continue to peel the release liner while unrolling the Sealwrap **KEEP CENTERED OVER JOINT**. For Sealwrap splicing, overlap a minimum of 4 inches. If primer is used, allow for full cure before Sealwrap installation.

MAR MAC RB ADHESIVE PRIMER

DESCRIPTION:

MAR MAC RB LIQUID ADHESIVE PRIMER is a rubber based adhesive in solvent solution which is specifically formulated to provide excellent adhesion with Macwrap, Sealwrap and Sealing Tape under may kinds of surface conditions.

USES: RB ADHESIVE PRIMER....

- Used to prime all precast structures on which Macwrap and/or Sealwrap will be installed. Including: round, arch, elliptical pipe and box culverts and span bridges.
- Designed to be used on applications down to 25ºF. (-4ºC).

APPLICATION:

MARMAC RB LIQUID ADHESIVE PRIMER may be applied with roller or brush. A roller with a heavy nap should be used, such to carry sufficient material to the area being primed.

Apply all ***MAR MAC RB LIQUID ADHESIVE PRIMER*** to a clean, dry, dust free, and frost free surface at a coverage of approximately 250 to 350 square feet per gallon on concrete. The liquid adhesive should be spread sufficiently to avoid areas of access material. Areas of excess material will lengthen the curing time on the application of the ***MAR MAC RB LIQUID ADHESIVE PRIMER.***

For best results ***MAR MAC RB LIQUID ADHESIVE PRIMER*** should be applied and allowed to become tacky to the touch, timing may vary due to atmospheric conditions. At this point Sealwrap/Macwrap should be applied. If primer dries and is no longer tacky, reapply primer.

SAFETY, STORAGE AND HANDLING INFORMATION:

MAR MAC RB LIQUID ADHESIVE PRIMER vapors are flammable. User should review Material Safety Data Sheet (MSDS) for this product and follow safety instructions listed within.

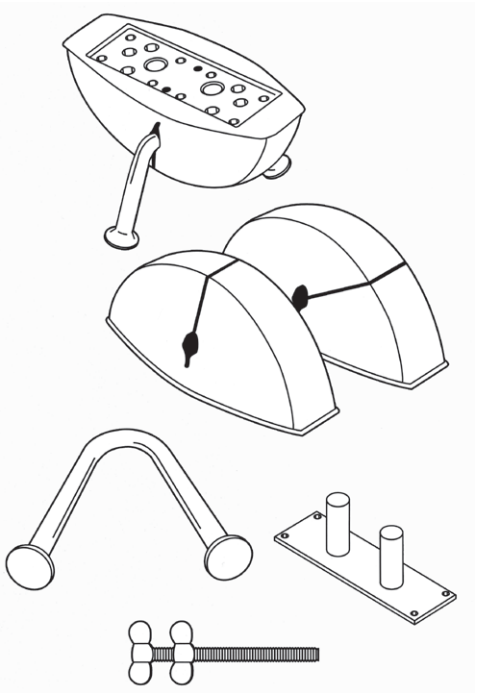
This information is based on our best knowledge, but MAR MAC cannot guarantee the results to be obtained

P.O.Box 447• US Hwy.#1 North• McBee, SC 29101• Phone: 877.962.7622• 843.335.5814• Fax: 843.335.5909
WWW.MARMAC.COM

DAYTON SUPERIOR®

Utility Anchor System

The Dayton Superior Utility Anchor System is designed to economically simplify the lifting and handling of precast concrete elements. Its economics, ease of use and versatility will be a welcome addition to your precast operations.



Key Advantages

- High strength – up to 24,000 lbs. SWL
- No special lifting hardware required
- Uses a standard hook or clevis
- Easy to install and use
- Utilizes reusable 90° and 45° polyurethane recess plugs
- Eliminates "through holes" in the precast element
- An economical and versatile system – applicable to any precast concrete element

Added Benefit

Utility contractors can use the utility anchor effectively as a pulling iron. When used as a pulling iron, the safe working loads may be increased by 33%, based on the use of a 3 to 1 factor of safety.

The design of the Dayton Superior Utility Anchor Utility System assures the precaster of an economical, user-friendly system for lifting and handling precast concrete elements.

Utilize the Utility Anchor System to:

- Remove precast elements from their forms
- Handle in the precast yard
- Load for shipment
- Unload and place at the job site

The precaster is able to do it all without the need for any special lifting equipment or hardware. Simply use a standard hook or shackle to connect slings to the utility anchor for a safe lift.

The Utility Anchor System uses a polyurethane recess plug to create a void in the concrete. The concrete void created for the P75H utility anchor is sufficiently large to accept the following:

1. 6-ton Grade 8 alloy hook or
2. 7-ton forged alloy shackle

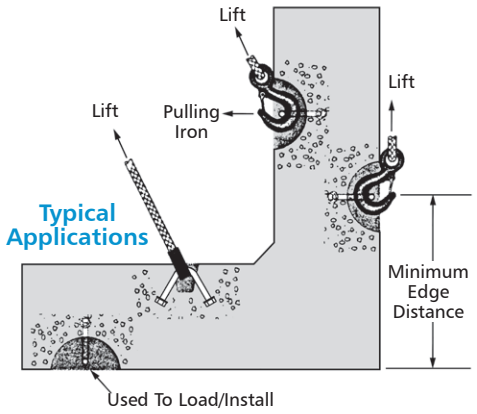
For the P75S Utility Anchors:

3. 15-ton cast/alloy hook or
4. 15-ton forged alloy shackle

DO NOT use larger hooks or shackles; they will apply additional and unintended loads to the utility anchor and could cause a premature failure of the concrete or anchor.

Anchor Placement

Placement of the Utility Anchor is dependent on the structural shape of the precast element. Utility anchors are not designed for thin edge installation. Always maintain minimum edge distances. For special conditions, contact the nearest Dayton Superior Technical Service Department for assistance.

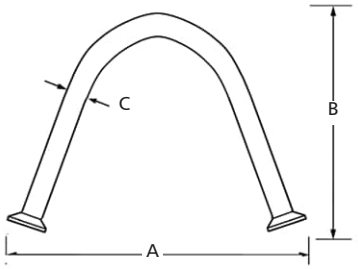


DAYTON SUPERIOR

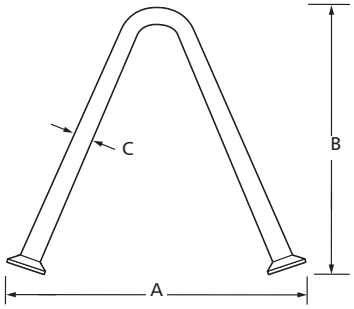
P75 and P75H Utility Anchor®

The Dayton Superior Utility Anchors are available in three diameters and a series of lengths for specific concrete thickness. The utility anchor can be set in either a 90° or a 45° anchor orientation using the appropriate setting plug.

P75 and P75H Utility Anchor						
Anchor	Type	Product Code No.	A	B	C	End Shape
P75	4UA444	121877	5-1/4"	3-1/8"	0.444"	Swift Lift
	5UA444	123442	6"	3-3/4"	0.444"	Swift Lift
	6UA444	121888	7-3/8"	4-3/4"	0.444"	Swift Lift
	5UA671	123441	6-7/16"	3-3/4"	0.671"	Swift Lift
	6UA671	121889	7-3/8"	4-3/4"	0.671"	Swift Lift
	8UA671	121891	9-3/4"	6-3/4"	0.671"	Swift Lift
P75H	12UA875	124738	15-7/8"	11"	0.875"	Swift Lift



P75 Utility Anchor



P75-H Utility Anchor

Anchor	Type	Product Code No.	Minimum Panel Thickness	Safe Working Load Tension 90	Safe Working Load Shear 90	Safe Working Load Tension/ Shear 45	Minimum Edge Distance
P75	4UA444	121877	4"	3,200	5,800	2,260	9"
	5US444	123442	5"	3,860	7,710	2,730	10"
	6UA444	121888	5 5/8"	4,460	9,460	3,150	12"
	5UA671	123441	5"	4,560	8,430	3,220	10"
	6UA671	121880	5 5/8"	7,320	15,780	5,170	12"
	8UA671	121801	7 5/8"	10,830	18,850	7,660	16"
P75H	12UA875	124738	12"	24,000	24,000	24,000	30"

Note:

1. Compressive strength of normal weight concrete to be 4,000 psi at time of initial lift.
2. Safe working loads provide an approximate factor of safety of 4 to 1.
3. Utility anchors to be installed at 90° to surface of the concrete.
4. Shear safe working loads are based on loading in the direction of the top of the precast concrete element.

To Order:

Specify: (1) quantity, (2) name, (3) product code.

Example:

200, P75 Utility Anchors, 5UA444.

P75C Utility Anchor® with Clip

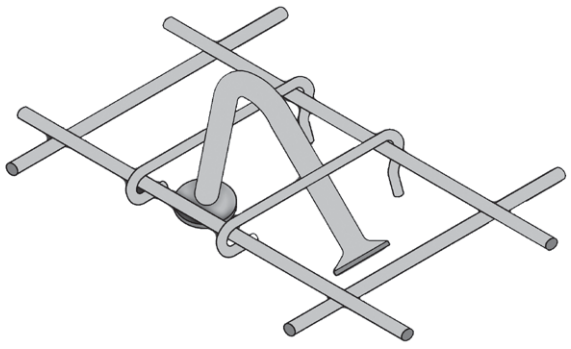
The Dayton Superior Utility Anchor with Clip is designed to allow the Utility Anchor to be secured to the wire mesh cage. This product utilizes the P75 Utility Anchors with 2 wire clips welded to opposite legs of the anchor. These wire clips are positioned to hold the utility anchor with Void to the wire mesh in the proper position in the wall for lifting your precast product. Both the 5UA and 6UA anchors in 0.444 and 0.671 diameters for 9" wire spacing are in stock. Other anchor and wire spacing are readily available.

To Order:

Specify: (1) quantity, (2) name, (3) product code (4) anchor size, (5) wire spacing (6) wall thickness.

Example:

200, P75C, #121443, 5UA444anchor, 9" wire spacing, 5" wall.



Product Code	Utility Anchor	Wire Clip Lengths	Wall Thickness
123443	5UA444	9"	5"
121890	5UA671	9"	5"
121892	6UA444	9"	6"
121893	6UA671	9"	6"
127446	8UA671	9"	8"

DAYTON SUPERIOR

P76 Utility Anchor® Setting Plugs

Utility Anchor Setting Plugs a polyurethane plastic in 90° and 45° orientation.

The reusable setting plug properly sets the anchor approximately 1/2" below the surface of the concrete and provides an adequate recess for easy sling attachment. After final positioning of the concrete element, the recess formed by the recess member can be easily grouted or conveniently covered by the Utility Anchor Cover/Patch.

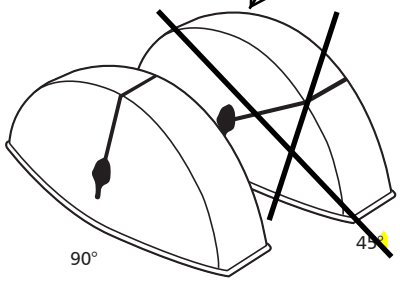
The 90P875 Setting Plug used with the P75-H 24,000 lb. anchor requires 2 each P101 holding rods to attach setting plug to the form. No holding plate or magnetic plate are available for this setting plug.

NOT USED

NOT USED

P76 Utility Anchor Setting Plug					
Type	Product Code No.	Length	Width	Depth	Color
90P444	123175	8.00"	3.25"	3"	Blue
~~45P444~~	~~123176~~	~~8.00"~~	~~3.25"~~	~~3"~~	~~Blue~~
90P671	123177	8.00"	3.25"	3"	Orange
90P671	127786	9.00"	4.58"	3.35"	Orange
~~45P671~~	~~123178~~	~~8.00"~~	~~3.25"~~	~~3"~~	~~Orange~~
90P875	124685	15.00"	6.13"	5"	Blue

45° NOT USED



P76 Utility Anchor Setting Plugs

To Order:
Specify: (1) quantity, (2) name, (3) product code.

Example:
200, P76 Utility Anchor Setting Plugs, 90P444.

BLUE PLUG USED FOR UA444
ORANGE PLUG USED FOR UA671
LARGE BLUE PLUG USED FOR UA875

P76D Disposable Setting Plugs

The Disposable Setting Plug is manufactured to offer the precaster an inexpensive alternate to urethane setting plugs. This 2 piece high density polyethylene plastic setting plug is used with the 0.671 Dayton Superior Utility Anchors. The two piece design snaps tightly together around the legs of the anchor eliminating concrete entering the void. The setting plug is installed to the formwork using nail holes on each end of the plug. This plug can also be used with the P77 Double Tee Anchors.

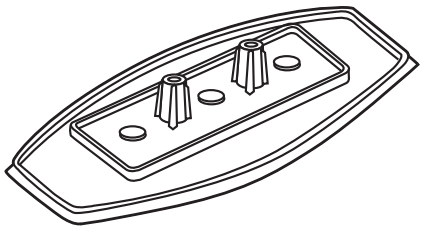
To Order:
Specify: (1) quantity, (2) name, (3) product code.

Example:
200, P76D, #126214.

P76D Disposable Utility Anchor Setting Plugs 0.671

P76C Utility Anchor Cover/Patch

The P76C Utility Anchor Cover/Patch installs over the back of the setting plug to protect the unit without the use of duct tape. The cover/patch can be installed on the setting plug/anchor assembly prior to setting the assembly in the form. This protects the assembly from concrete leakage through the concrete placement sequence. It can also be used later as a temporary or permanent cover for the recess. The P76C cover is gray in color and will blend with most concrete. It can be painted to match other color schemes.



P76C Utility Anchor Cover/Patch

Rinker MATERIALS™ A QUIKRETE® COMPANY

Brian S. Jenner
PO Box 1620
Rapid City, SD 57709-1620
605-737-5211 (TEL)
605-718-0808 (FAX)
Brian.Jenner@RinkerPipe.com

To: **Lewis & Clark County**
Dan Karlin
dkarlin@lccountymt.gov

Date: **9/4/2024**
Project: **Lewis & Clark Co. Crossing E**
Project#
Contractor: **Lewis & Clark County**
R/S # : **6024057BX4**

1	Set of	**6024057BX4 Submittal Review 240904**	sheets	1-33

X For your approval. Please return 1 set to: **RINKER MATERIALS**
PO BOX 1620, RAPID CITY, SD 57709-1620

X ***PRODUCTION CANNOT BE SCHEDULED OR BEGIN UNTIL APPROVALS ARE RECEIVED.***

____ For production as noted ____ For jobsite use X For your files
____ Per your request ____ For your information ____ Other

Dan,

6024057BX4 Submittal Review 240904 for your review.

Please forward to the engineer for review.

Production cannot begin until approvals are received.

Please respond by September 18, 2024.

Thanks

Brian

CONTRACTOR SUBMITTAL REVIEW

DATE SUBMITTED 09/10/2024 DUE DATE 09/18/2024

CHECKING IS ONLY FOR GENERAL CONFORMANCE WITH DESIGN CONCEPT OF THE PROJECT AND GENERAL CONFORMANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRECTED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF CONTRACTORS WORK WITH THAT OF ALL OTHER TRADES; AND SATISFACTORY PERFORMANCE OF CONTRACTORS WORK.

X APPROVED, NO EXCEPTIONS TAKEN
☐ APPROVED, AS NOTED
☐ REVISE AND RESUBMIT
☐ SUBMIT SPECIFIED ITEMS
☐ REJECTED

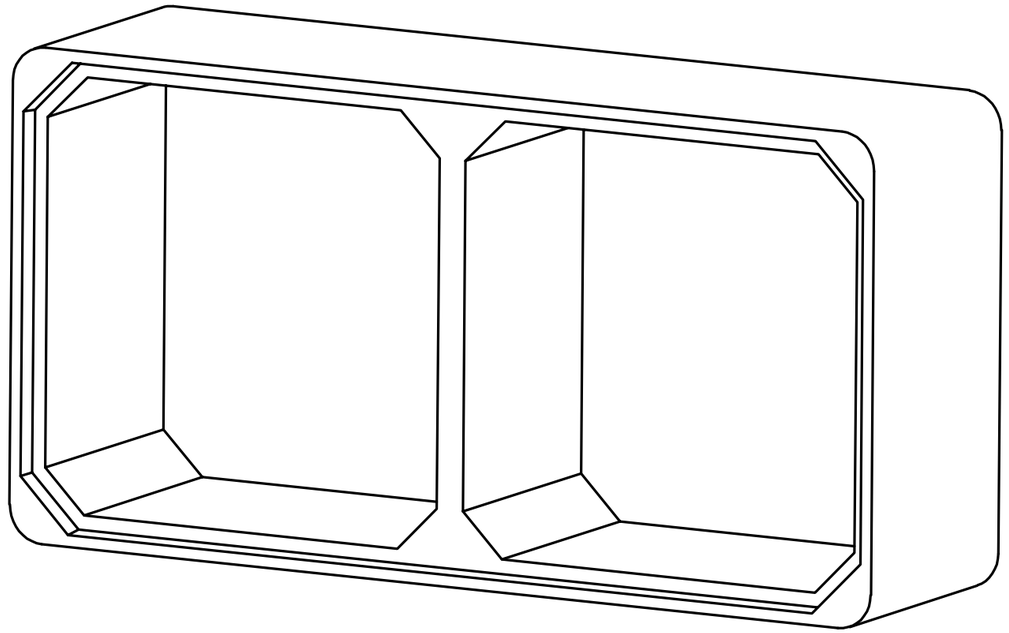
RESPEC
REVIEWER Jacob Lacy
DATE 09/09/2024

Copy:
1 Helena Plant, Proj. File
1 Mike Meredith

Sincerely,
RINKER MATERIALS

Brian S. Jenner, PE
Brian S. Jenner, PE - Project Engineer

RECOMMENDED INSTALLATION PROCEDURES FOR PRECAST CONCRETE BOX CULVERT

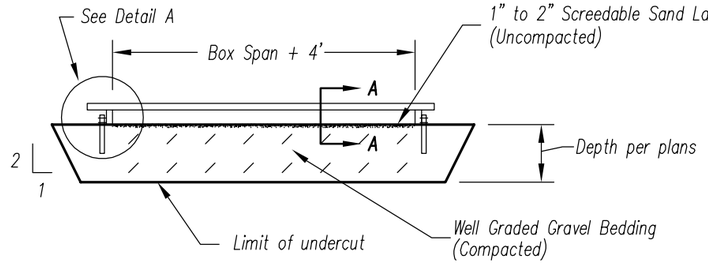


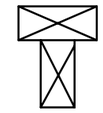
Rinker MATERIALS™
A QUIKRETE® COMPANY

MONTANA

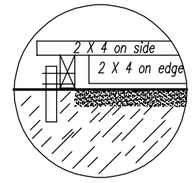
INSTALLATION

BED PREPARATION





Section A–A

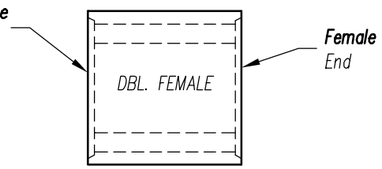


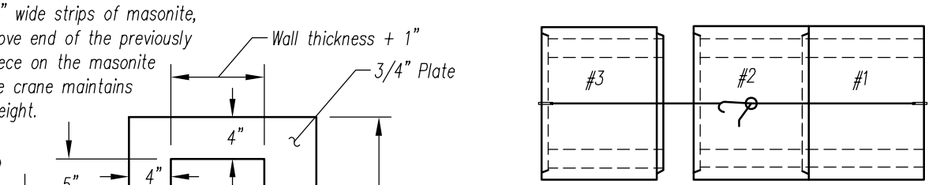
Detail A

1) Bedding material shall be a well graded material with a maximum particle size of 1" and placed to a uniform thickness and compaction as specified by engineer.
2) The top surface shall be a 1" to 2" thick screedable sand layer as a leveling course.
3) If installation equipment operates on top of bedding material the resulting compaction caused by the equipment shall not be greater than that of the bedding at any other location.

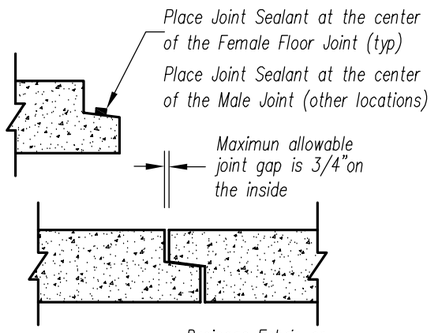
INSTALLATION SEQUENCE

1) Set section w/ double female first (if applicable). See detail at right.
2) When staged construction is required, place dbl. female @ ℄ of road to allow installation of barrel sections in both directions.
3) Place joint sealant at the center of the female joint from top of haunch to top of haunch.
4) Dig a groove approximately 1" deep and 2"–3" wide in front of the female joint for the entire width of the bed so bedding material does not push into the joint. An alternate option to dig would be to cut 18" wide strips of masonite, place them under the groove end of the previously set piece, set the next piece on the masonite and pull together while the crane maintains the majority of the box weight.
5) Prior to setting each box section, use the screed to reshape the bed and remove the material from step #4.
6) Use pulling bracket and come–along system to pull joints together. See Detail.



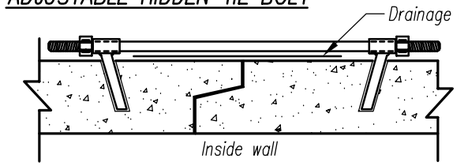


Bracket Detail

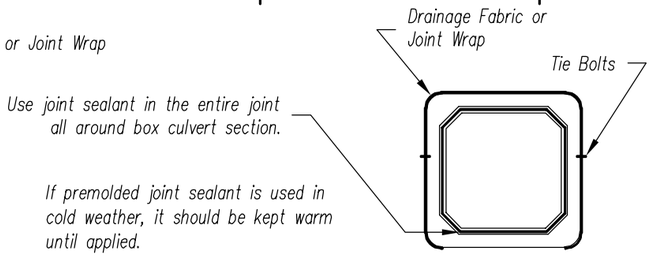


7) Check joint gap. If gap is larger than 3/4", pull joint apart and check for obstructions and check flatness of bedding surface. This maximum gap does not apply to the center wall of double cell boxes.
8) Install Tie Bolts and Drainage Fabric OR External Joint Wrap as specified.

ADJUSTABLE HIDDEN TIE BOLT

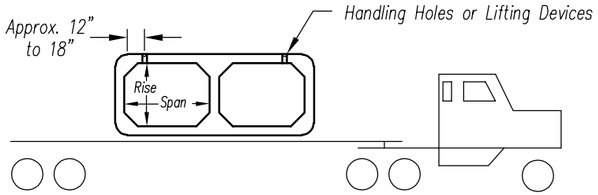


1) Tie Bolts should not be used to pull the joint together.
2) Tension adjusting nut 1/2 turn past snug.

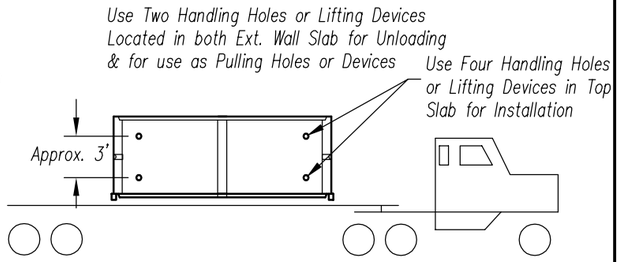


HANDLING

TRUCKING POSITION



On Box Sections where the rise is 9' or less, sections will be shipped in the laying position.



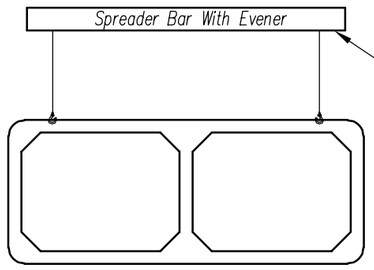
On Box Sections where the rise is greater than 9', sections will be shipped on end.

Box Sections will need to be tipped on the job site to the laying position when shipped on end.

Contractor will need to prepare a soft landing area for tipping.

All Box Culverts will have 4 handling holes or lifting devices in top slab.
Boxes with 8' or greater rise will have 2 handling holes or lifting devices in ea. ext. wall.

LIFTING DEVICE LIFTING DETAIL

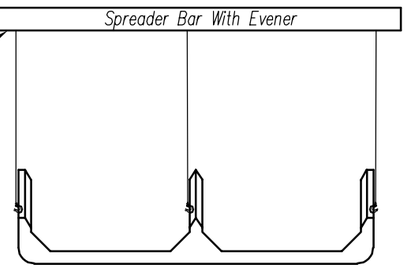


BARREL SECTIONS

Use Spreader Bars or other Lifting Jigs to maintain an Equalized Pick and a Vertical Pick unless otherwise specified on lifting device cut sheet.

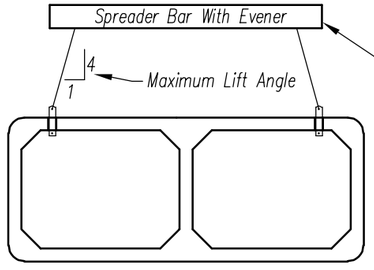
Rigging suppliers may have more stringent requirements based on section weights and cable size.

CONTRACTOR TO PROVIDE ANY DEVICES NECESSARY FOR LIFTING BARREL AND/OR END SECTIONS



END SECTIONS

LIFTING HOLE LIFTING DETAIL

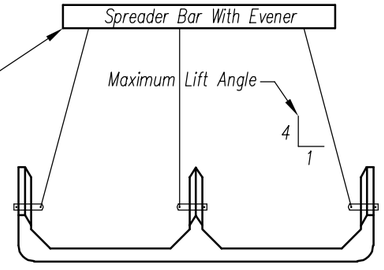


BARREL SECTIONS

Use Spreader Bar long enough to allow a Vertical Pick if possible.
If not, do not exceed maximum lift angle shown.

Rigging suppliers may have more stringent requirements based on section weights and cable size.

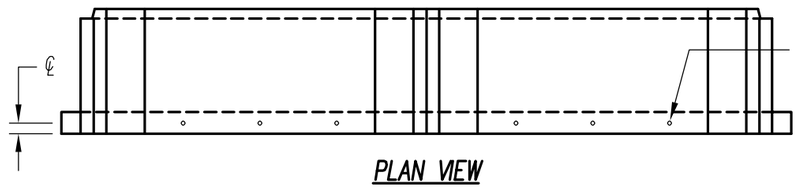
CONTRACTOR TO PROVIDE ANY DEVICES NECESSARY FOR LIFTING BARREL AND/OR END SECTIONS



END SECTIONS

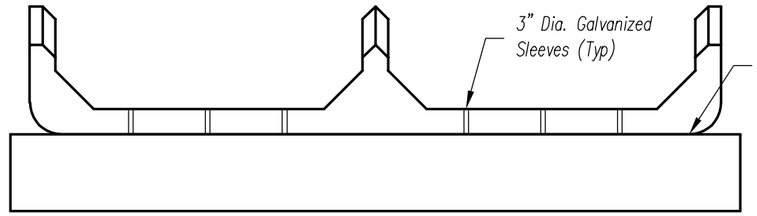
INSTALLATION

CUTOFF WALL CONNECTION



Contractor to drill 7/8" diameter x 6" deep holes thru the 3" sleeves into the cutoff wall and install #6 x 12" rebar dowels (provided). Fill sleeves completely with non-shrink grout (provided).

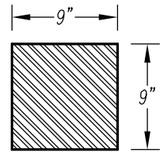
PLAN VIEW



ELEVATION VIEW

HANDLING HOLES / PULL HOLES (If used)

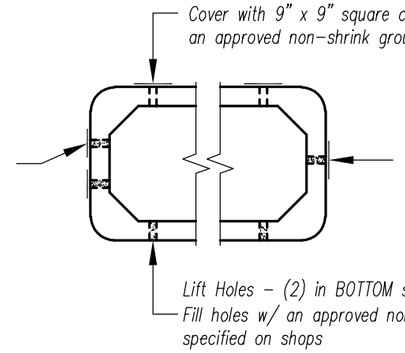
Lifting Holes are formed to be 3" Dia. when used



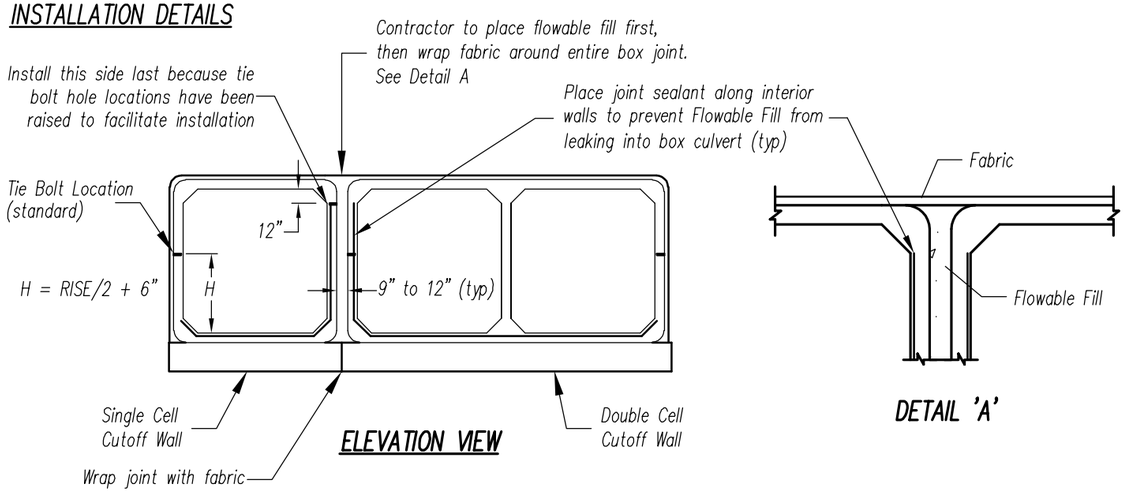
Lift Hole Cover

Self-adhering cover material provided with first shipment of box culvert sections.

(2) Pull Holes in bbl walls w/ 8' or greater rise.
– Cover with 9" x 9" square cover.
Fill holes w/ an approved non-shrink grout if specified on shops



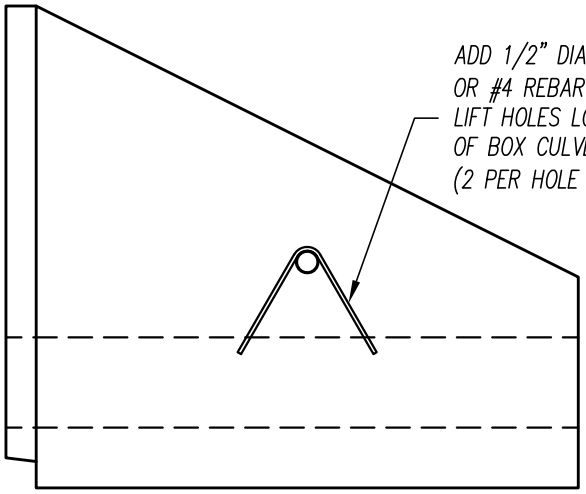
MULTIPLE CELL INSTALLATION DETAILS



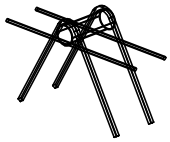
ELEVATION VIEW

DETAIL 'A'

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

** FOR ES#1 W/ 10' RISE OR GREATER, ADJUST DISTANCE FROM END AS SPECIFIED IN END SECTION DETAIL

Holes shall be formed from 3" EMT Tubing
*** DO NOT REMOVE TUBING**

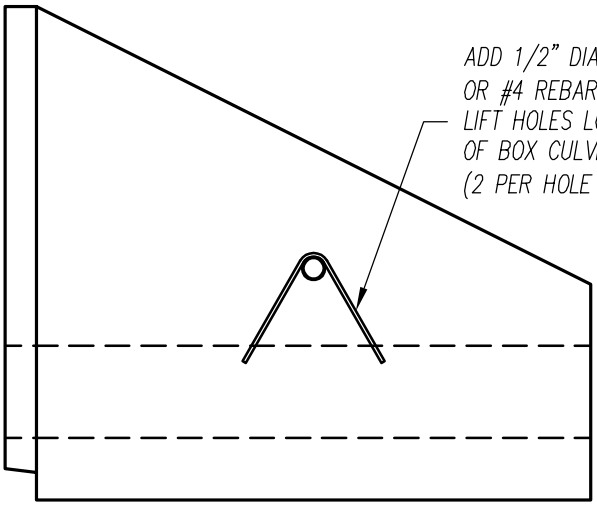
02/17/16 JWB	
11/27/17 JWB	
05/31/18 JWB	
11/29/18 JWB	
01/02/19 JWB	
06/07/21 JWB	

Rinker MATERIALS™ A QUIKRETE® COMPANY

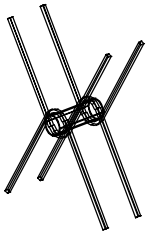
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: BOX CULVERT LIFT HOLE SPECIAL DETAIL PRESTRESS CABLE LOOPS MT ALTERNATIVE
DATE: 02/06/16	
DR'N BY: JWB	
REV: 07/27/21 JWB	DWG NAME: BOX LIFT HOLE - PS CABLE (MT ONLY)

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

** FOR ES#1 W/ 10' RISE OR GREATER, ADJUST DISTANCE FROM END AS SPECIFIED IN END SECTION DETAIL

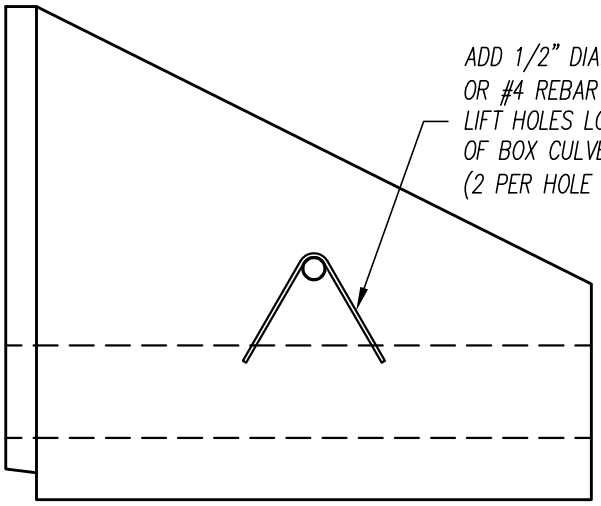
Holes shall be formed from 3" EMT Tubing
**** DO NOT REMOVE TUBING***

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

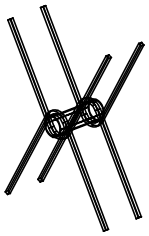
SCALE: NONE	PROJECT: BOX CULVERT LIFT HOLE SPECIAL DETAIL PRESTRESS CABLE LOOPS
DATE: 02/06/16	
DR'N BY: JWB	
REV: 01/02/19 JWB	DWG NAME: BOX LIFT HOLE - PS CABLE (MT ONLY)

02/17/16 JWB
11/27/17 JWB
05/31/18 JWB
11/29/18 JWB

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

FOR RISE 7' OR LESS UNLESS OTHERWISE SPECIFIED

Holes shall be formed from 3" EMT Tubing
** DO NOT REMOVE TUBING*

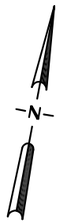
LIFTING HOLES TYP. FOR ALL BARREL SECTIONS EXCEPT WHEN SHOWN OTHERWISE

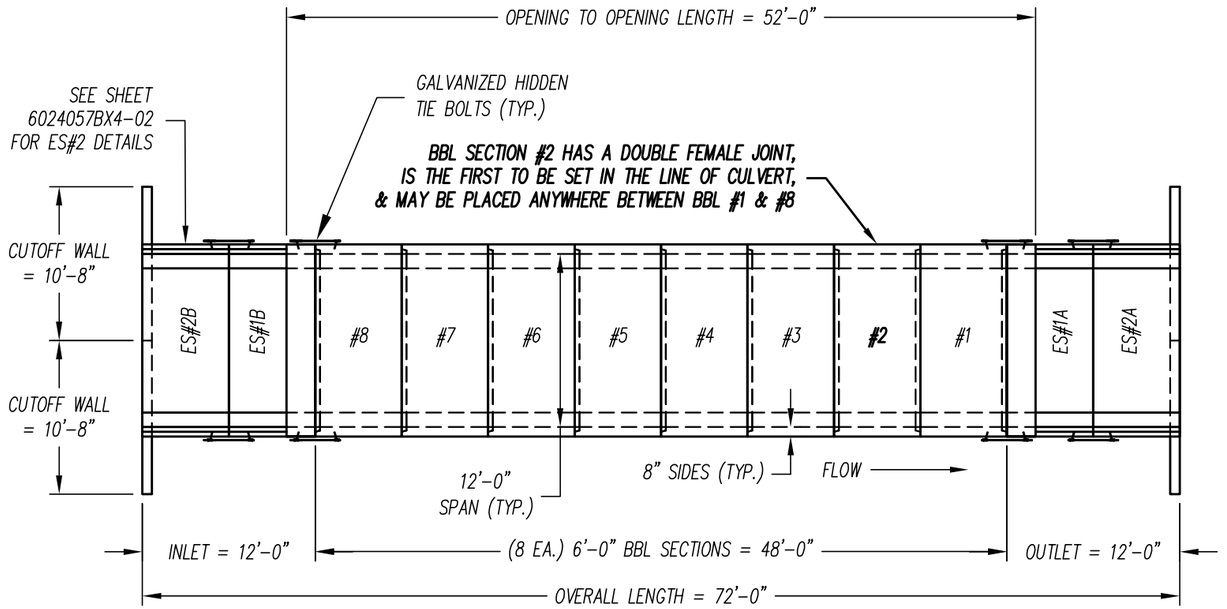
11/27/17 JWB

Rinker MATERIALS™ A QUIKRETE® COMPANY

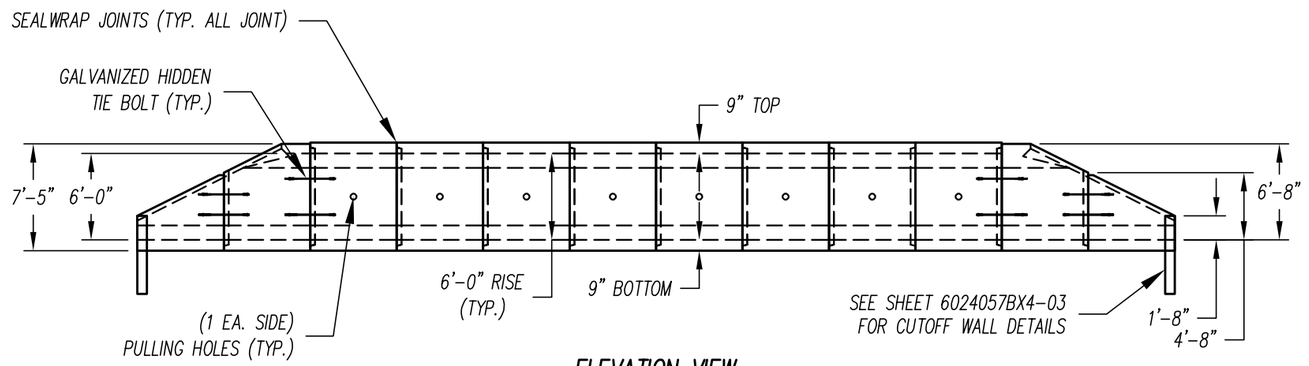
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: BOX CULVERT PULLING HOLE PRESTRESS CABLE LOOPS
DATE: 02/06/16	
DR'N BY: JWB	
REV: 11/30/18 JWB	DWG NAME: BOXPULLINGHOLE





PLAN VIEW



ELEVATION VIEW

TOLERANCES – PER ASTM C913	
DIMENSIONAL (UP TO 5')	± 1/4"
DIMENSIONAL (5'-10')	± 3/8"
DIMENSIONAL (10' & UP)	± 1/2"
SQUARENESS (UP TO 10')	± 1/2"
SQUARENESS (10' & UP)	± 3/4"
MIN. WALL OR SLAB THICKNESS	GREATER OF 3/8" OR 5% OF THICKNESS
REINF. LOCATION FROM DESIGN	± 1/4"
REINF. COVER	1" MIN.

MATERIAL LIST	
ITEM	QTY.
GALVANIZED HIDDEN TIE BOLTS	16
JOINT SEALANT (1.25" X 14.5')	37
GATORWRAP (12" X 50')	9
SEALWRAP SQUARE (9" X 9")	72
SET GROUT (0.4 CU. FT.)	20
REBAR DOWELS (#6 X 12")	16
CUTOFF WALL CONNECTION PLATES	4

SECTION WEIGHTS

6'-0" BBL SECTION = 27,500 LBS.
END SECTION #1 = 20,500 LBS.
END SECTION #2 = 14,000 LBS.
CUTOFF WALL U SHAPED = 4,150 LBS.

PLACE OF FABRICATION	HELENA, MT
CONTRACTOR	LEWIS & CLARK COUNTY
RINKER PROJECT #	6024057BX4
STATE TEST (Y OR N)	N
CONCRETE STRENGTH	5000 PSI

NOTES

1. Stencil each box with information as listed below. Center stencil on the inside face of the top haunch of each box culvert section.

DATE OF MANUFACTURE
Rinker MATERIALS™ A QUIKRETE® COMPANY
HELENA
12 X 6 – CROSSING E
STA. 42+38.95 TO 42+86.95
HL-93 / 1'-3' FILL HT.
LEWIS AND CLARK CO., MT

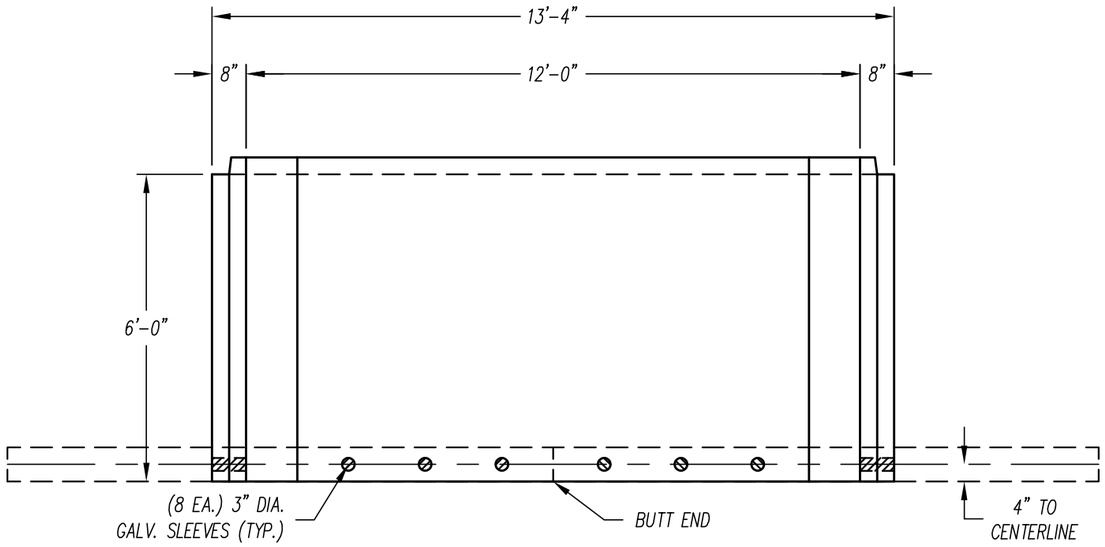
2. Lifting holes are formed by 3 3/16" Dia. Galvanized Tubing.
   - –Lifting holes located in the TOP slab of the culvert shall be covered with a 9" x 9" EDM Patch (provided).
   - –Lifting holes located in the SIDE WALLS & pull holes of the culvert shall be grouted with an approved non-shrink grout & covered with a 9" x 9" EDM Patch (provided).
   - –Lifting holes located in the BOTTOM slab of the culvert shall grouted with an approved non-shrink grout (provided).
3. Section **#2** has a double female joint. This piece is the first to be set in a line of box culvert. ***Consult the "Box Culvert Installation Guide" for suggested installation practices.***

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

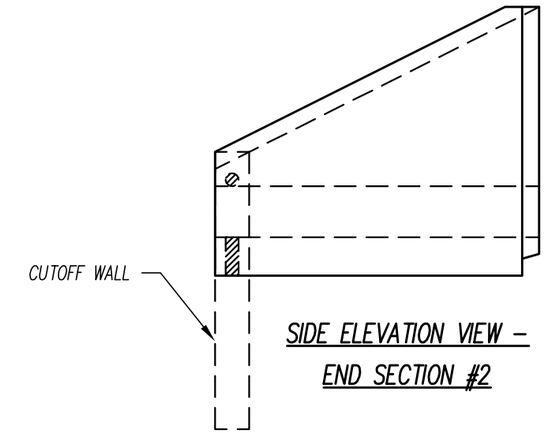
SCALE: NONE	PROJECT: 12'-0" X 6'-0" BOX CULVERT/CROSSING E STA. 42+38.95 TO 42+86.95 LEWIS AND CLARK COUNTY, MT
DATE: 8-21-24	
OR#: 6024057BX4	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX4-01

SPACING FOR 3" DIAMETER GALVANIZED SLEEVES.
CONTRACTOR TO DRILL 1 ½" DIAMETER X 6" DEEP HOLES IN THE CUTOFF WALL AND INSTALL #6 X 12" REBAR DOWELS (PROVIDED)
(FILL SLEEVES COMPLETELY WITH NON-SHRINK GROUT – PROVIDED)

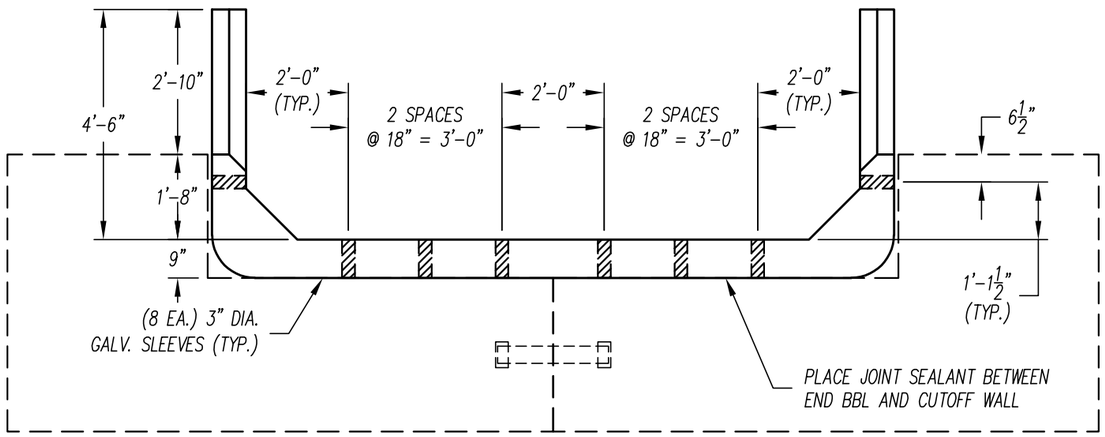
NOTE:
SEE SPECIAL PROVISIONS FOR INSTALLATION REQUIREMENTS FOR BOTH CUTOFF WALL AND CONCRETE SLOPE PROTECTION.



PLAN VIEW – END SECTION #2



SIDE ELEVATION VIEW – END SECTION #2

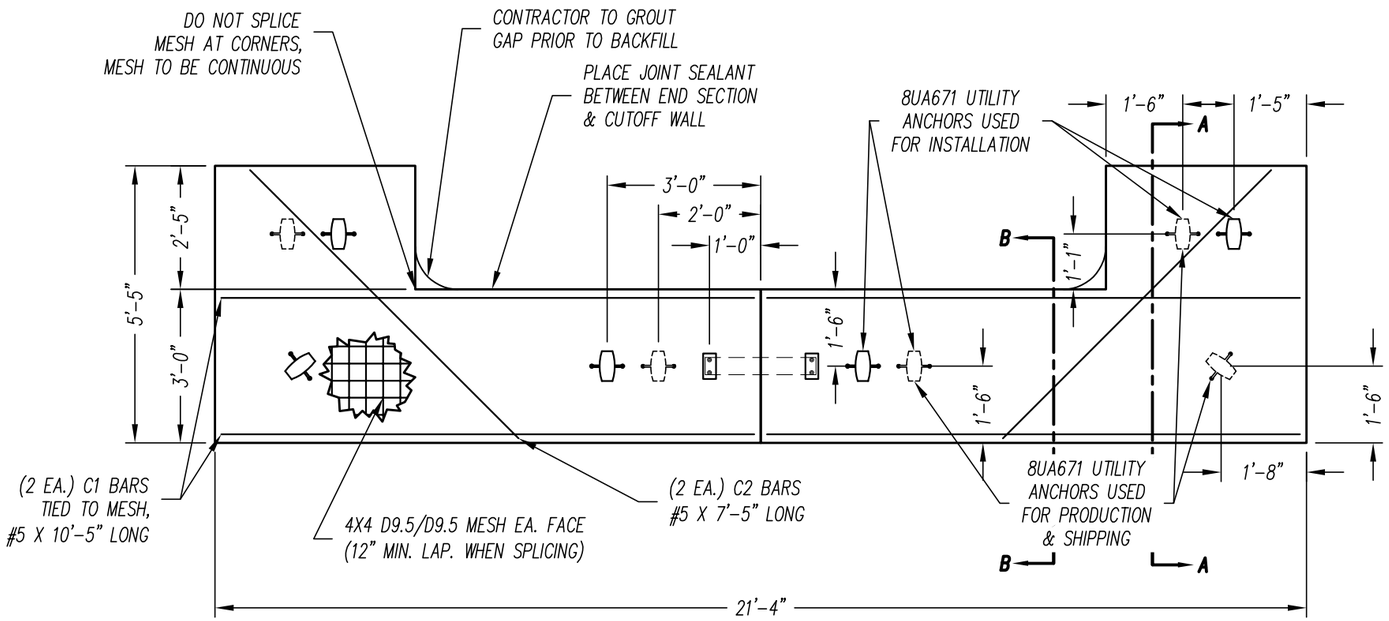


ELEVATION VIEW – END SECTION #2

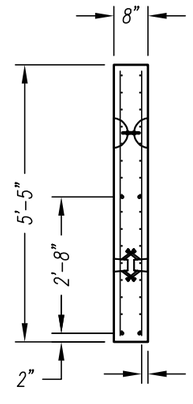
Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

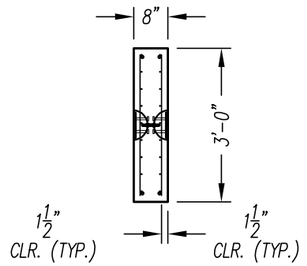
SCALE: NONE	PROJECT: 12'-0" x 6'-0" BOX CULVERT/CROSSING E STA. 42+38.95 TO 42+86.95 LEWIS AND CLARK COUNTY, MT
DATE: 8-21-24	
OR#: 6024057BX4	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX4-02



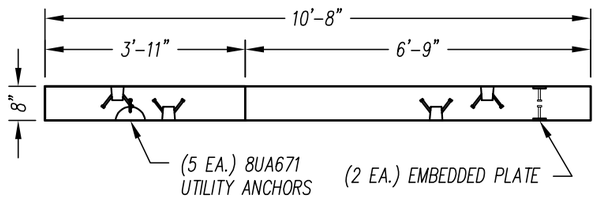
ELEVATION VIEW – CUTOFF WALL (2 PIECES SHOWN)



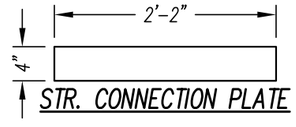
SECTION A–A



SECTION B–B



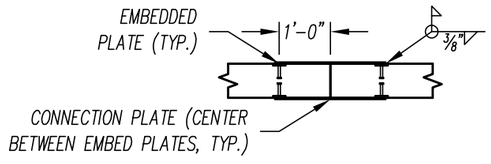
PLAN VIEW – CUTOFF WALL

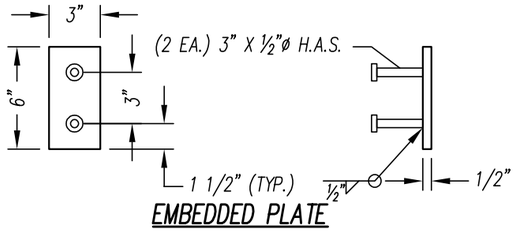


STR. CONNECTION PLATE

26" X 4" X ⅜" PLATE

(4 TOTAL NEEDED)





EMBEDDED PLATE

(8 TOTAL NEEDED)

4 PIECES REQUIRED

CUTOFF WALL = 4,150 LBS.

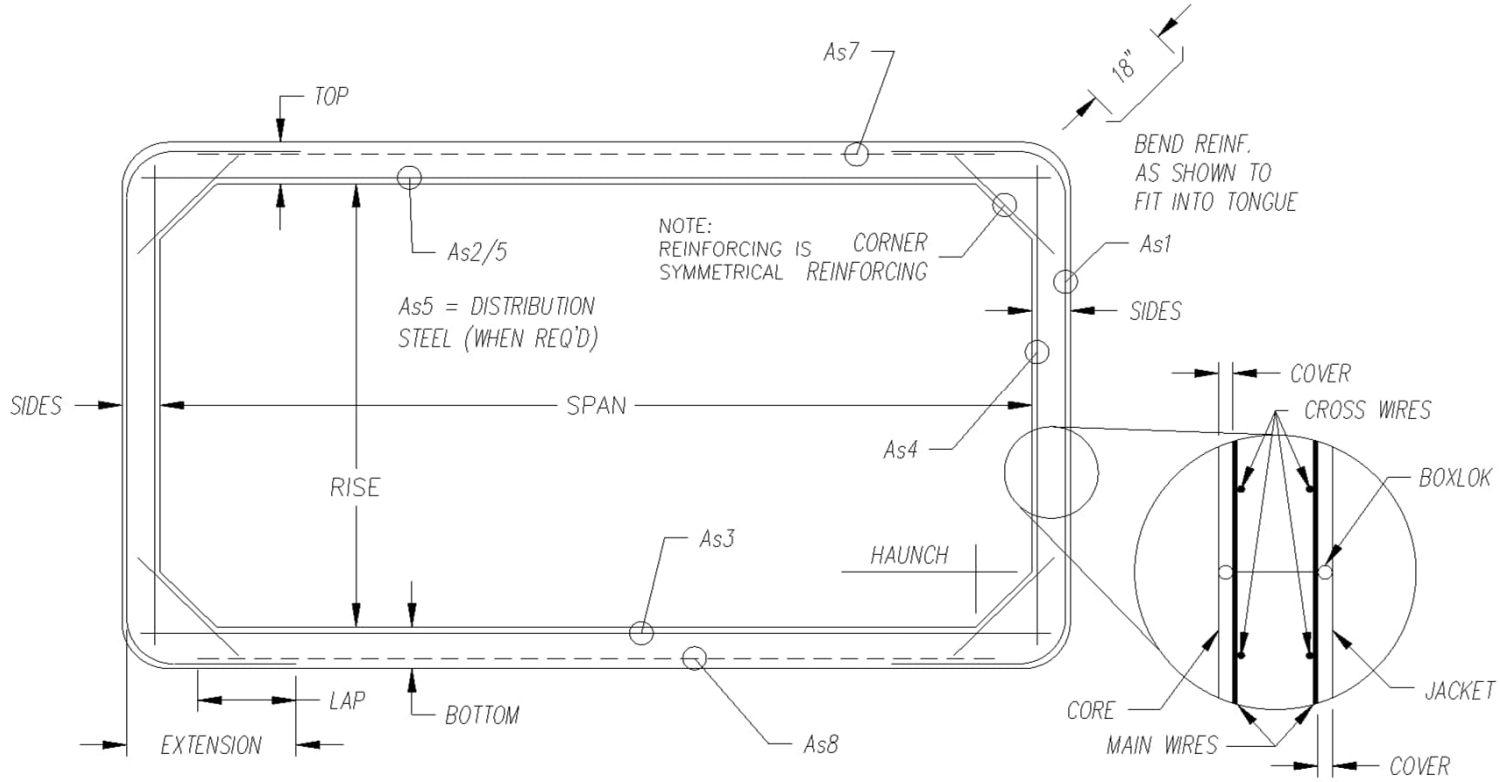
SPACING FOR 3" DIAMETER GALVANIZED SLEEVES.
CONTRACTOR TO DRILL 1 ½" DIAMETER X 6" DEEP HOLES IN THE CUTOFF WALL AND INSTALL #6 X 12" REBAR DOWELS (PROVIDED)
(FILL SLEEVES COMPLETELY WITH NON-SHRINK GROUT – PROVIDED)

NOTE:
SEE SPECIAL PROVISIONS FOR INSTALLATION REQUIREMENTS FOR BOTH CUTOFF WALL AND CONCRETE SLOPE PROTECTION.

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: 12'–0" X 6'–0" BOX CULVERT/CROSSING E STA. 42+38.95 TO 42+86.95 LEWIS AND CLARK COUNTY, MT
DATE: 8–21–24	
OR#: 6024057BX4	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX4–03



Note:
Leg = 9"
for 6" haunch

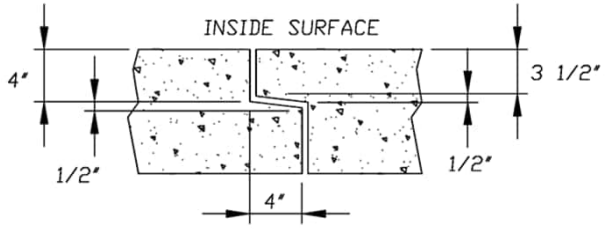
Location	Wire Diameter (in.)	Area Req'd (sq.in./ft.)	Area Prov'd (sq.in. / ft.)	Style	Overall Sheet Length	Sheet Width W/O Overhang
As1	0.299	0.397	0.42	2x8 D7.0/D4.0	13-4	70"
As2/5	0.329	0.51 / 0.216	0.51 / 0.225	2x4 D8.5/D7.5	12-4	70"
As3	0.309	0.450	0.450	2x8 D7.5/D4.0	12-8	70"
As4	0.309	0.216	0.225	4x8 D7.5/D4.0	6-8	70"
As7	0.309	0.216	0.225	4x8 D7.5/D4.0	9-4	70"
As8	0.309	0.216	0.225	4x8 D7.5/D4.0	9-4	70"
					Width Top Overhang =	1/2"
					Width Bottom Overhang =	1/2"
HAUNCH				#3 REBAR OR P/S CABLE X 2'-6" @ 12" O.C.		

Slab Sizes		Box Loks @ 18inch O.C.
TOP Slab Size	9 in	2.0 x 5.75 x 1.0 (40)
BTM Slab Size	9 in	1.0 x 6.75 x 1.0 (40)
SIDES size	8 in	1.0 x 5.75 x 1.0 (40)

Cover			
TOP INSIDE (As2)	1.00	SIDE INSIDE (As4)	1.00
TOP OUTSIDE (As1/7)	2.00	SIDE OUTSIDE (As1)	1.00
BTM INSIDE (As3)	1.00		
BTM OUTSIDE (As1/8)	1.00		

ALL STEEL TO BE OF DOMESTIC ORIGIN OF THE U.S.A.

EXTENSION: 36 inches
LAP: 10 inches
HAUNCH: 12 inches
DESIGN: HL93
STEEL WT: 771 lbs / 6' SECTION
PRODUCT WT: 27500 lbs / 6' SECTION
CONCRETE: 5000 psi
STEEL YIELD: 70000 psi (ASTM A1064)

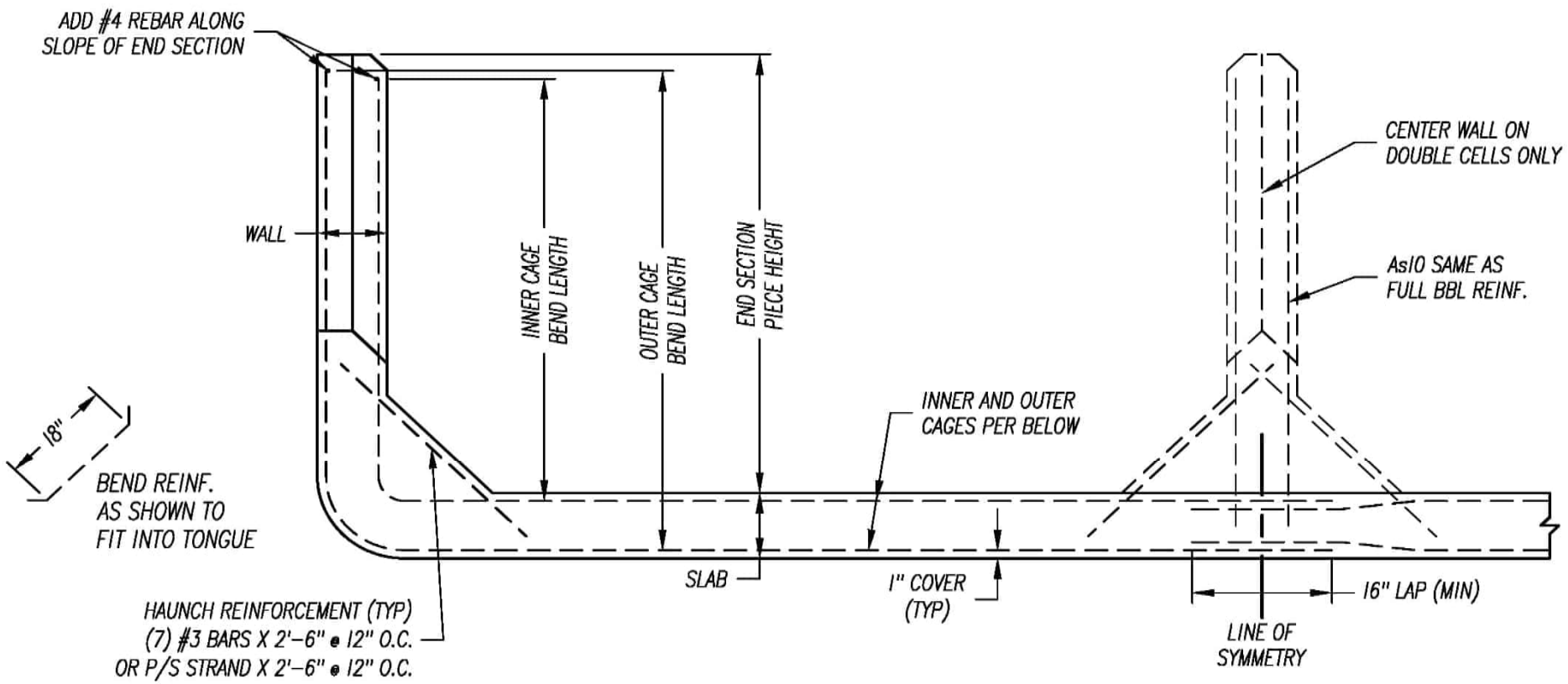


TYPICAL JOINT DETAIL

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701

SCALE	NONE	**SGL 12x6 BOX CULVERT**	
DATE	8/9/24	**DESIGN FILL = 1 FT - 3 FT**	
DRN BY	BSJ	**INSTALLED FILL = 1 FT - 3 FT**	
RS#	6024057BX4	**CUSTOMER**	Lewis and Clark County
REV DATE		**DWG NAME**	



Size (ft)		
Span	x	Rise
12	x	6
Single Cell		

Steel Areas (sq.in. / ft.)					(inches)	
ES#1	ES#2	ES#3	ES#4	ES#5	SLAB	WALL
Full BBL	0.73	*	*	*	9	8
20500	14000	*	*	*	Conc lbs/pc	
771	786	*	*	*	Steel lbs/pc	

Total ES Length (ft)	Sheet Length	# Sheets per End
12	12.00	4

Mesh Style Used							
2	x	8	D	12.5	/	D	5.0

Sht Weight (lbs)
197

Section Lengths (ft)				
ES#1	ES#2	ES#3	ES#4	ES#5
6	6	0	0	0

Inner Cage Bend (in)				
ES#1	ES#2	ES#3	ES#4	ES#5
0	52	0	0	0

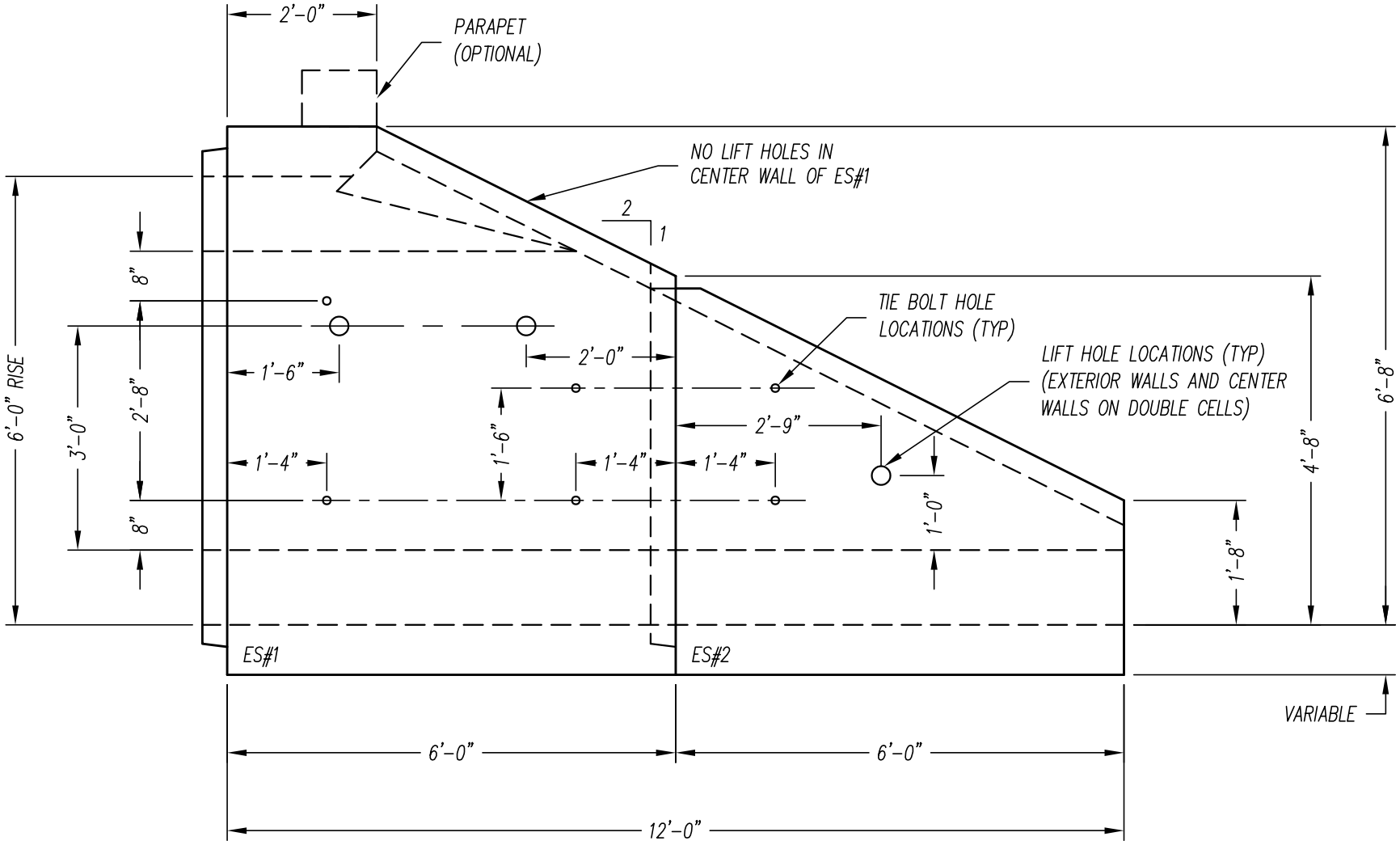
End Section Piece Heights (ft)				
ES#1	ES#2	ES#3	ES#4	ES#5
6.67	4.67	0.00	0	0

Outer Cage Bend (in)				
ES#1	ES#2	ES#3	ES#4	ES#5
0	61	0	0	0

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701

SCALE	NONE	SGL 12x6 BOX CULVERT	
DATE	8/9/24	END SECTION REINFORCEMENT DETAILS	
DRN BY	BSJ	STANDARD 2:1 END SECTION DESIGN	
RS#	6024057BX4	CUSTOMER	Lewis and Clark County
REV DATE		DWG NAME	



NOTES – LIFT HOLES TO BE 3-1/4" DIA.
TIE BOLT HOLES TO BE 1-1/4" DIA.

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: 6' RISE TYPE 1 END SECTION TIE BOLT AND LIFT HOLE LOCATIONS
DATE: 02/17/16	
DR'N BY: JWB	
REV: 07/26/21 JWB	DWG NAME: LIFT TIE – 6 RISE (MODIFIED)

11/21/17 JWB
01/25/18 JWB
06/27/18 JWB
02/18/19 JWB

Sht:____of____
By:BSJ Chk:____
8/9/2024 11:28:14 AM
Culvert p. 1 of 14

Eriksson Culvert v6.3.1

Filename: SGL 12x6 HL93 01-03 fill.etcx

Project: SGL 12x6 HL93 01-03 fill
Task :
Client :
Job No.:

CULVERT PROPERTIES
==========
Type of Culvert: Precast Specification : LRFD 9th Edition
Operating Mode : Analysis

Physical Dimensions

No. of Boxes: 1 Name: BoxCulvert
Clear Span : 12.0000 ft
Clear Height: 6.0000 ft Skew Angle : 0.00 deg
Length : 6.0000 ft Bottom Slab Support: Full Slab
Fill Depth Range: Maximum : 3.00 ft Minimum : 1.00 ft Increment : 2.00 ft
Haunches: Top, Length: 12.0000 in Height: 12.0000 in
Bottom, Length: 12.0000 in Height: 12.0000 in
Member Thicknesses: Top Slab: 9.0000 in Bot Slab: 9.0000 in
Ext Wall: 8.0000 in
Wall Joint: None

Material Properties

Concrete: Strength,f'c : 5.000 ksi Density : 0.150 kcf Elasticity,Ec: 4592 ksi
Type : Normal Weight Density Modification Factor : 1.00
Fr Factor : 0.24 Gamma1 : 1.60 Gamma3 : 0.75 (user defined)
Steel: Yield,fy : 70.00 ksi fss Limit : 0.65fy Elasticity,Es: 29000 ksi
Yield,fyv : 60.00 ksi Diameter : 1.000 in Type : Mesh
Soil: Density : 0.120 kcf Slope Factor: 1.150
Poisson's : 0.5
Fe Factor : 1.150 (Maximum for Compacted Fill)
Serviceability, Gamma-e: 1.00

Loads

Live Load: Vehicle: (AA) HL-93 - Design Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	8.00	0.00
2	32.00	14.00
3	32.00	14.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: yes
Tandem: Axle 1: 25.00 k, Axle 2: 25.00 k, Axle Spacing: 4.00 ft
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Inventory Rating Load Factor: 1.75 Operating Rating Load Factor: 1.35
Design Load Combinations: Strength I
Override MPF: no
Override DLA: no
Include Lane Load : no Max. No. of Lanes: Computed by Program
Traffic Direction** : Lanes Parallel to Main Reinforcement
Neglect Live Load for Large Fill Depths: no
Apply Surcharge at Fill Depths > 2 ft : yes
Compute Surcharge Depth: yes
Dead Load: Future Wearing Surface : 0.00 klf Add. Dead Load : 0.00 klf
Concentrated Loads : none
Lateral Soil Loads: Max. Equiv. Fluid Press.: 60.00 pcf Min. Equiv. Fluid Press. : 30.00 pcf
Include Additional Uniform Horiz. Load: no
Include Additional Uniform Vert. Load: no
Buoyancy Check : no
Fluid Pressures : Apply Water Press. : yes, interior only
: Interior Pressure Head : 0.00 ft
Foundation Model : Uniform Loads
Seismic Analysis : Do not include

Load and Resistance Factors

	Max	Min
DC:	1.250	0.900
DW:	1.500	0.650
EV:	1.300	0.900
EH:	1.350	0.900
WA:	1.000	
EQ:	1.000	

LL I : 1.750 LL II : 1.350 LL Legal : 1.750 LL Extreme : 0.500
Ductility: 1.000 Importance: 1.000 Redundancy, non-earth: 1.000 Redundancy, earth: 1.000
Condition: 1.000 System : 1.000
Phi Shear: 0.900 Phi Moment: 1.000 PM Compression: 0.750 PM Tension : 0.900

Sht:____of____
By:BSJ Chk:____

Eriksson Culvert v6.3.1

Filename: SGL 12x6 HL93 01-03 fill.etcx
8/9/2024 11:28:14 AM

Load Factor Multipliers, Design Mode: 1.00 Analysis Mode: 1.00

Reinforcement

Reinforcement Covers	Exterior	Interior
Top Slab:	2.0000 in	1.0000 in
Walls :	1.0000 in	1.0000 in
Bot Slab:	1.0000 in	1.0000 in

Assigned reinforcement:

Location	Mark	Size	Spacing (in)	# of Layers
Top Slab Inside	A100 (AS2)	D8.5	2.0000	1
Bottom Slab Inside	A200 (AS3)	D7.5	2.0000	1
Top Slab Outside	A300 (AS7)	D7.5	4.0000	1
Bottom Slab Outside	A400 (AS8)	D7.5	4.0000	1
Top Corner	A1 (AS1)	D7	2.0000	1
Bottom Corner	A2 (AS1)	D7	2.0000	1
Ext. Wall Inside	B1 (AS4)	D7.5	4.0000	1
Ext. Wall Outside	B2 (AS1)	D7	2.0000	1
Longitudinal	C1 (AS6)	D4	8.0000	1
Top Distribution	C100 (AS5)	D7.5	4.0000	1
Bottom Distribution	C200	D4	8.0000	1

Analysis Options

LL Analysis : Automatically Set Traffic Direction to Account for Skew Effects: yes
Limit LL Distribution Width to Culvert Length for: None
Combine Longitudinal Axle Distribution Overlaps: Yes, Max of 2 Axles
Combine Transverse Axle Distribution Overlaps: No
Axle Placement Increment for Moving Load Analysis: 20
Include Impact on Bottom Slab: yes
Always Distribute Wheel Load: yes
Deflection Criteria : 1/800
Approach Slab will be Used: no
Reinforcement : Always Include Distribution Steel: no
Distribution Slab Provided: no
User Defined Longitudinal Steel: yes
Max. As used in Vc Calcs: 2.00 in2/ft
Distribute Minimum Reinforcement per Face: yes
Use individual Member Thicknesses for Min Steel: no
Epoxy coat steel: no
Use M-dimension for bar length calcs.: no
Slenderness : Checked K Factor: 2.00
Analysis Modeling : Use Haunches in the Structural Analysis Model: yes
Critical Sections : Flexure critical section location: end of haunch
Shear critical section location: dv beyond haunch
Use Max. Moment with Max. Shear at the Critical Section for Shear: no
Include depth of haunch for critical sections: no
Flexure : Ignore Axial Thrust: no
Use Eq. 12.10.4.2.4a-1: yes Nu Multiplier: 1.00
Shear : Always Check Iterative Beta Method
Environmental : Apply duribility factors: no
Load Combinations : LRFD min/min: no

Sht:____of____
By:BSJ Chk:____

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ANALYSIS RESULTS
==========

Top Slab Thickness = 9.00 in
Bottom Slab Thickness = 9.00 in
Exterior Wall Thickness = 8.00 in

Modular Ratio (N) = 6.32 Max. Steel Ratio = 0.020
Design Span = 12.67 ft Design Height = 6.75 ft

Volume of Concrete: 1.111 cy/ft

Note: Design and analysis results do not include force effects from stipping and handling stages

M dimension = 2' 10" (method of equivalent capacity)
= 4' 12" (method of contraflexure - ASTM)

Reinforcing Steel Schedule

Location	Mat Mark	Sheets Included	Layers	As,prv (in2/ft)
Top Slab (int)	A100 (AS2)	Top	1	0.510
Bot Slab (int)	A200 (AS3)	Bot	1	0.450
Top Slab (ext)	A300 (AS7)	Top	1	0.225
Bot Slab (ext)	A400 (AS8)	Bot	1	0.225
Corner Top-U	A1 (AS1)	Top	1	0.420
Corner Bottom-U	A2 (AS1)	Bot	1	0.420
Ext Wall (int)	B1 (AS4)	L&R	1	0.225
Ext Wall (ext)	B2 (AS1)	L&R	1	0.420
Top Slab (int- 1)	C100 (AS5)	Top	1	0.225
Bot Slab (int- 1)	C200	Bot	1	0.060
Temperature (1)	C1 (AS6)	Top	1	0.060
Temperature (1)	C1 (AS6)	Bot	1	0.060
Temperature (1)	C1 (AS6)	L&R	1	0.060
Temperature (1)	C1 (AS6)	L&R	1	0.060

Note: A denotes flexural steel, B denotes vertical steel, C denotes longitudinal steel

AS Bar Marks

Location	As prv in2/ft
Transverse Side Wall - Outside Face (AS1)	0.420
Transverse Top Slab - Inside Face (AS2)	0.510
Transverse Bottom Slab - Inside Face (AS3)	0.450
Transverse Side Wall - Inside Face (AS4)	0.225
Distribution Top Slab - Inside Face (AS5)	0.225
Distribution Top Slab - OutSide Face (AS6)	0.060
Transverse Top Slab - Outside Face (AS7)	0.225
Transverse Bottom Slab - Outside Face (AS8)	0.225

Notes: 1.) Final areas of steel provided must be checked in analysis mode

Sheet Inventory

Interior sheets - 4 sheet layout with laps located in the wall

Sheet Loc.	Mat Mark	Zone	Line Wires Size	Spac. (in)	Length (ft-in)	Area (in2/ft)	H leg (ft-in)	V leg (ft-in)	Cross Wires(L,tot= 5-11) Mat Mark	Size	Spac. (in)	Area (in2/ft)	Wgt (lbs)
Top	A100	Base	D8.5	2.00	14-12	0.510	12- 2	1- 5	C100	D7.5	4.00	0.225	223
										(1) sheets, Total weight:			223
L&R	B1	Base	D7.5	4.00	6- 2	0.225			C1	D4	8.00	0.060	47
										(2) sheets, Total weight:			94
Bot	A200	Base	D7.5	2.00	14-12	0.450	12- 2	1- 5	C200	D4	8.00	0.060	156
										(1) sheets, Total weight:			156

Exterior sheets - 4 sheet layout with laps located in the slab

Sheet Loc.	Mat Mark	Zone	Line Wires Size	Spac. (in)	Length (ft-in)	Area (in2/ft)	H leg (ft-in)	V leg (ft-in)	Cross Wires(L,tot= 5-11) Mat Mark	Size	Spac. (in)	Area (in2/ft)	Wgt (lbs)
Top	A300	Base	D7.5	4.00	13- 2	0.225							61
										(1) sheets, Total weight:			61
L&R	B2	Base	D7	2.00	14- 3	0.420	3- 6	7- 3	C1	D4	8.00	0.060	141
	A1	Base	D7	2.00	14- 3	0.420	3- 6	7- 3	C1	D4	8.00	0.060	18
	A2	Base	D7	2.00	14- 3	0.420	3- 6	7- 3	C1	D4	8.00	0.060	18

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 By:BSJ Chk:____
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Culvert p. 4 of 14

(2) sheets, Total weight: 354

Bot	A400	Base	D7.5	4.00	13- 2	0.225	C1	D4	8.00	0.060	79

(1) sheets, Total weight: 79

Weight of Steel: 161 lb/ft Total weight of all sheets: 967

Notes:
Epoxy coating may be needed for A1, A300, and some C1 reinforcement, check with governing agency.
L&R - left and right, TC - top corner, BC - bottom corner, INT - interior walls, EXT - exterior walls
Nested line wires are additive to the base line wires, but nested cross wires replace base cross wires.
Adder sheets may require cross wires, check with mesh supplier.

Summary of Ratings Table:

			Flexure					Shear				
Truck	ILF	OLF	Fill	Member	Location	IR	OR	Fill	Member	Location	IR	OR
(AA)HL-93	1.75	1.35	1.99	2	MID	1.07	1.39	1.00	2	LT	1.02	1.32

Critical Sections Summary: Flexure

Member 1: (Exterior Wall), Thickness = 8.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
BOT	16.50	-16.86	13.18	16.08	6.85	19.70	1.00	0.42	6.87	1.25	1.62	AA	1.99
MID	40.50	0.35	1.45	8.78	6.85	9.23	1.00	0.23	6.87	7.51	9.74	AA	1.00
MID-	40.50	-17.17	13.18	16.08	6.85	19.70	1.00	0.42	6.87	1.19	1.54	AA	1.99
TOP	16.50	-17.98	13.18	16.08	6.85	19.70	1.00	0.42	6.87	1.13	1.46	AA	1.99

Member 2: (Top Slab), Thickness = 9.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	16.00	-7.90	2.64	16.08	6.85	16.94	1.00	0.42	8.69	2.28	2.96	AA	1.00
MID	76.00	20.90	-0.72	22.27	7.84	22.04	1.00	0.51	8.69	1.07	1.39	AA	1.99
MID-	76.00	0.20	2.35	8.78	6.85	9.60	1.00	0.23	8.69	NC	NC	AA	3.00
RT	16.00	-7.90	2.64	16.08	6.85	16.94	1.00	0.42	8.69	2.28	2.96	AA	1.00

Member 4: (Bottom Slab), Thickness = 9.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	16.00	-5.77	3.94	18.53	7.85	19.80	1.00	0.42	8.69	5.13	6.65	AA	1.99
MID	76.00	18.59	-0.22	19.78	7.85	19.71	1.00	0.45	8.69	1.09	1.41	AA	1.99
MID-	76.00	0.29	3.43	10.09	7.85	11.28	1.00	0.23	8.69	NC	NC	AA	3.00
RT	16.00	-5.77	3.94	18.53	7.85	19.80	1.00	0.42	8.69	5.13	6.65	AA	1.99

Critical Sections Summary: Vertical Shear

Member 1: (Exterior Wall), Thickness = 8.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
BOT	22.35	2.24	15.9	13.14	6.56	10.02	2.000	11.13 b	0.00	0.00	0.00	6.56	8.50	AA	1.00
MID	40.50	1.22	0.3	1.45	6.69	19.59	3.836	21.76 a	0.00	0.00	0.00	21.88	28.36	AA	1.00
MID-	40.50	0.64	16.3	13.14	6.56	10.02	2.000	11.13 b	0.00	0.00	0.00	12.10	15.68	AA	1.00
TOP	22.35	-1.67	17.8	13.18	6.56	10.02	2.000	11.13 b	0.00	0.00	0.00	7.31	9.48	AA	1.99

Member 2: (Top Slab), Thickness = 9.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	22.48	10.26	7.5	2.64	6.56	10.40	2.076	11.55 a	0.00	0.00	0.00	1.02	1.32	AA	1.00
MID	76.00	3.80	20.1	-1.08	7.49	10.32	1.806	11.46 a	0.00	0.00	0.00	2.72	3.52	AA	1.00
MID-	76.00	3.80	1.2	1.93	6.69	13.42	2.628	14.91 a	0.00	0.00	0.00	3.53	4.58	AA	1.00
RT	22.48	10.26	7.5	2.64	6.56	10.40	2.076	11.55 a	0.00	0.00	0.00	1.02	1.32	AA	1.00

Member 4: (Bottom Slab), Thickness = 9.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	22.75	7.74	3.1	3.94	7.56	14.46	2.506	16.07 a	0.00	0.00	0.00	2.35	3.04	AA	1.99
MID	76.00	0.17	17.4	-0.42	7.54	10.37	1.803	11.52 a	0.00	0.00	0.00	61.32	79.50	AA	1.00
MID-	76.00	0.17	0.0	3.01	7.69	29.53	5.031	32.81 a	0.00	0.00	0.00	NC	NC	AA	1.00
RT	22.75	7.74	3.1	3.94	7.56	14.46	2.506	16.07 a	0.00	0.00	0.00	2.35	3.04	AA	1.99

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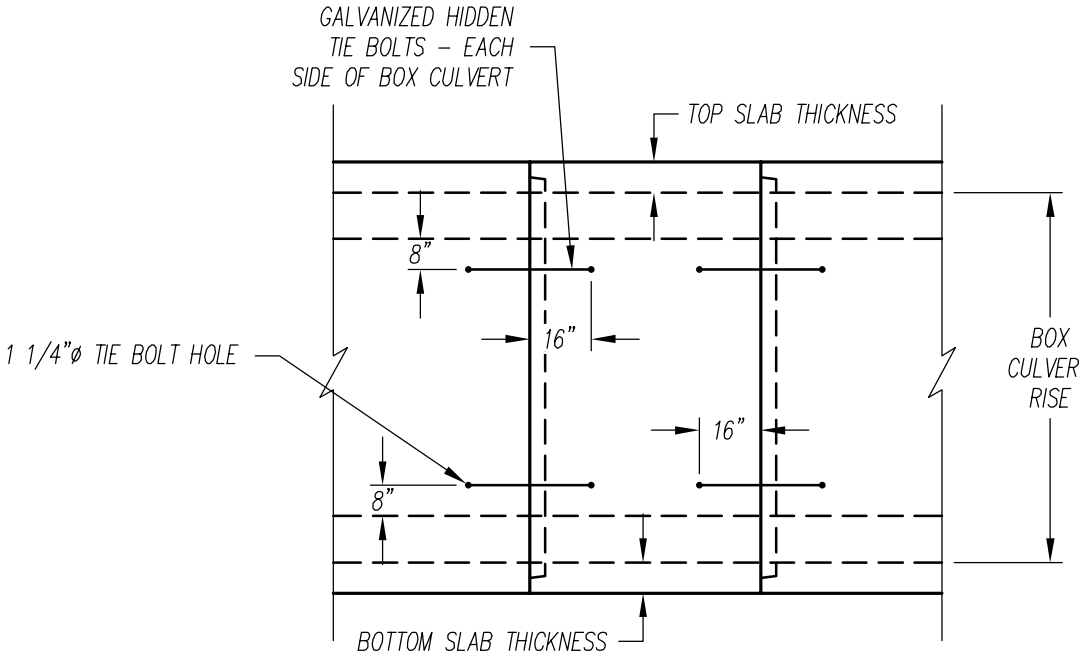
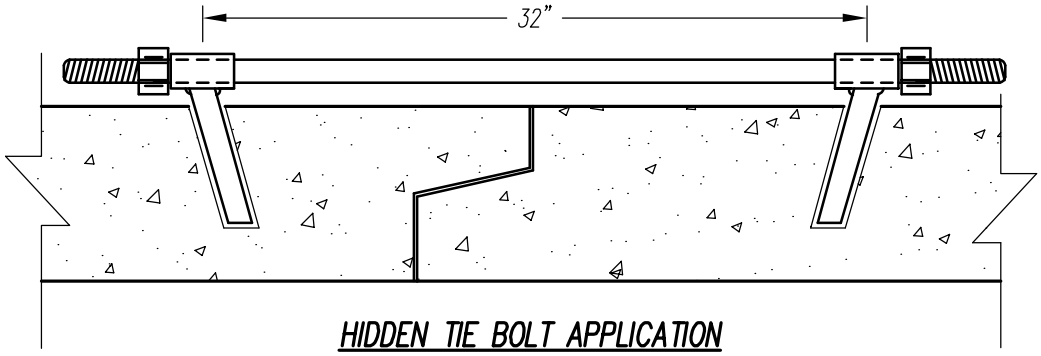
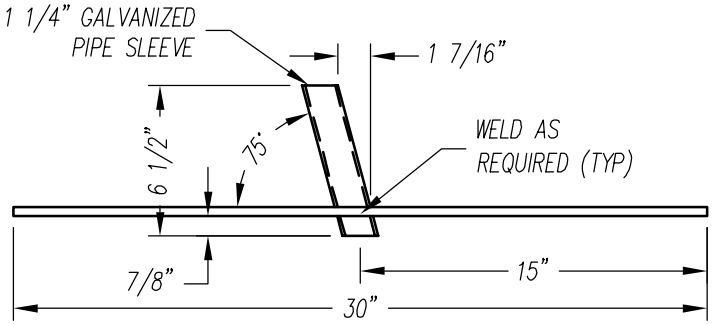
Vc Calculation By: a - Iterative Beta, b - Constant Beta, c - Box Culvert, d - Standard/Arema



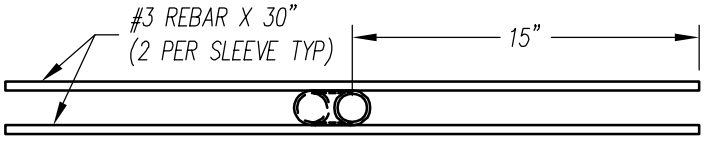
ELEVATION VIEW – BARREL SECTIONS WITH HIDDEN TIE BOLT



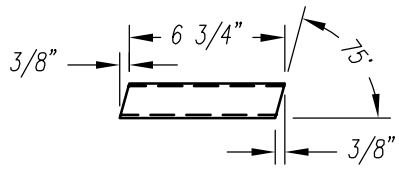
HIDDEN TIE BOLT APPLICATION



TOP VIEW



END VIEW



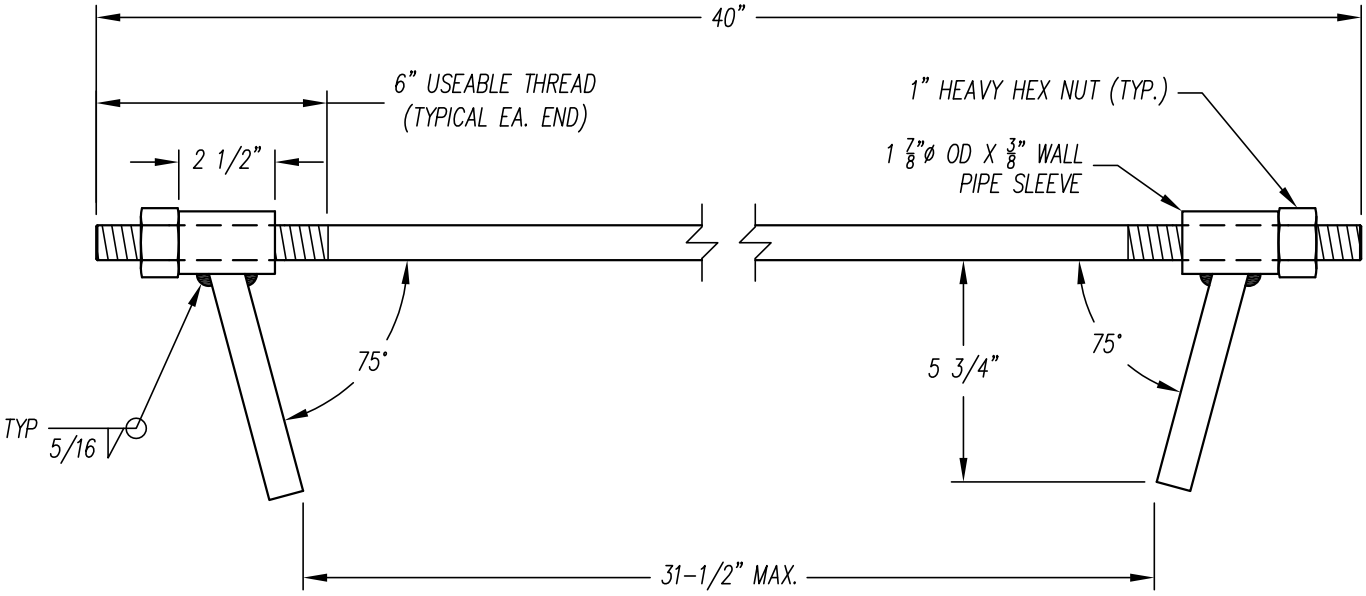
SLEEVE DETAIL

1) Tie Bolts should not be used to pull the joint together.
2) Tension adjusting nut 1/2 turn past snug.

02/17/16 JWB

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: TIE BOLT HOLE LOCATION DETAIL
DATE: 02/06/16	
DR'N BY: JWB	
REV: 11/27/17 JWB	DWG NAME: TIE BOLT HOLE LOCATION – 2



1. Tie bolts are manufactured from 29/32" diameter material conforming to ASTM A36.
2. Standard 1" diameter threads are rolled on adjusting bolts.
3. Heavy Hex Nuts conform to ASTM A563.
4. The welded pipe sleeve conforms to ASTM A519
5. Welding and weld inspection are done in accordance with AWS/ANSI D1.1-94 Structural Welding Code.
6. Tie bolt assembly is hot dip galvanized in accordance with ASTM A153 / ASTM F2329.

FORTERRA™
Rapid City, South Dakota
2046 Samco Road, Suite 2
Rapid City, SD 57702
(605) 718-4111

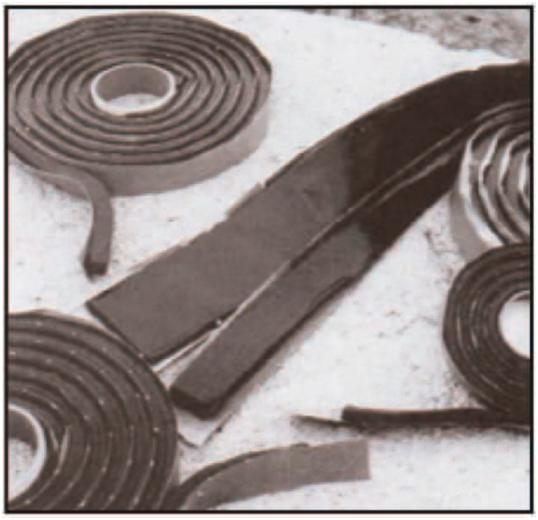
SCALE: NONE	PROJECT: GALVANIZED HIDDEN TIE BOLT
DATE: 2/4/13	
DR'N BY: TDE	
REV: 1/14/16 REM	DWG NAME: HIDDEN TIE BOLT

EZ-STIK

PREMIUM BUTYL JOINT SEALANT

What It Is

EZ-STIK is a premium preformed butyl joint sealant that is supplied in rope form. Containing a higher proportion of butyl rubber, EZ-STIK It is carefully blended from uncured butyl rubber and other solids and will not shrink, crack, or dry out. Although clean to handle, it provides excellent adhesion and cohesion to a wide variety of surfaces - concrete, metal, most concrete coatings, glass, wood, and painted surfaces.



Why It's Better

- Increased proportion of butyl rubber content.
- Premium packaging.
- Wide variety of sizes and styles.
- All-weather performance.
- Good adhesion to dry concrete, commonly specified concrete coatings, steel, glass, or painted surfaces.
- Coated release paper for easy installation.
- Long service life.
- Cohesive properties allow for joint movement.
- Compatible for use with rubber O-Ring designs.
- Low moisture vapor transmission rate (MVTR).
- Special primers available for use on damp, contaminated, or difficult surfaces.

How It Performs

EZ-STIK BUTYL JOINT SEALANT *meets or exceeds all requirements of the following Standards, Specifications and/or Test Methods:*

ASTM C 990 - *Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants; Section 6.2 Butyl Rubber Sealants*

AASHTO M 198 - *Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets*

Typical Applications

- Sanitary Manhole Joints
- Stormwater Manhole Joints
- Irrigation and Drainage Systems
- Box Culverts
- Elliptical/Arch Pipe
- Architectural Foundations
- Underground Utility Vaults
- Stormwater Treatment Structures
- Stormwater Inlet Structures
- On-Site Treatment Tanks
- Grease Interceptors
- Wet Wells

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Press-Seal Gasket is an ISO 9001:2008 Registered & ISO 14001:2004 Compliant Company

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email: sales @press-seal.com
web: www.press-seal.com

Made in USA

EZ-STIK

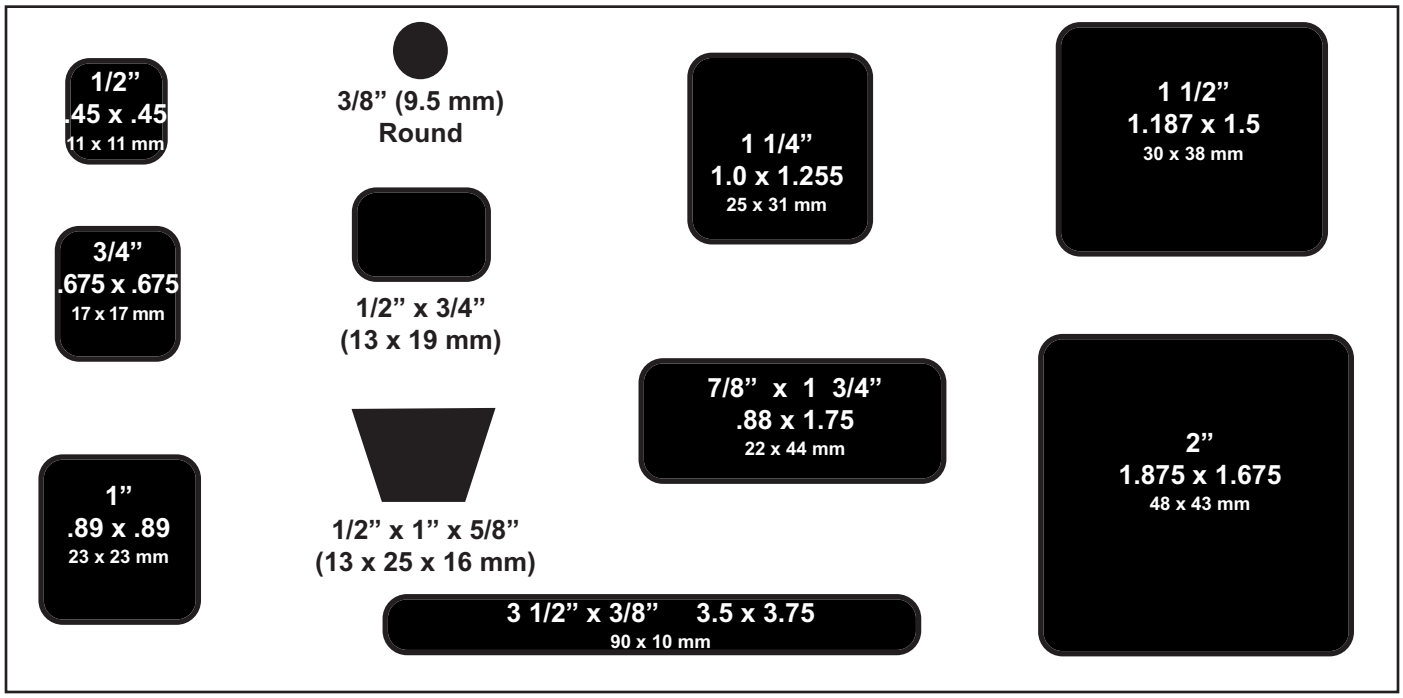
SPECIFICATION and SELECTION GUIDE

Submittal Specification

The joints and/or joint surfaces of the structures shall be sealed with a butyl-rubber-based preformed flexible sealant conforming to ASTM C-990, paragraph 6.2. The material shall be PRO-STIK or EZ-STIK as supplied by PRESS-SEAL GASKET CORPORATION, Fort Wayne, Indiana, or approved equal. The butyl material shall consists of 50% (min.) butyl rubber and shall contain 2% or less volatile matter.

For preformed joint sealants, the sealant shall be sized such that the joint is filled to 50% (min.) of its annular volume when fully assembled, and the sealant shall have the ends kneaded together at the overlap. Primer and/or adhesive as recommended by the sealant supplier shall be employed for adverse, critical, or other applications.

Testing of joints and compliance with construction requirements shall be conducted in strict conformance with the requirements of the sealant supplier.



Custom Sizes Available Upon Request

Also Available in Trowelable Bulk and Easy to Pump Bulk

All sizes sold 40 cartons per pallet. All pallets are shrink wrapped for outside storage.
Quantity discounts available - contact our Customer Service Department.

PRESS-SEAL GASKET CORPORATION
Protecting Our Planet's Clean Water Supply
Press-Seal Gasket is an ISO 9001:2008 Registered & ISO 14001:2004 Compliant Company
800-348-7325 Fax (260) 436-1908
email: sales @press-seal.com
web: www.press-seal.com
Made in USA

EZ-STIK

PHYSICAL PROPERTIES TEST RESULTS

Description

EZ-STIK is a butyl-rubber-based sealant designed to be permanently flexible, tacky and resistant to moisture and deterioration by exposure to dilute chemical solutions. EZ-STIK meets ASTM C-990, Section 6.2 requirementsfor Butyl Rubber Sealant, and AASHTO M 198.

Typical Properties

The following values represent typical test results and are manufacturing specifications.

		SPEC.	REQUIRED	EZ-STIK
Butyl Rubber (Hydrocarbon Content %)		ASTM D4	50% min.	62%
Ash Inert Mineral Filler %		AASHTO T111	30% min.	45-48%
Volatile Matter	(AASHTO T47)	ASTM D6	2% max.	0.5-1.0%
Specific Gravity @ 77ºF (25 C)	(AASHTO T229)	ASTM D71	1.15 - 1.50	1.25 - 1.35
Ductility @ 77ºF (25 C), cm	(AASHTO T51)	ASTM D113	5.0 min.	meets requirement
Flash Point C.O.C.		ASTM D92	350º (177 C) min.	375ºF (191 C)
Fire Point C.O.C.		ASTM D92	375º min. (191 C)	385ºF (196 C)
Compression Test				
@77ºF (25 C), lbf/in^3		ASTM C972	100 max.	40 - 55 lbf/in^3
@32ºF (0 C), lbf.in^3			200 max.	130 - 160 lbf/in^3
Low Temperature Flexibility				
@-10ºF (-23 C)		ASTM C765	180º bend, no cracking, nor loss of adhesion.	Pass - no cracking or adhesion loss.
Elevated Temperature Flexibility				
14 days @ 157ºF (69 C)		ASTM C776	No sag, nor change in extruded shape.	Pass - no sag or shape change.
Adhesion After Impact		ASTM C776-84	No greater loss than 50% of adhesion.	Pass - no loss of adhesion.
Cone Penetration				
@ 77ºF (25 C), dmm		ASTM D217	50 - 100 dmm	55 - 85 dmm
@ 32ºF (0 C), dmm			40 min.	45 - 55 dmm
Chemical Resistance			No deterioration, no cracking, no swelling.	Pass - no visible change after 30 days immersion in 5% solutions HCl, H_2SO_4,NaOH,KOH,H_2S

Application Properties

Service Temperature Range	-40F to 250F (-40 to 121 C)
Application Temperature	20F to 120F (-7 to 49 C)
Storage Temperature	Under 120F (49 C)
Shelf Life	2 Years minimum

PRESS-SEAL GASKET CORPORATION
Protecting Our Planet's Clean Water Supply
Press-Seal Gasket is an ISO 9001:2008 Registered & ISO 14001:2004 Compliant Company
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email: sales @press-seal.com
web: www.press-seal.com
Made in USA

GATOR WRAP

Infi-Shield® External Gator Wrap

Infi-Shield® Gator Wrap prevents infiltration by providing a water-tight seal around any manhole, catch basin or concrete pipe joint. Gator Wrap resists harsh soil conditions and also provides a root barrier for any crack or joint. Infi-Shield® Gator Wrap installs easily with no special tools and can be immediately backfilled.

Infi-Shield® Gator Wrap Specification

Each manhole, catch basin or pipe joint shall be sealed with an external rubber sleeve similar to the Infi-Shield Gator Wrap as manufactured by Sealing Systems Inc (763-478-2057). The seal shall be made of a Stretchable, Self-Shrinking, Intra-Curing Halogenated based rubber with a minimum thickness of 30 mils. The back side of each unit shall be coated with a cross-linked re-enforced butyl adhesive. The butyl adhesive shall be non-hardening sealant with a minimum thickness of 30 mils. The seal shall be designed to stretch around the joint and then overlapped creating a cross-link and fused bond between the rubber and butyl adhesive. Gator Wrap forms a continuous rubber seal on a manhole joint which prevents water and soil from infiltrating through the manhole, catch basin or concrete pipe joint.

INFI-SHIELD GatorWrap® is available in 6” and 9” widths and comes in a 50 foot roll or in a user-friendly kit which has six sixteen foot rolls. Upon special order, we can also manufacture a 12” width but please allow four weeks for delivery.

EPDM Rubber Specifications

Physical Properties	ASTM Test Method	Typical Value
Sheer Strength	D816	15 lb. PSI min
Tensile, PSI	D412	50 PSI
Elongation %	D412	500 %
Penetration	D217	40/120 MM
Low Temperature	D746	Minus 49º F flexibility
Heat Aging	D573 7 days @ 90 degrees C	
Tensile Strength	minimum, PSI (MPa) > 100 PSI	Pass
Fusion	5/64” (0.2) max	Pass
Elongation %	minimum 300% at break	Pass
Ozone Resistance	no visible signs of cracking	Pass
Aging and Storage	300% elongation applied (10 Years)	Pass
UV Resistance	No visible signs of cracking	Pass

Material meets ASTM C923 and C877 – Mastic Meet ASTM C990.
Disclaimer: This technical data information and recommendations offered are based on test results, and findings we believe to be reliable and complete.

Sealing Systems, Inc.
9350 County Road 19 • Loretto, MN 55357 • 763-478-2057 • 800-478-2054 • Fax 763-478-8868 • www.infi-shield.com

Infi-Shield GATOR WRAP

INSTALLATION INSTRUCTIONS

1. Expose the area that is to be sealed. Clean the entire area around the joint with a wire brush and whisk broom. Remove any sharp protruding edges around the joint with an abrasive tool. When finished cleaning, the entire area must be dry and free of any dirt.

2. Remove the first foot of paper backing from the mastic. Center and place the Gator Wrap around the joint. Continue to remove paper backing as you apply the Gator Wrap to the entire structure.

3. Seal the overlapping area with a 6" overlap. Be sure not to stretch material at the overlap area.

4. Cut excess material using a utility knife. Using a rubber mallet or hand held roller, firmly flatten the Gator Wrap 360 degrees around joint.

Material: Rubber meets ASTM C923 and C877 – Mastic Meet ASTM C990

Disclaimer: This technical data information and recomedations offered are based on test result, and findings we believe to be reliable and complete.

S.S.I. SEALING SYSTEMS, INC.

Sealing Systems, Inc.

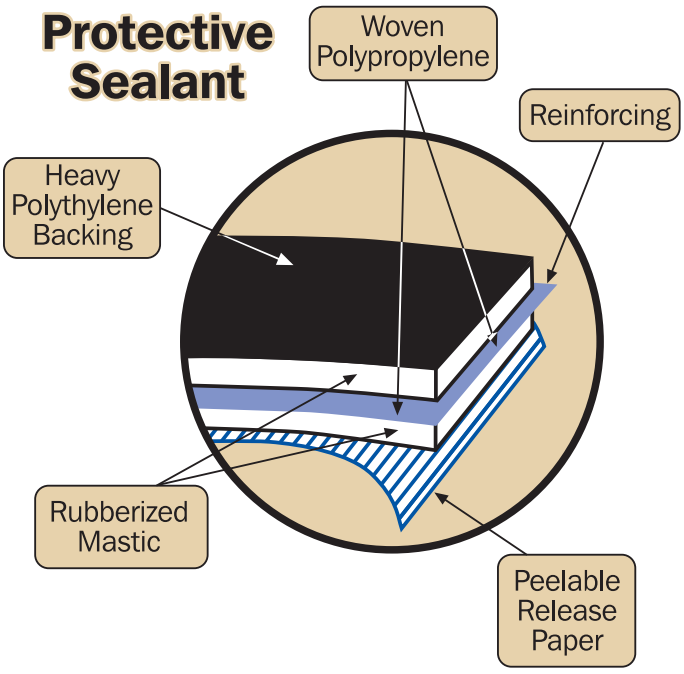
9350 County Road 19 • Loretto, MN 55357 • 763-478-2057 • 800-478-2054 • Fax 763-478-8868 • www.infi-shield.com

SEAL PLUGS

High-Performance, Water-Tight Seals For Sealing Lift Holes In Concrete Pipe

This two-ply seal plug is designed to adhere to concrete with its aggressive rubberized mastic. The plug is reinforced with a tough, puncture-resistant woven polypropylene with an outer layer of impervious polyethylene, resistant to most acids and alkalines.

Seal plugs are available in easy to apply 9”x9” squares with a peel-able protective paper for faster application without the waste or extra tools.



TYPICAL PROPERTIES

POLYETHYLENE BACKING		
Tensile strength, min, psi	4,000	D882, Method A
Elongation at break, min, %	100	D882, Method A
Tear resistance, min, psi	1,500	D624, Die C
Water absorption, max, %	0.01	D570

REINFORCING MESH ELEMENT		
Tensile strength min, lb., in.		D1682
	Warp 75	
	Fill 75	
Elongation at break, min, %		
	Warp 20	
	Fill 20	

RUBBERIZED MASTIC		
	Minimum	Maximum
Ash-inert matter, %	80	15
Volatiles, %	0.1	2
Softening Temp., min, F	175	-
Specific gravity	0.95	1.05
Penetration, dmm	60	90
Flow, mm	10	10

CERTIFICATION

SEAL WRAP MATERIALS AND PERFORMANCE REQUIREMENTS.

I hearby certify that Seal Wrap is produced in accordance to the following specifications:

9" seal plugs, 9"and 12" master rolls, consists of an outer backing of polyethylene film with a minimum tensile strength, 4000 lb. psi, when tested in accordance to test method D 882. We further certify that the rubberized mastic component of Seal Wrap is reinforced with a mesh element with a minimum, 75 lb./in, warp and fill when tested in accordance to test method D 1682.

Seal Wrap is made of the same high performance components, excluding the steel straps, as our Mac Wrap collar which meets ASTM standard C-877 Type II.

Robert L. Weir
President Construction Products Division

P.O. Box 447 • US Hwy. #1 North • McBee, SC 29101 • Phone: (877) 962-7622 • (843) 335-5814 • Fax: (843) 335-5909
www.marmac.com info@marmac.com

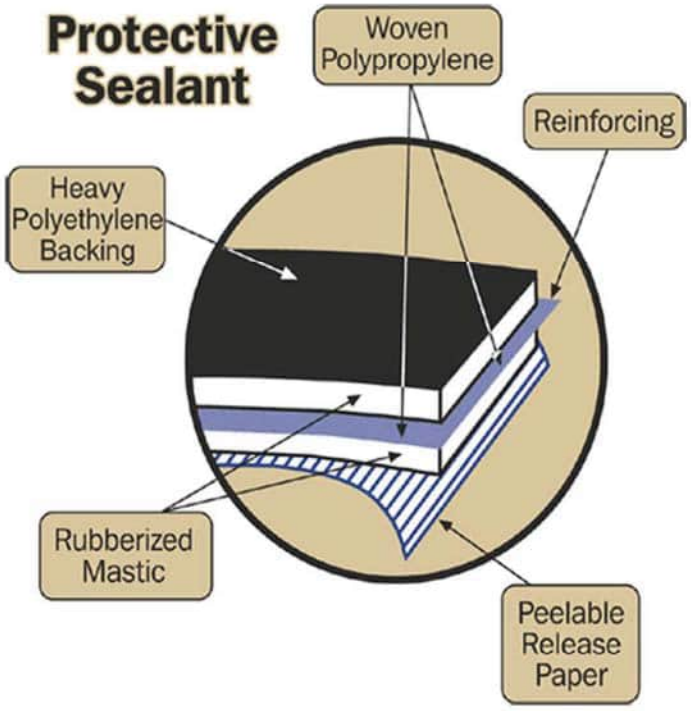
Seal Wrap

High-performance water-proofing membrane for culvert structures

Mar Mac Seal Wrap is a two-ply made with heavy-duty water-proofingmaterials essential for sealing boxed, arched and span culverts.

Seal Wrap is made of two layers of rubberized mastic, reinforced with a sheet of strong, puncture-resistant woven polypropylene. The outside backing is constructed with impervious polyethylene a material resistant to most acids and alkalines.

Seal Wrap is available in 60' rolls lined with peelable release paper for easy application without the waste.



TYPICAL PROPERTIES

POLYETHYLENE BACKING		
Tensile strength, min, psi	4,000	D882, Method A
Elongation at break, min, %	100	D882, Method A
Tear resistance, min, psi	1,500	D624, Die C
Water absorption, max, %	0.01	D570

REINFORCING MESH ELEMENT		
Tensile strength min, lb., in.		D1682
	Warp 75	
	Fill 75	
Elongation at break, min, %		
	Warp 20	
	Fill 20	

RUBBERIZED MASTIC		
	Minimum	Maximum
Ash-inert matter, %	80	15
Volatiles, %	0.1	2
Softening Temp., min, F	175	-
Specific gravity	0.95	1.05
Penetration, dmm	60	90
Flow, mm	10	10

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Seal Wrap is made of the same high performance components, excluding the steel straps, as our Mac Wrap collar which meets ASTM standard C-877 Type II.

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www.marmac.com info@marmac.com

INSTALLATION INSTRUCTIONS FOR SEALWRAP

- SURFACE PREPARATION:

Sweep or brush the external portion of the joint to insure that dirt, dust and other foreign matter do not interfere with direct contact between the mastic sealer and the concrete joint. If ambient temperature is below 40°F and/or wet conditions are present primer is recommended. Mar Mac RB Quick Dry Primer can be applied by brush or roller at the rate of 1 gallon per 250-350 sq. ft. depending on the porosity of the surface. Cure time is approximately 15-60 minutes dependent on temperature and humidity. Apply primer too exceed the width of the Sealwrap by a minimum of 2 inches.

- INSTALLATION

Peel away the silicon coated release liner to expose 1 ft of the mastic adhesive. Center the exposed mastic over the joint and using the palm of the hand, apply pressure to achieve a uniform bond of the Sealwrap to the concrete. Continue to peel the release liner while unrolling the Sealwrap **KEEP CENTERED OVER JOINT**. For Sealwrap splicing, overlap a minimum of 4 inches. If primer is used, allow for full cure before Sealwrap installation.

MAR MAC RB ADHESIVE PRIMER

DESCRIPTION:

MAR MAC RB LIQUID ADHESIVE PRIMER is a rubber based adhesive in solvent solution which is specifically formulated to provide excellent adhesion with Macwrap, Sealwrap and Sealing Tape under may kinds of surface conditions.

USES: RB ADHESIVE PRIMER....

- Used to prime all precast structures on which Macwrap and/or Sealwrap will be installed. Including: round, arch, elliptical pipe and box culverts and span bridges.
- Designed to be used on applications down to 25ºF. (-4ºC).

APPLICATION:

MARMAC RB LIQUID ADHESIVE PRIMER may be applied with roller or brush. A roller with a heavy nap should be used, such to carry sufficient material to the area being primed.

Apply all ***MAR MAC RB LIQUID ADHESIVE PRIMER*** to a clean, dry, dust free, and frost free surface at a coverage of approximately 250 to 350 square feet per gallon on concrete. The liquid adhesive should be spread sufficiently to avoid areas of access material. Areas of excess material will lengthen the curing time on the application of the ***MAR MAC RB LIQUID ADHESIVE PRIMER.***

For best results ***MAR MAC RB LIQUID ADHESIVE PRIMER*** should be applied and allowed to become tacky to the touch, timing may vary due to atmospheric conditions. At this point Sealwrap/Macwrap should be applied. If primer dries and is no longer tacky, reapply primer.

SAFETY, STORAGE AND HANDLING INFORMATION:

MAR MAC RB LIQUID ADHESIVE PRIMER vapors are flammable. User should review Material Safety Data Sheet (MSDS) for this product and follow safety instructions listed within.

This information is based on our best knowledge, but MAR MAC cannot guarantee the results to be obtained

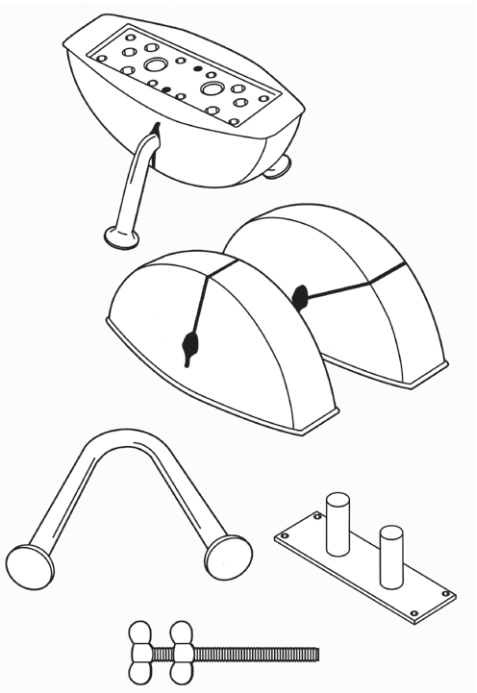
P.O.Box 447• US Hwy.#1 North• McBee, SC 29101• Phone: 877.962.7622• 843.335.5814• Fax: 843.335.5909
WWW.MARMAC.COM

DAYTON SUPERIOR®

Utility Anchor®

Utility Anchor System

The Dayton Superior Utility Anchor System is designed to economically simplify the lifting and handling of precast concrete elements. Its economics, ease of use and versatility will be a welcome addition to your precast operations.



Key Advantages

- High strength – up to 24,000 lbs. SWL
- No special lifting hardware required
- Uses a standard hook or clevis
- Easy to install and use
- Utilizes reusable 90° and 45° polyurethane recess plugs
- Eliminates "through holes" in the precast element
- An economical and versatile system – applicable to any precast concrete element

Added Benefit

Utility contractors can use the utility anchor effectively as a pulling iron. When used as a pulling iron, the safe working loads may be increased by 33%, based on the use of a 3 to 1 factor of safety.

The design of the Dayton Superior Utility Anchor Utility System assures the precaster of an economical, user-friendly system for lifting and handling precast concrete elements.

Utilize the Utility Anchor System to:

- Remove precast elements from their forms
- Handle in the precast yard
- Load for shipment
- Unload and place at the job site

The precaster is able to do it all without the need for any special lifting equipment or hardware. Simply use a standard hook or shackle to connect slings to the utility anchor for a safe lift.

The Utility Anchor System uses a polyurethane recess plug to create a void in the concrete. The concrete void created for the P75H utility anchor is sufficiently large to accept the following:

1. 6-ton Grade 8 alloy hook or
2. 7-ton forged alloy shackle

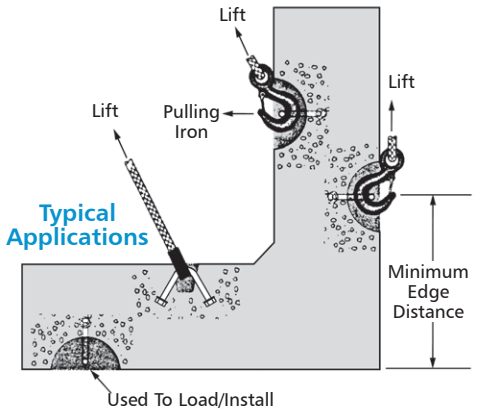
For the P75S Utility Anchors:

3. 15-ton cast/alloy hook or
4. 15-ton forged alloy shackle

DO NOT use larger hooks or shackles; they will apply additional and unintended loads to the utility anchor and could cause a premature failure of the concrete or anchor.

Anchor Placement

Placement of the Utility Anchor is dependent on the structural shape of the precast element. Utility anchors are not designed for thin edge installation. Always maintain minimum edge distances. For special conditions, contact the nearest Dayton Superior Technical Service Department for assistance.

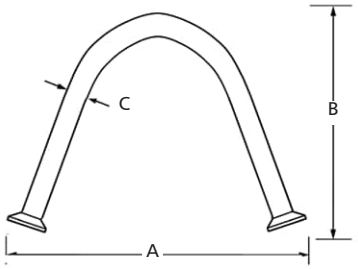


DAYTON SUPERIOR

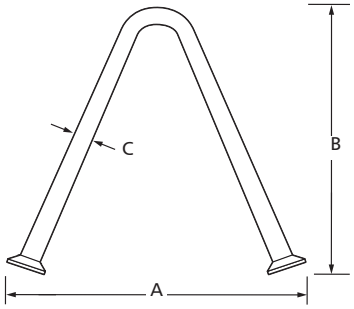
P75 and P75H Utility Anchor®

The Dayton Superior Utility Anchors are available in three diameters and a series of lengths for specific concrete thickness. The utility anchor can be set in either a 90° or a 45° anchor orientation using the appropriate setting plug.

P75 and P75H Utility Anchor						
Anchor	Type	Product Code No.	A	B	C	End Shape
P75	4UA444	121877	5-1/4"	3-1/8"	0.444"	Swift Lift
	5UA444	123442	6"	3-3/4"	0.444"	Swift Lift
	6UA444	121888	7-3/8"	4-3/4"	0.444"	Swift Lift
	5UA671	123441	6-7/16"	3-3/4"	0.671"	Swift Lift
	6UA671	121889	7-3/8"	4-3/4"	0.671"	Swift Lift
	8UA671	121891	9-3/4"	6-3/4"	0.671"	Swift Lift
P75H	12UA875	124738	15-7/8"	11"	0.875"	Swift Lift



P75 Utility Anchor



P75-H Utility Anchor

Anchor	Type	Product Code No.	Minimum Panel Thickness	Safe Working Load Tension 90	Safe Working Load Shear 90	Safe Working Load Tension/ Shear 45	Minimum Edge Distance
P75	4UA444	121877	4"	3,200	5,800	2,260	9"
	5US444	123442	5"	3,860	7,710	2,730	10"
	6UA444	121888	5 5/8"	4,460	9,460	3,150	12"
	5UA671	123441	5"	4,560	8,430	3,220	10"
	6UA671	121880	5 5/8"	7,320	15,780	5,170	12"
	8UA671	121801	7 5/8"	10,830	18,850	7,660	16"
P75H	12UA875	124738	12"	24,000	24,000	24,000	30"

Note:

1. Compressive strength of normal weight concrete to be 4,000 psi at time of initial lift.
2. Safe working loads provide an approximate factor of safety of 4 to 1.
3. Utility anchors to be installed at 90° to surface of the concrete.
4. Shear safe working loads are based on loading in the direction of the top of the precast concrete element.

To Order:

Specify: (1) quantity, (2) name, (3) product code.

Example:

200, P75 Utility Anchors, 5UA444.

P75C Utility Anchor® with Clip

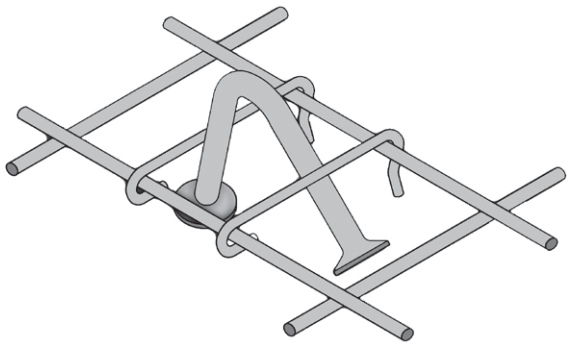
The Dayton Superior Utility Anchor with Clip is designed to allow the Utility Anchor to be secured to the wire mesh cage. This product utilizes the P75 Utility Anchors with 2 wire clips welded to opposite legs of the anchor. These wire clips are positioned to hold the utility anchor with Void to the wire mesh in the proper position in the wall for lifting your precast product. Both the 5UA and 6UA anchors in 0.444 and 0.671 diameters for 9" wire spacing are in stock. Other anchor and wire spacing are readily available.

To Order:

Specify: (1) quantity, (2) name, (3) product code (4) anchor size, (5) wire spacing (6) wall thickness.

Example:

200, P75C, #121443, 5UA444anchor, 9" wire spacing, 5" wall.



Product Code	Utility Anchor	Wire Clip Lengths	Wall Thickness
123443	5UA444	9"	5"
121890	5UA671	9"	5"
121892	6UA444	9"	6"
121893	6UA671	9"	6"
127446	8UA671	9"	8"

DAYTON SUPERIOR

P76 Utility Anchor® Setting Plugs

Utility Anchor Setting Plugs a polyurethane plastic in 90° and 45° orientation.

The reusable setting plug properly sets the anchor approximately 1/2" below the surface of the concrete and provides an adequate recess for easy sling attachment. After final positioning of the concrete element, the recess formed by the recess member can be easily grouted or conveniently covered by the Utility Anchor Cover/Patch.

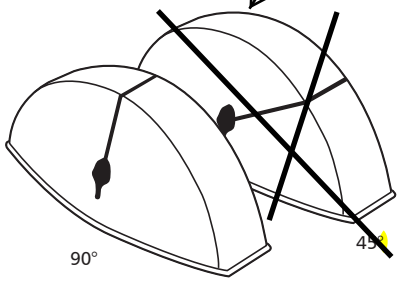
The 90P875 Setting Plug used with the P75-H 24,000 lb. anchor requires 2 each P101 holding rods to attach setting plug to the form. No holding plate or magnetic plate are available for this setting plug.

NOT USED

NOT USED

P76 Utility Anchor Setting Plug					
Type	Product Code No.	Length	Width	Depth	Color
90P444	123175	8.00"	3.25"	3"	Blue
~~45P444~~	~~123176~~	~~8.00"~~	~~3.25"~~	~~3"~~	~~Blue~~
90P671	123177	8.00"	3.25"	3"	Orange
90P671	127786	9.00"	4.58"	3.35"	Orange
~~45P671~~	~~123178~~	~~8.00"~~	~~3.25"~~	~~3"~~	~~Orange~~
90P875	124685	15.00"	6.13"	5"	Blue

45° NOT USED



P76 Utility Anchor Setting Plugs

To Order:
Specify: (1) quantity, (2) name, (3) product code.

Example:
200, P76 Utility Anchor Setting Plugs, 90P444.

BLUE PLUG USED FOR UA444
ORANGE PLUG USED FOR UA671
LARGE BLUE PLUG USED FOR UA875

P76D Disposable Setting Plugs

The Disposable Setting Plug is manufactured to offer the precaster an inexpensive alternate to urethane setting plugs. This 2 piece high density polyethylene plastic setting plug is used with the 0.671 Dayton Superior Utility Anchors. The two piece design snaps tightly together around the legs of the anchor eliminating concrete entering the void. The setting plug is installed to the formwork using nail holes on each end of the plug. This plug can also be used with the P77 Double Tee Anchors.

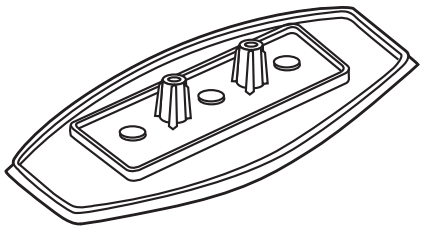
To Order:
Specify: (1) quantity, (2) name, (3) product code.

Example:
200, P76D, #126214.

P76D Disposable Utility Anchor Setting Plugs 0.671

P76C Utility Anchor Cover/Patch

The P76C Utility Anchor Cover/Patch installs over the back of the setting plug to protect the unit without the use of duct tape. The cover/patch can be installed on the setting plug/anchor assembly prior to setting the assembly in the form. This protects the assembly from concrete leakage through the concrete placement sequence. It can also be used later as a temporary or permanent cover for the recess. The P76C cover is gray in color and will blend with most concrete. It can be painted to match other color schemes.



P76C Utility Anchor Cover/Patch

Brian S. Jenner
PO Box 1620
Rapid City, SD 57709-1620
605-737-5211 (TEL)
605-718-0808 (FAX)
Brian.Jenner@RinkerPipe.com

To: **Lewis & Clark County**
Dan Karlin
dkarlin@lccountymt.gov

Date: **9/4/2024**
Project: **Lewis & Clark Co. Crossing D**
Project#
Contractor: **Lewis & Clark County**
R/S # : **6024057BX6**

1	Set of	**6024057BX6 Submittal Review 240904**	sheets	1-33

X For your approval. Please return 1 set to: **RINKER MATERIALS**
PO BOX 1620, RAPID CITY, SD 57709-1620

X ***PRODUCTION CANNOT BE SCHEDULED OR BEGIN UNTIL APPROVALS ARE RECEIVED.***

____ For production as noted ____ For jobsite use X For your files
____ Per your request ____ For your information ____ Other

Dan,

6024057BX6 Submittal Review 240904 for your review.

Please forward to the engineer for review.

Production cannot begin until approvals are received.

Please respond by September 18, 2024.

Thanks

Brian

CONTRACTOR SUBMITTAL REVIEW

DATE SUBMITTED 09/10/2024 DUE DATE 09/18/2024

CHECKING IS ONLY FOR GENERAL CONFORMANCE WITH DESIGN CONCEPT OF THE PROJECT AND GENERAL CONFORMANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRECTED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF CONTRACTORS WORK WITH THAT OF ALL OTHER TRADES; AND SATISFACTORY PERFORMANCE OF CONTRACTORS WORK.

☐ APPROVED, NO EXCEPTIONS TAKEN
X APPROVED, AS NOTED Typo on Page 7
☐ REVISE AND RESUBMIT
☐ SUBMIT SPECIFIED ITEMS
☐ REJECTED

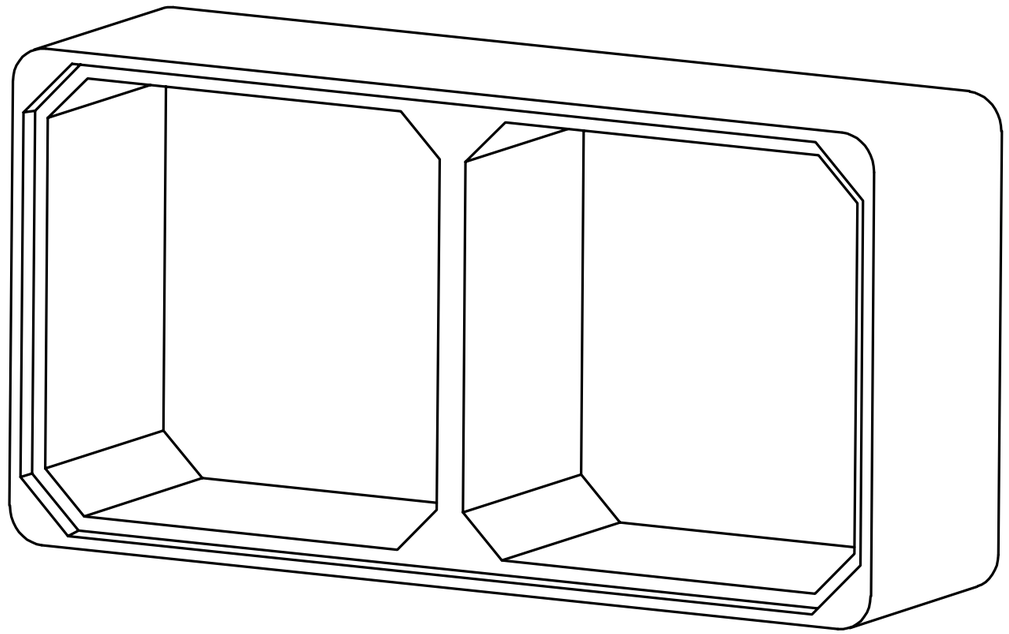
RESPEC
REVIEWER Jacob Lacy
DATE 09/09/2024

Copy:
1 Helena Plant, Proj. File
1 Mike Meredith

Sincerely,
RINKER MATERIALS

Brian S. Jenner, PE
Brian S. Jenner, PE - Project Engineer

RECOMMENDED INSTALLATION PROCEDURES FOR PRECAST CONCRETE BOX CULVERT

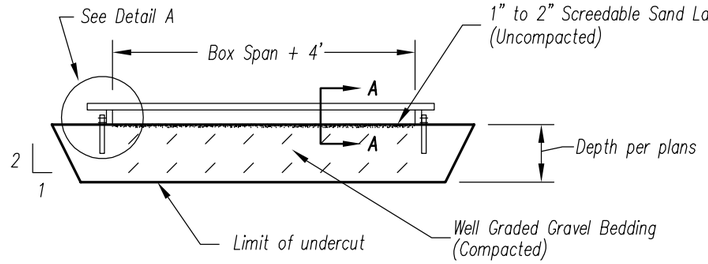


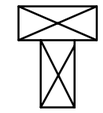
Rinker MATERIALS™
A QUIKRETE® COMPANY

MONTANA

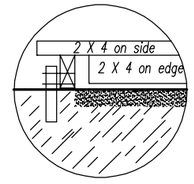
INSTALLATION

BED PREPARATION





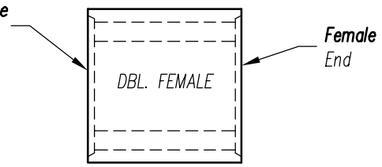
Section A–A



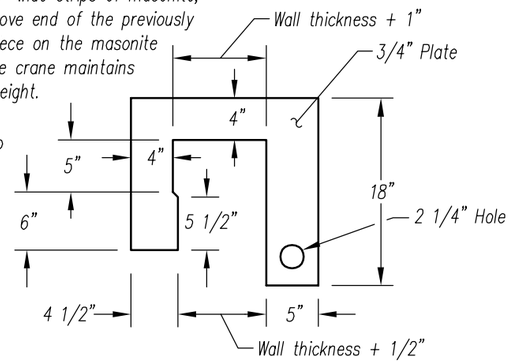
Detail A

1) Bedding material shall be a well graded material with a maximum particle size of 1" and placed to a uniform thickness and compaction as specified by engineer.
2) The top surface shall be a 1" to 2" thick screedable sand layer as a leveling course.
3) If installation equipment operates on top of bedding material the resulting compaction caused by the equipment shall not be greater than that of the bedding at any other location.

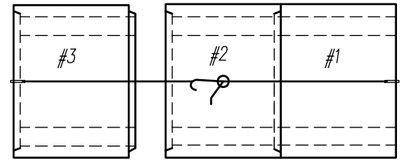
INSTALLATION SEQUENCE

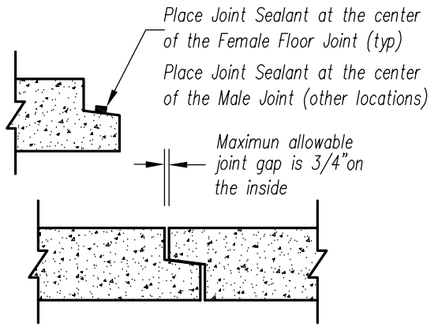


1) Set section w/ double female first (if applicable). See detail at right.
2) When staged construction is required, place dbl. female @ ℄ of road to allow installation of barrel sections in both directions.
3) Place joint sealant at the center of the female joint from top of haunch to top of haunch.
4) Dig a groove approximately 1" deep and 2"–3" wide in front of the female joint for the entire width of the bed so bedding material does not push into the joint. An alternate option to dig would be to cut 18" wide strips of masonite, place them under the groove end of the previously set piece, set the next piece on the masonite and pull together while the crane maintains the majority of the box weight.
5) Prior to setting each box section, use the screed to reshape the bed and remove the material from step #4.
6) Use pulling bracket and come–along system to pull joints together. See Detail.



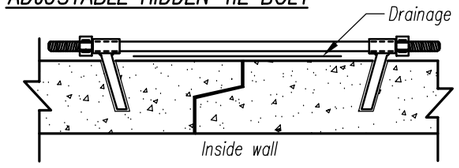
Bracket Detail



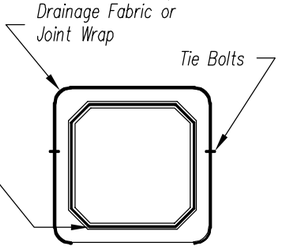


7) Check joint gap. If gap is larger than 3/4", pull joint apart and check for obstructions and check flatness of bedding surface. This maximum gap does not apply to the center wall of double cell boxes.
8) Install Tie Bolts and Drainage Fabric OR External Joint Wrap as specified.

ADJUSTABLE HIDDEN TIE BOLT



1) Tie Bolts should not be used to pull the joint together.
2) Tension adjusting nut 1/2 turn past snug.

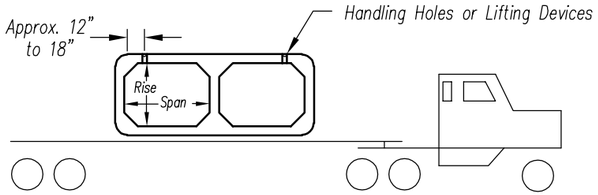


Use joint sealant in the entire joint all around box culvert section.

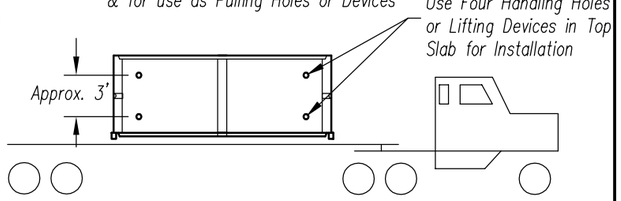
If premolded joint sealant is used in cold weather, it should be kept warm until applied.

HANDLING

TRUCKING POSITION



On Box Sections where the rise is 9' or less, sections will be shipped in the laying position.



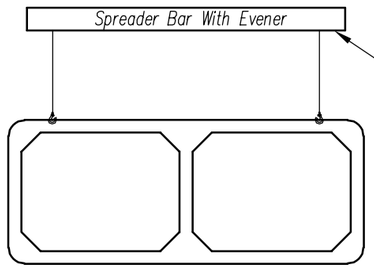
On Box Sections where the rise is greater than 9', sections will be shipped on end.

All Box Culverts will have 4 handling holes or lifting devices in top slab.
Boxes with 8' or greater rise will have 2 handling holes or lifting devices in ea. ext. wall.

Box Sections will need to be tipped on the job site to the laying position when shipped on end.

Contractor will need to prepare a soft landing area for tipping.

LIFTING DEVICE LIFTING DETAIL

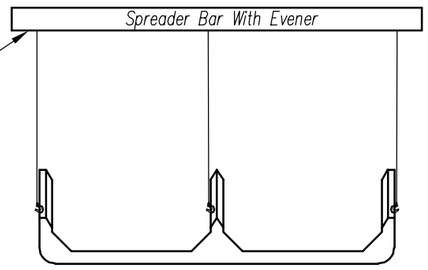


BARREL SECTIONS

Use Spreader Bars or other Lifting Jigs to maintain an Equalized Pick and a Vertical Pick unless otherwise specified on lifting device cut sheet.

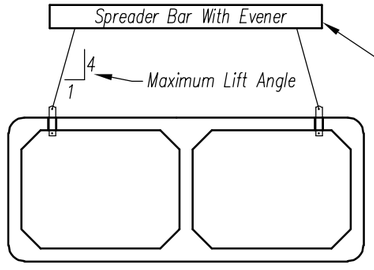
Rigging suppliers may have more stringent requirements based on section weights and cable size.

CONTRACTOR TO PROVIDE ANY DEVICES NECESSARY FOR LIFTING BARREL AND/OR END SECTIONS



END SECTIONS

LIFTING HOLE LIFTING DETAIL

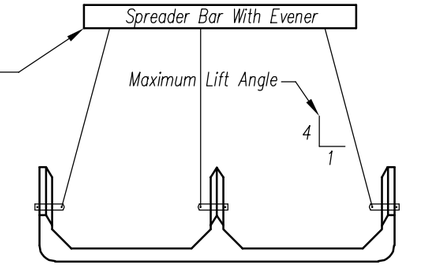


BARREL SECTIONS

Use Spreader Bar long enough to allow a Vertical Pick if possible.
If not, do not exceed maximum lift angle shown.

Rigging suppliers may have more stringent requirements based on section weights and cable size.

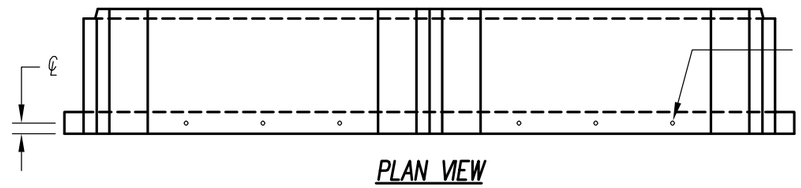
CONTRACTOR TO PROVIDE ANY DEVICES NECESSARY FOR LIFTING BARREL AND/OR END SECTIONS



END SECTIONS

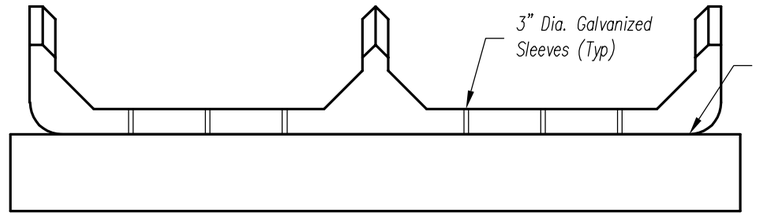
INSTALLATION

CUTOFF WALL CONNECTION



Contractor to drill 7/8" diameter x 6" deep holes thru the 3" sleeves into the cutoff wall and install #6 x 12" rebar dowels (provided). Fill sleeves completely with non-shrink grout (provided).

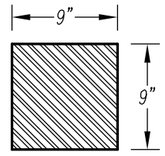
PLAN VIEW



ELEVATION VIEW

HANDLING HOLES / PULL HOLES (If used)

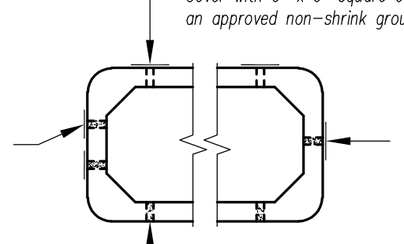
Lifting Holes are formed to be 3" Dia. when used



Lift Hole Cover

Self-adhering cover material provided with first shipment of box culvert sections.

(2) Pull Holes in bbl walls w/ 8' or greater rise.
– Cover with 9" x 9" square cover.
Fill holes w/ an approved non-shrink grout if specified on shops

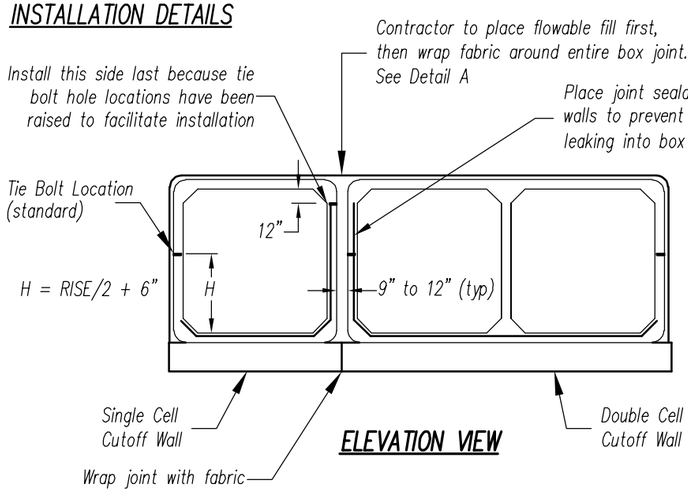


Lift Holes – (4) in TOP Slab.
Cover with 9" x 9" square cover. Fill holes w/ an approved non-shrink grout if specified on shops

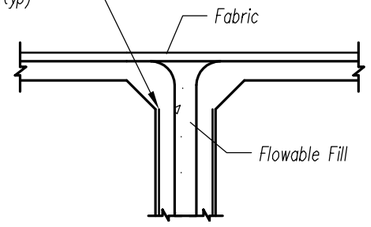
Lift Holes in end section walls or (1) Pull Holes in bbl walls w/ 7' or less rise.
– Cover with 9" x 9" square cover.
Fill holes w/ an approved non-shrink grout if specified on shops

Lift Holes – (2) in BOTTOM slab only when specified.
Fill holes w/ an approved non-shrink grout if specified on shops

MULTIPLE CELL INSTALLATION DETAILS

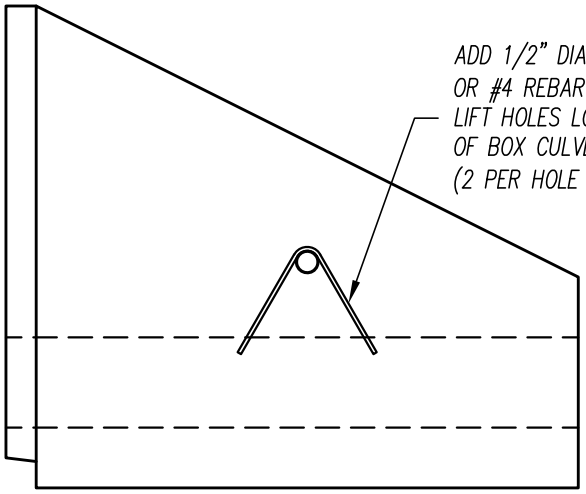


ELEVATION VIEW

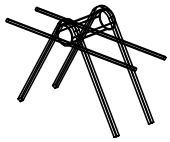


DETAIL 'A'

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

** FOR ES#1 W/ 10' RISE OR GREATER, ADJUST DISTANCE FROM END AS SPECIFIED IN END SECTION DETAIL

Holes shall be formed from 3" EMT Tubing
*** DO NOT REMOVE TUBING**

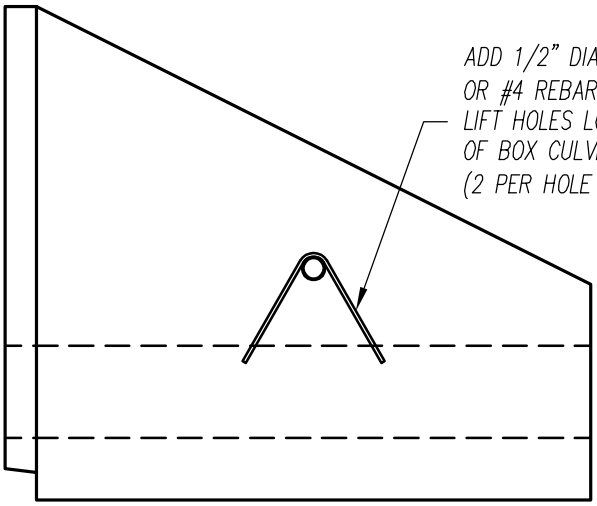
02/17/16 JWB	
11/27/17 JWB	
05/31/18 JWB	
11/29/18 JWB	
01/02/19 JWB	
06/07/21 JWB	

Rinker MATERIALS™ A QUIKRETE® COMPANY

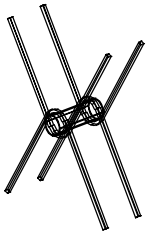
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: BOX CULVERT LIFT HOLE SPECIAL DETAIL PRESTRESS CABLE LOOPS MT ALTERNATIVE
DATE: 02/06/16	
DR'N BY: JWB	
REV: 07/27/21 JWB	DWG NAME: BOX LIFT HOLE - PS CABLE (MT ONLY)

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

** FOR ES#1 W/ 10' RISE OR GREATER, ADJUST DISTANCE FROM END AS SPECIFIED IN END SECTION DETAIL

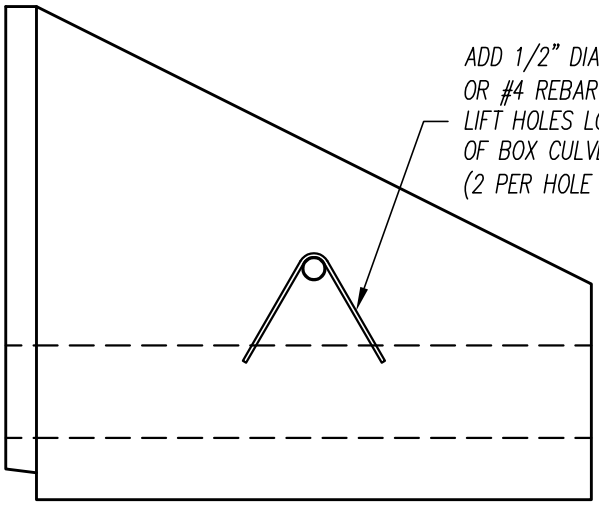
Holes shall be formed from 3" EMT Tubing
**** DO NOT REMOVE TUBING***

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

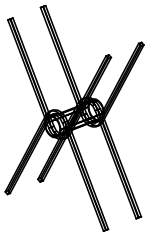
SCALE: NONE	PROJECT: BOX CULVERT LIFT HOLE SPECIAL DETAIL PRESTRESS CABLE LOOPS
DATE: 02/06/16	
DR'N BY: JWB	
REV: 01/02/19 JWB	DWG NAME: BOX LIFT HOLE - PS CABLE (MT ONLY)

02/17/16 JWB
11/27/17 JWB
05/31/18 JWB
11/29/18 JWB

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

FOR RISE 7' OR LESS UNLESS OTHERWISE SPECIFIED

Holes shall be formed from 3" EMT Tubing
** DO NOT REMOVE TUBING*

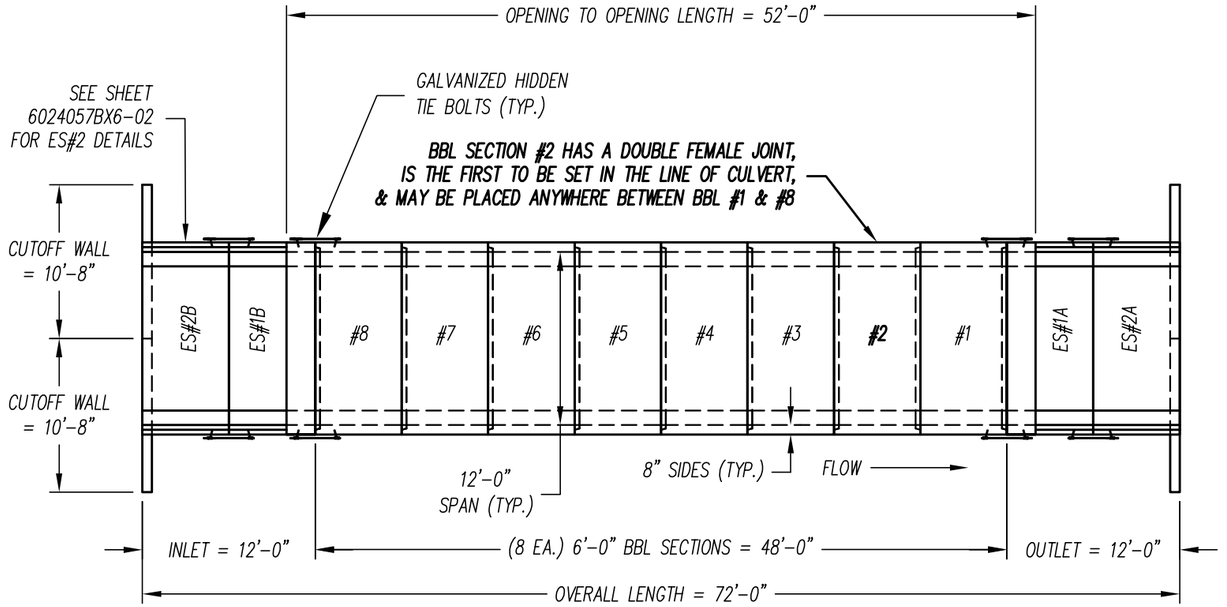
LIFTING HOLES TYP. FOR ALL BARREL SECTIONS EXCEPT WHEN SHOWN OTHERWISE

11/27/17 JWB

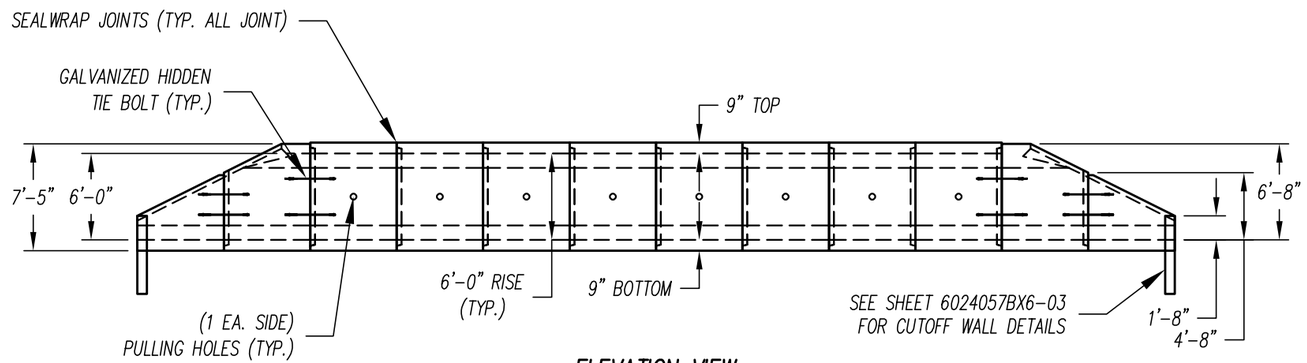
Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: BOX CULVERT PULLING HOLE PRESTRESS CABLE LOOPS
DATE: 02/06/16	
DR'N BY: JWB	
REV: 11/30/18 JWB	DWG NAME: BOXPULLINGHOLE



PLAN VIEW



ELEVATION VIEW

TOLERANCES – PER ASTM C913	
DIMENSIONAL (UP TO 5')	± 1/4"
DIMENSIONAL (5'-10')	± 3/8"
DIMENSIONAL (10' & UP)	± 1/2"
SQUARENESS (UP TO 10')	± 1/2"
SQUARENESS (10' & UP)	± 3/4"
MIN. WALL OR SLAB THICKNESS	GREATER OF 3/8" OR 5% OF THICKNESS
REINF. LOCATION FROM DESIGN	± 1/4"
REINF. COVER	1" MIN.

MATERIAL LIST	
ITEM	QTY.
GALVANIZED HIDDEN TIE BOLTS	16
JOINT SEALANT (1.25" X 14.5')	37
GATORWRAP (12" X 50')	9
SEALWRAP SQUARE (9" X 9")	72
SET GROUT (0.4 CU. FT.)	20
REBAR DOWELS (#6 X 12")	16
CUTOFF WALL CONNECTION PLATES	4

SECTION WEIGHTS

6'-0" BBL SECTION = 27,500 LBS.
END SECTION #1 = 20,500 LBS.
END SECTION #2 = 14,000 LBS.
CUTOFF WALL U SHAPED = 4,150 LBS.

PLACE OF FABRICATION	HELENA, MT
CONTRACTOR	LEWIS & CLARK COUNTY
RINKER PROJECT #	6024057BX6
STATE TEST (Y OR N)	N
CONCRETE STRENGTH	5000 PSI

NOTES

1. Stencil each box with information as listed below. Center stencil on the inside face of the top haunch of each box culvert section.

DATE OF MANUFACTURE
Rinker MATERIALS™ A QUIKRETE® COMPANY
HELENA
12 X 6 – CROSSING D 76+10.33
STA. 75+62.42 TO ~~75+10.33~~
HL-93 / 1'-3' FILL HT.
LEWIS AND CLARK CO., MT

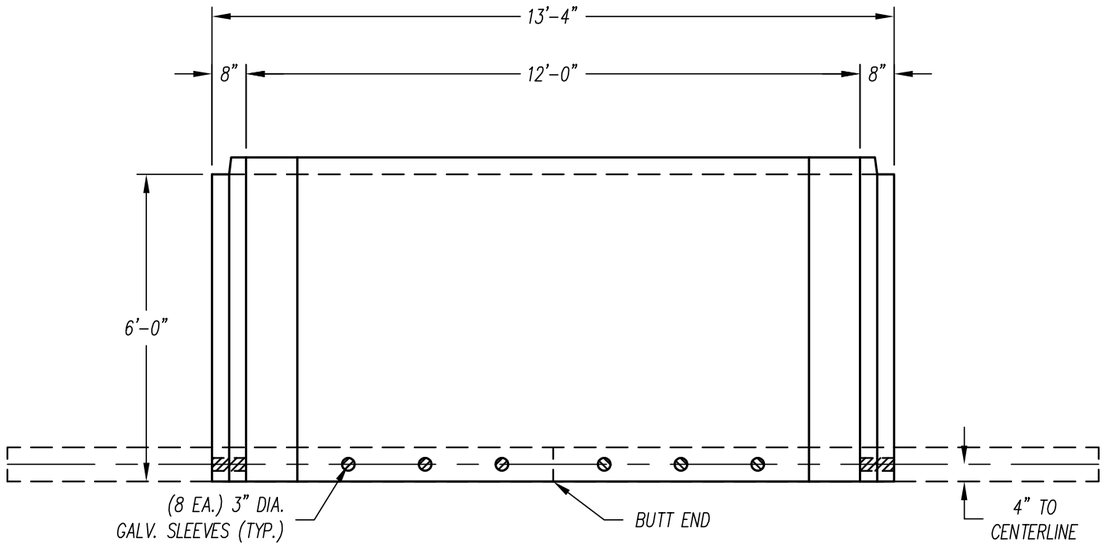
2. Lifting holes are formed by 3 3/16" Dia. Galvanized Tubing.
   - –Lifting holes located in the TOP slab of the culvert shall be covered with a 9" x 9" EDM Patch (provided).
   - –Lifting holes located in the SIDE WALLS & pull holes of the culvert shall be grouted with an approved non-shrink grout & covered with a 9" x 9" EDM Patch (provided).
   - –Lifting holes located in the BOTTOM slab of the culvert shall grouted with an approved non-shrink grout (provided).
3. Section **#2** has a double female joint. This piece is the first to be set in a line of box culvert. ***Consult the "Box Culvert Installation Guide" for suggested installation practices.***

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

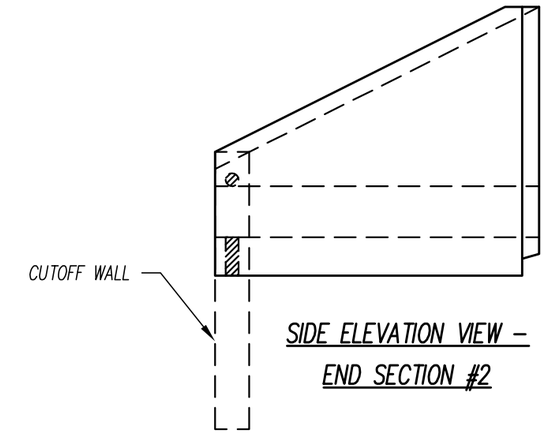
SCALE: NONE	PROJECT: 12'-0" X 6'-0" BOX CULVERT/CROSSING D STA. 75+62.42 TO 76+10.33 LEWIS AND CLARK COUNTY, MT
DATE: 8-21-24	
OR#: 6024057BX6	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX6-01

SPACING FOR 3" DIAMETER GALVANIZED SLEEVES.
CONTRACTOR TO DRILL 1 ½" DIAMETER X 6" DEEP HOLES IN THE CUTOFF WALL AND INSTALL #6 X 12" REBAR DOWELS (PROVIDED)
(FILL SLEEVES COMPLETELY WITH NON-SHRINK GROUT – PROVIDED)

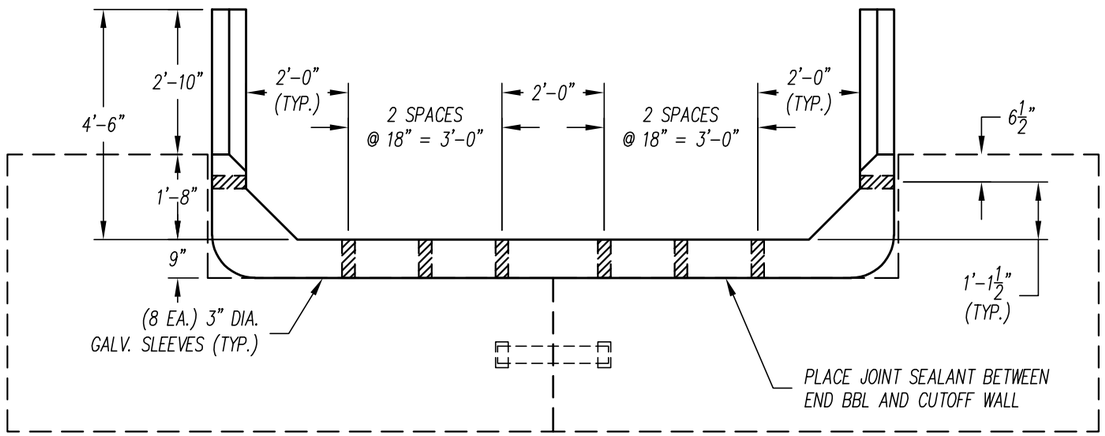
NOTE:
SEE SPECIAL PROVISIONS FOR INSTALLATION REQUIREMENTS FOR BOTH CUTOFF WALL AND CONCRETE SLOPE PROTECTION.



PLAN VIEW – END SECTION #2



SIDE ELEVATION VIEW – END SECTION #2

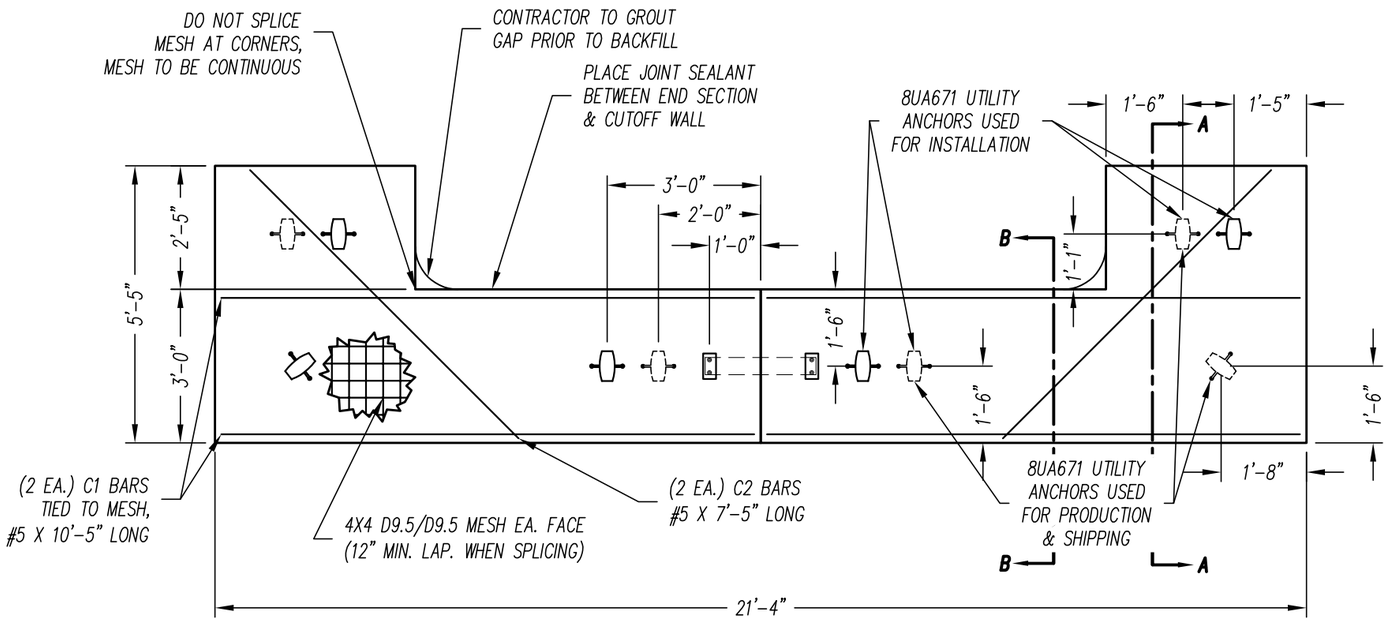


ELEVATION VIEW – END SECTION #2

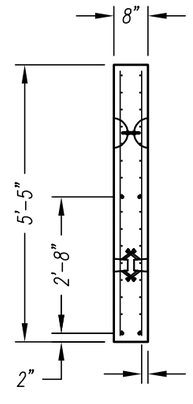
Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

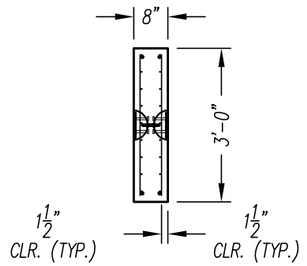
SCALE: NONE	PROJECT: 12'-0" x 6'-0" BOX CULVERT/CROSSING D STA. 75+62.42 TO 76+10.33 LEWIS AND CLARK COUNTY, MT
DATE: 8-21-24	
OR#: 6024057BX6	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX6-02



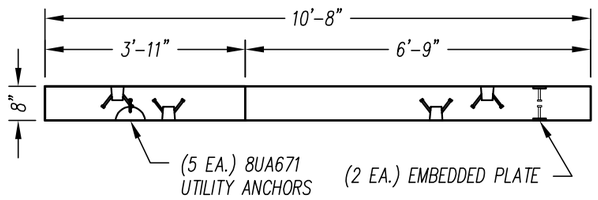
ELEVATION VIEW – CUTOFF WALL (2 PIECES SHOWN)



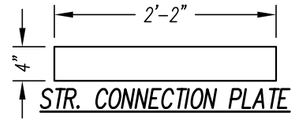
SECTION A–A



SECTION B–B



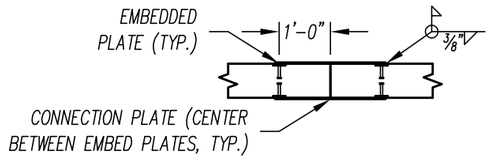
PLAN VIEW – CUTOFF WALL

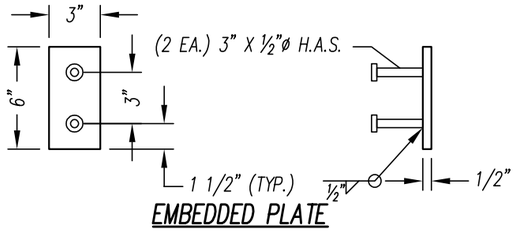


STR. CONNECTION PLATE

26" X 4" X ⅜" PLATE

(4 TOTAL NEEDED)





EMBEDDED PLATE

(8 TOTAL NEEDED)

4 PIECES REQUIRED

CUTOFF WALL = 4,150 LBS.

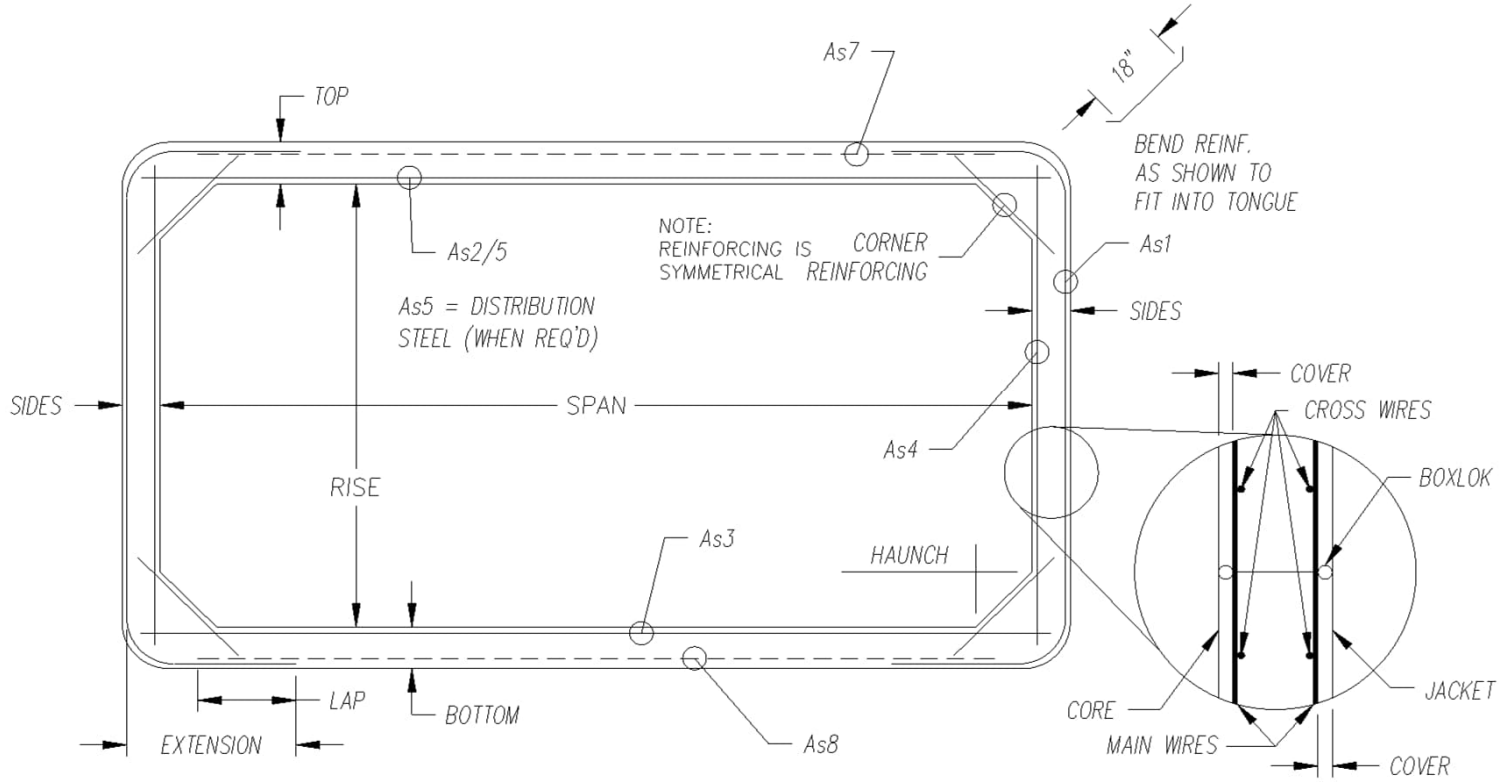
SPACING FOR 3" DIAMETER GALVANIZED SLEEVES.
CONTRACTOR TO DRILL 1 ½" DIAMETER X 6" DEEP HOLES IN THE CUTOFF WALL AND INSTALL #6 X 12" REBAR DOWELS (PROVIDED)
(FILL SLEEVES COMPLETELY WITH NON-SHRINK GROUT – PROVIDED)

NOTE:
SEE SPECIAL PROVISIONS FOR INSTALLATION REQUIREMENTS FOR BOTH CUTOFF WALL AND CONCRETE SLOPE PROTECTION.

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: 12'-0" X 6'-0" BOX CULVERT/CROSSING D STA. 75+62.42 TO 76+10.33 LEWIS AND CLARK COUNTY, MT
DATE: 8-21-24	
OR#: 6024057BX6	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX6-03



Note:
Leg = 9"
for 6" haunch

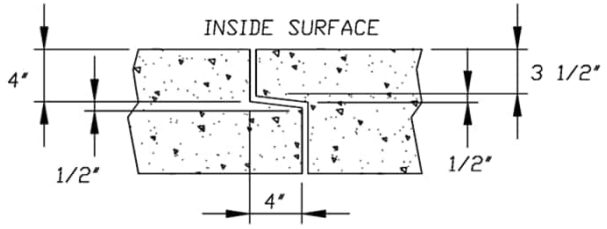
Location	Wire Diameter (in.)	Area Req'd (sq.in./ft.)	Area Prov'd (sq.in. / ft.)	Style	Overall Sheet Length	Sheet Width W/O Overhang
As1	0.299	0.397	0.42	2x8 D7.0/D4.0	13-4	70"
As2/5	0.329	0.51 / 0.216	0.51 / 0.225	2x4 D8.5/D7.5	12-4	70"
As3	0.309	0.450	0.450	2x8 D7.5/D4.0	12-8	70"
As4	0.309	0.216	0.225	4x8 D7.5/D4.0	6-8	70"
As7	0.309	0.216	0.225	4x8 D7.5/D4.0	9-4	70"
As8	0.309	0.216	0.225	4x8 D7.5/D4.0	9-4	70"
				Width Top Overhang =		1/2"
				Width Bottom Overhang =		1/2"
HAUNCH				#3 REBAR OR P/S CABLE X 2'-6" @ 12" O.C.		

Slab Sizes		Box Loks @ 18inch O.C.
TOP Slab Size	9 in	2.0 x 5.75 x 1.0 (40)
BTM Slab Size	9 in	1.0 x 6.75 x 1.0 (40)
SIDES size	8 in	1.0 x 5.75 x 1.0 (40)

Cover			
TOP INSIDE (As2)	1.00	SIDE INSIDE (As4)	1.00
TOP OUTSIDE (As1/7)	2.00	SIDE OUTSIDE (As1)	1.00
BTM INSIDE (As3)	1.00		
BTM OUTSIDE (As1/8)	1.00		

ALL STEEL TO BE OF DOMESTIC ORIGIN OF THE U.S.A.

EXTENSION: 36 inches
LAP: 10 inches
HAUNCH: 12 inches
DESIGN: HL93
STEEL WT: 771 lbs / 6' SECTION
PRODUCT WT: 27500 lbs / 6' SECTION
CONCRETE: 5000 psi
STEEL YIELD: 70000 psi (ASTM A1064)

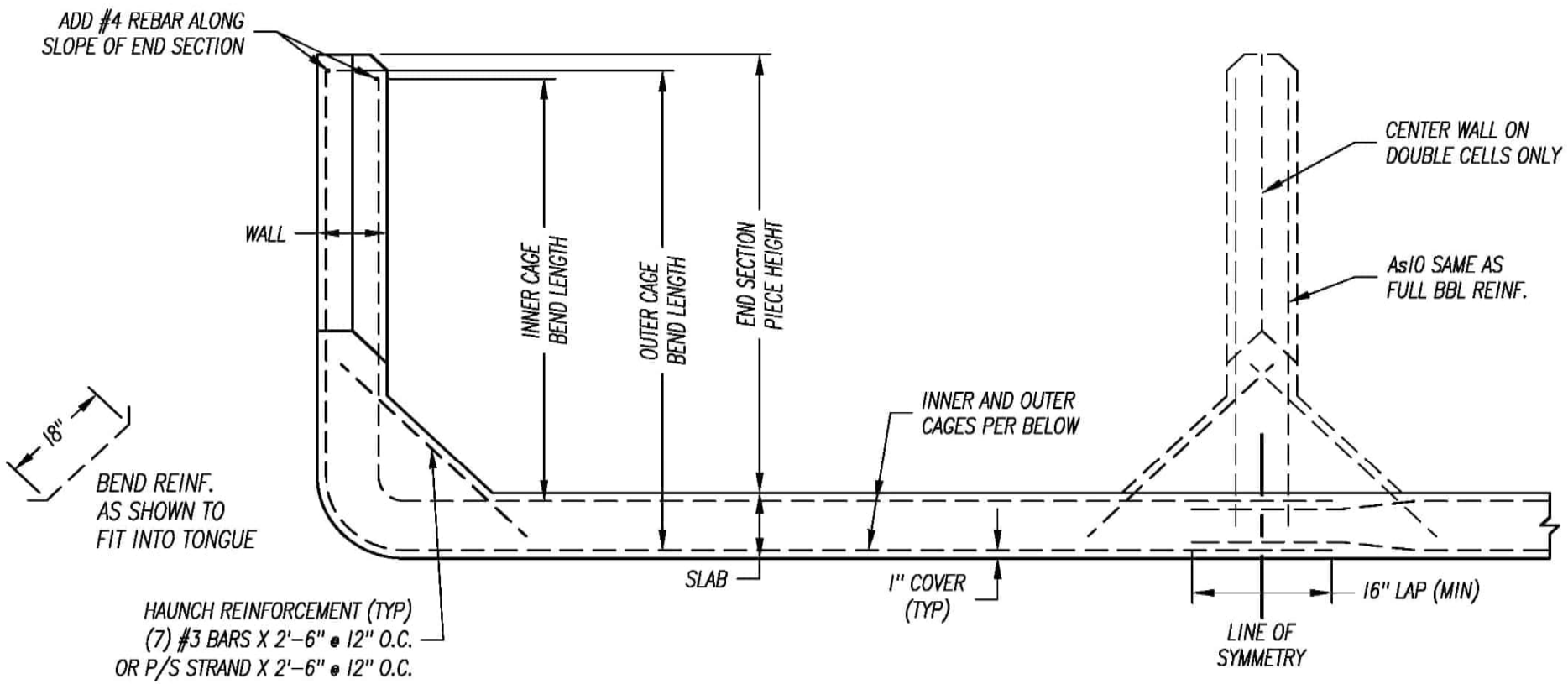


TYPICAL JOINT DETAIL

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701

SCALE	NONE	**SGL 12x6 BOX CULVERT**	
DATE	8/9/24	**DESIGN FILL = 1 FT - 3 FT**	
DRN BY	BSJ	**INSTALLED FILL = 1 FT - 3 FT**	
RS#	6024057BX6	**CUSTOMER**	Lewis and Clark County
REV DATE		**DWG NAME**	



Size (ft)		
Span	x	Rise
12	x	6
Single Cell		

Steel Areas (sq.in. / ft.)					(inches)	
ES#1	ES#2	ES#3	ES#4	ES#5	SLAB	WALL
Full BBL	0.73	*	*	*	9	8
20500	14000	*	*	*	Conc lbs/pc	
771	786	*	*	*	Steel lbs/pc	

Total ES Length (ft)	Sheet Length	# Sheets per End
12	12.00	4

Mesh Style Used							
2	x	8	D	12.5	/	D	5.0

Sht Weight (lbs)
197

Section Lengths (ft)				
ES#1	ES#2	ES#3	ES#4	ES#5
6	6	0	0	0

Inner Cage Bend (in)				
ES#1	ES#2	ES#3	ES#4	ES#5
0	52	0	0	0

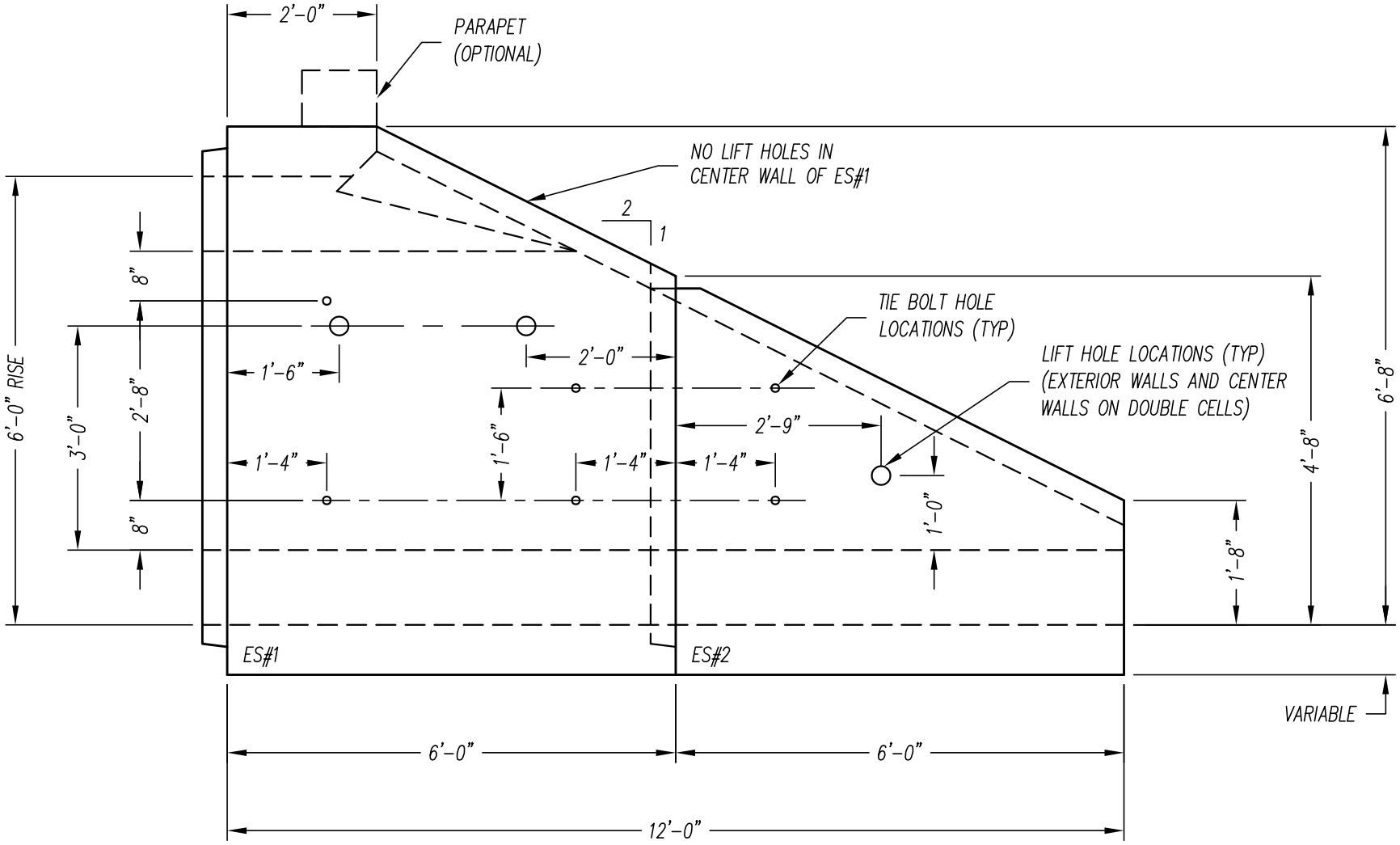
End Section Piece Heights (ft)				
ES#1	ES#2	ES#3	ES#4	ES#5
6.67	4.67	0.00	0	0

Outer Cage Bend (in)				
ES#1	ES#2	ES#3	ES#4	ES#5
0	61	0	0	0

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701

SCALE	NONE	SGL 12x6 BOX CULVERT END SECTION REINFORCEMENT DETAILS STANDARD 2:1 END SECTION DESIGN	
DATE	8/9/24		
DRN BY	BSJ		
RS#	6024057BX6	CUSTOMER	Lewis and Clark County
REV DATE		DWG NAME	



NOTES – LIFT HOLES TO BE 3-1/4" DIA.
TIE BOLT HOLES TO BE 1-1/4" DIA.

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: 6' RISE TYPE 1 END SECTION TIE BOLT AND LIFT HOLE LOCATIONS
DATE: 02/17/16	
DR'N BY: JWB	
REV: 07/26/21 JWB	DWG NAME: LIFT TIE – 6 RISE (MODIFIED)

11/21/17 JWB
01/25/18 JWB
06/27/18 JWB
02/18/19 JWB

Sht:____of____
By:BSJ Chk:____

Eriksson Culvert v6.3.1

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Filename: SGL 12x6 HL93 01-03 fill.etcx

Project: SGL 12x6 HL93 01-03 fill
Task :
Client :
Job No.:

CULVERT PROPERTIES
==========
Type of Culvert: Precast Specification : LRFD 9th Edition
Operating Mode : Analysis

Physical Dimensions

No. of Boxes: 1 Name: BoxCulvert
Clear Span : 12.0000 ft
Clear Height: 6.0000 ft Skew Angle : 0.00 deg
Length : 6.0000 ft Bottom Slab Support: Full Slab
Fill Depth Range: Maximum : 3.00 ft Minimum : 1.00 ft Increment : 2.00 ft
Haunches: Top, Length: 12.0000 in Height: 12.0000 in
Bottom, Length: 12.0000 in Height: 12.0000 in
Member Thicknesses: Top Slab: 9.0000 in Bot Slab: 9.0000 in
Ext Wall: 8.0000 in
Wall Joint: None

Material Properties

Concrete: Strength,f'c : 5.000 ksi Density : 0.150 kcf Elasticity,Ec: 4592 ksi
Type : Normal Weight Density Modification Factor : 1.00
Fr Factor : 0.24 Gamma1 : 1.60 Gamma3 : 0.75 (user defined)
Steel: Yield,fy : 70.00 ksi fss Limit : 0.65fy Elasticity,Es: 29000 ksi
Yield,fyv : 60.00 ksi Diameter : 1.000 in Type : Mesh
Soil: Density : 0.120 kcf Slope Factor: 1.150
Poisson's : 0.5
Fe Factor : 1.150 (Maximum for Compacted Fill)
Serviceability, Gamma-e: 1.00

Loads

Live Load: Vehicle: (AA) HL-93 - Design Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	8.00	0.00
2	32.00	14.00
3	32.00	14.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: yes
Tandem: Axle 1: 25.00 k, Axle 2: 25.00 k, Axle Spacing: 4.00 ft
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Inventory Rating Load Factor: 1.75 Operating Rating Load Factor: 1.35
Design Load Combinations: Strength I
Override MPF: no
Override DLA: no
Include Lane Load : no Max. No. of Lanes: Computed by Program
Traffic Direction** : Lanes Parallel to Main Reinforcement
Neglect Live Load for Large Fill Depths: no
Apply Surcharge at Fill Depths > 2 ft : yes
Compute Surcharge Depth: yes
Dead Load: Future Wearing Surface : 0.00 klf Add. Dead Load : 0.00 klf
Concentrated Loads : none
Lateral Soil Loads: Max. Equiv. Fluid Press.: 60.00 pcf Min. Equiv. Fluid Press. : 30.00 pcf
Include Additional Uniform Horiz. Load: no
Include Additional Uniform Vert. Load: no
Buoyancy Check : no
Fluid Pressures : Apply Water Press. : yes, interior only
: Interior Pressure Head : 0.00 ft
Foundation Model : Uniform Loads
Seismic Analysis : Do not include

Load and Resistance Factors

	Max	Min
DC:	1.250	0.900
DW:	1.500	0.650
EV:	1.300	0.900
EH:	1.350	0.900
WA:	1.000	
EQ:	1.000	

LL I : 1.750 LL II : 1.350 LL Legal : 1.750 LL Extreme : 0.500
Ductility: 1.000 Importance: 1.000 Redundancy, non-earth: 1.000 Redundancy, earth: 1.000
Condition: 1.000 System : 1.000
Phi Shear: 0.900 Phi Moment: 1.000 PM Compression: 0.750 PM Tension : 0.900

Load Factor Multipliers, Design Mode: 1.00 Analysis Mode: 1.00

Reinforcement

Reinforcement Covers	Exterior	Interior
Top Slab:	2.0000 in	1.0000 in
Walls :	1.0000 in	1.0000 in
Bot Slab:	1.0000 in	1.0000 in

Assigned reinforcement:

Location	Mark	Size	Spacing (in)	# of Layers
Top Slab Inside	A100 (AS2)	D8.5	2.0000	1
Bottom Slab Inside	A200 (AS3)	D7.5	2.0000	1
Top Slab Outside	A300 (AS7)	D7.5	4.0000	1
Bottom Slab Outside	A400 (AS8)	D7.5	4.0000	1
Top Corner	A1 (AS1)	D7	2.0000	1
Bottom Corner	A2 (AS1)	D7	2.0000	1
Ext. Wall Inside	B1 (AS4)	D7.5	4.0000	1
Ext. Wall Outside	B2 (AS1)	D7	2.0000	1
Longitudinal	C1 (AS6)	D4	8.0000	1
Top Distribution	C100 (AS5)	D7.5	4.0000	1
Bottom Distribution	C200	D4	8.0000	1

Analysis Options

LL Analysis	: Automatically Set Traffic Direction to Account for Skew Effects: yes
	Limit LL Distribution Width to Culvert Length for: None
	Combine Longitudinal Axle Distribution Overlaps: Yes, Max of 2 Axles
	Combine Transverse Axle Distribution Overlaps: No
	Axle Placement Increment for Moving Load Analysis: 20
	Include Impact on Bottom Slab: yes
	Always Distribute Wheel Load: yes
	Deflection Criteria : 1/800
	Approach Slab will be Used: no
Reinforcement	: Always Include Distribution Steel: no
	Distribution Slab Provided: no
	User Defined Longitudinal Steel: yes
	Max. As used in Vc Calcs: 2.00 in2/ft
	Distribute Minimum Reinforcement per Face: yes
	Use individual Member Thicknesses for Min Steel: no
	Epoxy coat steel: no
	Use M-dimension for bar length calcs.: no
Slenderness	: Checked K Factor: 2.00
Analysis Modeling	: Use Haunches in the Structural Analysis Model: yes
Critical Sections	: Flexure critical section location: end of haunch
	Shear critical section location: dv beyond haunch
	Use Max. Moment with Max. Shear at the Critical Section for Shear: no
	Include depth of haunch for critical sections: no
Flexure	: Ignore Axial Thrust: no
	Use Eq. 12.10.4.2.4a-1: yes Nu Multiplier: 1.00
Shear	: Always Check Iterative Beta Method
Environmental	: Apply duribility factors: no
Load Combinations	: LRFD min/min: no

Sht:____of____
By:BSJ Chk:____

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ANALYSIS RESULTS
==========

Top Slab Thickness = 9.00 in
Bottom Slab Thickness = 9.00 in
Exterior Wall Thickness = 8.00 in

Modular Ratio (N) = 6.32 Max. Steel Ratio = 0.020
Design Span = 12.67 ft Design Height = 6.75 ft

Volume of Concrete: 1.111 cy/ft

Note: Design and analysis results do not include force effects from stipping and handling stages

M dimension = 2' 10" (method of equivalent capacity)
= 4' 12" (method of contraflexure - ASTM)

Reinforcing Steel Schedule

Location	Mat Mark	Sheets Included	Layers	As,prv (in2/ft)
Top Slab (int)	A100 (AS2)	Top	1	0.510
Bot Slab (int)	A200 (AS3)	Bot	1	0.450
Top Slab (ext)	A300 (AS7)	Top	1	0.225
Bot Slab (ext)	A400 (AS8)	Bot	1	0.225
Corner Top-U	A1 (AS1)	Top	1	0.420
Corner Bottom-U	A2 (AS1)	Bot	1	0.420
Ext Wall (int)	B1 (AS4)	L&R	1	0.225
Ext Wall (ext)	B2 (AS1)	L&R	1	0.420
Top Slab (int- 1)	C100 (AS5)	Top	1	0.225
Bot Slab (int- 1)	C200	Bot	1	0.060
Temperature (1)	C1 (AS6)	Top	1	0.060
Temperature (1)	C1 (AS6)	Bot	1	0.060
Temperature (1)	C1 (AS6)	L&R	1	0.060
Temperature (1)	C1 (AS6)	L&R	1	0.060

Note: A denotes flexural steel, B denotes vertical steel, C denotes longitudinal steel

AS Bar Marks

Location	As prv in2/ft
Transverse Side Wall - Outside Face (AS1)	0.420
Transverse Top Slab - Inside Face (AS2)	0.510
Transverse Bottom Slab - Inside Face (AS3)	0.450
Transverse Side Wall - Inside Face (AS4)	0.225
Distribution Top Slab - Inside Face (AS5)	0.225
Distribution Top Slab - OutSide Face (AS6)	0.060
Transverse Top Slab - Outside Face (AS7)	0.225
Transverse Bottom Slab - Outside Face (AS8)	0.225

Notes: 1.) Final areas of steel provided must be checked in analysis mode

Sheet Inventory

Interior sheets - 4 sheet layout with laps located in the wall

Sheet Loc.	Mat Mark	Zone	Line Wires Size	Spac. (in)	Length (ft-in)	Area (in2/ft)	H leg (ft-in)	V leg (ft-in)	Cross Wires(L,tot= 5-11) Mat Mark	Size	Spac. (in)	Area (in2/ft)	Wgt (lbs)
Top	A100	Base	D8.5	2.00	14-12	0.510	12- 2	1- 5	C100	D7.5	4.00	0.225	223
										(1) sheets, Total weight:			223
L&R	B1	Base	D7.5	4.00	6- 2	0.225			C1	D4	8.00	0.060	47
										(2) sheets, Total weight:			94
Bot	A200	Base	D7.5	2.00	14-12	0.450	12- 2	1- 5	C200	D4	8.00	0.060	156
										(1) sheets, Total weight:			156

Exterior sheets - 4 sheet layout with laps located in the slab

Sheet Loc.	Mat Mark	Zone	Line Wires Size	Spac. (in)	Length (ft-in)	Area (in2/ft)	H leg (ft-in)	V leg (ft-in)	Cross Wires(L,tot= 5-11) Mat Mark	Size	Spac. (in)	Area (in2/ft)	Wgt (lbs)
Top	A300	Base	D7.5	4.00	13- 2	0.225							61
										(1) sheets, Total weight:			61
L&R	B2	Base	D7	2.00	14- 3	0.420	3- 6	7- 3	C1	D4	8.00	0.060	141
	A1	Base	D7	2.00	14- 3	0.420	3- 6	7- 3	C1	D4	8.00	0.060	18
	A2	Base	D7	2.00	14- 3	0.420	3- 6	7- 3	C1	D4	8.00	0.060	18

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(2) sheets, Total weight: 354

Bot	A400	Base	D7.5	4.00	13- 2	0.225		C1	D4	8.00	0.060		79

(1) sheets, Total weight: 79

Weight of Steel: 161 lb/ft Total weight of all sheets: 967

Notes:
Epoxy coating may be needed for A1, A300, and some C1 reinforcement, check with governing agency.
L&R - left and right, TC - top corner, BC - bottom corner, INT - interior walls, EXT - exterior walls
Nested line wires are additive to the base line wires, but nested cross wires replace base cross wires.
Adder sheets may require cross wires, check with mesh supplier.

Summary of Ratings Table:

			Flexure					Shear				
Truck	ILF	OLF	Fill	Member	Location	IR	OR	Fill	Member	Location	IR	OR
(AA)HL-93	1.75	1.35	1.99	2	MID	1.07	1.39	1.00	2	LT	1.02	1.32

Critical Sections Summary: Flexure

Member 1: (Exterior Wall), Thickness = 8.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
BOT	16.50	-16.86	13.18	16.08	6.85	19.70	1.00	0.42	6.87	1.25	1.62	AA	1.99
MID	40.50	0.35	1.45	8.78	6.85	9.23	1.00	0.23	6.87	7.51	9.74	AA	1.00
MID-	40.50	-17.17	13.18	16.08	6.85	19.70	1.00	0.42	6.87	1.19	1.54	AA	1.99
TOP	16.50	-17.98	13.18	16.08	6.85	19.70	1.00	0.42	6.87	1.13	1.46	AA	1.99

Member 2: (Top Slab), Thickness = 9.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	16.00	-7.90	2.64	16.08	6.85	16.94	1.00	0.42	8.69	2.28	2.96	AA	1.00
MID	76.00	20.90	-0.72	22.27	7.84	22.04	1.00	0.51	8.69	1.07	1.39	AA	1.99
MID-	76.00	0.20	2.35	8.78	6.85	9.60	1.00	0.23	8.69	NC	NC	AA	3.00
RT	16.00	-7.90	2.64	16.08	6.85	16.94	1.00	0.42	8.69	2.28	2.96	AA	1.00

Member 4: (Bottom Slab), Thickness = 9.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	16.00	-5.77	3.94	18.53	7.85	19.80	1.00	0.42	8.69	5.13	6.65	AA	1.99
MID	76.00	18.59	-0.22	19.78	7.85	19.71	1.00	0.45	8.69	1.09	1.41	AA	1.99
MID-	76.00	0.29	3.43	10.09	7.85	11.28	1.00	0.23	8.69	NC	NC	AA	3.00
RT	16.00	-5.77	3.94	18.53	7.85	19.80	1.00	0.42	8.69	5.13	6.65	AA	1.99

Critical Sections Summary: Vertical Shear

Member 1: (Exterior Wall), Thickness = 8.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
BOT	22.35	2.24	15.9	13.14	6.56	10.02	2.000	11.13 b	0.00	0.00	0.00	6.56	8.50	AA	1.00
MID	40.50	1.22	0.3	1.45	6.69	19.59	3.836	21.76 a	0.00	0.00	0.00	21.88	28.36	AA	1.00
MID-	40.50	0.64	16.3	13.14	6.56	10.02	2.000	11.13 b	0.00	0.00	0.00	12.10	15.68	AA	1.00
TOP	22.35	-1.67	17.8	13.18	6.56	10.02	2.000	11.13 b	0.00	0.00	0.00	7.31	9.48	AA	1.99

Member 2: (Top Slab), Thickness = 9.00 in

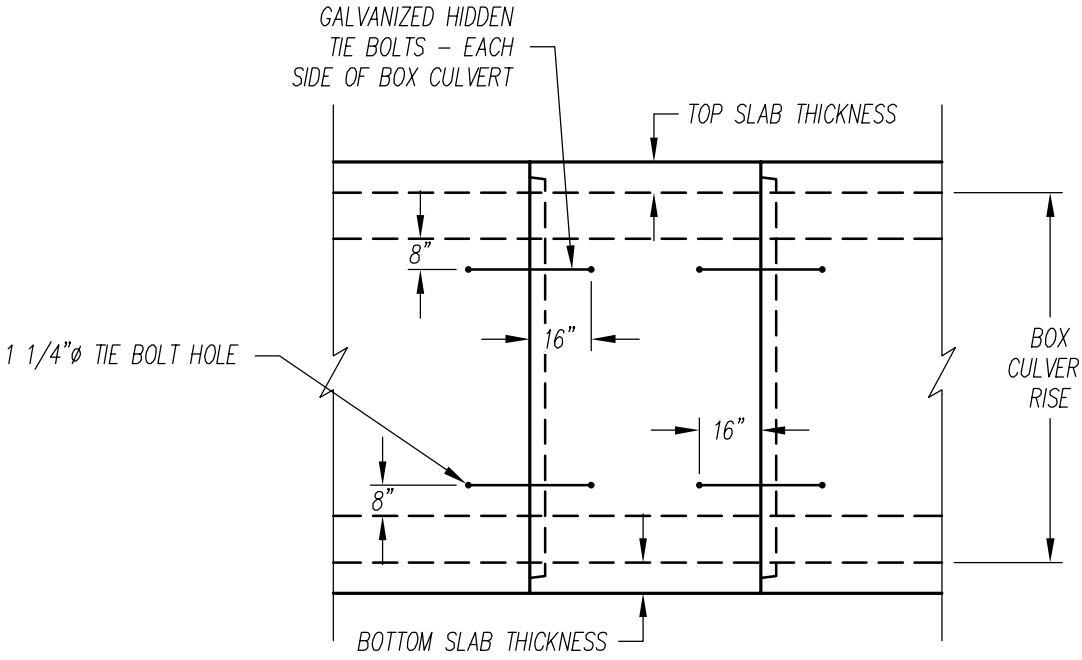
Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	22.48	10.26	7.5	2.64	6.56	10.40	2.076	11.55 a	0.00	0.00	0.00	1.02	1.32	AA	1.00
MID	76.00	3.80	20.1	-1.08	7.49	10.32	1.806	11.46 a	0.00	0.00	0.00	2.72	3.52	AA	1.00
MID-	76.00	3.80	1.2	1.93	6.69	13.42	2.628	14.91 a	0.00	0.00	0.00	3.53	4.58	AA	1.00
RT	22.48	10.26	7.5	2.64	6.56	10.40	2.076	11.55 a	0.00	0.00	0.00	1.02	1.32	AA	1.00

Member 4: (Bottom Slab), Thickness = 9.00 in

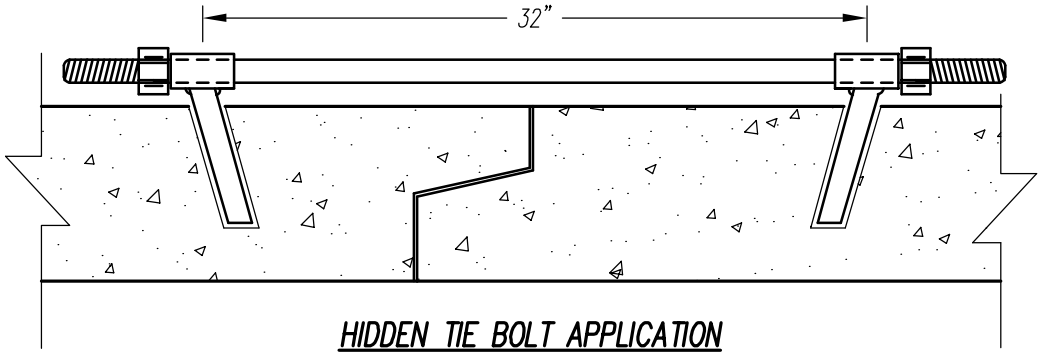
Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	22.75	7.74	3.1	3.94	7.56	14.46	2.506	16.07 a	0.00	0.00	0.00	2.35	3.04	AA	1.99
MID	76.00	0.17	17.4	-0.42	7.54	10.37	1.803	11.52 a	0.00	0.00	0.00	61.32	79.50	AA	1.00
MID-	76.00	0.17	0.0	3.01	7.69	29.53	5.031	32.81 a	0.00	0.00	0.00	NC	NC	AA	1.00
RT	22.75	7.74	3.1	3.94	7.56	14.46	2.506	16.07 a	0.00	0.00	0.00	2.35	3.04	AA	1.99

Eriksson Culvert v6.3.1 Sht:____of____
 By:BSJ Chk:____
Filename: SGL 12x6 HL93 01-03 fill.etcx 8/9/2024 11:28:14 AM

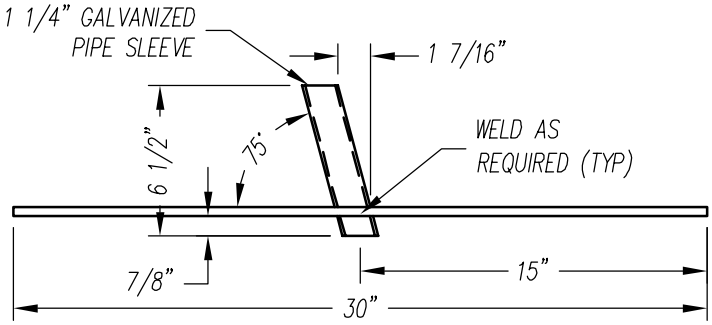
Vc Calculation By: a - Iterative Beta, b - Constant Beta, c - Box Culvert, d - Standard/Arema



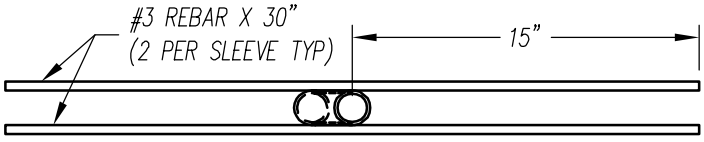
ELEVATION VIEW – BARREL SECTIONS WITH HIDDEN TIE BOLT



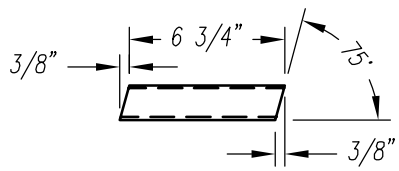
HIDDEN TIE BOLT APPLICATION



TOP VIEW



END VIEW



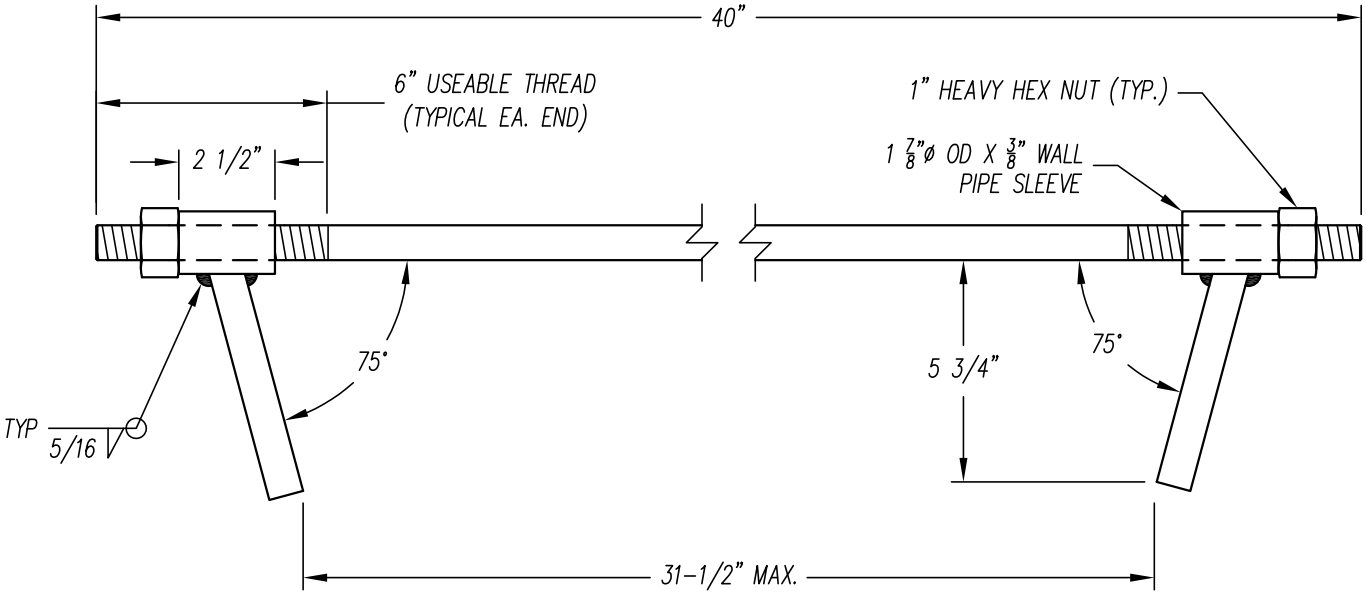
SLEEVE DETAIL

1) Tie Bolts should not be used to pull the joint together.
2) Tension adjusting nut 1/2 turn past snug.

02/17/16 JWB

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: TIE BOLT HOLE LOCATION DETAIL
DATE: 02/06/16	
DR'N BY: JWB	
REV: 11/27/17 JWB	DWG NAME: TIE BOLT HOLE LOCATION – 2



1. Tie bolts are manufactured from 29/32" diameter material conforming to ASTM A36.
2. Standard 1" diameter threads are rolled on adjusting bolts.
3. Heavy Hex Nuts conform to ASTM A563.
4. The welded pipe sleeve conforms to ASTM A519
5. Welding and weld inspection are done in accordance with AWS/ANSI D1.1-94 Structural Welding Code.
6. Tie bolt assembly is hot dip galvanized in accordance with ASTM A153 / ASTM F2329.

FORTERRA™
Rapid City, South Dakota
2046 Samco Road, Suite 2
Rapid City, SD 57702
(605) 718-4111

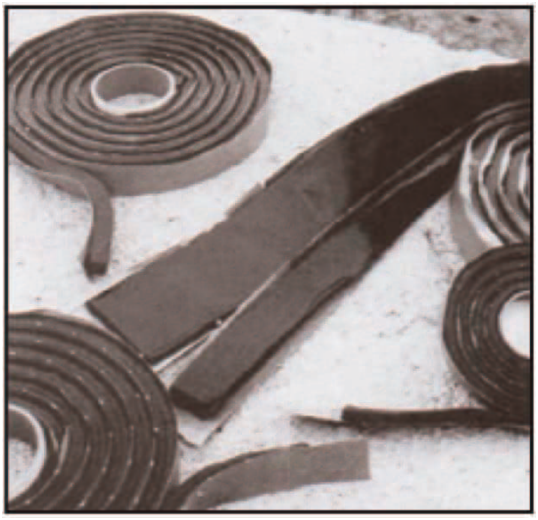
SCALE: NONE	PROJECT: GALVANIZED HIDDEN TIE BOLT
DATE: 2/4/13	
DR'N BY: TDE	
REV: 1/14/16 REM	DWG NAME: HIDDEN TIE BOLT

EZ-STIK

PREMIUM BUTYL JOINT SEALANT

What It Is

EZ-STIK is a premium preformed butyl joint sealant that is supplied in rope form. Containing a higher proportion of butyl rubber, EZ-STIK It is carefully blended from uncured butyl rubber and other solids and will not shrink, crack, or dry out. Although clean to handle, it provides excellent adhesion and cohesion to a wide variety of surfaces - concrete, metal, most concrete coatings, glass, wood, and painted surfaces.



Why It's Better

- Increased proportion of butyl rubber content.
- Premium packaging.
- Wide variety of sizes and styles.
- All-weather performance.
- Good adhesion to dry concrete, commonly specified concrete coatings, steel, glass, or painted surfaces.
- Coated release paper for easy installation.
- Long service life.
- Cohesive properties allow for joint movement.
- Compatible for use with rubber O-Ring designs.
- Low moisture vapor transmission rate (MVTR).
- Special primers available for use on damp, contaminated, or difficult surfaces.

How It Performs

EZ-STIK BUTYL JOINT SEALANT *meets or exceeds all requirements of the following Standards, Specifications and/or Test Methods:*

ASTM C 990 - *Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants; Section 6.2 Butyl Rubber Sealants*

AASHTO M 198 - *Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets*

Typical Applications

- Sanitary Manhole Joints
- Stormwater Manhole Joints
- Irrigation and Drainage Systems
- Box Culverts
- Elliptical/Arch Pipe
- Architectural Foundations
- Underground Utility Vaults
- Stormwater Treatment Structures
- Stormwater Inlet Structures
- On-Site Treatment Tanks
- Grease Interceptors
- Wet Wells

Scan (or click) Here To View More Info On This Product On The Web!

PRESS-SEAL GASKET CORPORATION
Protecting Our Planet's Clean Water Supply
Press-Seal Gasket is an ISO 9001:2008 Registered & ISO 14001:2004 Compliant Company

800-348-7325 Fax (260) 436-1908
email: sales @press-seal.com
web: www.press-seal.com

Made in USA

EZ-STIK

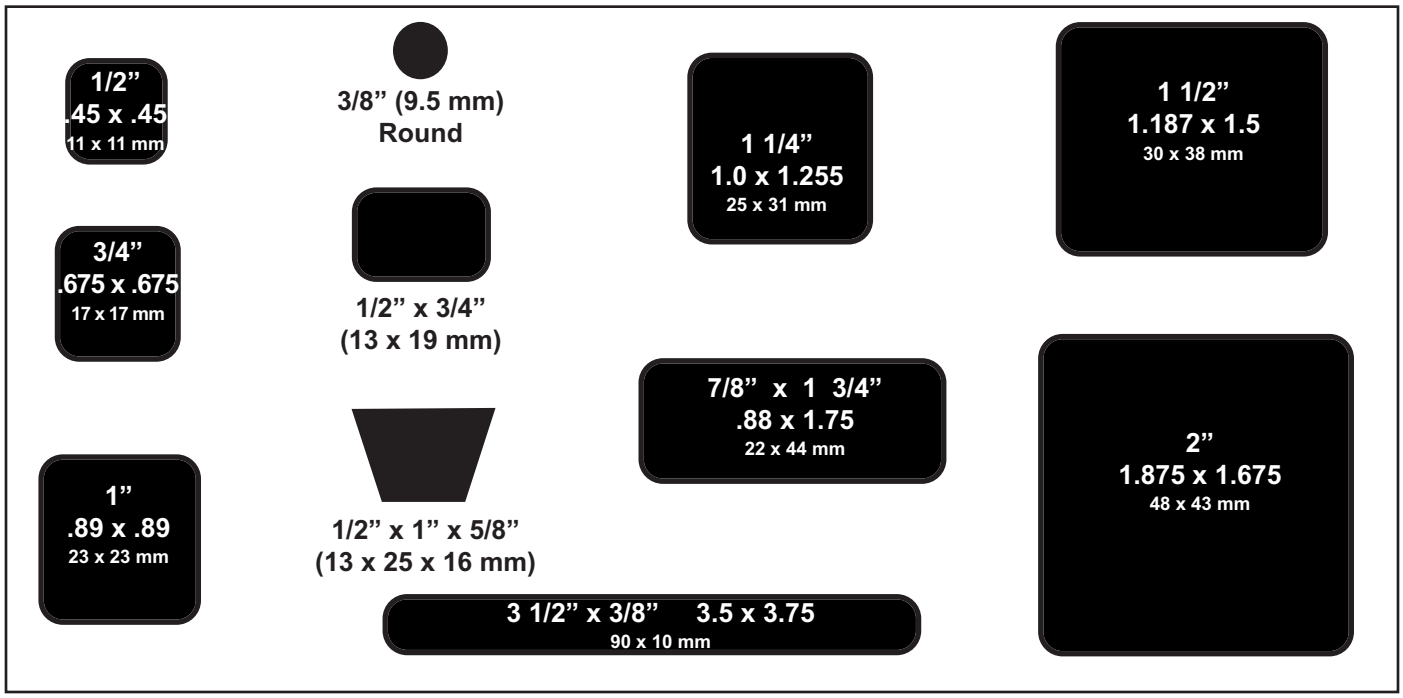
SPECIFICATION and SELECTION GUIDE

Submittal Specification

The joints and/or joint surfaces of the structures shall be sealed with a butyl-rubber-based preformed flexible sealant conforming to ASTM C-990, paragraph 6.2. The material shall be PRO-STIK or EZ-STIK as supplied by PRESS-SEAL GASKET CORPORATION, Fort Wayne, Indiana, or approved equal. The butyl material shall consists of 50% (min.) butyl rubber and shall contain 2% or less volatile matter.

For preformed joint sealants, the sealant shall be sized such that the joint is filled to 50% (min.) of its annular volume when fully assembled, and the sealant shall have the ends kneaded together at the overlap. Primer and/or adhesive as recommended by the sealant supplier shall be employed for adverse, critical, or other applications.

Testing of joints and compliance with construction requirements shall be conducted in strict conformance with the requirements of the sealant supplier.



Custom Sizes Available Upon Request

Also Available in Trowelable Bulk and Easy to Pump Bulk

All sizes sold 40 cartons per pallet. All pallets are shrink wrapped for outside storage.
Quantity discounts available - contact our Customer Service Department.

PRESS-SEAL GASKET CORPORATION
Protecting Our Planet's Clean Water Supply
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email: sales @press-seal.com
web: www.press-seal.com
Made in USA

EZ-STIK

PHYSICAL PROPERTIES TEST RESULTS

Description

EZ-STIK is a butyl-rubber-based sealant designed to be permanently flexible, tacky and resistant to moisture and deterioration by exposure to dilute chemical solutions. EZ-STIK meets ASTM C-990, Section 6.2 requirementsfor Butyl Rubber Sealant, and AASHTO M 198.

Typical Properties

The following values represent typical test results and are manufacturing specifications.

		SPEC.	REQUIRED	EZ-STIK
Butyl Rubber (Hydrocarbon Content %)		ASTM D4	50% min.	62%
Ash Inert Mineral Filler %		AASHTO T111	30% min.	45-48%
Volatile Matter	(AASHTO T47)	ASTM D6	2% max.	0.5-1.0%
Specific Gravity @ 77ºF (25 C)	(AASHTO T229)	ASTM D71	1.15 - 1.50	1.25 - 1.35
Ductility @ 77ºF (25 C), cm	(AASHTO T51)	ASTM D113	5.0 min.	meets requirement
Flash Point C.O.C.		ASTM D92	350º (177 C) min.	375ºF (191 C)
Fire Point C.O.C.		ASTM D92	375º min. (191 C)	385ºF (196 C)
Compression Test				
@77ºF (25 C), lbf/in^3		ASTM C972	100 max.	40 - 55 lbf/in^3
@32ºF (0 C), lbf.in^3			200 max.	130 - 160 lbf/in^3
Low Temperature Flexibility				
@-10ºF (-23 C)		ASTM C765	180º bend, no cracking, nor loss of adhesion.	Pass - no cracking or adhesion loss.
Elevated Temperature Flexibility				
14 days @ 157ºF (69 C)		ASTM C776	No sag, nor change in extruded shape.	Pass - no sag or shape change.
Adhesion After Impact		ASTM C776-84	No greater loss than 50% of adhesion.	Pass - no loss of adhesion.
Cone Penetration				
@ 77ºF (25 C), dmm		ASTM D217	50 - 100 dmm	55 - 85 dmm
@ 32ºF (0 C), dmm			40 min.	45 - 55 dmm
Chemical Resistance			No deterioration, no cracking, no swelling.	Pass - no visible change after 30 days immersion in 5% solutions HCl, H_2SO_4,NaOH,KOH,H_2S

Application Properties

Service Temperature Range	-40F to 250F (-40 to 121 C)
Application Temperature	20F to 120F (-7 to 49 C)
Storage Temperature	Under 120F (49 C)
Shelf Life	2 Years minimum

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GATOR WRAP

Infi-Shield® External Gator Wrap

Infi-Shield® Gator Wrap prevents infiltration by providing a water-tight seal around any manhole, catch basin or concrete pipe joint. Gator Wrap resists harsh soil conditions and also provides a root barrier for any crack or joint. Infi-Shield® Gator Wrap installs easily with no special tools and can be immediately backfilled.

Infi-Shield® Gator Wrap Specification

Each manhole, catch basin or pipe joint shall be sealed with an external rubber sleeve similar to the Infi-Shield Gator Wrap as manufactured by Sealing Systems Inc (763-478-2057). The seal shall be made of a Stretchable, Self-Shrinking, Intra-Curing Halogenated based rubber with a minimum thickness of 30 mils. The back side of each unit shall be coated with a cross-linked re-enforced butyl adhesive. The butyl adhesive shall be non-hardening sealant with a minimum thickness of 30 mils. The seal shall be designed to stretch around the joint and then overlapped creating a cross-link and fused bond between the rubber and butyl adhesive. Gator Wrap forms a continuous rubber seal on a manhole joint which prevents water and soil from infiltrating through the manhole, catch basin or concrete pipe joint.

INFI-SHIELD GatorWrap® is available in 6" and 9" widths and comes in a 50 foot roll or in a user-friendly kit which has six sixteen foot rolls. Upon special order, we can also manufacture a 12" width but please allow four weeks for delivery.

EPDM Rubber Specifications

Physical Properties	ASTM Test Method	Typical Value
Sheer Strength	D816	15 lb. PSI min
Tensile, PSI	D412	50 PSI
Elongation %	D412	500 %
Penetration	D217	40/120 MM
Low Temperature	D746	Minus 49º F flexibility
Heat Aging	D573 7 days @ 90 degrees C	
Tensile Strength	minimum, PSI (MPa) > 100 PSI	Pass
Fusion	5/64" (0.2) max	Pass
Elongation %	minimum 300% at break	Pass
Ozone Resistance	no visible signs of cracking	Pass
Aging and Storage	300% elongation applied (10 Years)	Pass
UV Resistance	No visible signs of cracking	Pass

Material meets ASTM C923 and C877 – Mastic Meet ASTM C990.
Disclaimer: This technical data information and recommendations offered are based on test results, and findings we believe to be reliable and complete.

Sealing Systems, Inc.
9350 County Road 19 • Loretto, MN 55357 • 763-478-2057 • 800-478-2054 • Fax 763-478-8868 • www.infi-shield.com

Infi-Shield GATOR WRAP

INSTALLATION INSTRUCTIONS

1. Expose the area that is to be sealed. Clean the entire area around the joint with a wire brush and whisk broom. Remove any sharp protruding edges around the joint with an abrasive tool. When finished cleaning, the entire area must be dry and free of any dirt.

2. Remove the first foot of paper backing from the mastic. Center and place the Gator Wrap around the joint. Continue to remove paper backing as you apply the Gator Wrap to the entire structure.

3. Seal the overlapping area with a 6” overlap. Be sure not to stretch material at the overlap area.

4. Cut excess material using a utility knife. Using a rubber mallet or hand held roller, firmly flatten the Gator Wrap 360 degrees around joint.

Material: Rubber meets ASTM C923 and C877 – Mastic Meet ASTM C990

Disclaimer: This technical data information and recomedations offered are based on test result, and findings we believe to be reliable and complete.

S.S.I. SEALING SYSTEMS, INC.

Sealing Systems, Inc.

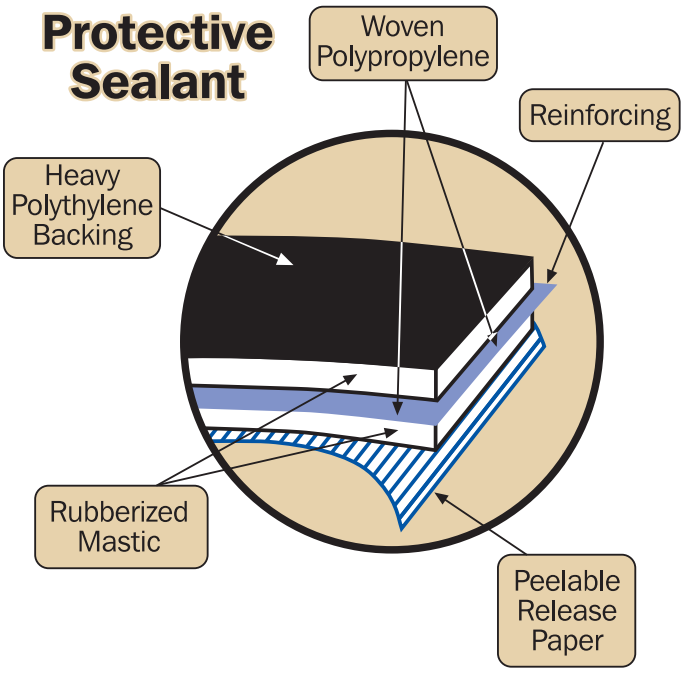
9350 County Road 19 • Loretto, MN 55357 • 763-478-2057 • 800-478-2054 • Fax 763-478-8868 • www.infi-shield.com

SEAL PLUGS

High-Performance, Water-Tight Seals For Sealing Lift Holes In Concrete Pipe

This two-ply seal plug is designed to adhere to concrete with its aggressive rubberized mastic. The plug is reinforced with a tough, puncture-resistant woven polypropylene with an outer layer of impervious polyethylene, resistant to most acids and alkalines.

Seal plugs are available in easy to apply 9”x9” squares with a peel-able protective paper for faster application without the waste or extra tools.



TYPICAL PROPERTIES

POLYETHYLENE BACKING		
Tensile strength, min, psi	4,000	D882, Method A
Elongation at break, min, %	100	D882, Method A
Tear resistance, min, psi	1,500	D624, Die C
Water absorption, max, %	0.01	D570

REINFORCING MESH ELEMENT		
Tensile strength min, lb., in.		D1682
	Warp 75	
	Fill 75	
Elongation at break, min, %		
	Warp 20	
	Fill 20	

RUBBERIZED MASTIC		
	Minimum	Maximum
Ash-inert matter, %	80	15
Volatiles, %	0.1	2
Softening Temp., min, F	175	-
Specific gravity	0.95	1.05
Penetration, dmm	60	90
Flow, mm	10	10

CERTIFICATION

SEAL WRAP MATERIALS AND PERFORMANCE REQUIREMENTS.

I hearby certify that Seal Wrap is produced in accordance to the following specifications:

9" seal plugs, 9"and 12" master rolls, consists of an outer backing of polyethylene film with a minimum tensile strength, 4000 lb. psi, when tested in accordance to test method D 882. We further certify that the rubberized mastic component of Seal Wrap is reinforced with a mesh element with a minimum, 75 lb./in, warp and fill when tested in accordance to test method D 1682.

Seal Wrap is made of the same high performance components, excluding the steel straps, as our Mac Wrap collar which meets ASTM standard C-877 Type II.

Robert L. Weir
President Construction Products Division

P.O. Box 447 • US Hwy. #1 North • McBee, SC 29101 • Phone: (877) 962-7622 • (843) 335-5814 • Fax: (843) 335-5909
www.marmac.com info@marmac.com

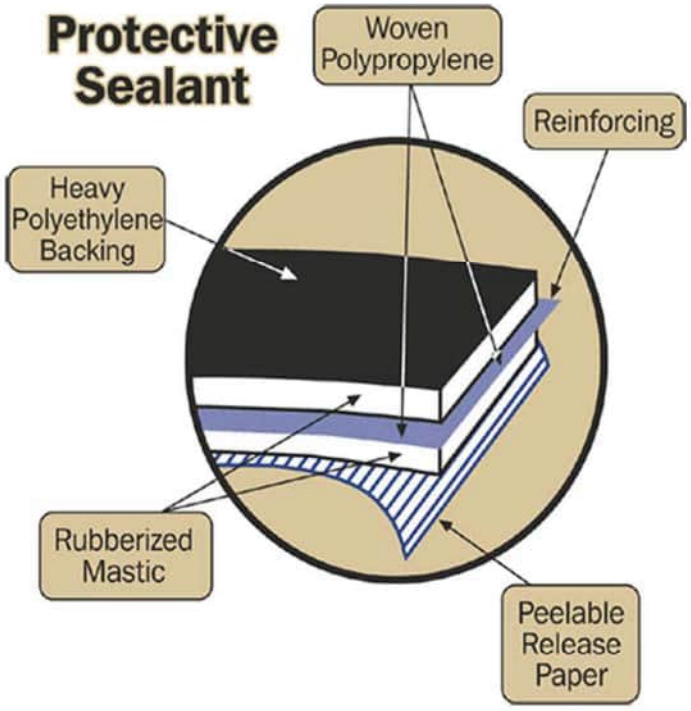
Seal Wrap

High-performance water-proofing membrane for culvert structures

Mar Mac Seal Wrap is a two-ply made with heavy-duty water-proofingmaterials essential for sealing boxed, arched and span culverts.

Seal Wrap is made of two layers of rubberized mastic, reinforced with a sheet of strong, puncture-resistant woven polypropylene. The outside backing is constructed with impervious polyethylene a material resistant to most acids and alkalines.

Seal Wrap is available in 60' rolls lined with peelable release paper for easy application without the waste.



TYPICAL PROPERTIES

POLYETHYLENE BACKING		
Tensile strength, min, psi	4,000	D882, Method A
Elongation at break, min, %	100	D882, Method A
Tear resistance, min, psi	1,500	D624, Die C
Water absorption, max, %	0.01	D570

REINFORCING MESH ELEMENT		
Tensile strength min, lb., in.		D1682
	Warp 75	
	Fill 75	
Elongation at break, min, %		
	Warp 20	
	Fill 20	

RUBBERIZED MASTIC		
	Minimum	Maximum
Ash-inert matter, %	80	15
Volatiles, %	0.1	2
Softening Temp., min, F	175	-
Specific gravity	0.95	1.05
Penetration, dmm	60	90
Flow, mm	10	10

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www.marmac.com info@marmac.com

INSTALLATION INSTRUCTIONS FOR SEALWRAP

- SURFACE PREPARATION:

Sweep or brush the external portion of the joint to insure that dirt, dust and other foreign matter do not interfere with direct contact between the mastic sealer and the concrete joint. If ambient temperature is below 40°F and/or wet conditions are present primer is recommended. Mar Mac RB Quick Dry Primer can be applied by brush or roller at the rate of 1 gallon per 250-350 sq. ft. depending on the porosity of the surface. Cure time is approximately 15-60 minutes dependent on temperature and humidity. Apply primer too exceed the width of the Sealwrap by a minimum of 2 inches.

- INSTALLATION

Peel away the silicon coated release liner to expose 1 ft of the mastic adhesive. Center the exposed mastic over the joint and using the palm of the hand, apply pressure to achieve a uniform bond of the Sealwrap to the concrete. Continue to peel the release liner while unrolling the Sealwrap **KEEP CENTERED OVER JOINT**. For Sealwrap splicing, overlap a minimum of 4 inches. If primer is used, allow for full cure before Sealwrap installation.

MAR MAC RB ADHESIVE PRIMER

DESCRIPTION:

MAR MAC RB LIQUID ADHESIVE PRIMER is a rubber based adhesive in solvent solution which is specifically formulated to provide excellent adhesion with Macwrap, Sealwrap and Sealing Tape under may kinds of surface conditions.

USES: RB ADHESIVE PRIMER....

- Used to prime all precast structures on which Macwrap and/or Sealwrap will be installed. Including: round, arch, elliptical pipe and box culverts and span bridges.
- Designed to be used on applications down to 25ºF. (-4ºC).

APPLICATION:

MARMAC RB LIQUID ADHESIVE PRIMER may be applied with roller or brush. A roller with a heavy nap should be used, such to carry sufficient material to the area being primed.

Apply all ***MAR MAC RB LIQUID ADHESIVE PRIMER*** to a clean, dry, dust free, and frost free surface at a coverage of approximately 250 to 350 square feet per gallon on concrete. The liquid adhesive should be spread sufficiently to avoid areas of access material. Areas of excess material will lengthen the curing time on the application of the ***MAR MAC RB LIQUID ADHESIVE PRIMER.***

For best results ***MAR MAC RB LIQUID ADHESIVE PRIMER*** should be applied and allowed to become tacky to the touch, timing may vary due to atmospheric conditions. At this point Sealwrap/Macwrap should be applied. If primer dries and is no longer tacky, reapply primer.

SAFETY, STORAGE AND HANDLING INFORMATION:

MAR MAC RB LIQUID ADHESIVE PRIMER vapors are flammable. User should review Material Safety Data Sheet (MSDS) for this product and follow safety instructions listed within.

This information is based on our best knowledge, but MAR MAC cannot guarantee the results to be obtained

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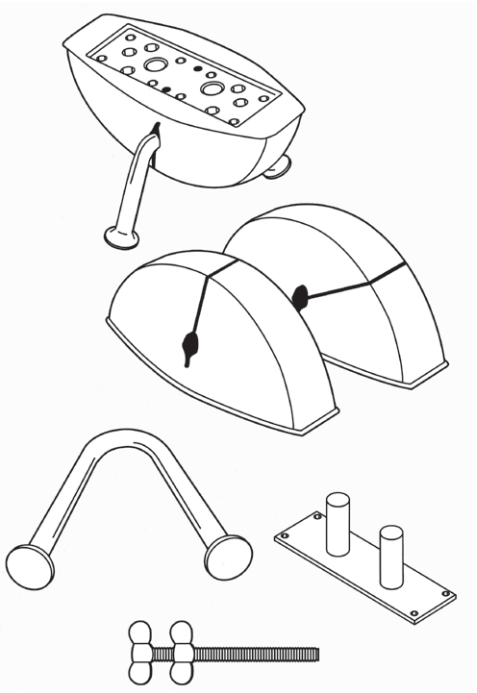
WWW.MARMAC.COM

DAYTON SUPERIOR®

Utility Anchor®

Utility Anchor System

The Dayton Superior Utility Anchor System is designed to economically simplify the lifting and handling of precast concrete elements. Its economics, ease of use and versatility will be a welcome addition to your precast operations.



Key Advantages

- High strength – up to 24,000 lbs. SWL
- No special lifting hardware required
- Uses a standard hook or clevis
- Easy to install and use
- Utilizes reusable 90° and 45° polyurethane recess plugs
- Eliminates "through holes" in the precast element
- An economical and versatile system – applicable to any precast concrete element

Added Benefit

Utility contractors can use the utility anchor effectively as a pulling iron. When used as a pulling iron, the safe working loads may be increased by 33%, based on the use of a 3 to 1 factor of safety.

The design of the Dayton Superior Utility Anchor Utility System assures the precaster of an economical, user-friendly system for lifting and handling precast concrete elements.

Utilize the Utility Anchor System to:

- Remove precast elements from their forms
- Handle in the precast yard
- Load for shipment
- Unload and place at the job site

The precaster is able to do it all without the need for any special lifting equipment or hardware. Simply use a standard hook or shackle to connect slings to the utility anchor for a safe lift.

The Utility Anchor System uses a polyurethane recess plug to create a void in the concrete. The concrete void created for the P75H utility anchor is sufficiently large to accept the following:

1. 6-ton Grade 8 alloy hook or
2. 7-ton forged alloy shackle

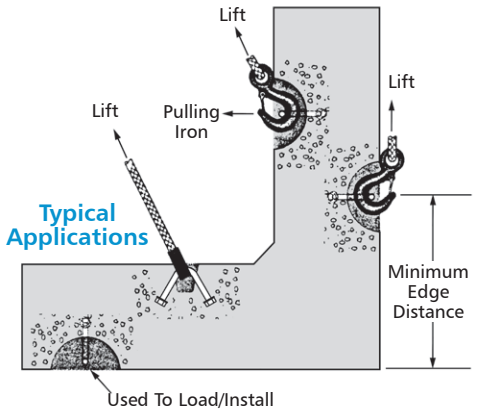
For the P75S Utility Anchors:

3. 15-ton cast/alloy hook or
4. 15-ton forged alloy shackle

DO NOT use larger hooks or shackles; they will apply additional and unintended loads to the utility anchor and could cause a premature failure of the concrete or anchor.

Anchor Placement

Placement of the Utility Anchor is dependent on the structural shape of the precast element. Utility anchors are not designed for thin edge installation. Always maintain minimum edge distances. For special conditions, contact the nearest Dayton Superior Technical Service Department for assistance.

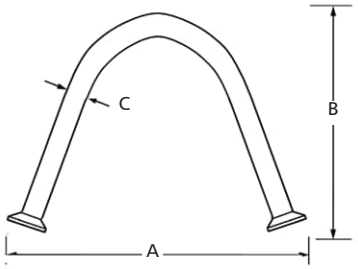


DAYTON SUPERIOR

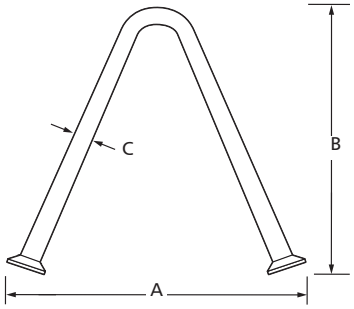
P75 and P75H Utility Anchor®

The Dayton Superior Utility Anchors are available in three diameters and a series of lengths for specific concrete thickness. The utility anchor can be set in either a 90° or a 45° anchor orientation using the appropriate setting plug.

P75 and P75H Utility Anchor						
Anchor	Type	Product Code No.	A	B	C	End Shape
P75	4UA444	121877	5-1/4"	3-1/8"	0.444"	Swift Lift
	5UA444	123442	6"	3-3/4"	0.444"	Swift Lift
	6UA444	121888	7-3/8"	4-3/4"	0.444"	Swift Lift
	5UA671	123441	6-7/16"	3-3/4"	0.671"	Swift Lift
	6UA671	121889	7-3/8"	4-3/4"	0.671"	Swift Lift
	8UA671	121891	9-3/4"	6-3/4"	0.671"	Swift Lift
P75H	12UA875	124738	15-7/8"	11"	0.875"	Swift Lift



P75 Utility Anchor



P75-H Utility Anchor

Anchor	Type	Product Code No.	Minimum Panel Thickness	Safe Working Load Tension 90	Safe Working Load Shear 90	Safe Working Load Tension/ Shear 45	Minimum Edge Distance
P75	4UA444	121877	4"	3,200	5,800	2,260	9"
	5US444	123442	5"	3,860	7,710	2,730	10"
	6UA444	121888	5 5/8"	4,460	9,460	3,150	12"
	5UA671	123441	5"	4,560	8,430	3,220	10"
	6UA671	121880	5 5/8"	7,320	15,780	5,170	12"
	8UA671	121801	7 5/8"	10,830	18,850	7,660	16"
P75H	12UA875	124738	12"	24,000	24,000	24,000	30"

To Order:

Specify: (1) quantity, (2) name, (3) product code.

Example:

200, P75 Utility Anchors, 5UA444.

Note:

1. Compressive strength of normal weight concrete to be 4,000 psi at time of initial lift.
2. Safe working loads provide an approximate factor of safety of 4 to 1.
3. Utility anchors to be installed at 90° to surface of the concrete.
4. Shear safe working loads are based on loading in the direction of the top of the precast concrete element.

P75C Utility Anchor® with Clip

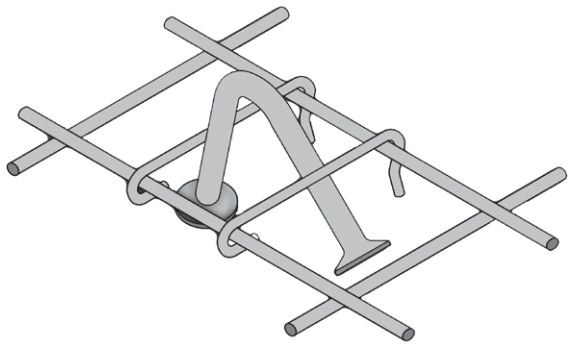
The Dayton Superior Utility Anchor with Clip is designed to allow the Utility Anchor to be secured to the wire mesh cage. This product utilizes the P75 Utility Anchors with 2 wire clips welded to opposite legs of the anchor. These wire clips are positioned to hold the utility anchor with Void to the wire mesh in the proper position in the wall for lifting your precast product. Both the 5UA and 6UA anchors in 0.444 and 0.671 diameters for 9" wire spacing are in stock. Other anchor and wire spacing are readily available.

To Order:

Specify: (1) quantity, (2) name, (3) product code (4) anchor size, (5) wire spacing (6) wall thickness.

Example:

200, P75C, #121443, 5UA444anchor, 9" wire spacing, 5" wall.



Product Code	Utility Anchor	Wire Clip Lengths	Wall Thickness
123443	5UA444	9"	5"
121890	5UA671	9"	5"
121892	6UA444	9"	6"
121893	6UA671	9"	6"
127446	8UA671	9"	8"

P76 Utility Anchor® Setting Plugs

Utility Anchor Setting Plugs a polyurethane plastic in 90° and 45° orientation.

The reusable setting plug properly sets the anchor approximately 1/2" below the surface of the concrete and provides an adequate recess for easy sling attachment. After final positioning of the concrete element, the recess formed by the recess member can be easily grouted or conveniently covered by the Utility Anchor Cover/Patch.

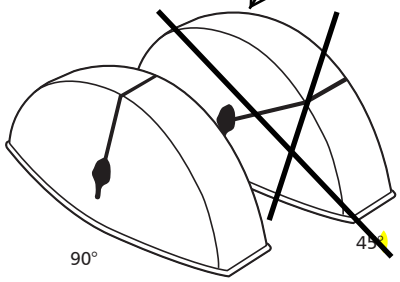
The 90P875 Setting Plug used with the P75-H 24,000 lb. anchor requires 2 each P101 holding rods to attach setting plug to the form. No holding plate or magnetic plate are available for this setting plug.

NOT USED

NOT USED

P76 Utility Anchor Setting Plug					
Type	Product Code No.	Length	Width	Depth	Color
90P444	123175	8.00"	3.25"	3"	Blue
~~45P444~~	~~123176~~	~~8.00"~~	~~3.25"~~	~~3"~~	~~Blue~~
90P671	123177	8.00"	3.25"	3"	Orange
90P671	127786	9.00"	4.58"	3.35"	Orange
~~45P671~~	~~123178~~	~~8.00"~~	~~3.25"~~	~~3"~~	~~Orange~~
90P875	124685	15.00"	6.13"	5"	Blue

45° NOT USED



P76 Utility Anchor Setting Plugs

To Order:
Specify: (1) quantity, (2) name, (3) product code.

Example:
200, P76 Utility Anchor Setting Plugs, 90P444.

BLUE PLUG USED FOR UA444
ORANGE PLUG USED FOR UA671
LARGE BLUE PLUG USED FOR UA875

P76D Disposable Setting Plugs

The Disposable Setting Plug is manufactured to offer the precaster an inexpensive alternate to urethane setting plugs. This 2 piece high density polyethylene plastic setting plug is used with the 0.671 Dayton Superior Utility Anchors. The two piece design snaps tightly together around the legs of the anchor eliminating concrete entering the void. The setting plug is installed to the formwork using nail holes on each end of the plug. This plug can also be used with the P77 Double Tee Anchors.

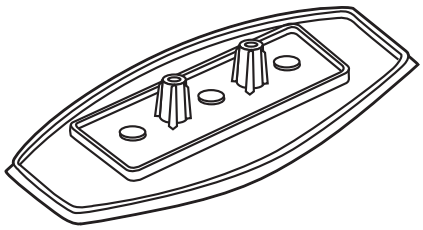
To Order:
Specify: (1) quantity, (2) name, (3) product code.

Example:
200, P76D, #126214.

P76D Disposable Utility Anchor Setting Plugs 0.671

P76C Utility Anchor Cover/Patch

The P76C Utility Anchor Cover/Patch installs over the back of the setting plug to protect the unit without the use of duct tape. The cover/patch can be installed on the setting plug/anchor assembly prior to setting the assembly in the form. This protects the assembly from concrete leakage through the concrete placement sequence. It can also be used later as a temporary or permanent cover for the recess. The P76C cover is gray in color and will blend with most concrete. It can be painted to match other color schemes.



P76C Utility Anchor Cover/Patch

Rinker MATERIALS™ A QUIKRETE® COMPANY

Brian S. Jenner
PO Box 1620
Rapid City, SD 57709-1620
605-737-5211 (TEL)
605-718-0808 (FAX)
Brian.Jenner@RinkerPipe.com

To: **Lewis & Clark County**
Dan Karlin
dkarlin@lccountymt.gov

Date: **9/4/2024**
Project: **Lewis & Clark Co. Crossing B**
Project#
Contractor: **Lewis & Clark County**
R/S # : **6024057BX8**

1	Set of	**6024057BX8 Submittal Review 240904**	sheets	1-33

X For your approval. Please return 1 set to: **RINKER MATERIALS**
PO BOX 1620, RAPID CITY, SD 57709-1620

X ***PRODUCTION CANNOT BE SCHEDULED OR BEGIN UNTIL APPROVALS ARE RECEIVED.***

____ For production as noted ____ For jobsite use X For your files

____ Per your request ____ For your information ____ Other

Dan,

6024057BX8 Submittal Review 240904 for your review.

Please forward to the engineer for review.

Production cannot begin until approvals are received.

Please respond by September 18, 2024.

Thanks

Brian

CONTRACTOR SUBMITTAL REVIEW

DATE SUBMITTED 09/10/2024 DUE DATE 09/18/2024

CHECKING IS ONLY FOR GENERAL CONFORMANCE WITH DESIGN CONCEPT OF THE PROJECT AND GENERAL CONFORMANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRECTED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF CONTRACTORS WORK WITH THAT OF ALL OTHER TRADES; AND SATISFACTORY PERFORMANCE OF CONTRACTORS WORK.

X APPROVED, NO EXCEPTIONS TAKEN
☐ APPROVED, AS NOTED
☐ REVISE AND RESUBMIT
☐ SUBMIT SPECIFIED ITEMS
☐ REJECTED

RESPEC

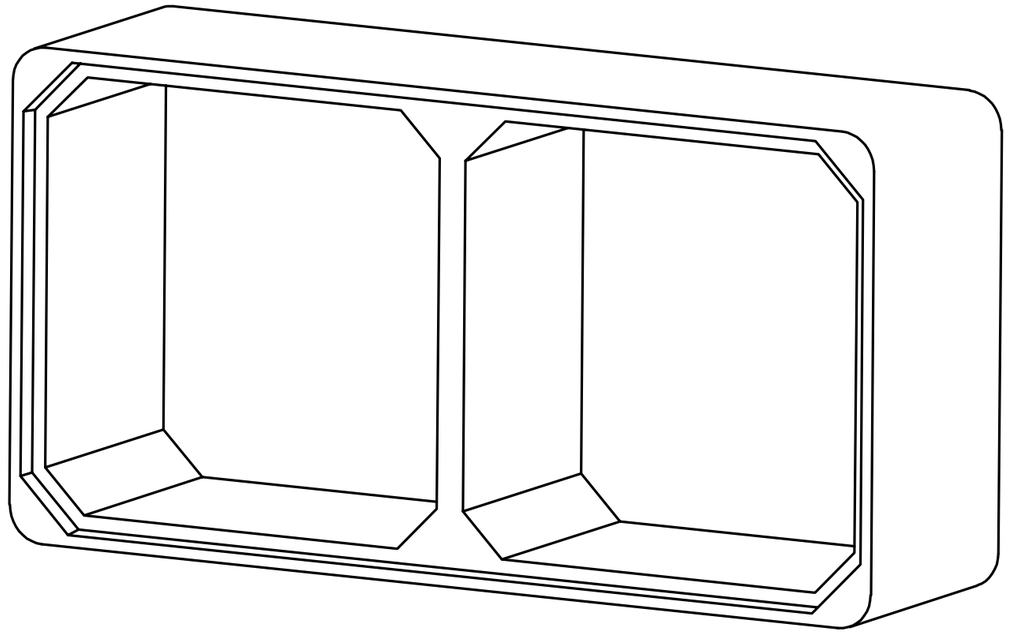
REVIEWER Jacob Lacy
DATE 09/09/2024

Copy:
1 Helena Plant, Proj. File
1 Mike Meredith

Sincerely,
RINKER MATERIALS

Brian S. Jenner, PE
Brian S. Jenner, PE - Project Engineer

RECOMMENDED INSTALLATION PROCEDURES FOR PRECAST CONCRETE BOX CULVERT

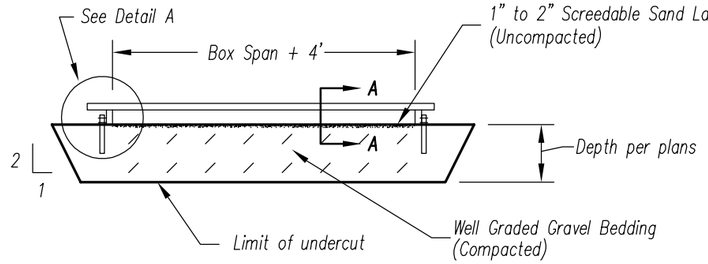


Rinker MATERIALS™
A QUIKRETE® COMPANY

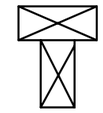
MONTANA

INSTALLATION

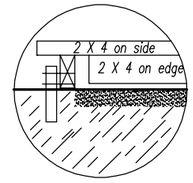
BED PREPARATION



1) Bedding material shall be a well graded material with a maximum particle size of 1" and placed to a uniform thickness and compaction as specified by engineer.
2) The top surface shall be a 1" to 2" thick screedable sand layer as a leveling course.
3) If installation equipment operates on top of bedding material the resulting compaction caused by the equipment shall not be greater than that of the bedding at any other location.



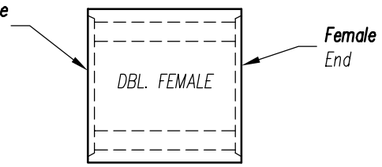
Section A–A

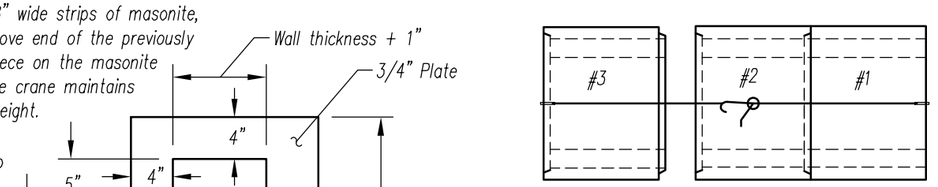


Detail A

INSTALLATION SEQUENCE

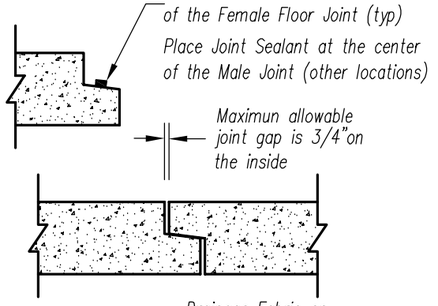
1) Set section w/ double female first (if applicable). See detail at right.
2) When staged construction is required, place dbl. female @ ℄ of road to allow installation of barrel sections in both directions.
3) Place joint sealant at the center of the female joint from top of haunch to top of haunch.
4) Dig a groove approximately 1" deep and 2"–3" wide in front of the female joint for the entire width of the bed so bedding material does not push into the joint. An alternate option to dig would be to cut 18" wide strips of masonite, place them under the groove end of the previously set piece, set the next piece on the masonite and pull together while the crane maintains the majority of the box weight.
5) Prior to setting each box section, use the screed to reshape the bed and remove the material from step #4.
6) Use pulling bracket and come–along system to pull joints together. See Detail.



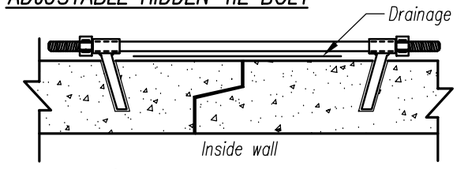


Bracket Detail

7) Check joint gap. If gap is larger than 3/4", pull joint apart and check for obstructions and check flatness of bedding surface. This maximum gap does not apply to the center wall of double cell boxes.
8) Install Tie Bolts and Drainage Fabric OR External Joint Wrap as specified.



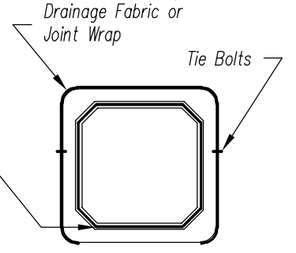
ADJUSTABLE HIDDEN TIE BOLT



1) Tie Bolts should not be used to pull the joint together.
2) Tension adjusting nut 1/2 turn past snug.

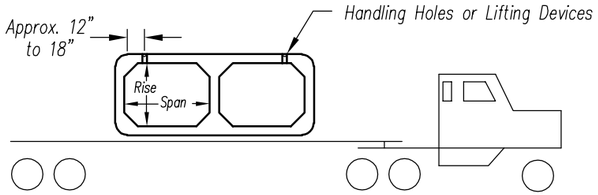
Use joint sealant in the entire joint all around box culvert section.

If premolded joint sealant is used in cold weather, it should be kept warm until applied.

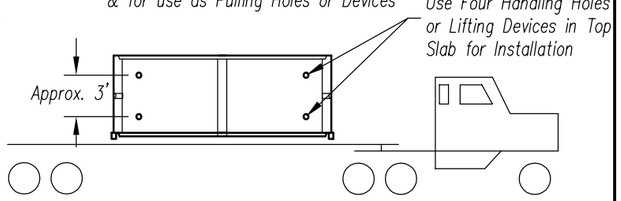


HANDLING

TRUCKING POSITION



On Box Sections where the rise is 9' or less, sections will be shipped in the laying position.



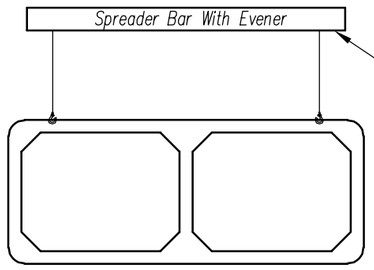
On Box Sections where the rise is greater than 9', sections will be shipped on end.

All Box Culverts will have 4 handling holes or lifting devices in top slab.
Boxes with 8' or greater rise will have 2 handling holes or lifting devices in ea. ext. wall.

Box Sections will need to be tipped on the job site to the laying position when shipped on end.

Contractor will need to prepare a soft landing area for tipping.

LIFTING DEVICE LIFTING DETAIL

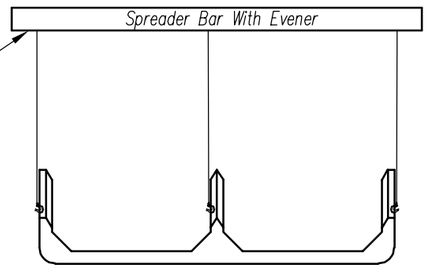


BARREL SECTIONS

Use Spreader Bars or other Lifting Jigs to maintain an Equalized Pick and a Vertical Pick unless otherwise specified on lifting device cut sheet.

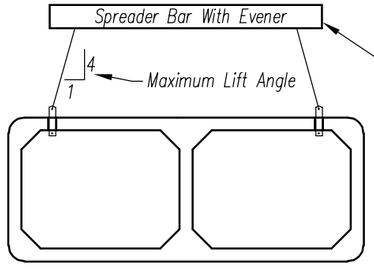
Rigging suppliers may have more stringent requirements based on section weights and cable size.

CONTRACTOR TO PROVIDE ANY DEVICES NECESSARY FOR LIFTING BARREL AND/OR END SECTIONS



END SECTIONS

LIFTING HOLE LIFTING DETAIL

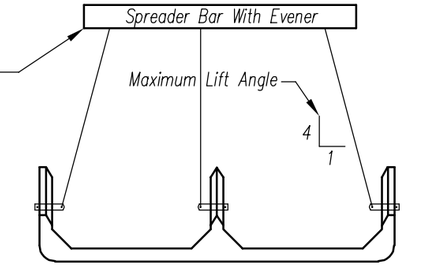


BARREL SECTIONS

Use Spreader Bar long enough to allow a Vertical Pick if possible.
If not, do not exceed maximum lift angle shown.

Rigging suppliers may have more stringent requirements based on section weights and cable size.

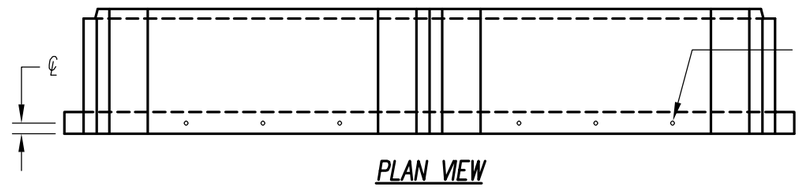
CONTRACTOR TO PROVIDE ANY DEVICES NECESSARY FOR LIFTING BARREL AND/OR END SECTIONS



END SECTIONS

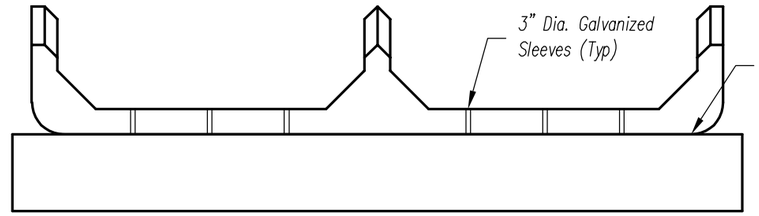
INSTALLATION

CUTOFF WALL CONNECTION



Contractor to drill 7/8" diameter x 6" deep holes thru the 3" sleeves into the cutoff wall and install #6 x 12" rebar dowels (provided). Fill sleeves completely with non-shrink grout (provided).

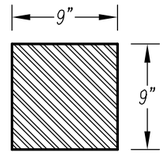
PLAN VIEW



ELEVATION VIEW

HANDLING HOLES / PULL HOLES (If used)

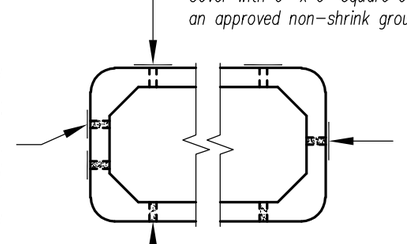
Lifting Holes are formed to be 3" Dia. when used



Lift Hole Cover

Self-adhering cover material provided with first shipment of box culvert sections.

(2) Pull Holes in bbl walls w/ 8' or greater rise.
– Cover with 9" x 9" square cover.
Fill holes w/ an approved non-shrink grout if specified on shops

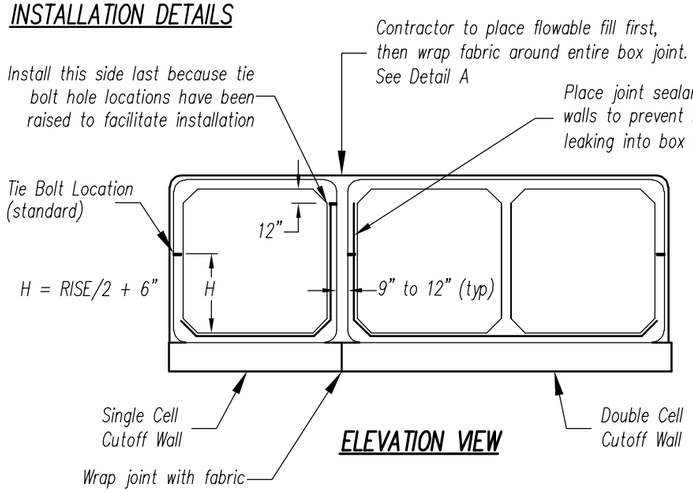


Lift Holes – (4) in TOP Slab.
Cover with 9" x 9" square cover. Fill holes w/ an approved non-shrink grout if specified on shops

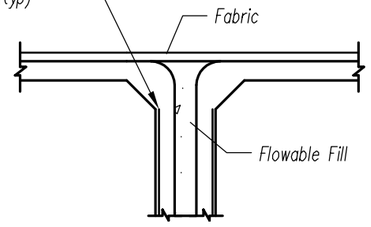
Lift Holes in end section walls or (1) Pull Holes in bbl walls w/ 7' or less rise.
– Cover with 9" x 9" square cover.
Fill holes w/ an approved non-shrink grout if specified on shops

Lift Holes – (2) in BOTTOM slab only when specified.
Fill holes w/ an approved non-shrink grout if specified on shops

MULTIPLE CELL INSTALLATION DETAILS

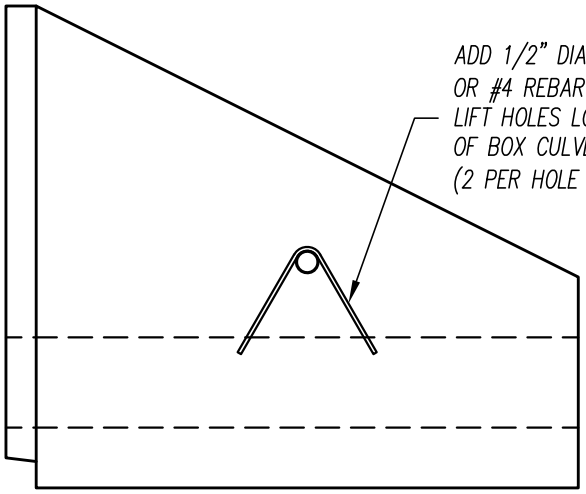


ELEVATION VIEW

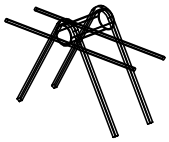


DETAIL 'A'

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

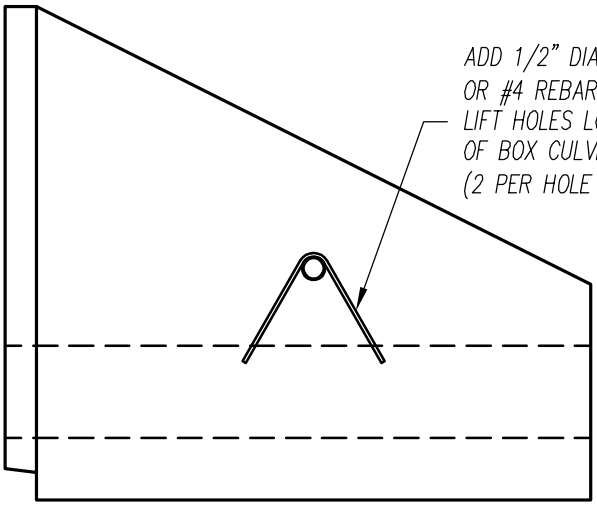
** FOR ES#1 W/ 10' RISE OR GREATER, ADJUST DISTANCE FROM END AS SPECIFIED IN END SECTION DETAIL

Holes shall be formed from 3" EMT Tubing
*** DO NOT REMOVE TUBING**

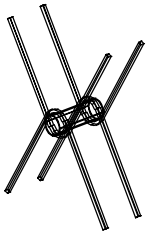
Rinker MATERIALS™ A QUIKRETE® COMPANY	Rapid City, South Dakota 4310 Pendleton Drive Rapid City, SD 57701 (605) 718-4111
SCALE: NONE	PROJECT: BOX CULVERT LIFT HOLE SPECIAL DETAIL PRESTRESS CABLE LOOPS MT ALTERNATIVE
DATE: 02/06/16	
DR'N BY: JWB	
REV: 07/27/21 JWB	DWG NAME: BOX LIFT HOLE - PS CABLE (MT ONLY)

02/17/16 JWB
11/27/17 JWB
05/31/18 JWB
11/29/18 JWB
01/02/19 JWB
06/07/21 JWB

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

** FOR ES#1 W/ 10' RISE OR GREATER, ADJUST DISTANCE FROM END AS SPECIFIED IN END SECTION DETAIL

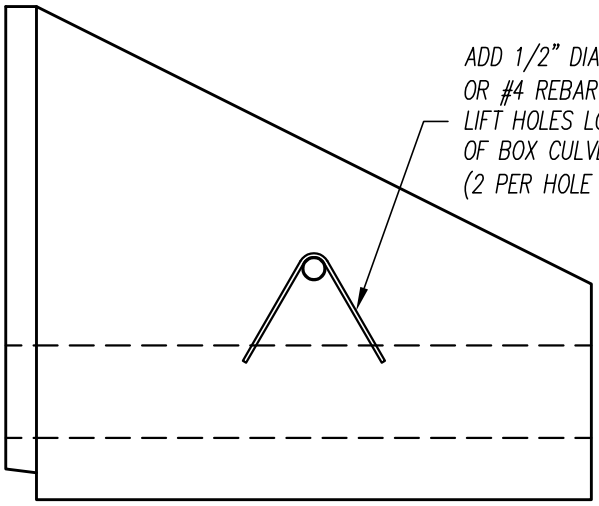
Holes shall be formed from 3" EMT Tubing
**** DO NOT REMOVE TUBING***

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

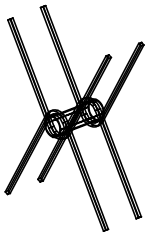
SCALE: NONE	PROJECT: BOX CULVERT LIFT HOLE SPECIAL DETAIL PRESTRESS CABLE LOOPS
DATE: 02/06/16	
DR'N BY: JWB	
REV: 01/02/19 JWB	DWG NAME: BOX LIFT HOLE - PS CABLE (MT ONLY)

02/17/16 JWB
11/27/17 JWB
05/31/18 JWB
11/29/18 JWB

SINGLE LOOP DETAIL (ES)



SLOPED END SECTION DETAIL



DOUBLE LOOP DETAIL (BBL)

BARREL SECTION DETAIL

FOR RISE 7' OR LESS UNLESS OTHERWISE SPECIFIED

Holes shall be formed from 3" EMT Tubing
** DO NOT REMOVE TUBING*

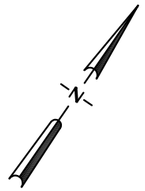
LIFTING HOLES TYP. FOR ALL BARREL SECTIONS EXCEPT WHEN SHOWN OTHERWISE

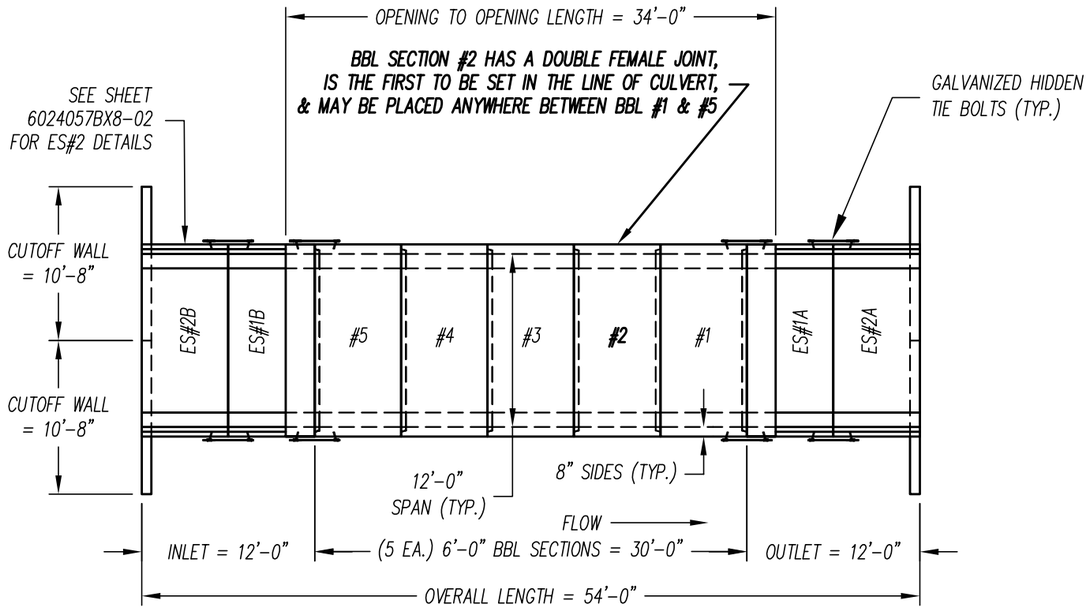
11/27/17 JWB

Rinker MATERIALS™ A QUIKRETE® COMPANY

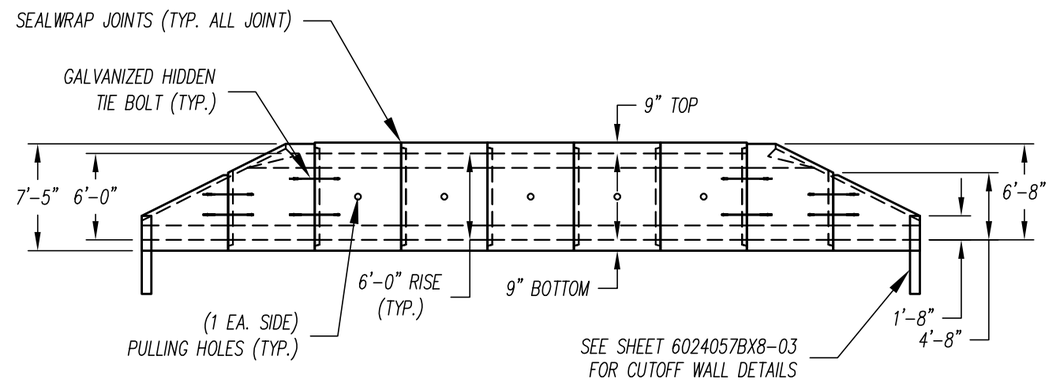
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: BOX CULVERT PULLING HOLE PRESTRESS CABLE LOOPS
DATE: 02/06/16	
DR'N BY: JWB	
REV: 11/30/18 JWB	DWG NAME: BOXPULLINGHOLE





PLAN VIEW



ELEVATION VIEW

TOLERANCES – PER ASTM C913	
DIMENSIONAL (UP TO 5')	± 1/4"
DIMENSIONAL (5'-10')	± 3/8"
DIMENSIONAL (10' & UP)	± 1/2"
SQUARENESS (UP TO 10')	± 1/2"
SQUARENESS (10' & UP)	± 3/4"
MIN. WALL OR SLAB THICKNESS	GREATER OF 3/8" OR 5% OF THICKNESS
REINF. LOCATION FROM DESIGN	± 1/4"
REINF. COVER	1" MIN.

MATERIAL LIST	
ITEM	QTY.
GALVANIZED HIDDEN TIE BOLTS	16
JOINT SEALANT (1.25" X 14.5')	27
GATORWRAP (12" X 50')	7
SEALWRAP SQUARE (9" X 9")	54
SET GROUT (0.4 CU. FT.)	17
REBAR DOWELS (#6 X 12")	16
CUTOFF WALL CONNECTION PLATES	4

SECTION WEIGHTS

6'-0" BBL SECTION = 27,500 LBS.
END SECTION #1 = 20,500 LBS.
END SECTION #2 = 14,000 LBS.
CUTOFF WALL U SHAPED = 4,150 LBS.

PLACE OF FABRICATION	HELENA, MT
CONTRACTOR	LEWIS & CLARK COUNTY
RINKER PROJECT #	6024057BX8
STATE TEST (Y OR N)	N
CONCRETE STRENGTH	5000 PSI

NOTES

1. Stencil each box with information as listed below. Center stencil on the inside face of the top haunch of each box culvert section.

DATE OF MANUFACTURE
Rinker MATERIALS™ A QUIKRETE® COMPANY
HELENA
12 X 6 – CROSSING B
STA. 95+86.63 TO 96+16.60
HL-93 / 1'-3' FILL HT.
LEWIS AND CLARK CO., MT

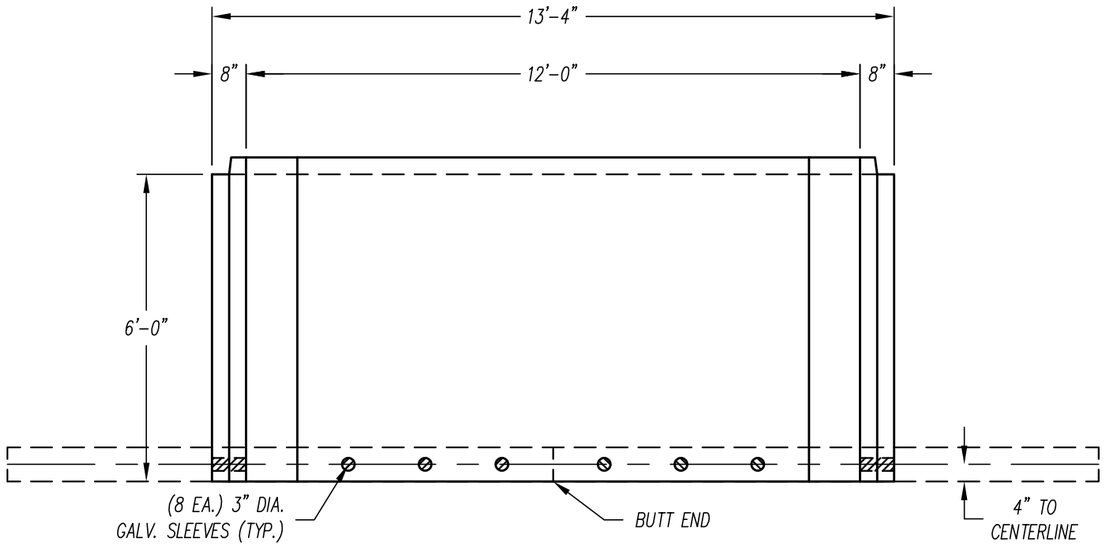
2. Lifting holes are formed by 3 3/16" Dia. Galvanized Tubing.
   - –Lifting holes located in the TOP slab of the culvert shall be covered with a 9" x 9" EDM Patch (provided).
   - –Lifting holes located in the SIDE WALLS & pull holes of the culvert shall be grouted with an approved non-shrink grout & covered with a 9" x 9" EDM Patch (provided).
   - –Lifting holes located in the BOTTOM slab of the culvert shall grouted with an approved non-shrink grout (provided).
3. Section **#2** has a double female joint. This piece is the first to be set in a line of box culvert. **Consult the "Box Culvert Installation Guide" for suggested installation practices.**

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

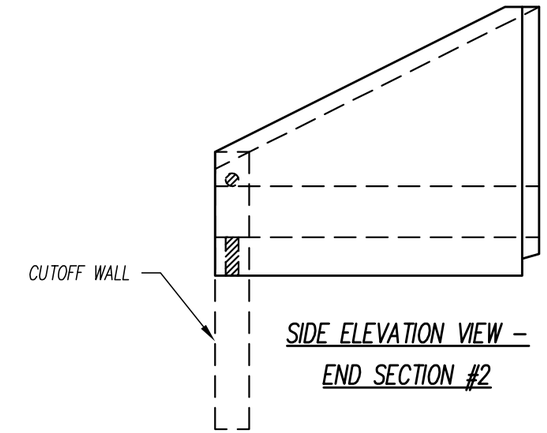
SCALE: NONE	PROJECT: 12'-0" X 6'-0" BOX CULVERT/CROSSING B STA. 95+86.63 TO 96+16.60 LEWIS AND CLARK COUNTY, MT
DATE: 8-26-24	
OR#: 6024057BX8	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX8-01

SPACING FOR 3" DIAMETER GALVANIZED SLEEVES.
CONTRACTOR TO DRILL 1 ½" DIAMETER X 6" DEEP HOLES IN THE CUTOFF WALL AND INSTALL #6 X 12" REBAR DOWELS (PROVIDED)
(FILL SLEEVES COMPLETELY WITH NON-SHRINK GROUT – PROVIDED)

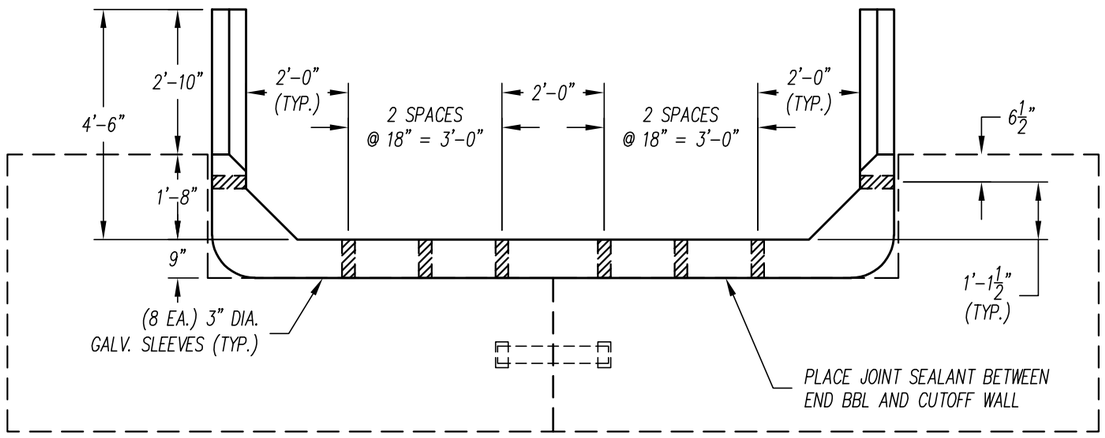
NOTE:
SEE SPECIAL PROVISIONS FOR INSTALLATION REQUIREMENTS FOR BOTH CUTOFF WALL AND CONCRETE SLOPE PROTECTION.



PLAN VIEW – END SECTION #2



SIDE ELEVATION VIEW – END SECTION #2



ELEVATION VIEW – END SECTION #2

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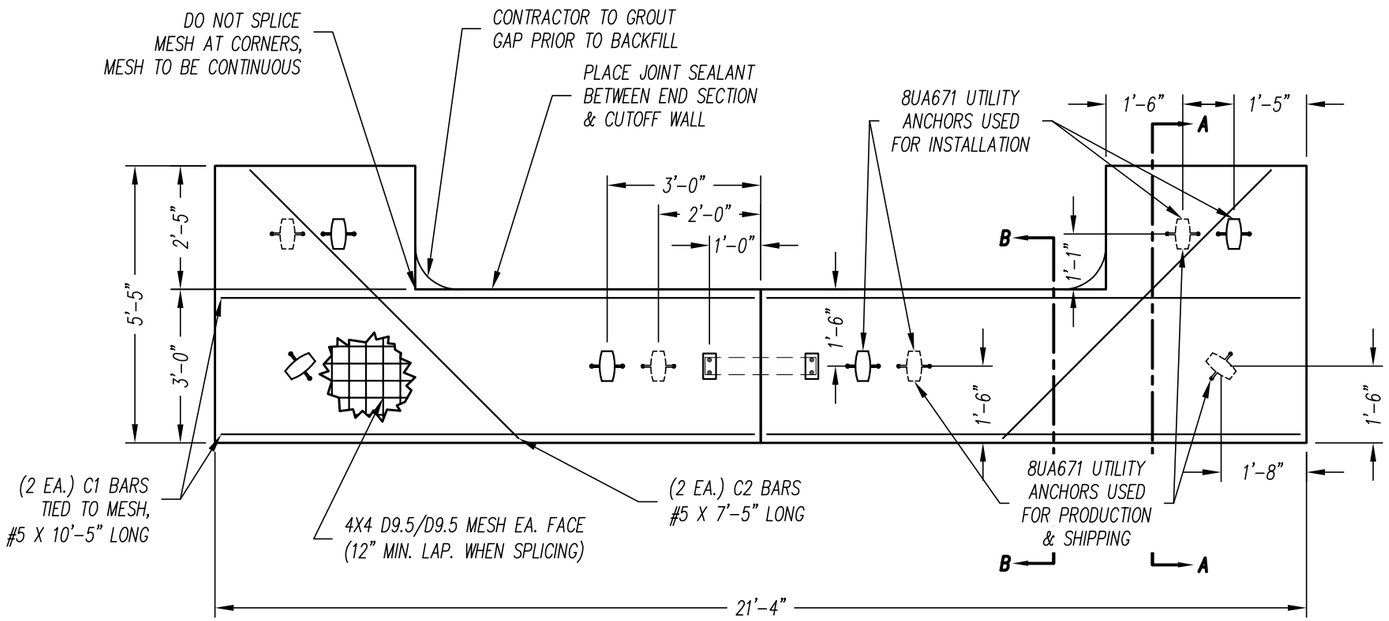
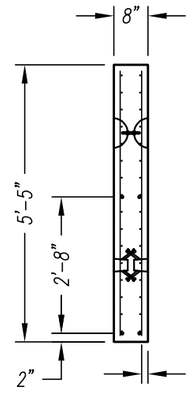
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

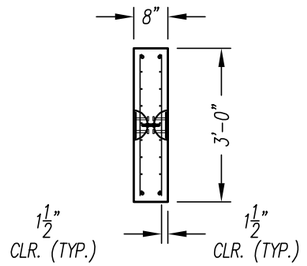
SCALE: NONE	PROJECT: 12'-0" x 6'-0" BOX CULVERT/CROSSING B STA. 95+86.63 TO 96+16.60 LEWIS AND CLARK COUNTY, MT
DATE: 8-26-24	
OR#: 6024057BX8	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX8-02



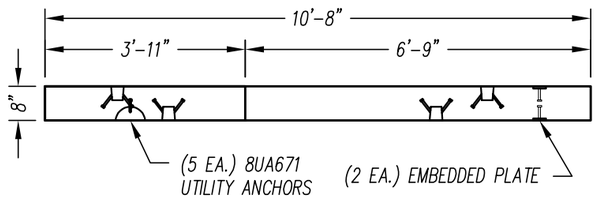
ELEVATION VIEW – CUTOFF WALL (2 PIECES SHOWN)



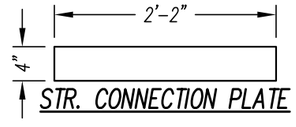
SECTION A–A



SECTION B–B



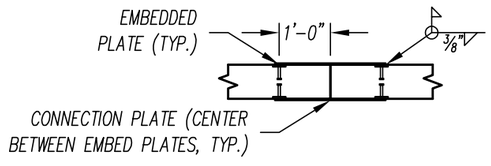
PLAN VIEW – CUTOFF WALL

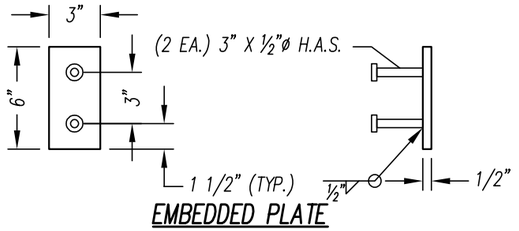


STR. CONNECTION PLATE

26" X 4" X ⅜" PLATE

(4 TOTAL NEEDED)





EMBEDDED PLATE

(8 TOTAL NEEDED)

4 PIECES REQUIRED

CUTOFF WALL = 4,150 LBS.

SPACING FOR 3" DIAMETER GALVANIZED SLEEVES.
CONTRACTOR TO DRILL 1 ½" DIAMETER X 6" DEEP HOLES IN THE CUTOFF WALL AND INSTALL #6 X 12" REBAR DOWELS (PROVIDED)
(FILL SLEEVES COMPLETELY WITH NON-SHRINK GROUT – PROVIDED)

NOTE:
SEE SPECIAL PROVISIONS FOR INSTALLATION REQUIREMENTS FOR BOTH CUTOFF WALL AND CONCRETE SLOPE PROTECTION.

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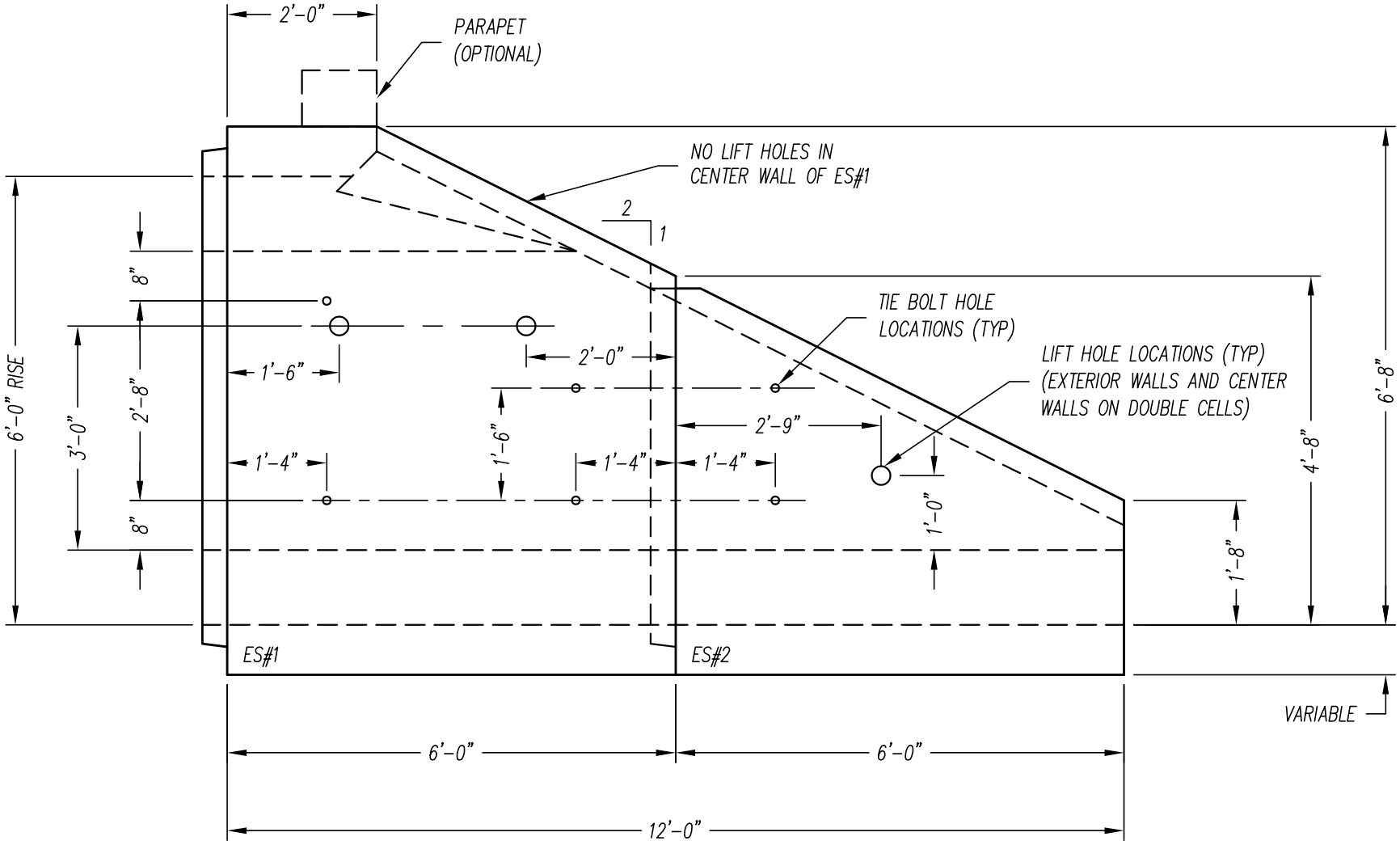
SCALE: NONE	PROJECT: 12'-0" X 6'-0" BOX CULVERT/CROSSING B STA. 95+86.63 TO 96+16.60 LEWIS AND CLARK COUNTY, MT
DATE: 8-26-24	
OR#: 6024057BX8	
DR'N BY: TKS	CUSTOMER: LEWIS AND CLARK COUNTY
CHK'D BY: BSJ	DWG NAME: 6024057BX8-03



NOTES – LIFT HOLES TO BE 3-1/4" DIA.
TIE BOLT HOLES TO BE 1-1/4" DIA.

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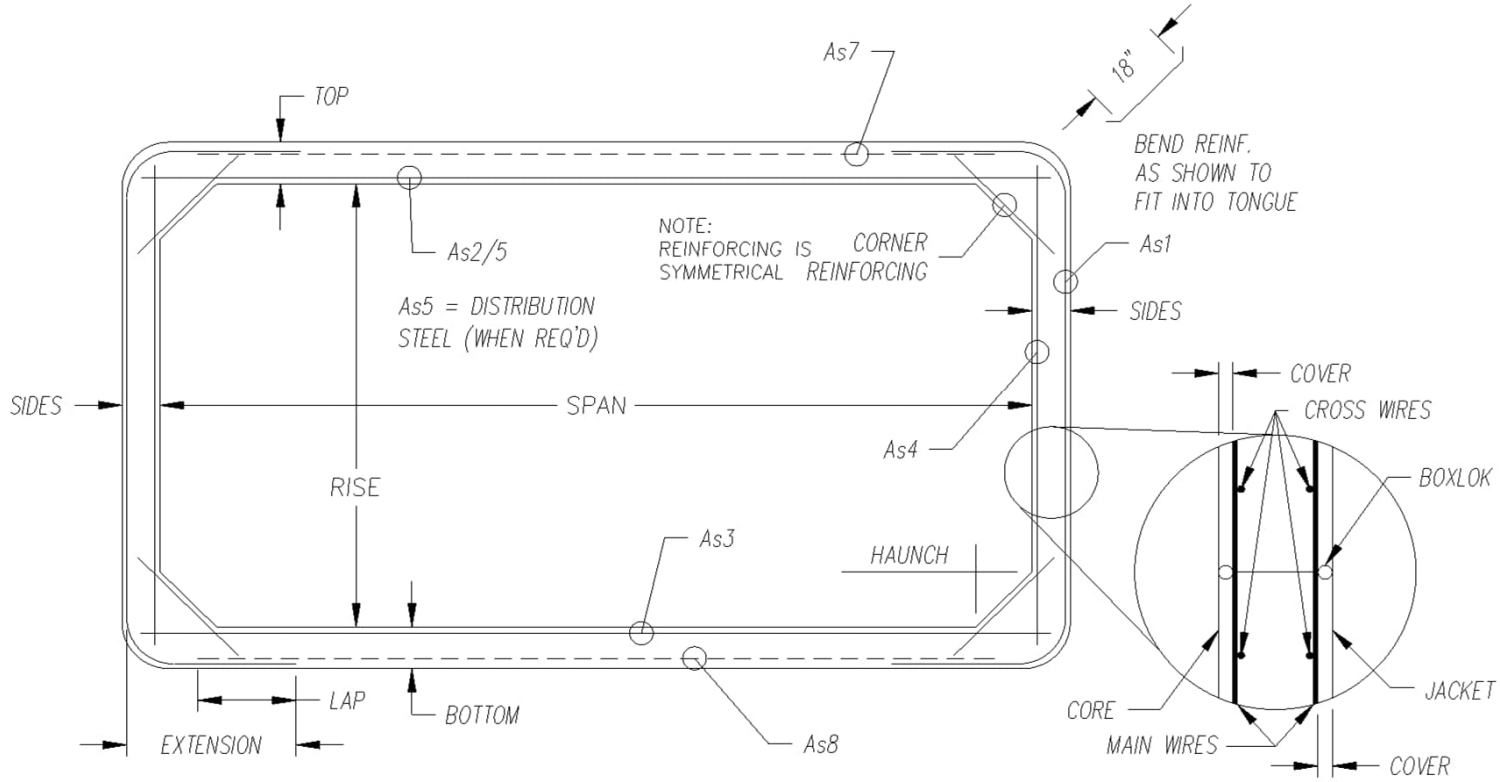
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: 6' RISE TYPE 1 END SECTION TIE BOLT AND LIFT HOLE LOCATIONS
DATE: 02/17/16	
DR'N BY: JWB	
REV: 07/26/21 JWB	DWG NAME: LIFT TIE – 6 RISE (MODIFIED)

11/21/17 JWB
01/25/18 JWB
06/27/18 JWB
02/18/19 JWB



Note:
Leg = 9"
for 6" haunch

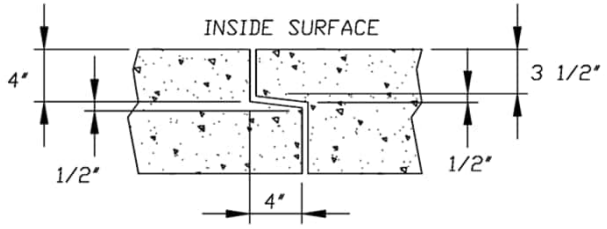
Location	Wire Diameter (in.)	Area Req'd (sq.in./ft.)	Area Prov'd (sq.in. / ft.)	Style	Overall Sheet Length	Sheet Width W/O Overhang
As1	0.299	0.397	0.42	2x8 D7.0/D4.0	13-4	70"
As2/5	0.329	0.51 / 0.216	0.51 / 0.225	2x4 D8.5/D7.5	12-4	70"
As3	0.309	0.450	0.450	2x8 D7.5/D4.0	12-8	70"
As4	0.309	0.216	0.225	4x8 D7.5/D4.0	6-8	70"
As7	0.309	0.216	0.225	4x8 D7.5/D4.0	9-4	70"
As8	0.309	0.216	0.225	4x8 D7.5/D4.0	9-4	70"
					Width Top Overhang =	1/2"
					Width Bottom Overhang =	1/2"
HAUNCH				#3 REBAR OR P/S CABLE X 2'-6" @ 12" O.C.		

Slab Sizes		Box Loks @ 18inch O.C.
TOP Slab Size	9 in	2.0 x 5.75 x 1.0 (40)
BTM Slab Size	9 in	1.0 x 6.75 x 1.0 (40)
SIDES size	8 in	1.0 x 5.75 x 1.0 (40)

Cover			
TOP INSIDE (As2)	1.00	SIDE INSIDE (As4)	1.00
TOP OUTSIDE (As1/7)	2.00	SIDE OUTSIDE (As1)	1.00
BTM INSIDE (As3)	1.00		
BTM OUTSIDE (As1/8)	1.00		

ALL STEEL TO BE OF DOMESTIC ORIGIN OF THE U.S.A.

EXTENSION: 36 inches
LAP: 10 inches
HAUNCH: 12 inches
DESIGN: HL93
STEEL WT: 771 lbs / 6' SECTION
PRODUCT WT: 27500 lbs / 6' SECTION
CONCRETE: 5000 psi
STEEL YIELD: 70000 psi (ASTM A1064)

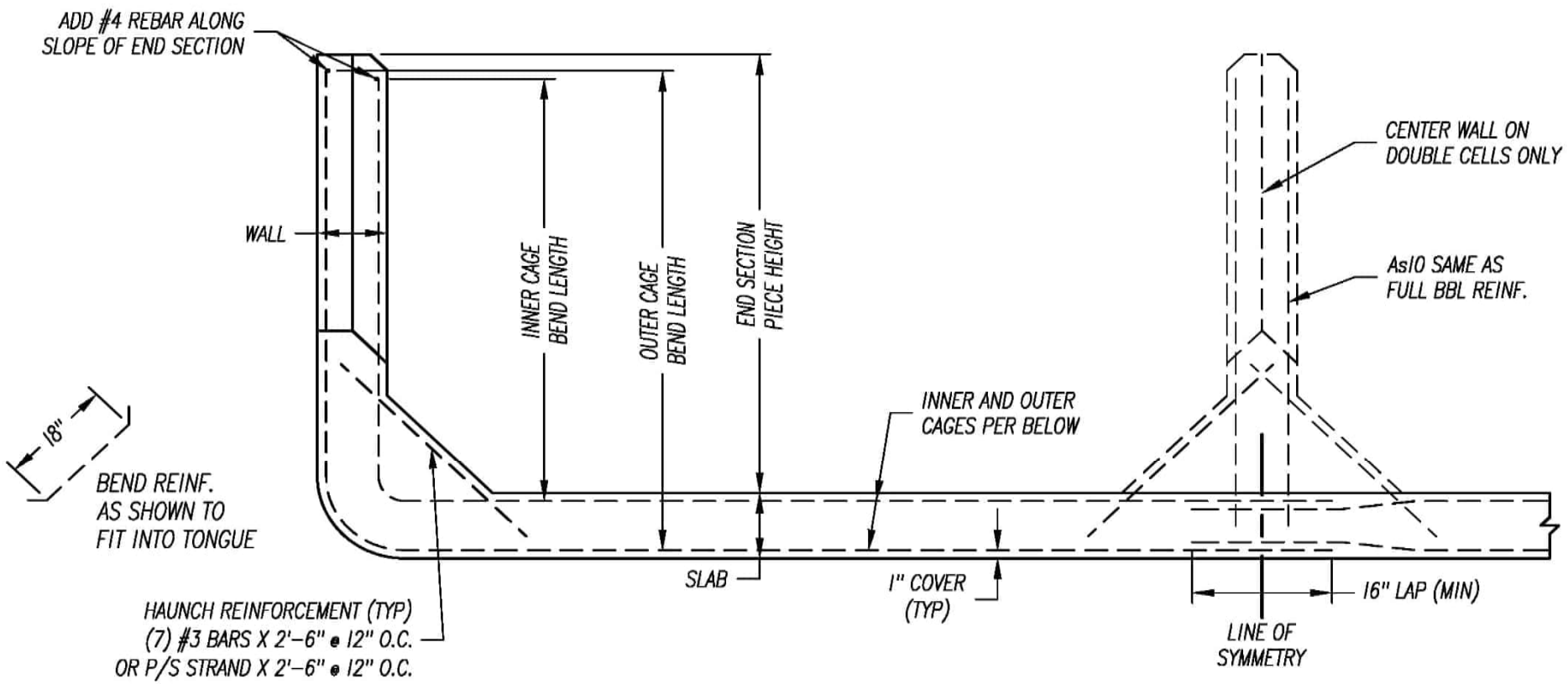


TYPICAL JOINT DETAIL

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701

SCALE	NONE	**SGL 12x6 BOX CULVERT**	
DATE	8/9/24	**DESIGN FILL = 1 FT - 3 FT**	
DRN BY	BSJ	**INSTALLED FILL = 1 FT - 3 FT**	
RS#	6024057BX8	**CUSTOMER**	Lewis and Clark County
REV DATE		**DWG NAME**	



Size (ft)		
Span	x	Rise
12	x	6
Single Cell		

Steel Areas (sq.in. / ft.)					(inches)	
ES#1	ES#2	ES#3	ES#4	ES#5	SLAB	WALL
Full BBL	0.73	*	*	*	9	8
20500	14000	*	*	*	Conc lbs/pc	
771	786	*	*	*	Steel lbs/pc	

Total ES Length (ft)	Sheet Length	# Sheets per End
12	12.00	4

Mesh Style Used							
2	x	8	D	12.5	/	D	5.0

Sht Weight (lbs)
197

Section Lengths (ft)				
ES#1	ES#2	ES#3	ES#4	ES#5
6	6	0	0	0

Inner Cage Bend (in)				
ES#1	ES#2	ES#3	ES#4	ES#5
0	52	0	0	0

End Section Piece Heights (ft)				
ES#1	ES#2	ES#3	ES#4	ES#5
6.67	4.67	0.00	0	0

Outer Cage Bend (in)				
ES#1	ES#2	ES#3	ES#4	ES#5
0	61	0	0	0

Rinker MATERIALS™ A QUIKRETE® COMPANY

Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701

SCALE	NONE	SGL 12x6 BOX CULVERT	
DATE	8/9/24	END SECTION REINFORCEMENT DETAILS	
DRN BY	BSJ	STANDARD 2:1 END SECTION DESIGN	
RS#	6024057BX8	CUSTOMER	Lewis and Clark County
REV DATE		DWG NAME	

Sht:____of____
By:BSJ Chk:____

Eriksson Culvert v6.3.1

8/9/2024 11:28:14 AM
Filename: SGL 12x6 HL93 01-03 fill.etcx

Project: SGL 12x6 HL93 01-03 fill
Task :
Client :
Job No.:

CULVERT PROPERTIES
==========
Type of Culvert: Precast Specification : LRFD 9th Edition
Operating Mode : Analysis

Physical Dimensions

No. of Boxes: 1 Name: BoxCulvert
Clear Span : 12.0000 ft
Clear Height: 6.0000 ft Skew Angle : 0.00 deg
Length : 6.0000 ft Bottom Slab Support: Full Slab
Fill Depth Range: Maximum : 3.00 ft Minimum : 1.00 ft Increment : 2.00 ft
Haunches: Top, Length: 12.0000 in Height: 12.0000 in
Bottom, Length: 12.0000 in Height: 12.0000 in
Member Thicknesses: Top Slab: 9.0000 in Bot Slab: 9.0000 in
Ext Wall: 8.0000 in
Wall Joint: None

Material Properties

Concrete: Strength,f'c : 5.000 ksi Density : 0.150 kcf Elasticity,Ec: 4592 ksi
Type : Normal Weight Density Modification Factor : 1.00
Fr Factor : 0.24 Gamma1 : 1.60 Gamma3 : 0.75 (user defined)
Steel: Yield,fy : 70.00 ksi fss Limit : 0.65fy Elasticity,Es: 29000 ksi
Yield,fyv : 60.00 ksi Diameter : 1.000 in Type : Mesh
Soil: Density : 0.120 kcf Slope Factor: 1.150
Poisson's : 0.5
Fe Factor : 1.150 (Maximum for Compacted Fill)
Serviceability, Gamma-e: 1.00

Loads

Live Load: Vehicle: (AA) HL-93 - Design Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	8.00	0.00
2	32.00	14.00
3	32.00	14.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: yes
Tandem: Axle 1: 25.00 k, Axle 2: 25.00 k, Axle Spacing: 4.00 ft
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Inventory Rating Load Factor: 1.75 Operating Rating Load Factor: 1.35
Design Load Combinations: Strength I
Override MPF: no
Override DLA: no
Include Lane Load : no Max. No. of Lanes: Computed by Program
Traffic Direction** : Lanes Parallel to Main Reinforcement
Neglect Live Load for Large Fill Depths: no
Apply Surcharge at Fill Depths > 2 ft : yes
Compute Surcharge Depth: yes
Dead Load: Future Wearing Surface : 0.00 klf Add. Dead Load : 0.00 klf
Concentrated Loads : none
Lateral Soil Loads: Max. Equiv. Fluid Press.: 60.00 pcf Min. Equiv. Fluid Press. : 30.00 pcf
Include Additional Uniform Horiz. Load: no
Include Additional Uniform Vert. Load: no
Buoyancy Check : no
Fluid Pressures : Apply Water Press. : yes, interior only
: Interior Pressure Head : 0.00 ft
Foundation Model : Uniform Loads
Seismic Analysis : Do not include

Load and Resistance Factors

	Max	Min
DC:	1.250	0.900
DW:	1.500	0.650
EV:	1.300	0.900
EH:	1.350	0.900
WA:	1.000	
EQ:	1.000	

LL I : 1.750 LL II : 1.350 LL Legal : 1.750 LL Extreme : 0.500
Ductility: 1.000 Importance: 1.000 Redundancy, non-earth: 1.000 Redundancy, earth: 1.000
Condition: 1.000 System : 1.000
Phi Shear: 0.900 Phi Moment: 1.000 PM Compression: 0.750 PM Tension : 0.900

Sht:____of____
By:BSJ Chk:____

Eriksson Culvert v6.3.1

Filename: SGL 12x6 HL93 01-03 fill.etcx
8/9/2024 11:28:14 AM

Load Factor Multipliers, Design Mode: 1.00 Analysis Mode: 1.00

Reinforcement

Reinforcement Covers	Exterior	Interior
Top Slab:	2.0000 in	1.0000 in
Walls :	1.0000 in	1.0000 in
Bot Slab:	1.0000 in	1.0000 in

Assigned reinforcement:

Location	Mark	Size	Spacing (in)	# of Layers
Top Slab Inside	A100 (AS2)	D8.5	2.0000	1
Bottom Slab Inside	A200 (AS3)	D7.5	2.0000	1
Top Slab Outside	A300 (AS7)	D7.5	4.0000	1
Bottom Slab Outside	A400 (AS8)	D7.5	4.0000	1
Top Corner	A1 (AS1)	D7	2.0000	1
Bottom Corner	A2 (AS1)	D7	2.0000	1
Ext. Wall Inside	B1 (AS4)	D7.5	4.0000	1
Ext. Wall Outside	B2 (AS1)	D7	2.0000	1
Longitudinal	C1 (AS6)	D4	8.0000	1
Top Distribution	C100 (AS5)	D7.5	4.0000	1
Bottom Distribution	C200	D4	8.0000	1

Analysis Options

LL Analysis : Automatically Set Traffic Direction to Account for Skew Effects: yes
Limit LL Distribution Width to Culvert Length for: None
Combine Longitudinal Axle Distribution Overlaps: Yes, Max of 2 Axles
Combine Transverse Axle Distribution Overlaps: No
Axle Placement Increment for Moving Load Analysis: 20
Include Impact on Bottom Slab: yes
Always Distribute Wheel Load: yes
Deflection Criteria : 1/800
Approach Slab will be Used: no
Reinforcement : Always Include Distribution Steel: no
Distribution Slab Provided: no
User Defined Longitudinal Steel: yes
Max. As used in Vc Calcs: 2.00 in2/ft
Distribute Minimum Reinforcement per Face: yes
Use individual Member Thicknesses for Min Steel: no
Epoxy coat steel: no
Use M-dimension for bar length calcs.: no
Slenderness : Checked K Factor: 2.00
Analysis Modeling : Use Haunches in the Structural Analysis Model: yes
Critical Sections : Flexure critical section location: end of haunch
Shear critical section location: dv beyond haunch
Use Max. Moment with Max. Shear at the Critical Section for Shear: no
Include depth of haunch for critical sections: no
Flexure : Ignore Axial Thrust: no
Use Eq. 12.10.4.2.4a-1: yes Nu Multiplier: 1.00
Shear : Always Check Iterative Beta Method
Environmental : Apply duribility factors: no
Load Combinations : LRFD min/min: no

Sht:____of____
By:BSJ Chk:____

Eriksson Culvert v6.3.1

Filename: SGL 12x6 HL93 01-03 fill.etcx

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Culvert p. 3 of 14

ANALYSIS RESULTS
==========

Top Slab Thickness = 9.00 in
Bottom Slab Thickness = 9.00 in
Exterior Wall Thickness = 8.00 in

Modular Ratio (N) = 6.32 Max. Steel Ratio = 0.020
Design Span = 12.67 ft Design Height = 6.75 ft

Volume of Concrete: 1.111 cy/ft

Note: Design and analysis results do not include force effects from stipping and handling stages

M dimension = 2' 10" (method of equivalent capacity)
= 4' 12" (method of contraflexure - ASTM)

Reinforcing Steel Schedule

Location	Mat Mark	Sheets Included	Layers	As,prv (in2/ft)
Top Slab (int)	A100 (AS2)	Top	1	0.510
Bot Slab (int)	A200 (AS3)	Bot	1	0.450
Top Slab (ext)	A300 (AS7)	Top	1	0.225
Bot Slab (ext)	A400 (AS8)	Bot	1	0.225
Corner Top-U	A1 (AS1)	Top	1	0.420
Corner Bottom-U	A2 (AS1)	Bot	1	0.420
Ext Wall (int)	B1 (AS4)	L&R	1	0.225
Ext Wall (ext)	B2 (AS1)	L&R	1	0.420
Top Slab (int- 1)	C100 (AS5)	Top	1	0.225
Bot Slab (int- 1)	C200	Bot	1	0.060
Temperature (1)	C1 (AS6)	Top	1	0.060
Temperature (1)	C1 (AS6)	Bot	1	0.060
Temperature (1)	C1 (AS6)	L&R	1	0.060
Temperature (1)	C1 (AS6)	L&R	1	0.060

Note: A denotes flexural steel, B denotes vertical steel, C denotes longitudinal steel

AS Bar Marks

Location	As prv in2/ft
Transverse Side Wall - Outside Face (AS1)	0.420
Transverse Top Slab - Inside Face (AS2)	0.510
Transverse Bottom Slab - Inside Face (AS3)	0.450
Transverse Side Wall - Inside Face (AS4)	0.225
Distribution Top Slab - Inside Face (AS5)	0.225
Distribution Top Slab - OutSide Face (AS6)	0.060
Transverse Top Slab - Outside Face (AS7)	0.225
Transverse Bottom Slab - Outside Face (AS8)	0.225

Notes: 1.) Final areas of steel provided must be checked in analysis mode

Sheet Inventory

Interior sheets - 4 sheet layout with laps located in the wall

Sheet Loc.	Mat Mark	Zone	Line Wires Size	Spac. (in)	Length (ft-in)	Area (in2/ft)	H leg (ft-in)	V leg (ft-in)	Cross Wires(L,tot= 5-11) Mat Mark	Size	Spac. (in)	Area (in2/ft)	Wgt (lbs)
Top	A100	Base	D8.5	2.00	14-12	0.510	12- 2	1- 5	C100	D7.5	4.00	0.225	223
										(1) sheets, Total weight:			223
L&R	B1	Base	D7.5	4.00	6- 2	0.225			C1	D4	8.00	0.060	47
										(2) sheets, Total weight:			94
Bot	A200	Base	D7.5	2.00	14-12	0.450	12- 2	1- 5	C200	D4	8.00	0.060	156
										(1) sheets, Total weight:			156

Exterior sheets - 4 sheet layout with laps located in the slab

Sheet Loc.	Mat Mark	Zone	Line Wires Size	Spac. (in)	Length (ft-in)	Area (in2/ft)	H leg (ft-in)	V leg (ft-in)	Cross Wires(L,tot= 5-11) Mat Mark	Size	Spac. (in)	Area (in2/ft)	Wgt (lbs)
Top	A300	Base	D7.5	4.00	13- 2	0.225							61
										(1) sheets, Total weight:			61
L&R	B2	Base	D7	2.00	14- 3	0.420	3- 6	7- 3	C1	D4	8.00	0.060	141
	A1	Base	D7	2.00	14- 3	0.420	3- 6	7- 3	C1	D4	8.00	0.060	18
	A2	Base	D7	2.00	14- 3	0.420	3- 6	7- 3	C1	D4	8.00	0.060	18

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 By:BSJ Chk:____
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Culvert p. 4 of 14

(2) sheets, Total weight: 354

Bot	A400	Base	D7.5	4.00	13- 2	0.225	C1	D4	8.00	0.060	79

(1) sheets, Total weight: 79

Weight of Steel: 161 lb/ft Total weight of all sheets: 967

Notes:
Epoxy coating may be needed for A1, A300, and some C1 reinforcement, check with governing agency.
L&R - left and right, TC - top corner, BC - bottom corner, INT - interior walls, EXT - exterior walls
Nested line wires are additive to the base line wires, but nested cross wires replace base cross wires.
Adder sheets may require cross wires, check with mesh supplier.

Summary of Ratings Table:

			Flexure					Shear				
Truck	ILF	OLF	Fill	Member	Location	IR	OR	Fill	Member	Location	IR	OR
(AA)HL-93	1.75	1.35	1.99	2	MID	1.07	1.39	1.00	2	LT	1.02	1.32

Critical Sections Summary: Flexure

Member 1: (Exterior Wall), Thickness = 8.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
BOT	16.50	-16.86	13.18	16.08	6.85	19.70	1.00	0.42	6.87	1.25	1.62	AA	1.99
MID	40.50	0.35	1.45	8.78	6.85	9.23	1.00	0.23	6.87	7.51	9.74	AA	1.00
MID-	40.50	-17.17	13.18	16.08	6.85	19.70	1.00	0.42	6.87	1.19	1.54	AA	1.99
TOP	16.50	-17.98	13.18	16.08	6.85	19.70	1.00	0.42	6.87	1.13	1.46	AA	1.99

Member 2: (Top Slab), Thickness = 9.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	16.00	-7.90	2.64	16.08	6.85	16.94	1.00	0.42	8.69	2.28	2.96	AA	1.00
MID	76.00	20.90	-0.72	22.27	7.84	22.04	1.00	0.51	8.69	1.07	1.39	AA	1.99
MID-	76.00	0.20	2.35	8.78	6.85	9.60	1.00	0.23	8.69	NC	NC	AA	3.00
RT	16.00	-7.90	2.64	16.08	6.85	16.94	1.00	0.42	8.69	2.28	2.96	AA	1.00

Member 4: (Bottom Slab), Thickness = 9.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	16.00	-5.77	3.94	18.53	7.85	19.80	1.00	0.42	8.69	5.13	6.65	AA	1.99
MID	76.00	18.59	-0.22	19.78	7.85	19.71	1.00	0.45	8.69	1.09	1.41	AA	1.99
MID-	76.00	0.29	3.43	10.09	7.85	11.28	1.00	0.23	8.69	NC	NC	AA	3.00
RT	16.00	-5.77	3.94	18.53	7.85	19.80	1.00	0.42	8.69	5.13	6.65	AA	1.99

Critical Sections Summary: Vertical Shear

Member 1: (Exterior Wall), Thickness = 8.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
BOT	22.35	2.24	15.9	13.14	6.56	10.02	2.000	11.13 b	0.00	0.00	0.00	6.56	8.50	AA	1.00
MID	40.50	1.22	0.3	1.45	6.69	19.59	3.836	21.76 a	0.00	0.00	0.00	21.88	28.36	AA	1.00
MID-	40.50	0.64	16.3	13.14	6.56	10.02	2.000	11.13 b	0.00	0.00	0.00	12.10	15.68	AA	1.00
TOP	22.35	-1.67	17.8	13.18	6.56	10.02	2.000	11.13 b	0.00	0.00	0.00	7.31	9.48	AA	1.99

Member 2: (Top Slab), Thickness = 9.00 in

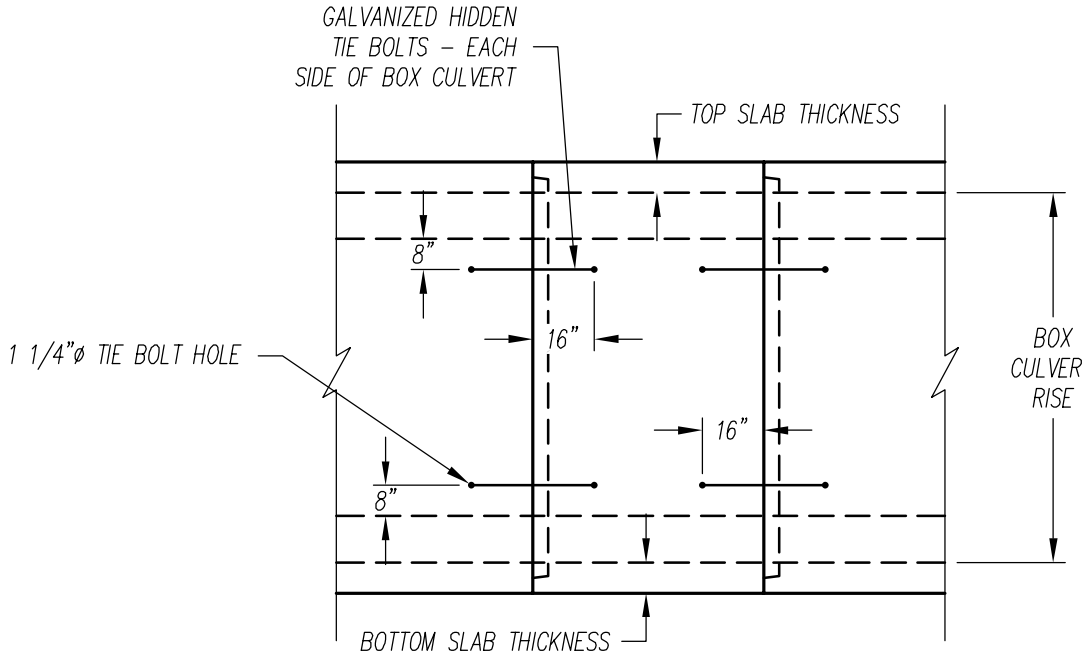
Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	22.48	10.26	7.5	2.64	6.56	10.40	2.076	11.55 a	0.00	0.00	0.00	1.02	1.32	AA	1.00
MID	76.00	3.80	20.1	-1.08	7.49	10.32	1.806	11.46 a	0.00	0.00	0.00	2.72	3.52	AA	1.00
MID-	76.00	3.80	1.2	1.93	6.69	13.42	2.628	14.91 a	0.00	0.00	0.00	3.53	4.58	AA	1.00
RT	22.48	10.26	7.5	2.64	6.56	10.40	2.076	11.55 a	0.00	0.00	0.00	1.02	1.32	AA	1.00

Member 4: (Bottom Slab), Thickness = 9.00 in

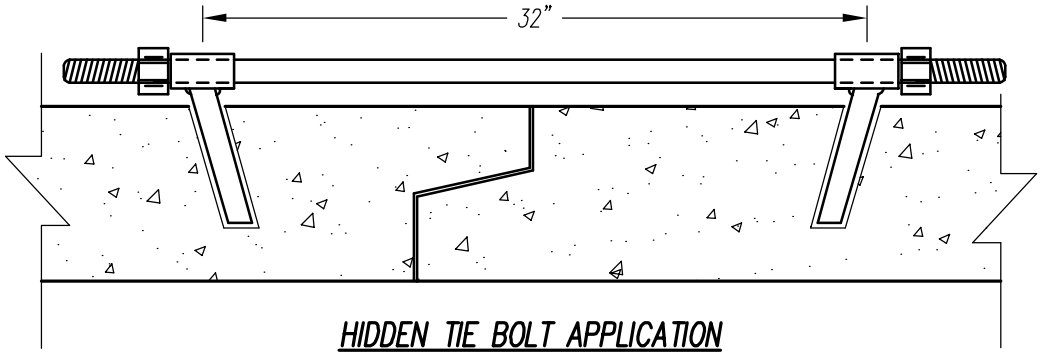
Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	22.75	7.74	3.1	3.94	7.56	14.46	2.506	16.07 a	0.00	0.00	0.00	2.35	3.04	AA	1.99
MID	76.00	0.17	17.4	-0.42	7.54	10.37	1.803	11.52 a	0.00	0.00	0.00	61.32	79.50	AA	1.00
MID-	76.00	0.17	0.0	3.01	7.69	29.53	5.031	32.81 a	0.00	0.00	0.00	NC	NC	AA	1.00
RT	22.75	7.74	3.1	3.94	7.56	14.46	2.506	16.07 a	0.00	0.00	0.00	2.35	3.04	AA	1.99

Eriksson Culvert v6.3.1 Sht:____of____
 By:BSJ Chk:____
Filename: SGL 12x6 HL93 01-03 fill.etcx 8/9/2024 11:28:14 AM

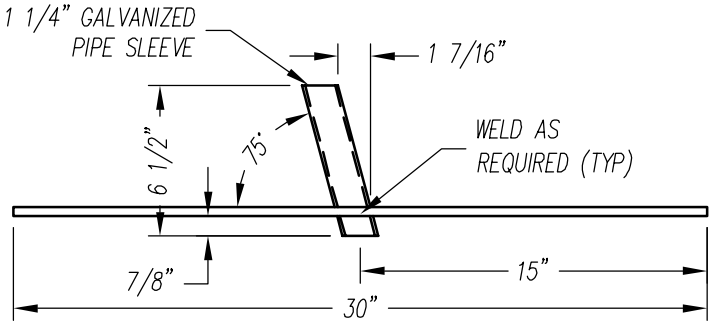
Vc Calculation By: a - Iterative Beta, b - Constant Beta, c - Box Culvert, d - Standard/Arema



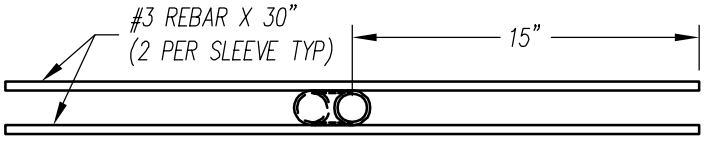
ELEVATION VIEW – BARREL SECTIONS WITH HIDDEN TIE BOLT



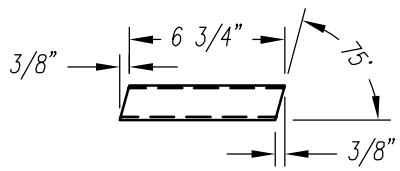
HIDDEN TIE BOLT APPLICATION



TOP VIEW



END VIEW



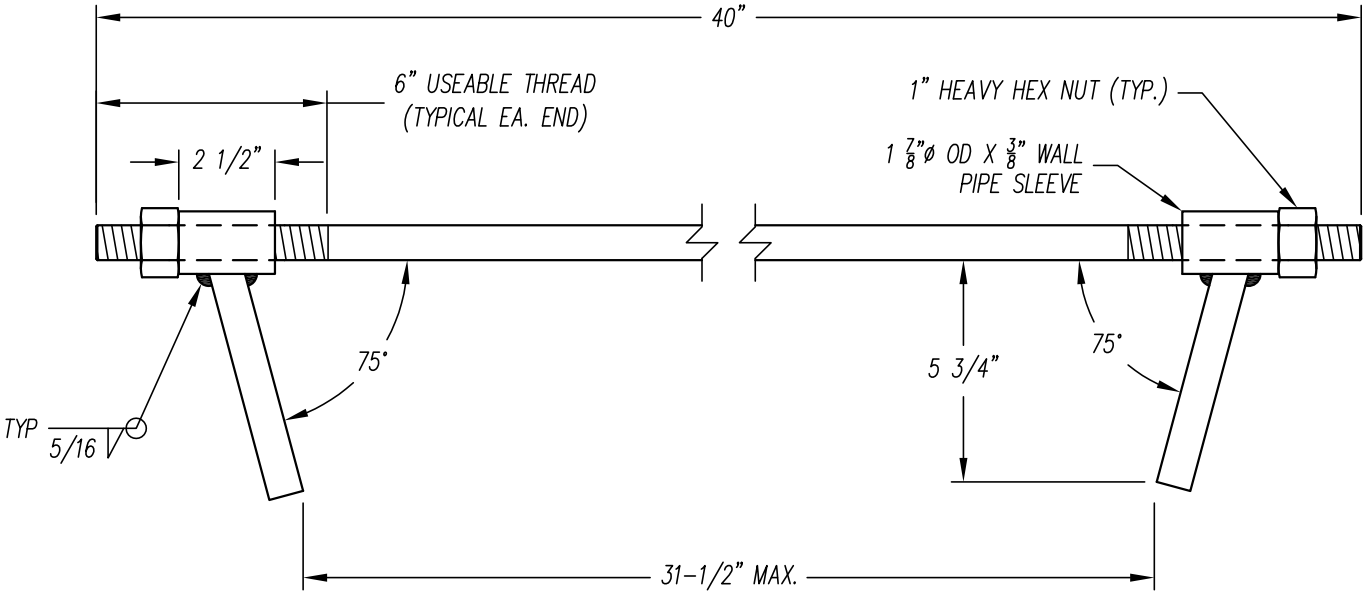
SLEEVE DETAIL

1) Tie Bolts should not be used to pull the joint together.
2) Tension adjusting nut 1/2 turn past snug.

02/17/16 JWB

Rinker MATERIALS™ A QUIKRETE® COMPANY
Rapid City, South Dakota
4310 Pendleton Drive
Rapid City, SD 57701
(605) 718-4111

SCALE: NONE	PROJECT: TIE BOLT HOLE LOCATION DETAIL
DATE: 02/06/16	
DR'N BY: JWB	
REV: 11/27/17 JWB	DWG NAME: TIE BOLT HOLE LOCATION – 2



1. Tie bolts are manufactured from 29/32" diameter material conforming to ASTM A36.
2. Standard 1" diameter threads are rolled on adjusting bolts.
3. Heavy Hex Nuts conform to ASTM A563.
4. The welded pipe sleeve conforms to ASTM A519
5. Welding and weld inspection are done in accordance with AWS/ANSI D1.1-94 Structural Welding Code.
6. Tie bolt assembly is hot dip galvanized in accordance with ASTM A153 / ASTM F2329.

FORTERRA™
Rapid City, South Dakota
2046 Samco Road, Suite 2
Rapid City, SD 57702
(605) 718-4111

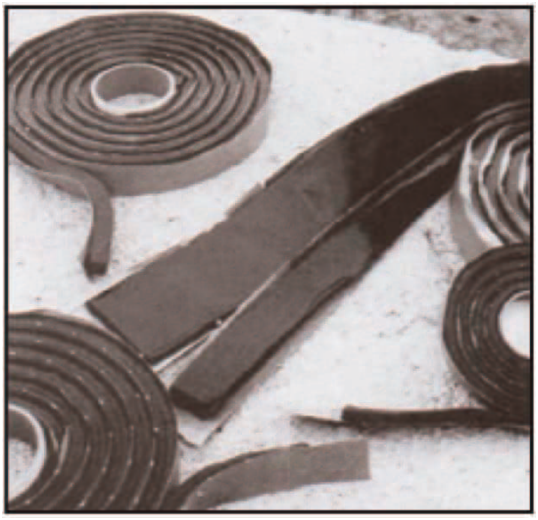
SCALE: NONE	PROJECT: GALVANIZED HIDDEN TIE BOLT
DATE: 2/4/13	
DR'N BY: TDE	
REV: 1/14/16 REM	DWG NAME: HIDDEN TIE BOLT

EZ-STIK

PREMIUM BUTYL JOINT SEALANT

What It Is

EZ-STIK is a premium preformed butyl joint sealant that is supplied in rope form. Containing a higher proportion of butyl rubber, EZ-STIK It is carefully blended from uncured butyl rubber and other solids and will not shrink, crack, or dry out. Although clean to handle, it provides excellent adhesion and cohesion to a wide variety of surfaces - concrete, metal, most concrete coatings, glass, wood, and painted surfaces.



Why It's Better

- Increased proportion of butyl rubber content.
- Premium packaging.
- Wide variety of sizes and styles.
- All-weather performance.
- Good adhesion to dry concrete, commonly specified concrete coatings, steel, glass, or painted surfaces.
- Coated release paper for easy installation.
- Long service life.
- Cohesive properties allow for joint movement.
- Compatible for use with rubber O-Ring designs.
- Low moisture vapor transmission rate (MVTR).
- Special primers available for use on damp, contaminated, or difficult surfaces.

How It Performs

EZ-STIK BUTYL JOINT SEALANT *meets or exceeds all requirements of the following Standards, Specifications and/or Test Methods:*

ASTM C 990 - *Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants; Section 6.2 Butyl Rubber Sealants*

AASHTO M 198 - *Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets*

Typical Applications

- Sanitary Manhole Joints
- Stormwater Manhole Joints
- Irrigation and Drainage Systems
- Box Culverts
- Elliptical/Arch Pipe
- Architectural Foundations
- Underground Utility Vaults
- Stormwater Treatment Structures
- Stormwater Inlet Structures
- On-Site Treatment Tanks
- Grease Interceptors
- Wet Wells

Scan (or click) Here To View More Info On This Product On The Web!

PRESS-SEAL GASKET CORPORATION
Protecting Our Planet's Clean Water Supply
Press-Seal Gasket is an ISO 9001:2008 Registered & ISO 14001:2004 Compliant Company

800-348-7325 Fax (260) 436-1908
email: sales @press-seal.com
web: www.press-seal.com

Made in USA

VERSION 9.13

EZ-STIK

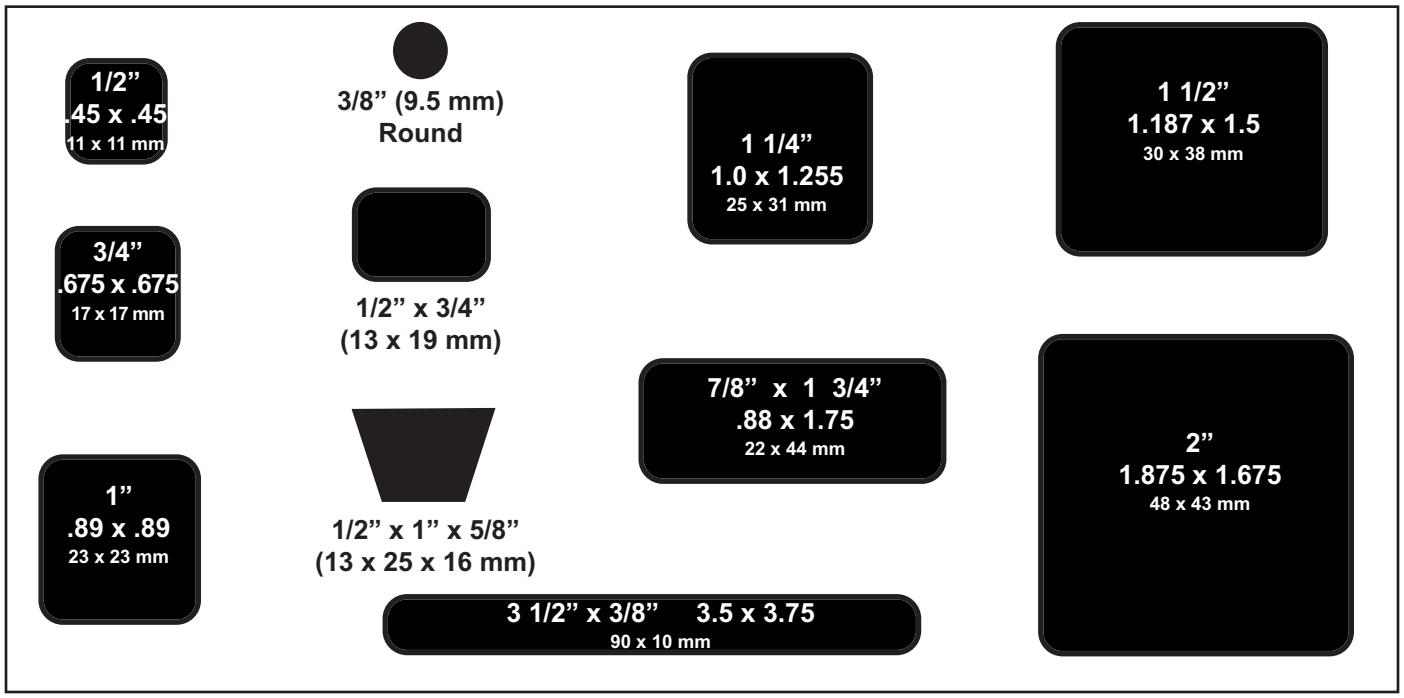
SPECIFICATION and SELECTION GUIDE

Submittal Specification

The joints and/or joint surfaces of the structures shall be sealed with a butyl-rubber-based preformed flexible sealant conforming to ASTM C-990, paragraph 6.2. The material shall be PRO-STIK or EZ-STIK as supplied by PRESS-SEAL GASKET CORPORATION, Fort Wayne, Indiana, or approved equal. The butyl material shall consists of 50% (min.) butyl rubber and shall contain 2% or less volatile matter.

For preformed joint sealants, the sealant shall be sized such that the joint is filled to 50% (min.) of its annular volume when fully assembled, and the sealant shall have the ends kneaded together at the overlap. Primer and/or adhesive as recommended by the sealant supplier shall be employed for adverse, critical, or other applications.

Testing of joints and compliance with construction requirements shall be conducted in strict conformance with the requirements of the sealant supplier.



Custom Sizes Available Upon Request

Also Available in Trowelable Bulk and Easy to Pump Bulk

All sizes sold 40 cartons per pallet. All pallets are shrink wrapped for outside storage.
Quantity discounts available - contact our Customer Service Department.

PRESS-SEAL GASKET CORPORATION
Protecting Our Planet's Clean Water Supply
Press-Seal Gasket is an ISO 9001:2008 Registered & ISO 14001:2004 Compliant Company
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email: sales @press-seal.com
web: www.press-seal.com
Made in USA

EZ-STIK

PHYSICAL PROPERTIES TEST RESULTS

Description

EZ-STIK is a butyl-rubber-based sealant designed to be permanently flexible, tacky and resistant to moisture and deterioration by exposure to dilute chemical solutions. EZ-STIK meets ASTM C-990, Section 6.2 requirementsfor Butyl Rubber Sealant, and AASHTO M 198.

Typical Properties

The following values represent typical test results and are manufacturing specifications.

		SPEC.	REQUIRED	EZ-STIK
Butyl Rubber (Hydrocarbon Content %)		ASTM D4	50% min.	62%
Ash Inert Mineral Filler %		AASHTO T111	30% min.	45-48%
Volatile Matter	(AASHTO T47)	ASTM D6	2% max.	0.5-1.0%
Specific Gravity @ 77ºF (25 C)	(AASHTO T229)	ASTM D71	1.15 - 1.50	1.25 - 1.35
Ductility @ 77ºF (25 C), cm	(AASHTO T51)	ASTM D113	5.0 min.	meets requirement
Flash Point C.O.C.		ASTM D92	350º (177 C) min.	375ºF (191 C)
Fire Point C.O.C.		ASTM D92	375º min. (191 C)	385ºF (196 C)
Compression Test				
@77ºF (25 C), lbf/in^3		ASTM C972	100 max.	40 - 55 lbf/in^3
@32ºF (0 C), lbf.in^3			200 max.	130 - 160 lbf/in^3
Low Temperature Flexibility				
@-10ºF (-23 C)		ASTM C765	180º bend, no cracking, nor loss of adhesion.	Pass - no cracking or adhesion loss.
Elevated Temperature Flexibility				
14 days @ 157ºF (69 C)		ASTM C776	No sag, nor change in extruded shape.	Pass - no sag or shape change.
Adhesion After Impact		ASTM C776-84	No greater loss than 50% of adhesion.	Pass - no loss of adhesion.
Cone Penetration				
@ 77ºF (25 C), dmm		ASTM D217	50 - 100 dmm	55 - 85 dmm
@ 32ºF (0 C), dmm			40 min.	45 - 55 dmm
Chemical Resistance			No deterioration, no cracking, no swelling.	Pass - no visible change after 30 days immersion in 5% solutions HCl, H_2SO_4,NaOH,KOH,H_2S

Application Properties

Service Temperature Range	-40F to 250F (-40 to 121 C)
Application Temperature	20F to 120F (-7 to 49 C)
Storage Temperature	Under 120F (49 C)
Shelf Life	2 Years minimum

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email: sales @press-seal.com
web: www.press-seal.com
Made in USA

GATOR WRAP

Infi-Shield® External Gator Wrap

Infi-Shield® Gator Wrap prevents infiltration by providing a water-tight seal around any manhole, catch basin or concrete pipe joint. Gator Wrap resists harsh soil conditions and also provides a root barrier for any crack or joint. Infi-Shield® Gator Wrap installs easily with no special tools and can be immediately backfilled.

Infi-Shield® Gator Wrap Specification

Each manhole, catch basin or pipe joint shall be sealed with an external rubber sleeve similar to the Infi-Shield Gator Wrap as manufactured by Sealing Systems Inc (763-478-2057). The seal shall be made of a Stretchable, Self-Shrinking, Intra-Curing Halogenated based rubber with a minimum thickness of 30 mils. The back side of each unit shall be coated with a cross-linked re-enforced butyl adhesive. The butyl adhesive shall be non-hardening sealant with a minimum thickness of 30 mils. The seal shall be designed to stretch around the joint and then overlapped creating a cross-link and fused bond between the rubber and butyl adhesive. Gator Wrap forms a continuous rubber seal on a manhole joint which prevents water and soil from infiltrating through the manhole, catch basin or concrete pipe joint.

INFI-SHIELD GatorWrap® is available in 6" and 9" widths and comes in a 50 foot roll or in a user-friendly kit which has six sixteen foot rolls. Upon special order, we can also manufacture a 12" width but please allow four weeks for delivery.

EPDM Rubber Specifications

Physical Properties	ASTM Test Method	Typical Value
Sheer Strength	D816	15 lb. PSI min
Tensile, PSI	D412	50 PSI
Elongation %	D412	500 %
Penetration	D217	40/120 MM
Low Temperature	D746	Minus 49º F flexibility
Heat Aging	D573 7 days @ 90 degrees C	
Tensile Strength	minimum, PSI (MPa) > 100 PSI	Pass
Fusion	5/64" (0.2) max	Pass
Elongation %	minimum 300% at break	Pass
Ozone Resistance	no visible signs of cracking	Pass
Aging and Storage	300% elongation applied (10 Years)	Pass
UV Resistance	No visible signs of cracking	Pass

Material meets ASTM C923 and C877 – Mastic Meet ASTM C990.
Disclaimer: This technical data information and recommendations offered are based on test results, and findings we believe to be reliable and complete.

Sealing Systems, Inc.
9350 County Road 19 • Loretto, MN 55357 • 763-478-2057 • 800-478-2054 • Fax 763-478-8868 • www.infi-shield.com

Infi-Shield GATOR WRAP

INSTALLATION INSTRUCTIONS

1. Expose the area that is to be sealed. Clean the entire area around the joint with a wire brush and whisk broom. Remove any sharp protruding edges around the joint with an abrasive tool. When finished cleaning, the entire area must be dry and free of any dirt.

2. Remove the first foot of paper backing from the mastic. Center and place the Gator Wrap around the joint. Continue to remove paper backing as you apply the Gator Wrap to the entire structure.

3. Seal the overlapping area with a 6" overlap. Be sure not to stretch material at the overlap area.

4. Cut excess material using a utility knife. Using a rubber mallet or hand held roller, firmly flatten the Gator Wrap 360 degrees around joint.

Material: Rubber meets ASTM C923 and C877 – Mastic Meet ASTM C990

Disclaimer: This technical data information and recomedations offered are based on test result, and findings we believe to be reliable and complete.

S.S.I. SEALING SYSTEMS, INC.

Sealing Systems, Inc.

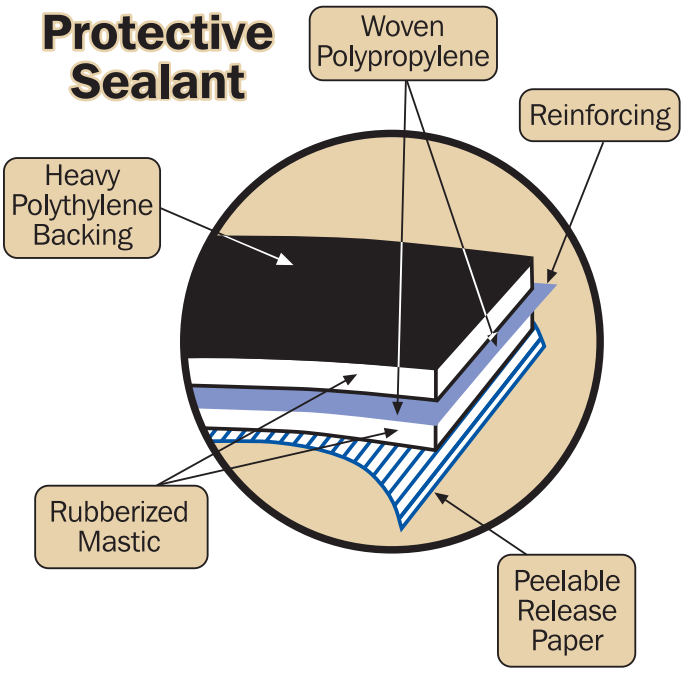
9350 County Road 19 • Loretto, MN 55357 • 763-478-2057 • 800-478-2054 • Fax 763-478-8868 • www.infi-shield.com

SEAL PLUGS

High-Performance, Water-Tight Seals For Sealing Lift Holes In Concrete Pipe

This two-ply seal plug is designed to adhere to concrete with its aggressive rubberized mastic. The plug is reinforced with a tough, puncture-resistant woven polypropylene with an outer layer of impervious polyethylene, resistant to most acids and alkalines.

Seal plugs are available in easy to apply 9”x9” squares with a peel-able protective paper for faster application without the waste or extra tools.



TYPICAL PROPERTIES

POLYETHYLENE BACKING		
Tensile strength, min, psi	4,000	D882, Method A
Elongation at break, min, %	100	D882, Method A
Tear resistance, min, psi	1,500	D624, Die C
Water absorption, max, %	0.01	D570

REINFORCING MESH ELEMENT		
Tensile strength min, lb., in.		D1682
	Warp 75	
	Fill 75	
Elongation at break, min, %		
	Warp 20	
	Fill 20	

RUBBERIZED MASTIC		
	Minimum	Maximum
Ash-inert matter, %	80	15
Volatiles, %	0.1	2
Softening Temp., min, F	175	-
Specific gravity	0.95	1.05
Penetration, dmm	60	90
Flow, mm	10	10

CERTIFICATION

SEAL WRAP MATERIALS AND PERFORMANCE REQUIREMENTS.

I hearby certify that Seal Wrap is produced in accordance to the following specifications:

9" seal plugs, 9"and 12" master rolls, consists of an outer backing of polyethylene film with a minimum tensile strength, 4000 lb. psi, when tested in accordance to test method D 882. We further certify that the rubberized mastic component of Seal Wrap is reinforced with a mesh element with a minimum, 75 lb./in, warp and fill when tested in accordance to test method D 1682.

Seal Wrap is made of the same high performance components, excluding the steel straps, as our Mac Wrap collar which meets ASTM standard C-877 Type II.

Robert L. Weir
President Construction Products Division

P.O. Box 447 • US Hwy. #1 North • McBee, SC 29101 • Phone: (877) 962-7622 • (843) 335-5814 • Fax: (843) 335-5909
www.marmac.com info@marmac.com

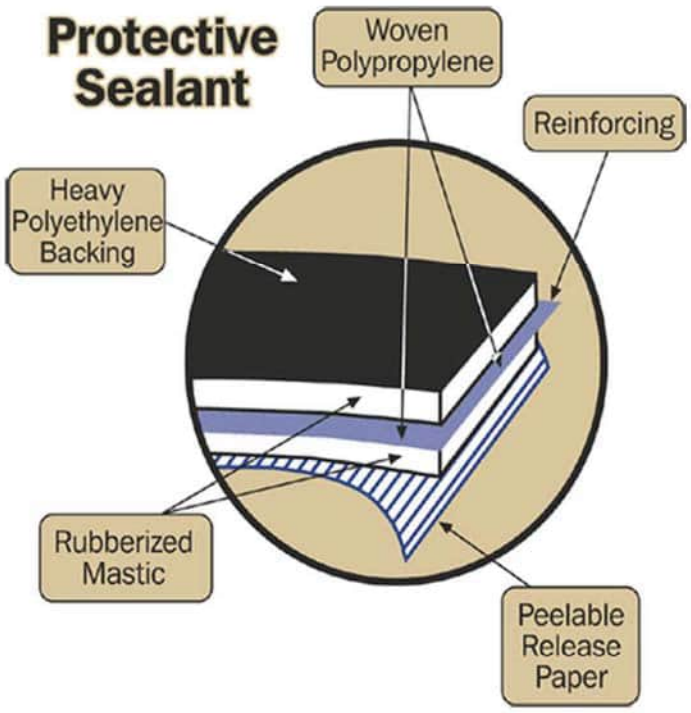
Seal Wrap

High-performance water-proofing membrane for culvert structures

Mar Mac Seal Wrap is a two-ply made with heavy-duty water-proofingmaterials essential for sealing boxed, arched and span culverts.

Seal Wrap is made of two layers of rubberized mastic, reinforced with a sheet of strong, puncture-resistant woven polypropylene. The outside backing is constructed with impervious polyethylene a material resistant to most acids and alkalines.

Seal Wrap is available in 60' rolls lined with peelable release paper for easy application without the waste.



TYPICAL PROPERTIES

POLYETHYLENE BACKING		
Tensile strength, min, psi	4,000	D882, Method A
Elongation at break, min, %	100	D882, Method A
Tear resistance, min, psi	1,500	D624, Die C
Water absorption, max, %	0.01	D570

REINFORCING MESH ELEMENT		
Tensile strength min, lb., in.		D1682
	Warp 75	
	Fill 75	
Elongation at break, min, %		
	Warp 20	
	Fill 20	

RUBBERIZED MASTIC		
	Minimum	Maximum
Ash-inert matter, %	80	15
Volatiles, %	0.1	2
Softening Temp., min, F	175	-
Specific gravity	0.95	1.05
Penetration, dmm	60	90
Flow, mm	10	10

P.O. Box 447 • US Hwy #1 North • McBee, SC 29101 • Phone (877) 962-7622 • Fax (843) 335-5909
www. marmac.com

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Seal Wrap is made of the same high performance components, excluding the steel straps, as our Mac Wrap collar which meets ASTM standard C-877 Type II.

Robert L. Weir
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www.marmac.com info@marmac.com

INSTALLATION INSTRUCTIONS FOR SEALWRAP

- SURFACE PREPARATION:

Sweep or brush the external portion of the joint to insure that dirt, dust and other foreign matter do not interfere with direct contact between the mastic sealer and the concrete joint. If ambient temperature is below 40°F and/or wet conditions are present primer is recommended. Mar Mac RB Quick Dry Primer can be applied by brush or roller at the rate of 1 gallon per 250-350 sq. ft. depending on the porosity of the surface. Cure time is approximately 15-60 minutes dependent on temperature and humidity. Apply primer too exceed the width of the Sealwrap by a minimum of 2 inches.

- INSTALLATION

Peel away the silicon coated release liner to expose 1 ft of the mastic adhesive. Center the exposed mastic over the joint and using the palm of the hand, apply pressure to achieve a uniform bond of the Sealwrap to the concrete. Continue to peel the release liner while unrolling the Sealwrap **KEEP CENTERED OVER JOINT**. For Sealwrap splicing, overlap a minimum of 4 inches. If primer is used, allow for full cure before Sealwrap installation.

MAR MAC RB ADHESIVE PRIMER

DESCRIPTION:

MAR MAC RB LIQUID ADHESIVE PRIMER is a rubber based adhesive in solvent solution which is specifically formulated to provide excellent adhesion with Macwrap, Sealwrap and Sealing Tape under may kinds of surface conditions.

USES: RB ADHESIVE PRIMER....

- Used to prime all precast structures on which Macwrap and/or Sealwrap will be installed. Including: round, arch, elliptical pipe and box culverts and span bridges.
- Designed to be used on applications down to 25ºF. (-4ºC).

APPLICATION:

MARMAC RB LIQUID ADHESIVE PRIMER may be applied with roller or brush. A roller with a heavy nap should be used, such to carry sufficient material to the area being primed.

Apply all ***MAR MAC RB LIQUID ADHESIVE PRIMER*** to a clean, dry, dust free, and frost free surface at a coverage of approximately 250 to 350 square feet per gallon on concrete. The liquid adhesive should be spread sufficiently to avoid areas of access material. Areas of excess material will lengthen the curing time on the application of the ***MAR MAC RB LIQUID ADHESIVE PRIMER.***

For best results ***MAR MAC RB LIQUID ADHESIVE PRIMER*** should be applied and allowed to become tacky to the touch, timing may vary due to atmospheric conditions. At this point Sealwrap/Macwrap should be applied. If primer dries and is no longer tacky, reapply primer.

SAFETY, STORAGE AND HANDLING INFORMATION:

MAR MAC RB LIQUID ADHESIVE PRIMER vapors are flammable. User should review Material Safety Data Sheet (MSDS) for this product and follow safety instructions listed within.

This information is based on our best knowledge, but MAR MAC cannot guarantee the results to be obtained

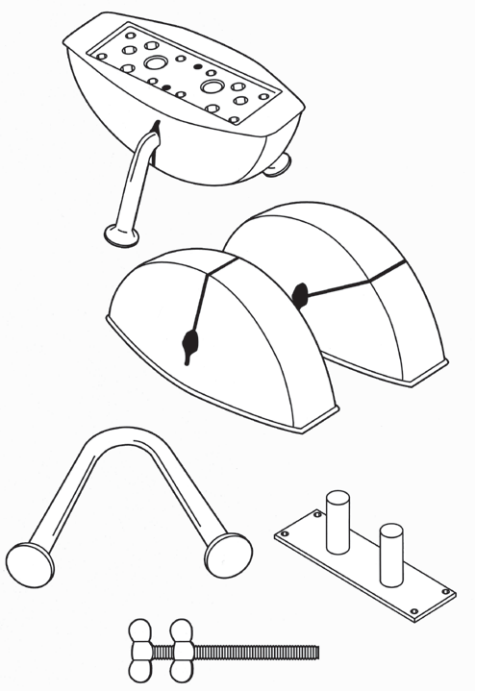
P.O.Box 447• US Hwy.#1 North• McBee, SC 29101• Phone: 877.962.7622• 843.335.5814• Fax: 843.335.5909
WWW.MARMAC.COM

DAYTON SUPERIOR®

Utility Anchor®

Utility Anchor System

The Dayton Superior Utility Anchor System is designed to economically simplify the lifting and handling of precast concrete elements. Its economics, ease of use and versatility will be a welcome addition to your precast operations.



Key Advantages

- High strength – up to 24,000 lbs. SWL
- No special lifting hardware required
- Uses a standard hook or clevis
- Easy to install and use
- Utilizes reusable 90° and 45° polyurethane recess plugs
- Eliminates "through holes" in the precast element
- An economical and versatile system – applicable to any precast concrete element

Added Benefit

Utility contractors can use the utility anchor effectively as a pulling iron. When used as a pulling iron, the safe working loads may be increased by 33%, based on the use of a 3 to 1 factor of safety.

The design of the Dayton Superior Utility Anchor Utility System assures the precaster of an economical, user-friendly system for lifting and handling precast concrete elements.

Utilize the Utility Anchor System to:

- Remove precast elements from their forms
- Handle in the precast yard
- Load for shipment
- Unload and place at the job site

The precaster is able to do it all without the need for any special lifting equipment or hardware. Simply use a standard hook or shackle to connect slings to the utility anchor for a safe lift.

The Utility Anchor System uses a polyurethane recess plug to create a void in the concrete. The concrete void created for the P75H utility anchor is sufficiently large to accept the following:

1. 6-ton Grade 8 alloy hook or
2. 7-ton forged alloy shackle

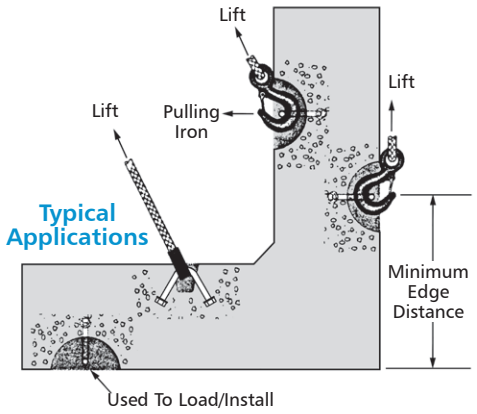
For the P75S Utility Anchors:

3. 15-ton cast/alloy hook or
4. 15-ton forged alloy shackle

DO NOT use larger hooks or shackles; they will apply additional and unintended loads to the utility anchor and could cause a premature failure of the concrete or anchor.

Anchor Placement

Placement of the Utility Anchor is dependent on the structural shape of the precast element. Utility anchors are not designed for thin edge installation. Always maintain minimum edge distances. For special conditions, contact the nearest Dayton Superior Technical Service Department for assistance.



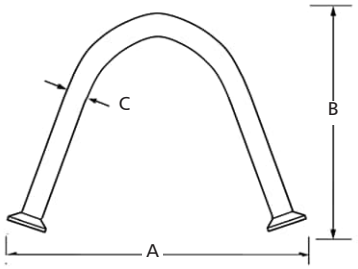
DAYTON SUPERIOR®

Utility Anchor®

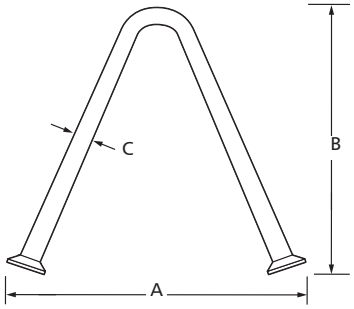
P75 and P75H Utility Anchor®

The Dayton Superior Utility Anchors are available in three diameters and a series of lengths for specific concrete thickness. The utility anchor can be set in either a 90° or a 45° anchor orientation using the appropriate setting plug.

P75 and P75H Utility Anchor						
Anchor	Type	Product Code No.	A	B	C	End Shape
P75	4UA444	121877	5-1/4"	3-1/8"	0.444"	Swift Lift
	5UA444	123442	6"	3-3/4"	0.444"	Swift Lift
	6UA444	121888	7-3/8"	4-3/4"	0.444"	Swift Lift
	5UA671	123441	6-7/16"	3-3/4"	0.671"	Swift Lift
	6UA671	121889	7-3/8"	4-3/4"	0.671"	Swift Lift
	8UA671	121891	9-3/4"	6-3/4"	0.671"	Swift Lift
P75H	12UA875	124738	15-7/8"	11"	0.875"	Swift Lift



P75 Utility Anchor



P75-H Utility Anchor

Anchor	Type	Product Code No.	Minimum Panel Thickness	Safe Working Load Tension 90	Safe Working Load Shear 90	Safe Working Load Tension/ Shear 45	Minimum Edge Distance
P75	4UA444	121877	4"	3,200	5,800	2,260	9"
	5US444	123442	5"	3,860	7,710	2,730	10"
	6UA444	121888	5 5/8"	4,460	9,460	3,150	12"
	5UA671	123441	5"	4,560	8,430	3,220	10"
	6UA671	121880	5 5/8"	7,320	15,780	5,170	12"
	8UA671	121801	7 5/8"	10,830	18,850	7,660	16"
P75H	12UA875	124738	12"	24,000	24,000	24,000	30"

Note:

1. Compressive strength of normal weight concrete to be 4,000 psi at time of initial lift.
2. Safe working loads provide an approximate factor of safety of 4 to 1.
3. Utility anchors to be installed at 90° to surface of the concrete.
4. Shear safe working loads are based on loading in the direction of the top of the precast concrete element.

To Order:

Specify: (1) quantity, (2) name, (3) product code.

Example:

200, P75 Utility Anchors, 5UA444.

P75C Utility Anchor® with Clip

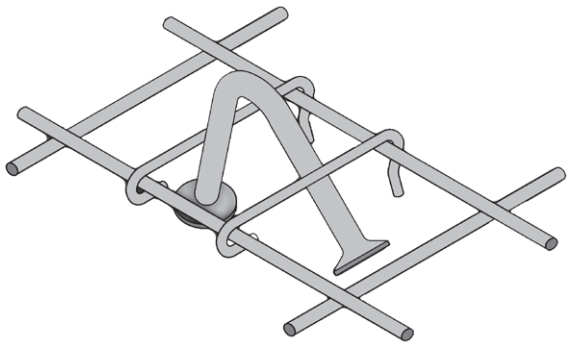
The Dayton Superior Utility Anchor with Clip is designed to allow the Utility Anchor to be secured to the wire mesh cage. This product utilizes the P75 Utility Anchors with 2 wire clips welded to opposite legs of the anchor. These wire clips are positioned to hold the utility anchor with Void to the wire mesh in the proper position in the wall for lifting your precast product. Both the 5UA and 6UA anchors in 0.444 and 0.671 diameters for 9" wire spacing are in stock. Other anchor and wire spacing are readily available.

To Order:

Specify: (1) quantity, (2) name, (3) product code (4) anchor size, (5) wire spacing (6) wall thickness.

Example:

200, P75C, #121443, 5UA444anchor, 9" wire spacing, 5" wall.



Product Code	Utility Anchor	Wire Clip Lengths	Wall Thickness
123443	5UA444	9"	5"
121890	5UA671	9"	5"
121892	6UA444	9"	6"
121893	6UA671	9"	6"
127446	8UA671	9"	8"

P76 Utility Anchor® Setting Plugs

Utility Anchor Setting Plugs a polyurethane plastic in 90° and 45° orientation.

The reusable setting plug properly sets the anchor approximately 1/2" below the surface of the concrete and provides an adequate recess for easy sling attachment. After final positioning of the concrete element, the recess formed by the recess member can be easily grouted or conveniently covered by the Utility Anchor Cover/Patch.

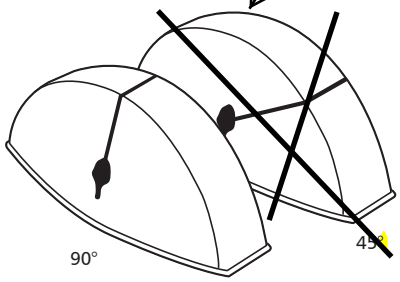
The 90P875 Setting Plug used with the P75-H 24,000 lb. anchor requires 2 each P101 holding rods to attach setting plug to the form. No holding plate or magnetic plate are available for this setting plug.

NOT USED

NOT USED

P76 Utility Anchor Setting Plug					
Type	Product Code No.	Length	Width	Depth	Color
90P444	123175	8.00"	3.25"	3"	Blue
~~45P444~~	~~123176~~	~~8.00"~~	~~3.25"~~	~~3"~~	~~Blue~~
90P671	123177	8.00"	3.25"	3"	Orange
90P671	127786	9.00"	4.58"	3.35"	Orange
~~45P671~~	~~123178~~	~~8.00"~~	~~3.25"~~	~~3"~~	~~Orange~~
90P875	124685	15.00"	6.13"	5"	Blue

45° NOT USED



P76 Utility Anchor Setting Plugs

To Order:
Specify: (1) quantity, (2) name, (3) product code.

Example:
200, P76 Utility Anchor Setting Plugs, 90P444.

BLUE PLUG USED FOR UA444
ORANGE PLUG USED FOR UA671
LARGE BLUE PLUG USED FOR UA875

P76D Disposable Setting Plugs

The Disposable Setting Plug is manufactured to offer the precaster an inexpensive alternate to urethane setting plugs. This 2 piece high density polyethylene plastic setting plug is used with the 0.671 Dayton Superior Utility Anchors. The two piece design snaps tightly together around the legs of the anchor eliminating concrete entering the void. The setting plug is installed to the formwork using nail holes on each end of the plug. This plug can also be used with the P77 Double Tee Anchors.

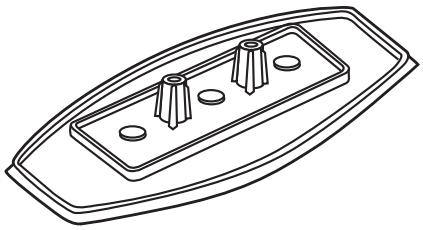
To Order:
Specify: (1) quantity, (2) name, (3) product code.

Example:
200, P76D, #126214.

P76D Disposable Utility Anchor Setting Plugs 0.671

P76C Utility Anchor Cover/Patch

The P76C Utility Anchor Cover/Patch installs over the back of the setting plug to protect the unit without the use of duct tape. The cover/patch can be installed on the setting plug/anchor assembly prior to setting the assembly in the form. This protects the assembly from concrete leakage through the concrete placement sequence. It can also be used later as a temporary or permanent cover for the recess. The P76C cover is gray in color and will blend with most concrete. It can be painted to match other color schemes.



P76C Utility Anchor Cover/Patch

△1 **SECTION 06100**

REVEGETATION

PART 1: GENERAL

1.1 DESCRIPTION

A. Incorporate into the contract by reference the technical and supplemental specifications of Section 610 Roadside Revegetation in its entirety, as published by the Montana Department of Transportation (MDT), Standard Specifications for Road and Bridge Construction, 2020 Edition.

B. The specification is separated into two categories, revegetation of streambank slopes and non-streambank slopes.

1.2 REFERENCES

A. Montana Department of Transportation Standard Specifications for Road and Bridge Construction, 2014 Edition:
Section 610 Roadside Revegetation

PART 2: PRODUCTS

2.1 GENERAL

A. Materials are in accordance with the entirety of Section 610.02 and the additional subsections below, additions supersede all MDT Specifications:

2.2 ALL DISTURBED AREAS NON-STREAMBANK SLOPES

1. Furnish a seed blend of the following species and rates.

SPECIES	LBS OF PLS PER ACRE
Big bluegrass	0.75
Thickspike wheatgrass	5.0
Slender wheatgrass	4.0
Timothy	0.5
Junegrass	0.3
Orchardgrass	1.0
Canby bluegrass	0.8

2.3 ALL STREAMBANK SLOPES

1. Furnish a seed blend of the following species and rates.

SPECIES	LBS OF PLS PER ACRE
Bluejoint reedgrass	0.50
Mountain brome	6.00

Western wheatgrass	4.00
Beardless or creeping wildrye	5.00
Canada wildrye	6.00
Streambank wheatgrass	6.00
Slender wheatgrass	6.50
Baltic rush	0.20

2. EROSION CONTROL BLANKET

    a. Mass per unit Area, including fiber matrix and stitching and netting – minimum 0.5 lbs/sq yard.
    b. MD Tensile Strength – Minimum 180 lbs/ft.
    c. Stitching and netting is to be constructed of natural fiber materials. Non-organic, photodegradable materials are not accepted.

PART 3: EXECUTION

3.1 GENERAL

A. Complete all work in accordance with the entirety of Section 610.03 and the additional subsections below, additions supersede all MDT Specifications:

3.2 ALL DISTURBED AREAS NON-STREAMBANK SLOPES

Sequence the work in the following order:

1. Seedbed Preparation. Following final grading and topsoil placement, condition the seedbed by disking or harrowing to a depth of 2 to 4 inches. Remove all rock and debris greater than 4 inches in diameter.
2. Within 72 hours of seedbed preparation broadcast seed with the seed mixture and rates specified in the table under 2.2.1.

3.3 ALL STREAMBANK SLOPES

Sequence the work in the following order:

1. Seedbed Preparation. Following final grading of the ditch sections, roughen the sideslopes with an excavator arm mounted roller sheepsfoot attachment. The purpose is to create a roughened/dimpled surface to capture and retain the applied seed, and to facilitate water infiltration. The depth of the dimples are not to exceed 4 inches. Note – the purpose is to roughen the surface, not compact it.
2. Within 72 hours of seedbed preparation broadcast seed with the seed mixture and rates specified in the table under 2.2.1.
3. Erosion Blanket Placement. Within 48 hours of Step 2, install the 100% biodegradable erosion control blanket per manufacturers recommendations and the Drawings. Secure to the slope per manufacturers recommendations. Install the blankets horizontally across the slope face.

END OF SECTION 06100

CROSSING B - CONSTRUCTION QUANTITIES			
DESCRIPTION	UNIT	QUANTITY	NOTES
REMOVE AND DISPOSE EXISTING CULVERTS TYPE I	EA	0	SMALL CMP
REMOVE AND DISPOSE EXISTING CULVERTS TYPE II	EA	1	DOUBLE CMP, BOX CULVERT, OR CULVERT WITH EXCESSIVE REMOVAL OF FOUNDATION MATERIALS
CULVERT PROCURMENT & PLACEMENT (RCB 12'x6')	LF	30	CULVERT LENGTH (WITHOUT END SECTIONS)
CULVERT END SECTION (RCB 12'X6'X12')	EA	2	NUMBER OF END SECTIONS
RCB CULVERT BEDDING PROCUREMENT AND PLACEMENT	CY	19	INCLUDES END SECTIONS
RCB SAND CUSHION	CY	4	INCLUDES END SECTIONS
UNCLASSIFIED EXCAVATION 1	CY	116	INCLUDES OVER EXCAVATION FOR RIPRAP. DOES NOT INCLUDE CULVERT EXCAVATION
CULVERT EXCAVATION	CY	350	BASED ON ASSUMED CULVERT EXCAVATION SIDE SLOPE AND OVER EXCAVATION FOR BEDDING MATERIAL; INCLUDES VOLUME OCCUPIED BY EXISTING CULVERT
CULVERT NATIVE BACKFILL	CY	150	INCLUDES CULVERT EXCAVATION LESS CULVERT VOLUME, DOES NOT INCLUDE CULVERT BEDDING
RIPRAP PROCUREMENT & PLACEMENT 1	CY	116	RIPRAP VOLUME
STABILIZATION GEOTEXTILE 1	SY	220	AREA OF STABILIZATION GEOTEXTILE
HAUL OFF 1	CY	316	EXCESS EXCAVATION MATERIAL
AGGREGATE BASE COURSE	CY	12	MATERIAL FOR ROAD BASE OR SURFACE OF NON-ROAD CROSSINGS
AGGREGATE SURFACE COURSE	CY	0	MATERIAL FOR ROAD SURFACING
GRANULAR FILTER MATERIAL	CY	5	GRANULAR FILTER PLACED ON TOP OF RIPRAP
REVEGETATION 1	LS	1	RESEED DISTURBED AREAS WITHIN CONSTRUCTION LIMTIS. INCLUDES SEEDBED PREPARATION, SEED, AND SEEDING

DESIGNED JAL
DRAWN JAL
CHECKED MWJ
DATE 8/30/2024

REVISION
Rev. 1, 09/12/2024, ADDENDUM #1

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WATER & NATURAL RESOURCES
3810 VALLEY COMMONS DR SUITE 4
BOZEMAN, MT 59718
WWW.RESPEC.COM PHONE: (406)284-2525

STAMP
MONTANA
MATTHEW WYNN JOHNSON
No. 32820PE
LICENSED PROFESSIONAL ENGINEER
9/2024

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VFMMP - LOWER D2
FLOOD
INFRASTRUCTURE
IMPROVEMENTS

CONSTRUCTION
QUANTITIES -
CROSSING B

SHEET NUMBER:
G-03R
SHEET

NAME: N:\PROJECTS\W0138.23003-LCC VFMMP LOWER D2 TO5\CAD\SHEETS\W0138.23003_LOWER D2_S_GENERAL.DWG
PLOT DATE: September 12, 2024 9:48 AM, BY: JACOB LACY

CROSSING D - CONSTRUCTION QUANTITIES			
DESCRIPTION	UNIT	QUANTITY	NOTES
REMOVE AND DISPOSE EXISTING CULVERTS TYPE I	EA	1	SMALL CMP
REMOVE AND DISPOSE EXISTING CULVERTS TYPE II	EA	0	DOUBLE CMP, BOX CULVERT, OR CULVERT WITH EXCESSIVE REMOVAL OF FOUNDATION MATERIALS
CULVERT PROCURMENT & PLACEMENT (RCB 12'x6')	LF	48	CULVERT LENGTH (WITHOUT END SECTIONS)
CULVERT END SECTION (RCB 12'X6'X12')	EA	2	NUMBER OF END SECTIONS
STRUCTURAL BACKFILL	CY	408.78	
RCB CULVERT BEDDING PROCUREMENT AND PLACEMENT	CY	26	INCLUDES END SECTIONS
RCB SAND CUSHION	CY	5	INCLUDES END SECTIONS
UNCLASSIFIED EXCAVATION 1	CY	112	INCLUDES OVER EXCAVATION FOR RIPRAP. DOES NOT INCLUDE CULVERT EXCAVATION
CULVERT EXCAVATION	CY	460	BASED ON ASSUMED CULVERT EXCAVATION SIDE SLOPE AND OVER EXCAVATION FOR BEDDING MATERIAL; INCLUDES VOLUME OCCUPIED BY EXISTING CULVERT
CULVERT NATIVE BACKFILL	CY	200	INCLUDES CULVERT EXCAVATION LESS CULVERT VOLUME, DOES NOT INCLUDE CULVERT BEDDING
NATIVE MATERIAL TO BE REPLACED BY STRUC. BACKFILL	CY	409	VOLUME OF NATIVE EMBANKMENT
RIPRAP PROCUREMENT & PLACEMENT 1	CY	112	RIPRAP VOLUME
TOPSOIL -- BANK TREATMENT	CY	93	SALVAGED TOPSOIL
COIR LOG -- BANK TREATMENT	LF	551	PLACED AT OHWE
EROSION CONTROL BLANKET -- BANK TREATMENT	SY	93	TO COVER SEEDED TOPSOIL
STONE/COBBLE -- BANK TREATMENT	CY	30	PLACED AT TOE OF EMBANKMENT TO OHWE
STABILIZATION GEOTEXTILE 1	SY	246	AREA OF STABILIZATION GEOTEXTILE
HAUL OFF 1	CY	1102	EMBANKMENT TO BE REMOVED VOLUME LESS SALVAGED TOPSOIL
AGGREGATE BASE COURSE	CY	94	MATERIAL FOR ROAD BASE OR SURFACE OF NON-ROAD CROSSINGS
AGGREGATE SURFACE COURSE	CY	47	MATERIAL FOR ROAD SURFACING
GRANULAR FILTER MATERIAL	CY	7	GRANULAR FILTER PLACED ON TOP OF RIPRAP
REVEGETATION 1	LS	1	RESEED DISTURBED AREAS WITHIN CONSTRUCTION LIMTIS. INCLUDES SEEDBED PREPARATION, SEED, AND SEEDING
EXISTING ROADWAY/EMBANKMENT REMOVAL	CY	823	
STRUCTURAL BACKFILL	CY	550	
INSTALL CATTLE GUARD PROVIDED BY OWNER	EA	1	

DESIGNED JAL
DRAWN JAL
CHECKED MWJ
DATE 8/30/2024

REVISION
Rev. 1, 09/12/2024, ADDENDUM #1

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LICENSED PROFESSIONAL ENGINEER
9/2024

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INFRASTRUCTURE
IMPROVEMENTS

CONSTRUCTION QUANTITIES - CROSSING D

SHEET NUMBER:
G-05R
SHEET

NAME: N:\PROJECTS\W0138.23003-LCC VFMMP LOWER D2 TOS\CAD\SHEETS\W0138.23003_LOWER D2_S_GENERAL.DWG
PLOT DATE: September 12, 2024 9:48 AM, BY: JACOB LACY

CROSSING E - CONSTRUCTION QUANTITIES			
DESCRIPTION	UNIT	QUANTITY	NOTES
REMOVE AND DISPOSE EXISTING CULVERTS TYPE I	EA	1	SMALL CMP
REMOVE AND DISPOSE EXISTING CULVERTS TYPE II	EA	0	DOUBLE CMP, BOX CULVERT, OR CULVERT WITH EXCESSIVE REMOVAL OF FOUNDATION MATERIALS
CULVERT PROCURMENT & PLACEMENT (RCB 12'x6')	LF	48	CULVERT LENGTH (WITHOUT END SECTIONS)
CULVERT END SECTION (RCB 12'X6'X12')	EA	2	NUMBER OF END SECTIONS
RCB CULVERT BEDDING PROCUREMENT AND PLACEMENT	CY	26	INCLUDES END SECTIONS
RCB SAND CUSHION	CY	5	INCLUDES END SECTIONS
UNCLASSIFIED EXCAVATION 1	CY	128	INCLUDES OVER EXCAVATION FOR RIPRAP. DOES NOT INCLUDE CULVERT EXCAVATION
CULVERT EXCAVATION	CY	460	BASED ON ASSUMED CULVERT EXCAVATION SIDE SLOPE AND OVER EXCAVATION FOR BEDDING MATERIAL; INCLUDES VOLUME OCCUPIED BY EXISTING CULVERT
CULVERT NATIVE BACKFILL	CY	200	INCLUDES CULVERT EXCAVATION LESS CULVERT VOLUME, DOES NOT INCLUDE CULVERT BEDDING
RIPRAP PROCUREMENT & PLACEMENT 1	CY	128	RIPRAP VOLUME
STABILIZATION GEOTEXTILE 1	SY	431	AREA OF STABILIZATION GEOTEXTILE
HAUL OFF 1	CY	388	EXCESS EXCAVATION MATERIAL
AGGREGATE BASE COURSE	CY	24	MATERIAL FOR ROAD BASE OR SURFACE OF NON-ROAD CROSSINGS
AGGREGATE SURFACE COURSE	CY	0	MATERIAL FOR ROAD SURFACING
GRANULAR FILTER MATERIAL	CY	5	GRANULAR FILTER PLACED ON TOP OF RIPRAP
REVEGETATION 1	LS	1	RESEED DISTURBED AREAS WITHIN CONSTRUCTION LIMTIS. INCLUDES SEEDBED PREPARATION, SEED, AND SEEDING

DESIGNED JAL
DRAWN JAL
CHECKED MWJ
DATE 8/30/2024

REVISION
Rev. 1, 09/12/2024, ADDENDUM #1

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MATTHEW WYNN JOHNSON
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LICENSED PROFESSIONAL ENGINEER
9/2024

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VFMMP - LOWER D2
FLOOD
INFRASTRUCTURE
IMPROVEMENTS

CONSTRUCTION
QUANTITIES -
CROSSING E

SHEET NUMBER:
G-06R
SHEET

NAME: N:\PROJECTS\W0138.23003-LCC VFMMP LOWER D2 TO5\CAD\SHEETS\W0138.23003_LOWER D2_S_GENERAL.DWG
PLOT DATE: September 12, 2024 9:48 AM, BY: JACOB LACY

CROSSING F - CONSTRUCTION QUANTITIES			
DESCRIPTION	UNIT	QUANTITY	NOTES
REMOVE AND DISPOSE EXISTING CULVERTS TYPE I	EA	1	SMALL CMP
REMOVE AND DISPOSE EXISTING CULVERTS TYPE II	EA	0	DOUBLE CMP, BOX CULVERT, OR CULVERT WITH EXCESSIVE REMOVAL OF FOUNDATION MATERIALS
CULVERT PROCURMENT & PLACEMENT (RCB 12'x6')	LF	78	CULVERT LENGTH (WITHOUT END SECTIONS)
CULVERT END SECTION (RCB 12'X6'X12')	EA	2	NUMBER OF END SECTIONS
RCB CULVERT BEDDING PROCUREMENT AND PLACEMENT	CY	36	INCLUDES END SECTIONS
RCB SAND CUSHION	CY	6	INCLUDES END SECTIONS
UNCLASSIFIED EXCAVATION 1	CY	124	INCLUDES OVER EXCAVATION FOR RIPRAP. DOES NOT INCLUDE CULVERT EXCAVATION
CULVERT EXCAVATION	CY	650	BASED ON ASSUMED CULVERT EXCAVATION SIDE SLOPE AND OVER EXCAVATION FOR BEDDING MATERIAL; INCLUDES VOLUME OCCUPIED BY EXISTING CULVERT
CULVERT NATIVE BACKFILL	CY	280	INCLUDES CULVERT EXCAVATION LESS CULVERT VOLUME, DOES NOT INCLUDE CULVERT BEDDING
RIPRAP PROCUREMENT & PLACEMENT 1	CY	124	RIPRAP VOLUME
STABILIZATION GEOTEXTILE 1	SY	311	AREA OF STABILIZATION GEOTEXTILE
HAUL OFF 1	CY	494	EXCESS EXCAVATION MATERIAL
AGGREGATE BASE COURSE	CY	48	MATERIAL FOR ROAD BASE OR SURFACE OF NON-ROAD CROSSINGS
AGGREGATE SURFACE COURSE	CY	0	MATERIAL FOR ROAD SURFACING
GRANULAR FILTER MATERIAL	CY	5	GRANULAR FILTER PLACED ON TOP OF RIPRAP
REVEGETATION 1	LS	1	RESEED DISTURBED AREAS WITHIN CONSTRUCTION LIMTIS. INCLUDES SEEDBED PREPARATION, SEED, AND SEEDING

DESIGNED JAL
DRAWN JAL
CHECKED MWJ
DATE 8/30/2024

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MATTHEW WYNN JOHNSON
No. 32820PE
LICENSED PROFESSIONAL ENGINEER
9/2024

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LEWIS AND CLARK COUNTY
PUBLIC WORKS
3402 COONEY DRIVE
HELENA, MT 59602

VFMMP - LOWER D2
FLOOD
INFRASTRUCTURE
IMPROVEMENTS

CONSTRUCTION
QUANTITIES -
CROSSING F

SHEET NUMBER:
G-07R
SHEET

NAME: N:\PROJECTS\W0138.23003-LCC VFMMP LOWER D2 TO5\CAD\SHEETS\W0138.23003_LOWER D2_S_GENERAL.DWG
PLOT DATE: September 12, 2024 9:48 AM, BY: JACOB LACY

CROSSING GLASS DRIVE #2 - CONSTRUCTION QUANTITIES			
DESCRIPTION	UNIT	QUANTITY	NOTES
REMOVE AND DISPOSE EXISTING CULVERTS TYPE I	EA	0	SMALL CMP
REMOVE AND DISPOSE EXISTING CULVERTS TYPE II	EA	1	DOUBLE CMP, BOX CULVERT, OR CULVERT WITH EXCESSIVE REMOVAL OF FOUNDATION MATERIALS
CULVERT PROCURMENT & PLACEMENT (RCB 12'x6')	LF	30	CULVERT LENGTH (WITHOUT END SECTIONS)
CULVERT END SECTION (RCB 12'X6'X12')	EA	2	NUMBER OF END SECTIONS
RCB CULVERT BEDDING PROCUREMENT AND PLACEMENT	CY	19	INCLUDES END SECTIONS
RCB SAND CUSHION	CY	4	INCLUDES END SECTIONS
UNCLASSIFIED EXCAVATION 1	CY	148	INCLUDES OVER EXCAVATION FOR RIPRAP. DOES NOT INCLUDE CULVERT EXCAVATION
CULVERT EXCAVATION	CY	350	BASED ON ASSUMED CULVERT EXCAVATION SIDE SLOPE AND OVER EXCAVATION FOR BEDDING MATERIAL; INCLUDES VOLUME OCCUPIED BY EXISTING CULVERT
CULVERT NATIVE BACKFILL	CY	150	INCLUDES CULVERT EXCAVATION LESS CULVERT VOLUME, DOES NOT INCLUDE CULVERT BEDDING
NATIVE MATERIAL TO BE REPLACED BY STRUC. BACKFILL	CY	293	VOLUME OF NATIVE EMBANKMENT
RIPRAP PROCUREMENT & PLACEMENT 1	CY	148	RIPRAP VOLUME
TOPSOIL -- BANK TREATMENT	CY	70	SALVAGED TOPSOIL
COIR LOG -- BANK TREATMENT	LF	426	PLACED AT OHWE
EROSION CONTROL BLANKET -- BANK TREATMENT	SY	70	TO COVER SEEDED TOPSOIL
STONE/COBBLE -- BANK TREATMENT	CY	33	PLACED AT TOE OF EMBANKMENT TO OHWE
STABILIZATION GEOTEXTILE 1	SY	255	AREA OF STABILIZATION GEOTEXTILE
HAUL OFF 1	CY	606	EMBANKMENT TO BE REMOVED VOLUME LESS SALVAGED TOPSOIL
AGGREGATE BASE COURSE	CY	24	MATERIAL FOR ROAD BASE OR SURFACE OF NON-ROAD CROSSINGS
AGGREGATE SURFACE COURSE	CY	12	MATERIAL FOR ROAD SURFACING
GRANULAR FILTER MATERIAL	CY	11	GRANULAR FILTER PLACED ON TOP OF RIPRAP
REVEGETATION 1	LS	1	RESEED DISTURBED AREAS WITHIN CONSTRUCTION LIMTIS. INCLUDES SEEDBED PREPARATION, SEED, AND SEEDING
EXISTING ROADWAY/EMBANKMENT REMOVAL	CY	328	
STRUCTURAL BACKFILL	CY	293	

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VFMMP - LOWER D2 FLOOD INFRASTRUCTURE IMPROVEMENTS

CONSTRUCTION QUANTITIES - GLASS DRIVE #2

SHEET NUMBER:
G-08R
SHEET

NAME: N:\PROJECTS\W0138.23003-LCC VFMMP LOWER D2 TOS\CAD\SHEETS\W0138.23003_LOWER D2_S_GENERAL.DWG
PLOT DATE: September 12, 2024 9:48 AM, BY: JACOB LACY

GLASS DRIVE #1 - CONSTRUCTION QUANTITIES			
DESCRIPTION	UNIT	QUANTITY	NOTES
REMOVE AND DISPOSE EXISTING CULVERTS TYPE I	EA	1	SMALL CMP
REMOVE AND DISPOSE EXISTING CULVERTS TYPE II	EA	0	DOUBLE CMP, BOX CULVERT, OR CULVERT WITH EXCESSIVE REMOVAL OF FOUNDATION MATERIALS
CULVERT PROCURMENT & PLACEMENT (RCB 12'x6')	LF	48	CULVERT LENGTH (WITHOUT END SECTIONS)
CULVERT END SECTION (RCB 12'X6'X12')	EA	2	NUMBER OF END SECTIONS
RCB CULVERT BEDDING PROCUREMENT AND PLACEMENT	CY	26	INCLUDES END SECTIONS
RCB SAND CUSHION	CY	5	INCLUDES END SECTIONS
UNCLASSIFIED EXCAVATION 1	CY	139	INCLUDES OVER EXCAVATION FOR RIPRAP. DOES NOT INCLUDE CULVERT EXCAVATION
CULVERT EXCAVATION	CY	460	BASED ON ASSUMED CULVERT EXCAVATION SIDE SLOPE AND OVER EXCAVATION FOR BEDDING MATERIAL; INCLUDES VOLUME OCCUPIED BY EXISTING CULVERT
CULVERT NATIVE BACKFILL	CY	200	INCLUDES CULVERT EXCAVATION LESS CULVERT VOLUME, DOES NOT INCLUDE CULVERT BEDDING
RIPRAP PROCUREMENT & PLACEMENT 1	CY	139	
STABILIZATION GEOTEXTILE 1	SY	276	AREA OF STABILIZATION GEOTEXTILE
HAUL OFF 1	CY	399	EXCESS EXCAVATION MATERIAL
AGGREGATE BASE COURSE	CY	19	MATERIAL FOR ROAD BASE OR SURFACE OF NON-ROAD CROSSINGS
AGGREGATE SURFACE COURSE	CY	0	MATERIAL FOR ROAD SURFACING
GRANULAR FILTER MATERIAL	CY	5	GRANULAR FILTER PLACED ON TOP OF RIPRAP
REVEGETATION 1	LS	1	RESEED DISTURBED AREAS WITHIN CONSTRUCTION LIMTIS. INCLUDES SEEDBED PREPARATION, SEED, AND SEEDING

DESIGNED JAL
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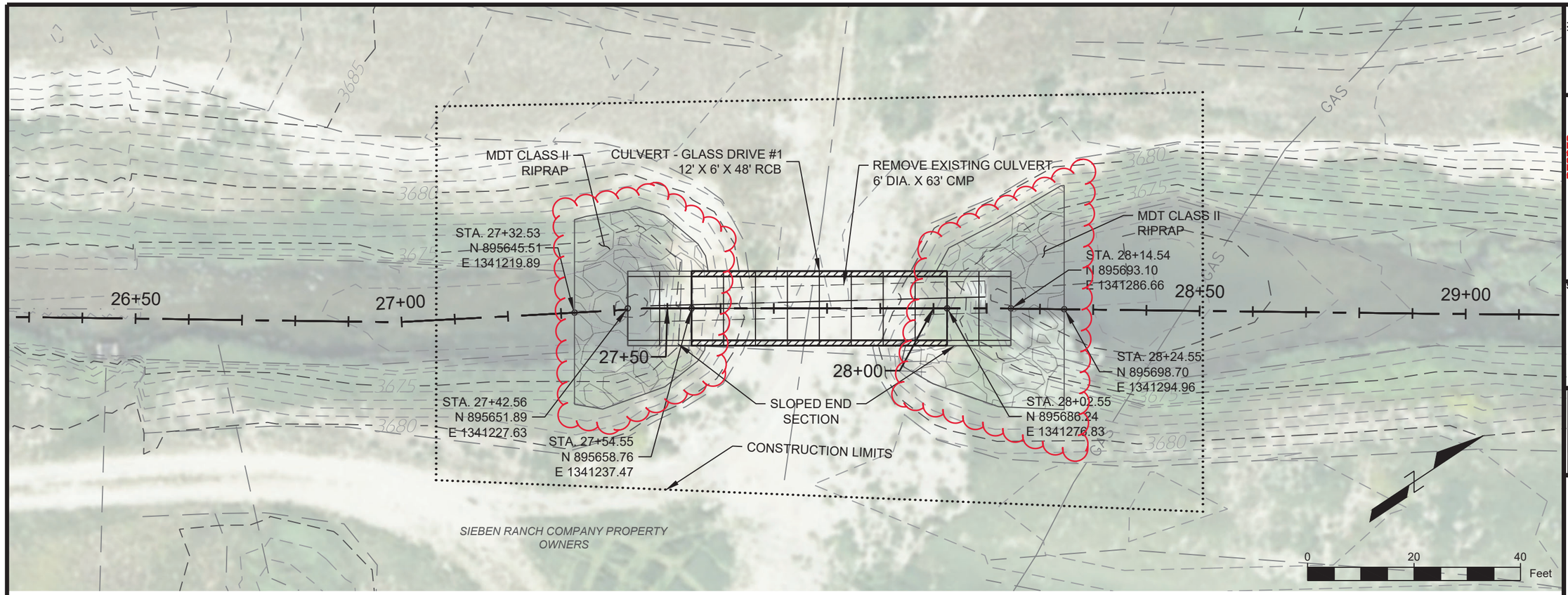
HELENA, MT 59602

VFMMP - LOWER D2
FLOOD
INFRASTRUCTURE
IMPROVEMENTS

CONSTRUCTION
QUANTITIES -
GLASS DRIVE #1

SHEET NUMBER:
G-09R
SHEET

NAME: N:\PROJECTS\W0138.23003-LCC VFMMP LOWER D2 TO5\CAD\SHEETS\W0138.23003_LOWER D2_S_GENERAL.DWG
PLOT DATE: September 12, 2024 9:48 AM, BY: JACOB LACY



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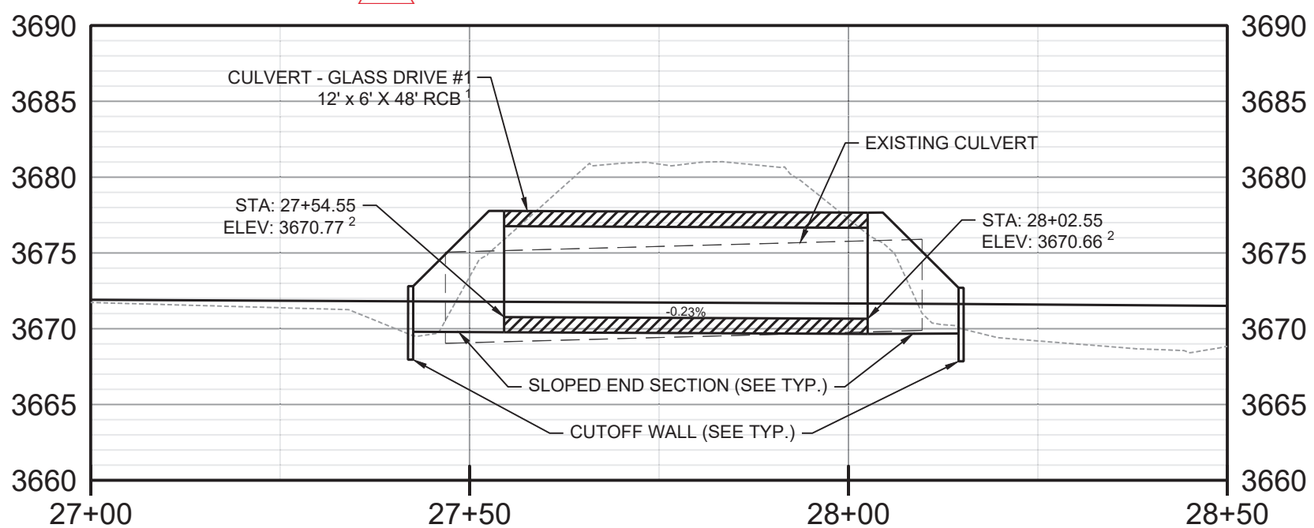

GLASS DRIVE #1 - CULVERT PROFILE
HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 10'

NOTES:

1. CULVERT WILL BE PLACED IN A MANNER THAT THE POST-CONSTRUCTION EQUILIBRATED CHANNEL PROFILE WILL BE 1.0' ABOVE CULVERT INVERTS.

EXISTING GROUND PROFILE
POST CONSTRUCTION EQUILIBRATED CHANNEL PROFILE

NAME: N:\PROJECTS\W0138.23003-LCC VFMMP LOWER D2 TO5\CAD\SHEETS\W0138.23003_LOWER D2_S_CULVERT P&P.DWG
PLOT DATE: September 12, 2024 9:49 AM, BY: JACOB LACY

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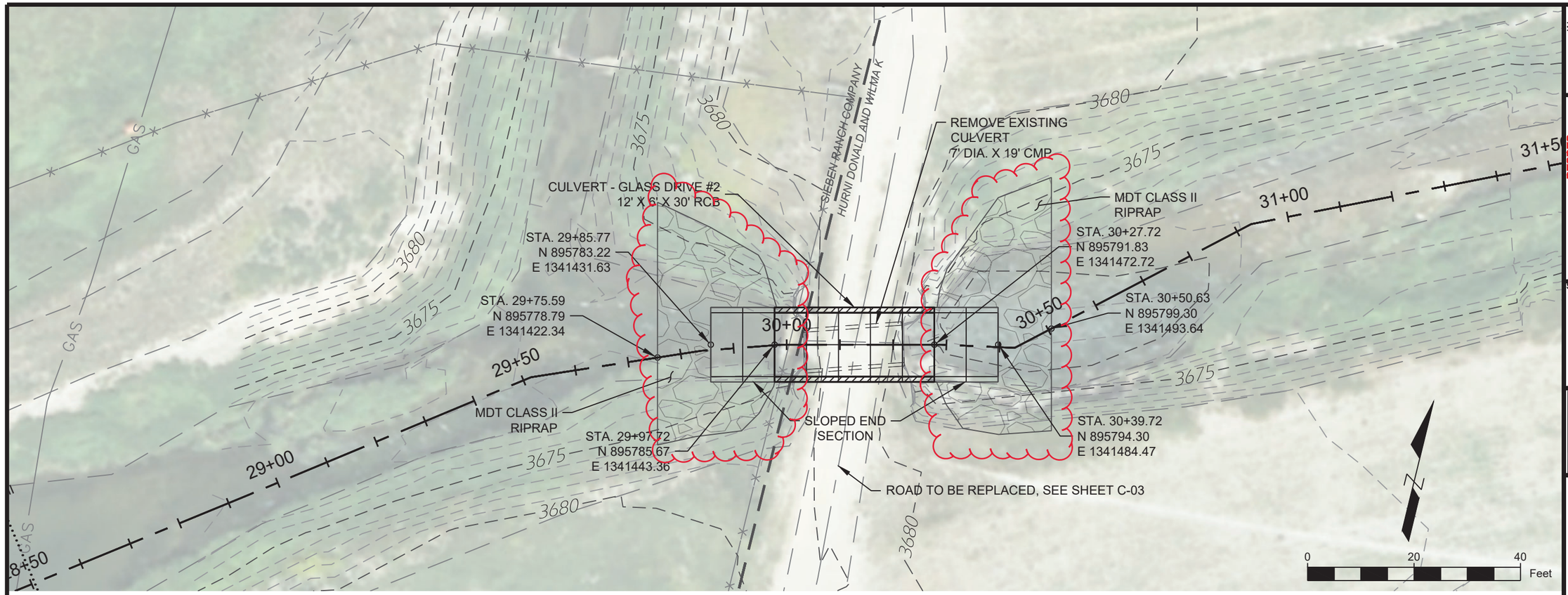
VFMMP - LOWER D2 FLOOD INFRASTRUCTURE IMPROVEMENTS

GLASS DRIVE 1 - CULVERT DETAIL

SHEET NUMBER:
C-01R
SHEET



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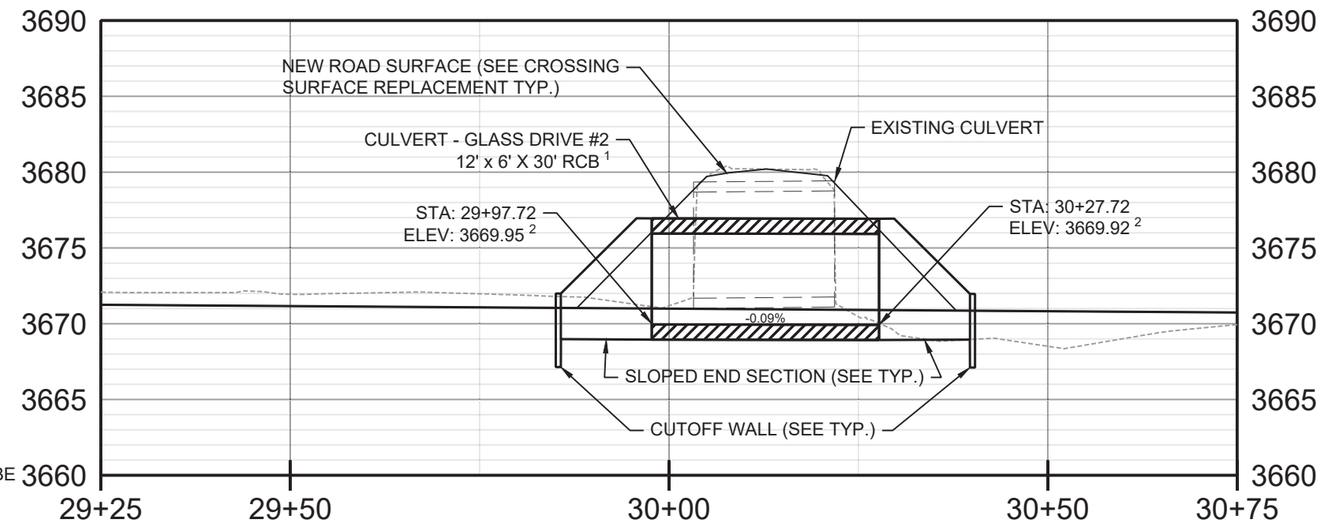

GLASS DRIVE #2 - CULVERT PROFILE
HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 10'

NOTES:

1. CULVERT WILL BE PLACED IN A MANNER THAT THE POST-CONSTRUCTION EQUILIBRATED CHANNEL PROFILE WILL BE 1.0' ABOVE CULVERT INVERTS.
2. EASEMENT BOUNDARIES ARE APPROXIMATE AND NOT FOR LEGAL PURPOSES.
3. CONSTRUCTION LIMITS SHOWN ON SHEETC-03

EXISTING GROUND PROFILE
POST CONSTRUCTION EQUILIBRATED CHANNEL PROFILE

DESIGNED JAL
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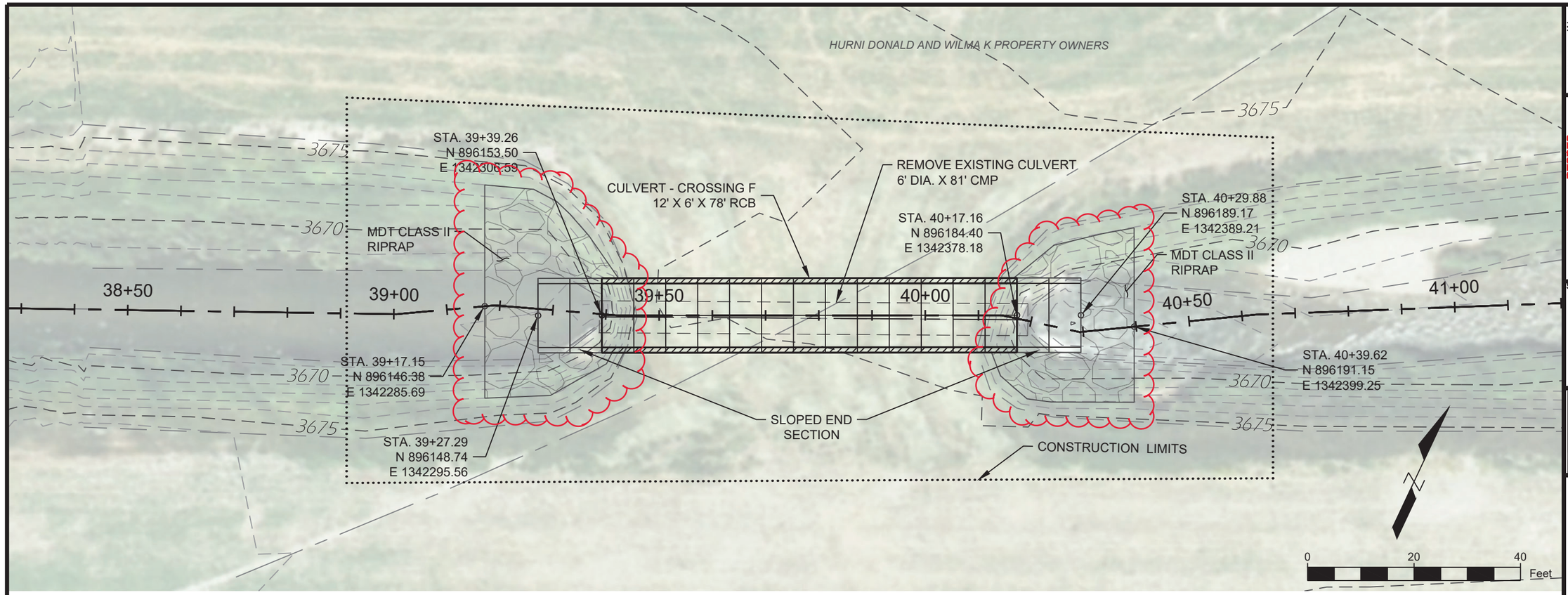
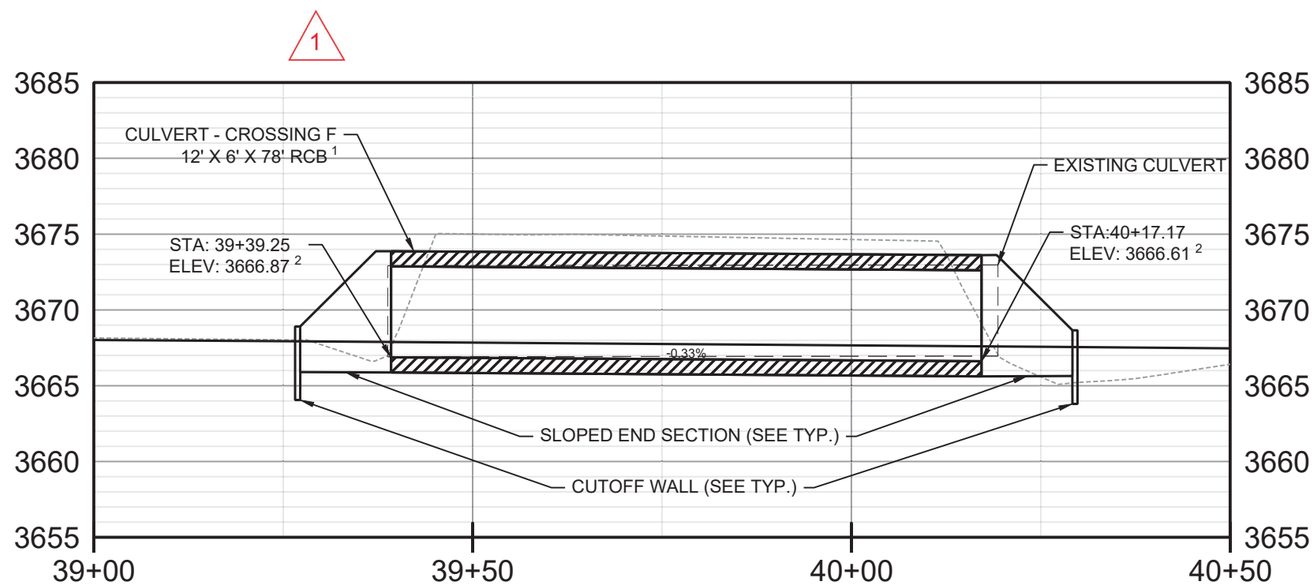
VFMMP - LOWER D2 FLOOD INFRASTRUCTURE IMPROVEMENTS

GLASS DRIVE 2 - CULVERT DETAIL

SHEET NUMBER:
C-02R
SHEET

NAME: N:\PROJECTS\W0138.23003-LCC VFMMP LOWER D2 TO5\CAD\SHEETS\W0138.23003_LOWER D2_S_CULVERT P&P.DWG
PLOT DATE: September 12, 2024 9:50 AM, BY: JACOB LACY





CROSSING F - CULVERT PROFILE
HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 10'

EXISTING GROUND PROFILE
POST CONSTRUCTION EQUILIBRATED CHANNEL PROFILE

NOTES:

1. CULVERT WILL BE PLACED IN A MANNER THAT THE POST-CONSTRUCTION EQUILIBRATED CHANNEL PROFILE WILL BE 1.0' ABOVE CULVERT INVERTS.

DESIGNED JAL
DRAWN JAL
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DATE 8/30/2024

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LICENSED PROFESSIONAL ENGINEER
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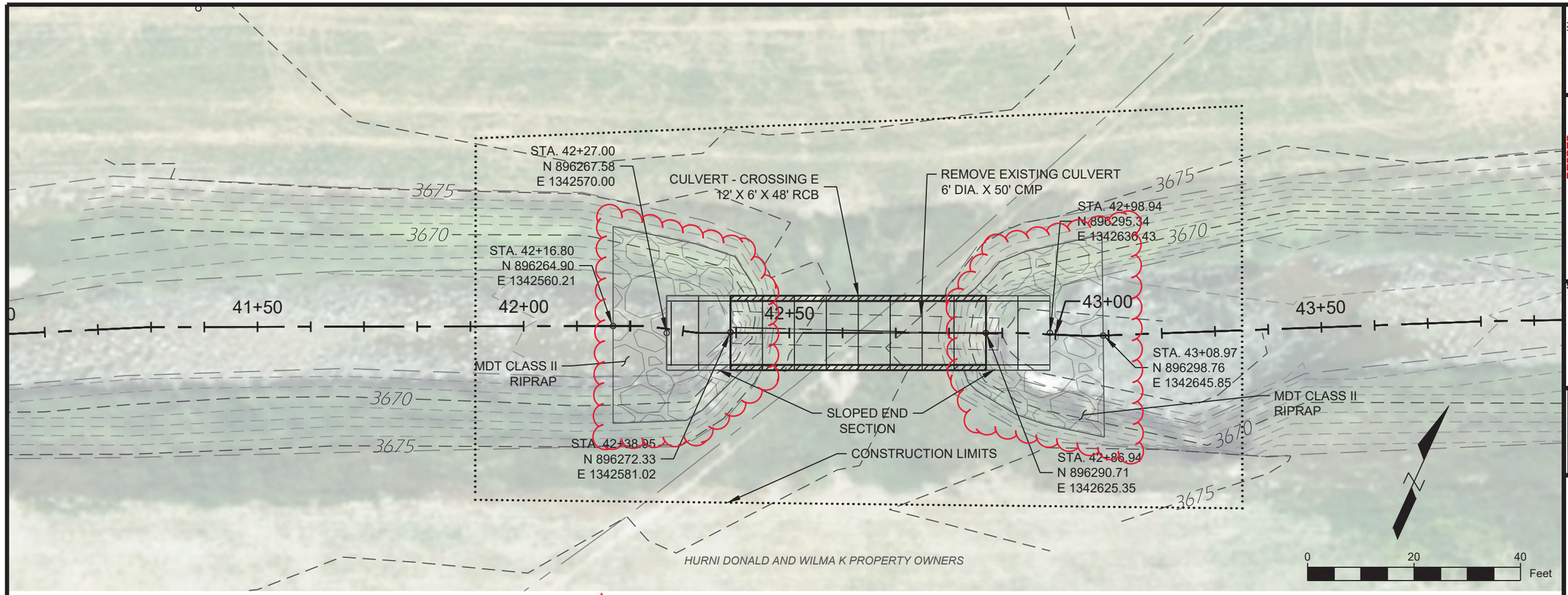
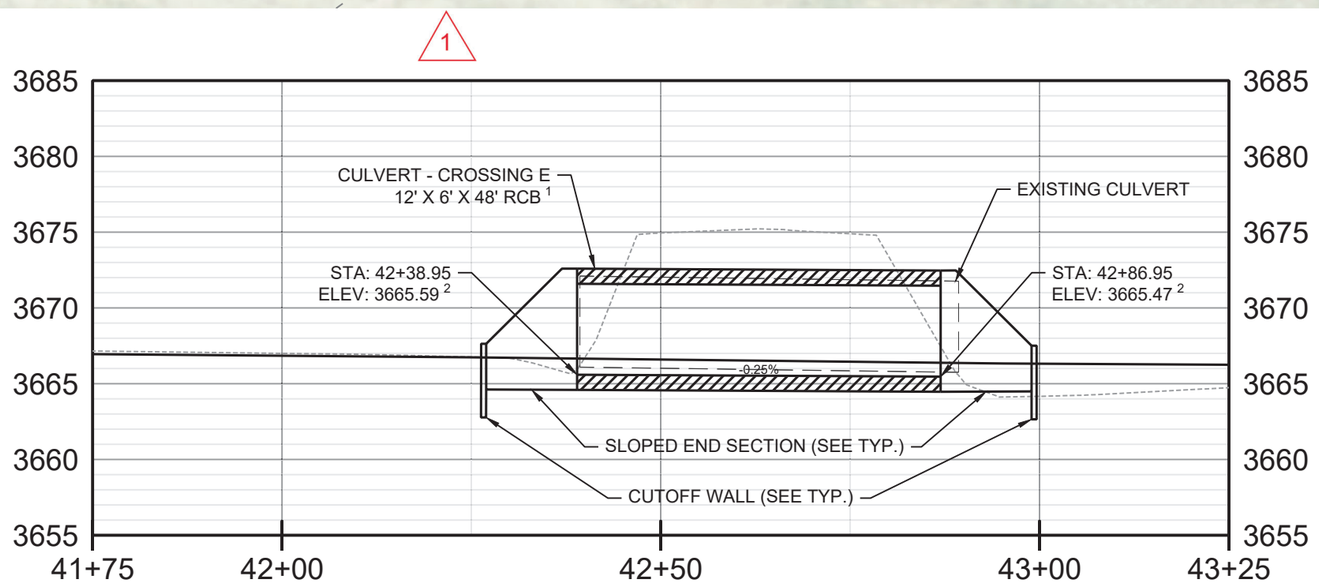
VFMMP - LOWER D2 FLOOD INFRASTRUCTURE IMPROVEMENTS

CROSSING F - CULVERT DETAIL

SHEET NUMBER:
C-04R
SHEET

NAME: N:\PROJECTS\W0138.23003-LCC VFMMP LOWER D2 TO5\CAD\SHEETS\W0138.23003_LOWER D2_S_CULVERT P&P.DWG
PLOT DATE: September 12, 2024 9:51 AM, BY: JACOB LACY





CROSSING E - CULVERT PROFILE
HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 10'

NOTES:

1. CULVERT WILL BE PLACED IN A MANNER THAT THE POST-CONSTRUCTION EQUILIBRATED CHANNEL PROFILE WILL BE 1.0' ABOVE CULVERT INVERTS.

EXISTING GROUND PROFILE
POST CONSTRUCTION EQUILIBRATED CHANNEL PROFILE

DESIGNED JAL
DRAWN JAL
CHECKED MWJ
DATE 8/30/2024

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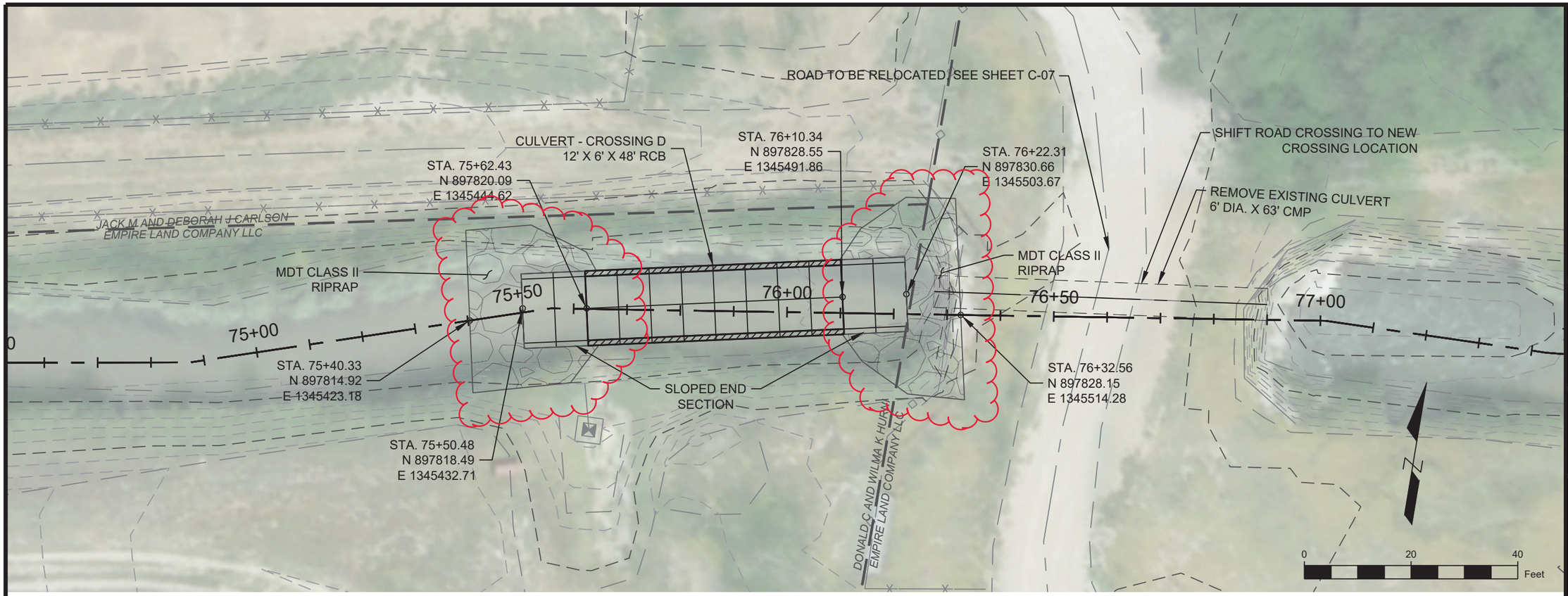
VFMMP - LOWER D2 FLOOD INFRASTRUCTURE IMPROVEMENTS

CROSSING E - CULVERT DETAIL

SHEET NUMBER:
C-05R
SHEET

NAME: N:\PROJECTS\W0138.23003-LCC.VFMMP LOWER D2 TO5\CAD\SHEETS\W0138.23003_LOWER D2_S_CULVERT P&P.DWG
PLOT DATE: September 12, 2024 9:51 AM, BY: JACOB LACY



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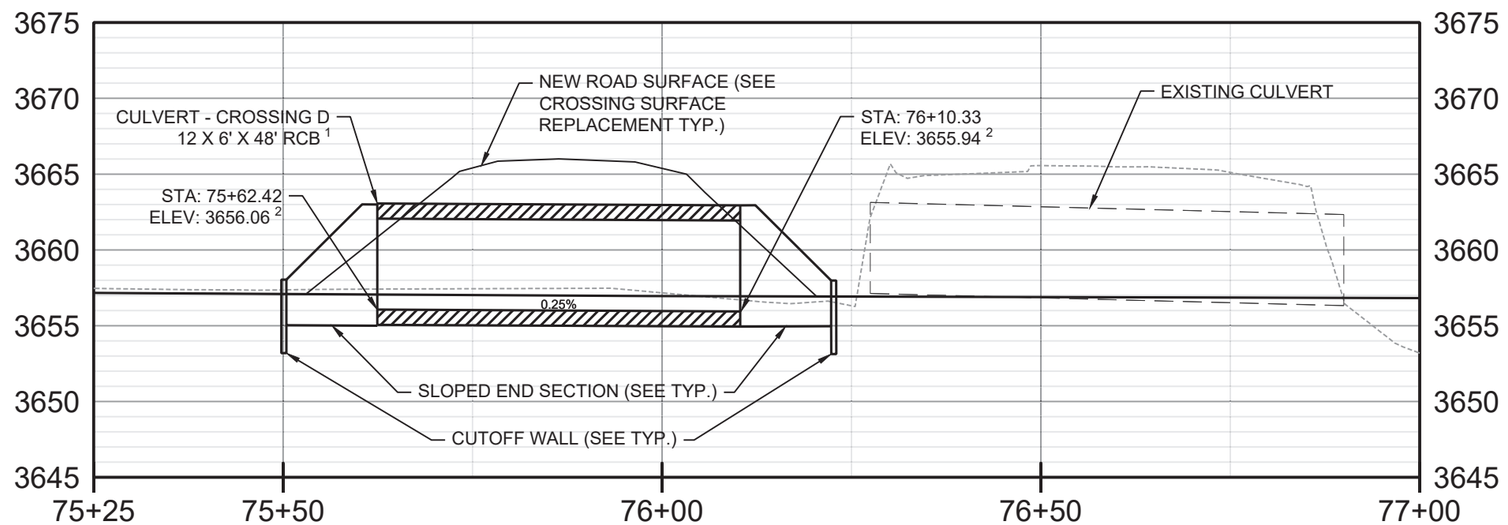

CROSSING D - CULVERT PROFILE
HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 10'

EXISTING GROUND PROFILE
POST CONSTRUCTION EQUILIBRATED CHANNEL PROFILE

NOTES:

1. REMOVAL OF EXISTING CULVERT TO BE COMPLETED ONLY AFTER NEW CULVERT INSTALLED AND NEW ROADWAY COMPLETED.
2. CULVERT WILL BE PLACED IN A MANNER THAT THE POST-CONSTRUCTION EQUILIBRATED CHANNEL PROFILE WILL BE 1.0' ABOVE CULVERT INVERTS.
3. EASEMENT BOUNDARIES ARE APPROXIMATE AND NOT FOR LEGAL PURPOSES.
4. CONSTRUCTION LIMITS SHOWN ON SHEETC-07

NAME: N:\PROJECTS\W0138.23003-LCC.VFMMP LOWER D2 TO5\CAD\SHEETS\W0138.23003_LOWER D2_S_CULVERT P&P.DWG
PLOT DATE: September 12, 2024 9:51 AM, BY: JACOB LACY

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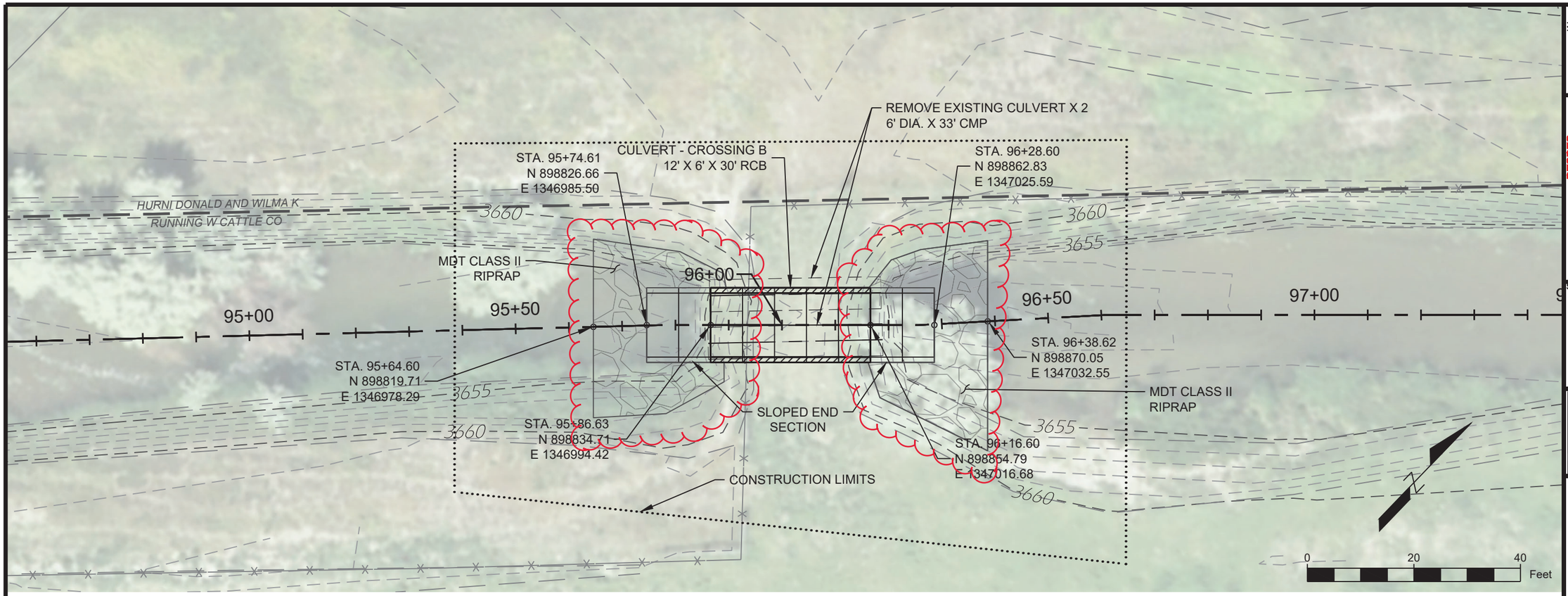
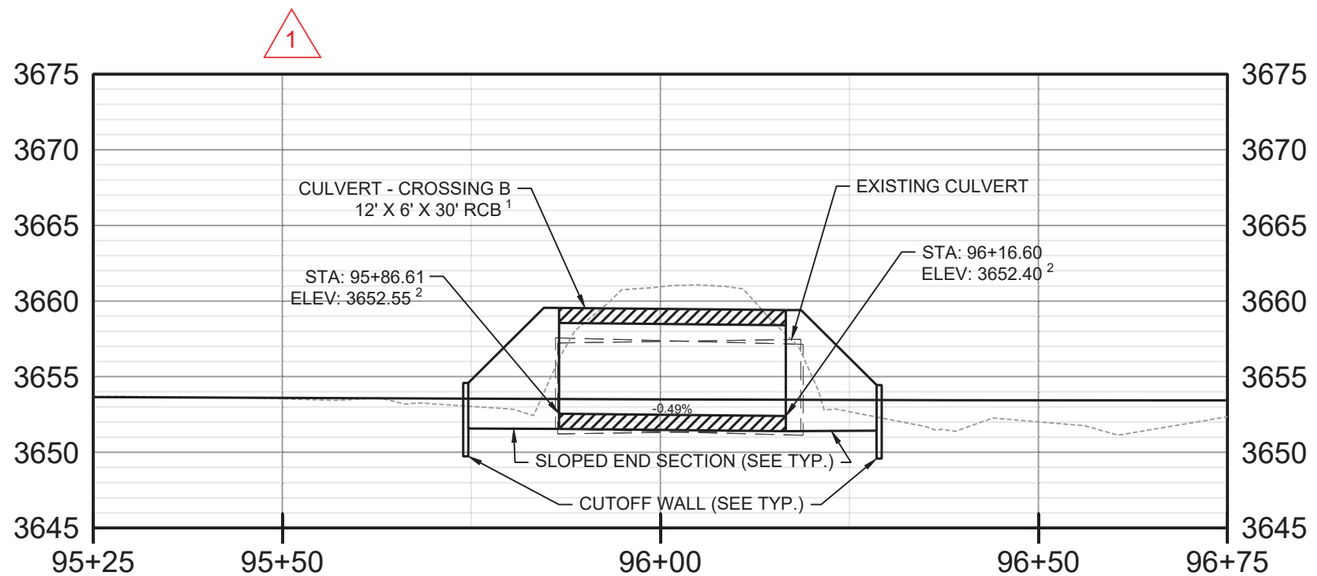
VFMMP - LOWER D2 FLOOD INFRASTRUCTURE IMPROVEMENTS

CROSSING D - CULVERT DETAIL

SHEET NUMBER:
C-06R
SHEET





CROSSING B - CULVERT PROFILE
HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 10'

EXISTING GROUND PROFILE
POST CONSTRUCTION EQUILIBRATED CHANNEL PROFILE

NOTES:

1. CULVERT WILL BE PLACED IN A MANNER THAT THE POST-CONSTRUCTION EQUILIBRATED CHANNEL PROFILE WILL BE 1.0' ABOVE CULVERT INVERTS.

NAME: N:\PROJECTS\W0138.23003-LCC.VFMMP LOWER D2 TO5\CAD\SHEETS\W0138.23003_LOWER D2_S_CULVERT P&P.DWG
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CHECKED MWJ
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REGISTERED PROFESSIONAL ENGINEER
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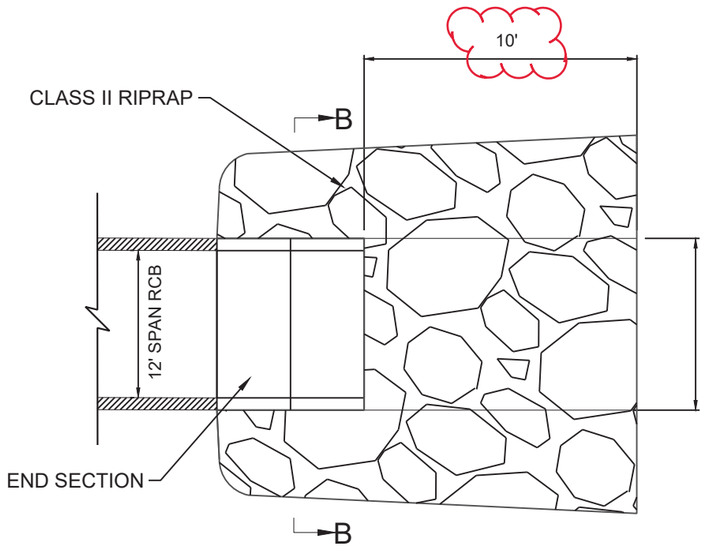
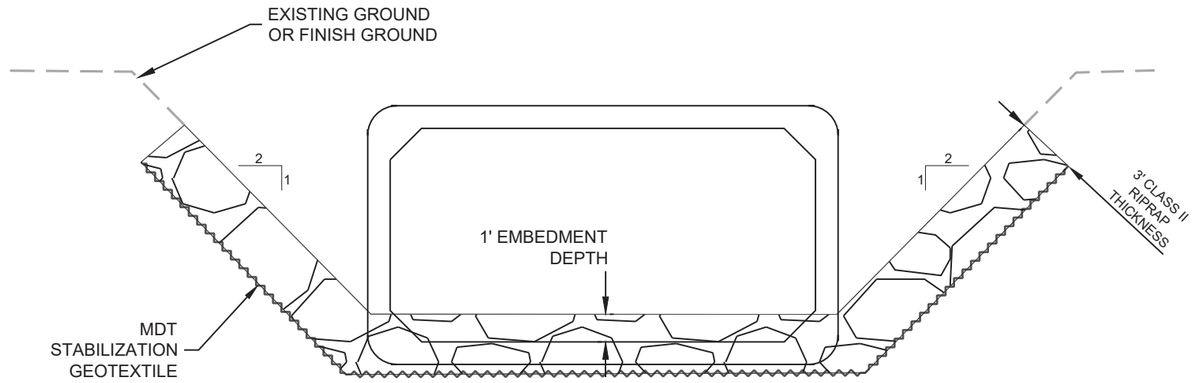
VFMMP - LOWER D2 FLOOD INFRASTRUCTURE IMPROVEMENTS

CROSSING B - CULVERT DETAIL

SHEET NUMBER:
C-09R
SHEET



PLAN VIEW
NO SCALE



SECTION B-B
NO SCALE

CULVERT INLET AND OUTLET DETAIL

1

CULVERT	STATION START INLET RIPRAP	STATION END INLET RIPRAP	CHANNEL LENGTH OF INLET RIPRAP (FT)	STATION START OUTLET RIPRAP	STATION END OUTLET RIPRAP	CHANNEL LENGTH OF OUTLET RIPRAP (FT)
GLASS DRIVE #1	27+06.57	27+57.54	36	28+02.54	28+50.55	36
GLASS DRIVE #2	29+51.53	29+97.71	36	30+27.72	30+72.26	36
CROSSING F	38+91.09	39+39.26	36	40+17.16	40+65.73	36
CROSSING E	41+90.86	42+38.95	36	42+86.94	43+34.96	36
CROSSING D	75+14.88	75+62.42	36	76+10.34	76+58.23	36
CROSSING B	95+38.62	95+86.63	36	96+16.60	96+64.65	36

DESIGNED JAL
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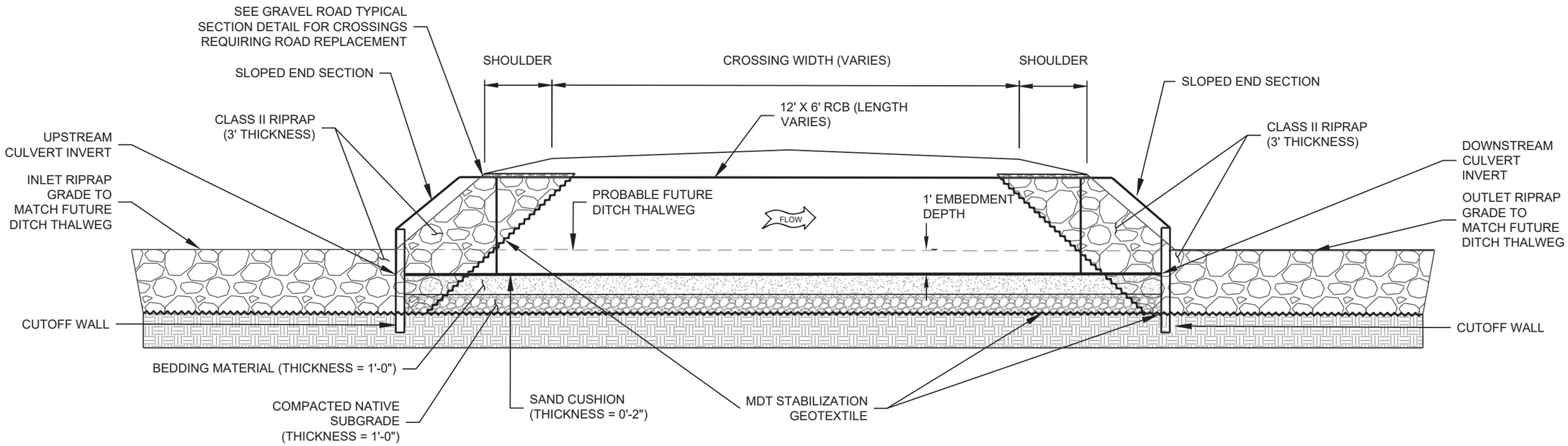
3402 COONEY DRIVE
HELENA, MT 59602

VFMMP - LOWER D2
FLOOD
INFRASTRUCTURE
IMPROVEMENTS

INLET AND
OUTLET RIP RAP
TYPICAL DETAILS

SHEET NUMBER:
D-03R
SHEET

NAME: N:\PROJECTS\W0138.23003-LCC VFMMP LOWER D2 TOS\CAD\SHEETS\W0138.23003_LOWER D2_S_DETAILS.DWG
PLOT DATE: September 12, 2024 11:22 AM, BY: JACOB LACY



REPLACEMENT CROSSING TYPICAL PROFILE

N.T.S

CULVERT	PROPOSED CROSSING WIDTH (FT)	SHOULDER WIDTH (FT)
GLASS DRIVE #1	20	2
GLASS DRIVE #2*	10	2
CROSSING F	63	2
CROSSING E	29	2
CROSSING D*	20	3
CROSSING B	13	2

* CROSSING REQUIRING ROAD REPLACEMENT OR RELOCATION

1

NOTES:

1. BACKFILLING RIPRAP IN CULVERT BARREL NOT REQUIRED. USE NATIVE CHANNEL MATERIAL AT CULVERT INLET AND OUTLET TO FEATHER INTO FG RIPRAP AT 2:1 SLOPE WITHIN CULVERT BARREL.

DESIGNED JAL
DRAWN JAL
CHECKED MWJ
DATE 8/30/2024

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3810 VALLEY COMMONS DR SUITE 4
BOZEMAN, MT 59718
WWW.RESPEC.COM PHONE: (406)284-2525

STAMP
MONTANA
MATTHEW WYNN JOHNSON
No. 32820PE
LICENSED PROFESSIONAL ENGINEER
9/2024

811 Know what's below. Call before you dig.

LEWIS AND CLARK COUNTY
PUBLIC WORKS
3402 COONEY DRIVE
HELENA, MT 59602

VFMMP - LOWER D2
FLOOD
INFRASTRUCTURE
IMPROVEMENTS

CROSSING
SURFACE
REPLACEMENT
TYPICAL DETAILS

SHEET NUMBER:
D-04R
SHEET

NAME: N:\PROJECTS\W0138.23003-LCC.VFMMP LOWER D2 TO5\CAD\SHEETS\W0138.23003_LOWER D2_S_DETAILS.DWG
PLOT DATE: September 12, 2024 9:53 AM, BY: JACOB LACY