MnDOT and MnCPA: Lessons in Collaboration

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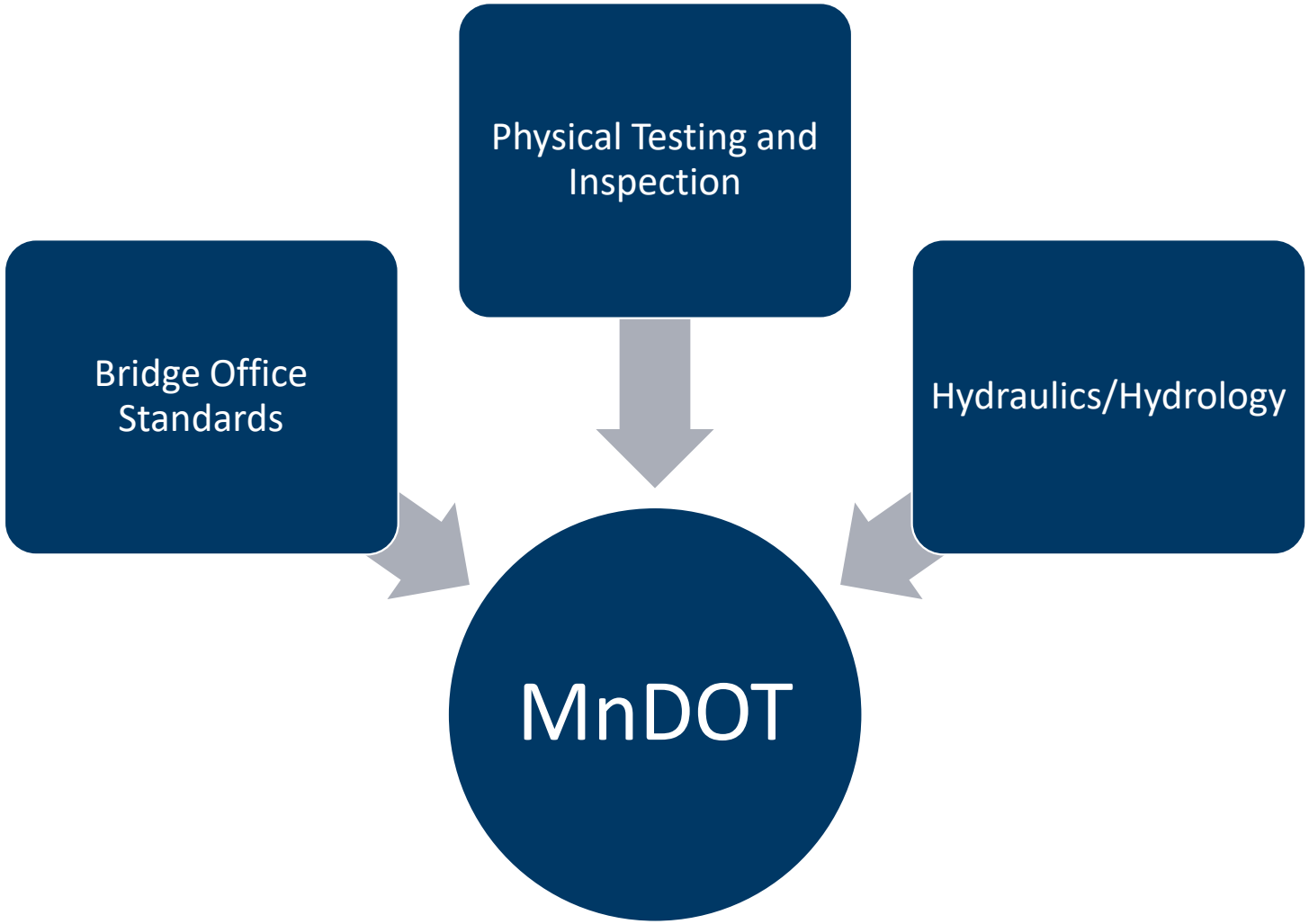
DEPARTMENT OF TRANSPORTATION

mndot.gov/

MnDOT Structure



MnCPA Technical Committee

- ***Engineering***
- ***Production***
- ***Technical Resources***

Oldcastle Infrastructure™
A CRH COMPANY

COUNTY®
MATERIALS CORPORATION

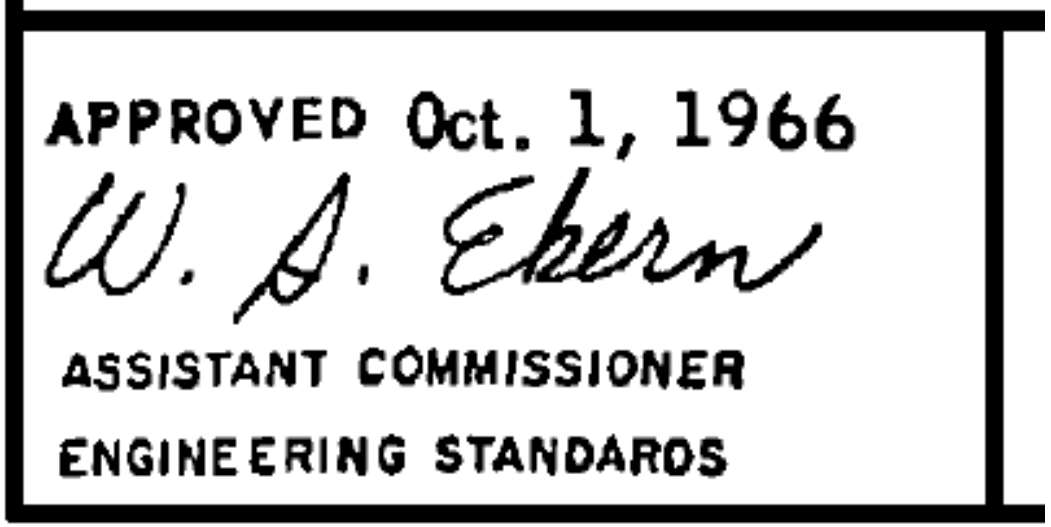
Rinker®
MATERIALS®
A QUIKRETE® COMPANY

“Both MnDOT and Fabricators are interested in providing a quality product at the right cost.”

History of MnDOT/MnCPA Collaboration

2005	Earliest Documented MnPA/MnDOT Meetings
May 2012	Suggested creating similar group for CP
January 2017	More frequent meetings implemented

OTHER APPROVED PIPES MAY BE



Example Agenda

- Introductions
- Box Culvert Items
- Pipe Issues
  - Group I – Finalized Plates
  - Group II – Plates Ready to be finalized
  - Group III – Additional Design and Drafting Work Required
- Round Robin

What is Brought to the Table

Industry Benefits

- Understanding Expectations
- Opportunity to Offer Input
- Improving the End Product
- Future Outlook on MnDOT Direction

MnDOT Benefits

- Improved performance
- A National Perspective
- Fabrication Expertise
- Design knowledge

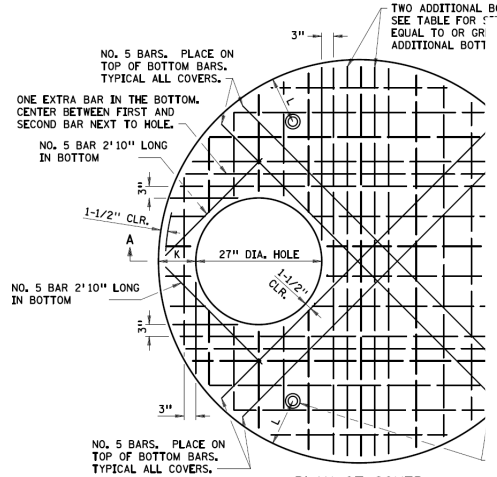
Who is Involved?

- MnDOT
- Pipe fabricators
- ACPA
- Other industry participants

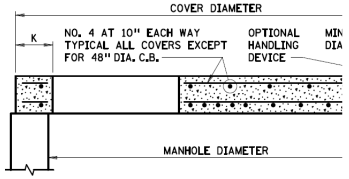
TABLE

	C.B. OR M.H. DIA.	COVER DIAMETER	WEIGHT OF SECTION	T	K	L	BOTTOM BARS EACH WAY
①	48"	58"	1140 LBS.	6"	6"	8"	NO. 5 AT 6"
	54"	65"	1990 LBS.	8"	6"	8"	NO. 5 AT 8"
	60"	72"	2510 LBS.	8"	7"	9"	NO. 5 AT 7"
	66"	79"	3090 LBS.	8"	7"	9"	NO. 5 AT 7"
	72"	86"	3720 LBS.	8"	8"	10"	NO. 5 AT 6"
	78"	93"	4400 LBS.	8"	8"	10"	NO. 5 AT 5"
	84"	100"	5140 LBS.	8"	9"	11"	NO. 5 AT 5"
	90"	107"	5930 LBS.	8"	9"	11"	NO. 5 AT 5"
	96"	114"	6770 LBS.	8"	9"	11"	NO. 6 AT 6"
	102"	121"	7670 LBS.	8"	9"	12"	NO. 6 AT 5"
	108"	126"	12520 LBS.	12"	10"	12"	NO. 5 AT 6"
	120"	140"	15560 LBS.	12"	11"	13"	NO. 5 AT 6"

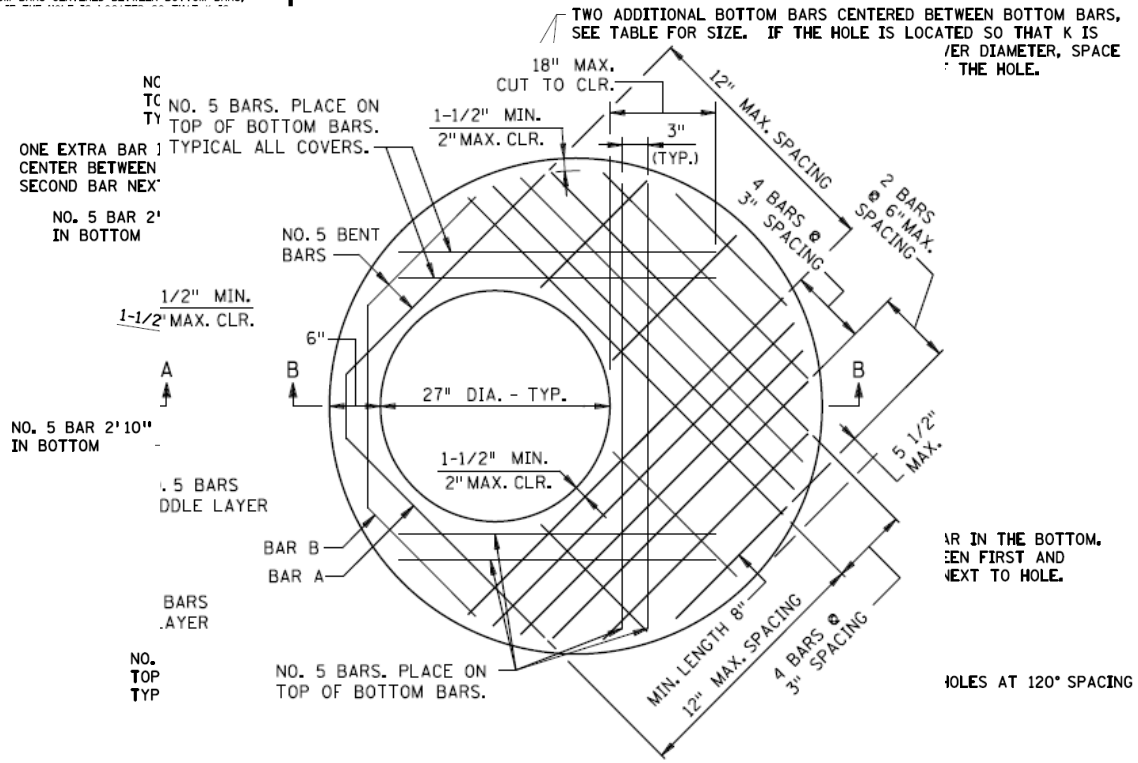
① ONLY NECESSARY TO USE BOTTOM LAYER OF STEEL.



PLAN OF COVER
TOP BARS NOT SHOWN



SECTION A-A



PLAN - OPTION 2

TABLE

	C.B. OR M.H. DIA.	COVER DIAMETER	WEIGHT OF SECTION	T	K	L	BOTTOM BARS EACH WAY
①	48"	58"	1140 LBS.	6"	6"	8"	NO. 5 AT 6"
	54"	65"	1990 LBS.	8"	6"	8"	NO. 5 AT 8"
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① ONLY NECESSARY TO USE BOTTOM LAYER OF STEEL.

NOTES:

AASHTO HS 25 LOADING.

MAXIMUM FILL HEIGHT 15 FT.

THE NO. 4020 SHALL BE PERMANENTLY MARKED OF THE COVER.

EQUIVALENT STEEL AREAS IN WIRE MESH MAY BE USED.

REINFORCEMENT PER SPEC. 3301, GRADE 60. ANY STEEL REINFORCEMENT THAT IS WELDED DURING FABRICATION SHALL MEET THE REQUIREMENTS OF ASTM A706.

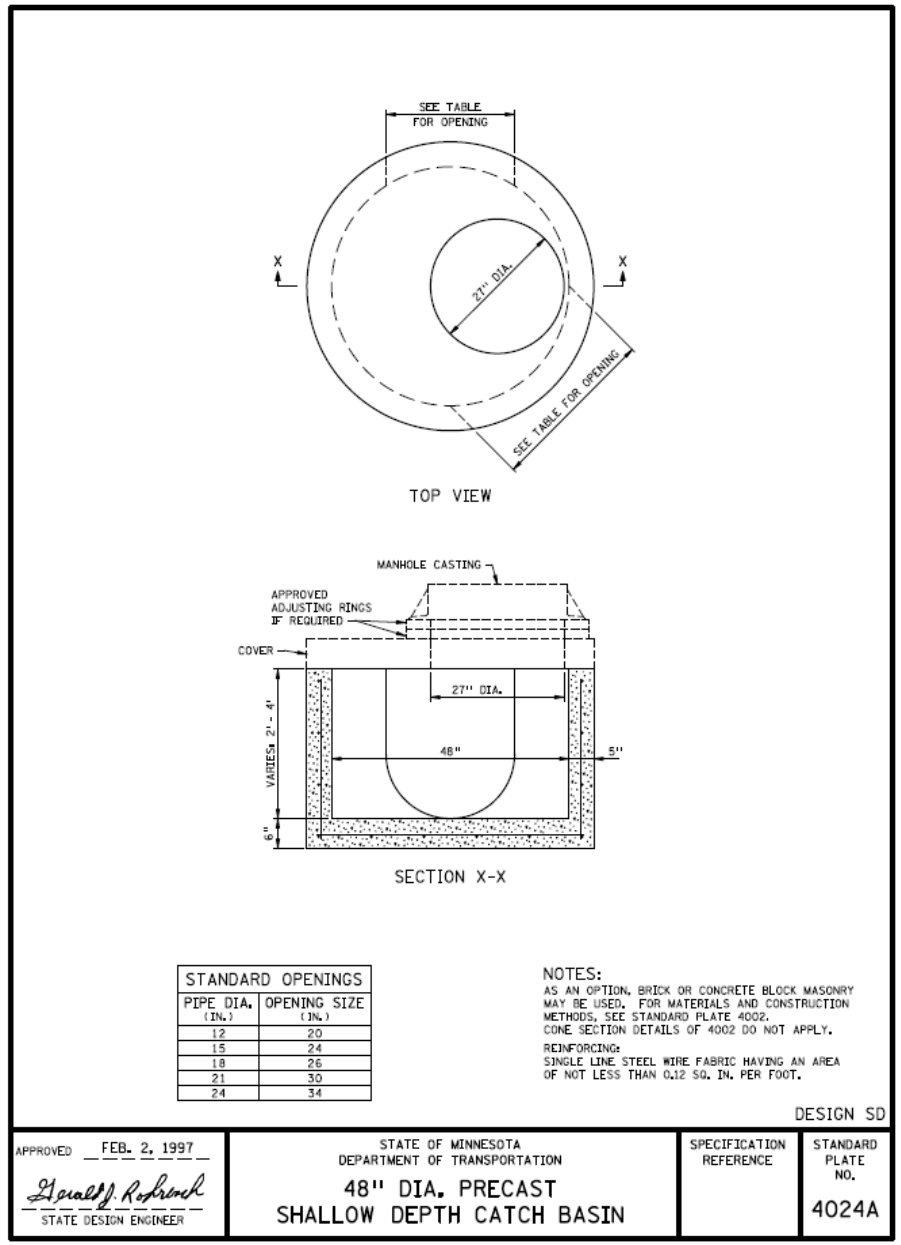
REFER TO PLANS FOR STEP REQUIREMENTS, HEIGHT, & DIAMETER.

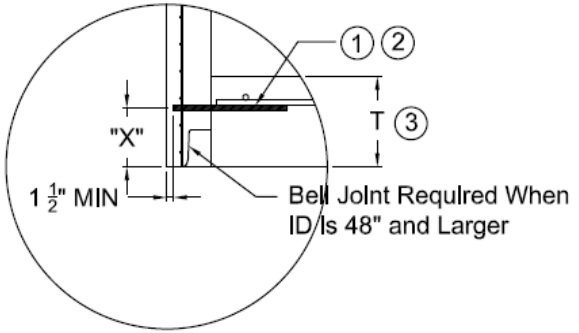
SEE SHEET (2 OF 2) FOR INSTALLATION DETAILS.

DESIGNER NOTE:
WHEN STRUCTURE IS USED AS A CATCH BASIN, GIVE X & Y COORDINATES OF BOTH THE CENTERLINE FOR A, C, F OR G STRUCTURE AND THE CENTERLINE FOR THE 4020 STRUCTURE.

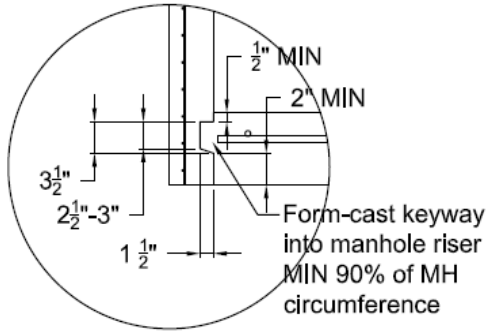
DESIGNATION:
DESIGN DIA. - STANDARD PLATE EXAMPLE: DESIGN 66 - 4020

APPROVED NOV. 22, 2000 Delbert W. Tinder STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION MANHOLE OR CATCH BASIN FOR USE WITH OR WITHOUT TRAFFIC LOADS	SPECIFICATION REFERENCE 2506 REVISION DATE 3-22-2013 M.J.E.	STANDARD PLATE NO. 4020J 1 OF 2

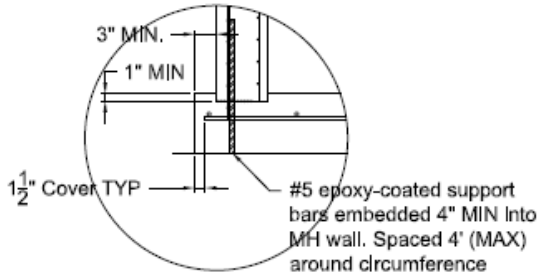




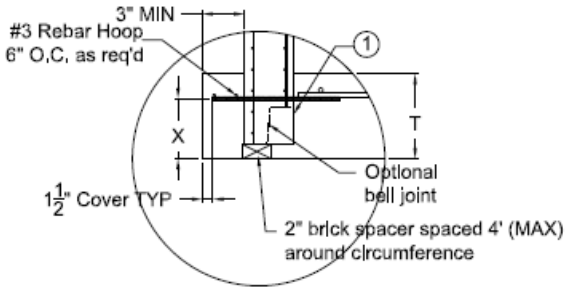
STANDARD SECONDARY POUR



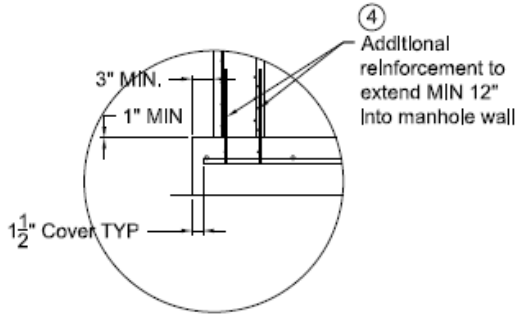
KEYWAY SECONDARY POUR



SECONDARY POUR W/
EXTENDED BASE OPTION 1

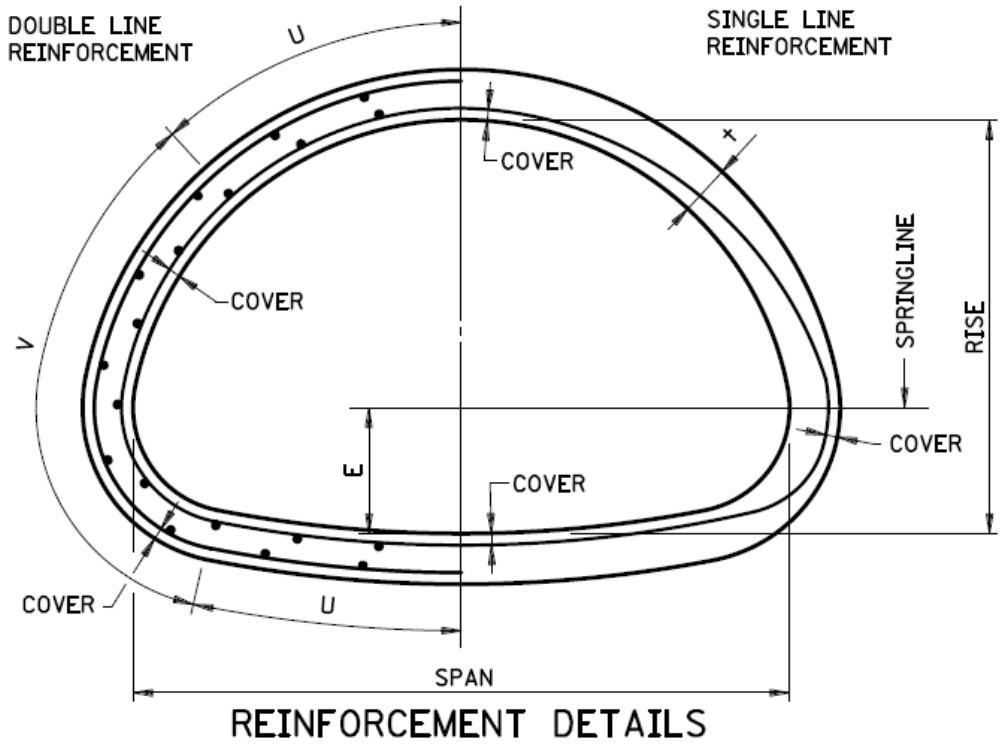


② SECONDARY POUR W/
EXTENDED BASE OPTION 2



② SECONDARY POUR W/
EXTENDED BASE OPTION 3

Arch Pipe Design Revisions



REINFORCEMENT DETAILS

Required Steel Calculation for Arch Pipe

Date:

Inputs		
Eq.Diameter, D_{eq}	132	in
Concrete Strength, f'_c	6	ksi
Class	IIIA	

Outputs		
Span, S_i	168.75	in
Rise, H	106.5	in
Wall Thickness, t	10	in
Inner Cage, As_i	1.089	in^2/ft
Outer Cage, As_o	0.816	in^2/ft
U - Inner Cage, As_U	1.089	in^2/ft
V - Outer Cage, As_V	0.816	in^2/ft
TOP Shear Steel, As_r	0.227	in^2/ft^2
Top Stirrup Span, X	71	in
Max Spacing, S	5.5	in
BTM Shear Steel, As_r	0.152	in^2/ft^2
Bottom Stirrup Span, Z	74	in
Max Spacing, S	5.5	in

Key Assumptions		
Max Cover, C_c	1.00	in
Max Circumferential Spacing, S	2	in
Number of Cages Per Layer, nl	1	unitless
(As_o/As_i), C_s	0.75	unitless
Unit Width, b	12	in
C_l	1.9	in
Steel Strength, f_y	65	ksi
Factor for Shear , ϕ_v	0.90	unitless
Factor for Radial Tension, ϕ_r	0.90	unitless
Factor for Flexure, ϕ_f	1.00	unitless
Factor for Crack Control, ϕ_{cr}	1.00	unitless
Developable Stirrup Strength, f_v	60	ksi

Limitations
Only for Arch pipe equivalent sizes 48" - 132"

Lintel Beam Issues

Effective Collaboration Tips

- Find Common Ground (It’s a Partnership)
- Set Reasonable Expectations
- Permit Open Dialogue (Both Industry and State)
- Use Clear and Concise Communication
- Meet Regularly
- Clearly Document Processes, Decisions, and Rationale
- Form Subgroups

Thank You!

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