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VERY IMPORTANT!
Please Read Before Using

These form ties are designed with a BREAK-BACK feature. Care is to be used in installing them properly in the forms to prevent damage by bending. ANY damaged or bent ties should be replaced before concrete is poured.

To assure the best BREAK-BACK of your ties, break all the ends as soon as possible after the concrete has hardened.

Always space form ties so the working load NEVER exceeds the above SAFE WORKING LOAD based on:

1. Concrete Temperature
2. Vertical Height of Concrete Placement.
3. Concrete Mix Chemistry and Slump.
4. Rate of Concrete Placement.

Rate of Placement (ft/hr)	Concrete Temperature at time of placement (degrees F)					
	50	60	70	80	90	100
	Maximum Form Pressure					
1	600.00	600.00	600.00	600.00	600.00	600.00
2	600.00	600.00	600.00	600.00	600.00	600.00
3	600.00	600.00	600.00	600.00	600.00	600.00
4	600.00	600.00	600.00	600.00	600.00	600.00
5	750.00	750.00	750.00	712.50	650.00	600.00
6	900.00	900.00	900.00	825.00	750.00	690.00
7	1050.00	1050.00	1050.00	937.50	850.00	780.00

*Based on recommendations and formulas per ACI 347R-14 for 150 pcf normal weight concrete, type I, II or III cement without slag, fly ash and retarders, slump less than or equal to 7", pour rate less than 7 ft/hr, wall or column height less than or equal to 14' high, and internal vibration depth less than or equal to 4 ft.

*Minimum allowable design pressure = 600 psf
*Maximum pressure = wh

SAFE LOAD RATINGS OF WIRE TIES		
Ties	Ultimate Load (lbs.)	Safe Working Load (lbs.) (FOS 2:1)
4 ga. Tie	4,500	2,250
3 ga. Tie	5,500	2,750
2 ga. Tie	6,500	3,250

GENERAL NOTES

- A. Gates & Sons, Inc. (Gates) has prepared these drawings based on information provided to Gates by others. These drawings are intended to illustrate a proper manner for the erection and use of the goods shown on these drawings, based on the information provided by others as to the intended use of these goods.
- B. Gates makes no warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose.
- C. The customer and not Gates, has the responsibility for the actual use of the drawings and the erection and use of the goods; for the checking of accuracy of field details and dimensions; for identifying and complying with all OSHA, state and local laws, ordinances.
- D. Gates shall have no responsibility for any of the above matters. Gates shall have no liability for loss, liability or expense incurred by the customer for personal injury, property damage, or economic injury (including consequential damages) occurred by the customer arising out of or caused by any defect in the drawings or the goods.
- E. Gates' only responsibility in the event of a defect is to repair or replace the defective drawings or goods.

FORMWORK DESIGN NOTES

- A. Wale & brace all formwork joints that are not tied.
- B. Job built fillers and/or bulkheads, along with all job built formwork, are the customers design and construction responsibility unless noted otherwise.
- C. Inspect completed formwork before pouring to assure proper placement and secure connections of ties, wedge bolts and other associated hardware.
- D. Do not attach scaffold brackets to forms without proper consideration and prevention of overturning tendency. Customer to erect guard rails, planks, and toe boards to local and/or OSHA standards.
- E. Do not weld or bend, or otherwise alter ties or other accessories as it may seriously reduce their strength. Do not try to force position of forms or ties by striking or hammering on ends of wire ties.
- F. Lift handle and intercoastal rods are to be used to manually transport forms or as an integral structure member. They are not to be used as a support or for any other purpose. They are not to be used as hand holds, worker supports in climbing, or for safety sling attachment unless noted otherwise.
- G. Braces are shown for alignment and plumbing only. They are not intended to restrict the concrete pressure or wind loading and should be considered inadequate for these purposes unless noted otherwise.
- H. For safety guidelines, refer to SSFI Guide to Safety Procedures for Vertical Concrete Formwork.

FORMWORK TIES

THE SAFE LOAD CAPACITY* OF THE TIES USED IN THIS LAYOUT IS XXXX LBS. UNLESS NOTED OTHERWISE.

* (2:1 SAFETY FACTOR)



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PROJECT:	FORMWORK PRESSURE CHART AND NOTES
CUSTOMER:	GATES & SONS, INC. 90 S. FOX STREET DENVER, CO. 80223
SHEET TITLE:	GENERAL NOTES AND POUR CHART
JOB NO.:	2015-073
DATE:	05/07/2015
DRAWN BY:	TDK

SCALE:	0 1'
SHEET:	1.0
REVISION:	-

VARIABLE DEFINITIONS AND EQUATIONS PER ACI 347R-14

Equations:

$C_{CP} = wh$	eqn. 4.2.2.1a(a)
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Columns and Walls with rate of placement < 7ft/hr, not exceeding 14' high:

$C_{CPmax} = C_w C_c (150 + 9000 R/T)$	eqn. 4.2.2.1a(b)
--	------------------

With a maximum pressure of wh
and minimum pressure of $600 C_w$, but never more than wh

Walls with Rate of Placement < 7ft/hr and greater than 14' high and for all walls with placement rate 7 to 15ft/hr:

$C_{CPmax} = C_w C_c (150 + 43400/T + 2800 R/T)$	eqn. 4.2.2.1a(c)
--	------------------

With a maximum pressure of wh
and minimum pressure of $600 C_w$, but never more than wh

Table 1. Coefficients to be used in pressure equations

Unit weight coefficient, C_w	
Concrete weighing less than 140 pcf	$C_w = 0.5(1+w/145)$ but not less than 0.80
Concrete weighing 140 to 150 pcf	$C_w = 1.0$
Concrete weighing more than 150 pcf	$C_w = w/145$
Chemistry coefficient, C_c	
Type I, II or III cement without Slag, Flyash and Retarders*	1.0
Type I, II or III cement without Slag or Flyash, with a retarder*	1.2
Other types or blends without retarders* containing less than 70% slag or less than 40% flyash	1.2
Other types or blends with retarders* containing less than 70% slag or less than 40% flyash	1.4
Blends containing more than 70% slag or 40% flyash, without retarders*	1.4
Blends containing more than 70% slag or 40% flyash with retarders*	1.5

*Retarders include any admixtures such as retarders, retarding water reducers, or retarding high-range water-retarding admixtures that delay the setting of concrete.

Slump	Internal Vibration Depth	Element	Rate of Placement	Pressure Equation
Greater than 7 in.	Any	Any	Any	4.2.2.1a(a)
Less than or equal to 7 in.	Greater than 4 ft	Any	Any	4.2.2.1a(a)
		Column	Any	4.2.2.1a(b)
Less than or equal to 7 in.	Less than or equal to 4 ft	Wall less than or equal to 14ft tall	Less than 7ft/hr	4.2.2.1a(b)
		Wall greater than 14 ft tall	Less than 7 ft/hr	4.2.2.1a(c)
		Wall	7 to 15 ft/hr.	4.2.2.1a(c)
		Wall	Greater than 15 ft/hr	4.2.2.1a(a)

NOTES:

- SEE CHARTS ON SHEET 2.0 FOR DEFINITION OF AND INSTRUCTIONS ON WHEN TO USE ALL VARIABLES.
- THESE CHARTS ARE ONLY FOR $C_w = 1.0$, CONTACT DH GLABE & ASSOCIATES IF VALUES FOR OTHER THAN NORMAL WEIGHT CONCRETE ARE REQUIRED.
- ABOVE THE BOLD LINE, FULL LIQUID HEAD, OR 600 PSF MINIMUM ALLOWABLE DESIGN PRESSURE CONTROLS. BELOW THE BOLD LINE ARE VALUES TABULATED FROM ACTUAL CALCULATIONS USING THE FORMULA DESIGNATED FOR EACH TABLE.

Concrete Weight: 150 pcf

Equation 4.2.2.1a(a)

$C_{CP} = wh$ Form Height (ft) Form Pressure for Full Liquid Head (psf)

1	150 (use 600)
2	300 (use 600)
3	450 (use 600)
4	600
5	750
6	900
7	1050
8	1200
9	1350
10	1500
11	1650
12	1800
13	1950
14	2100
15	2250
16	2400
17	2550
18	2700
19	2850
20	3000

PROCEDURE FOR TABLE USE:

- DETERMINE PARAMETERS OF POUR:
 - SLUMP (GREATER THAN, OR LESS THAN OR EQUAL TO 7")
 - INTERNAL VIBRATION DEPTH (GREATER THAN, EQUAL TO OR LESS THAN 4')
 - ELEMENT (WALL LESS THAN OR GREATER THAN 6' LONG OR COLUMN)
 - DESIRED RATE OF PLACEMENT (LESS THAN OR GREATER THAN 7 FT/HR.)
 - WALL HEIGHT LESS THAN OR GREATER THAN 14'
- BASED ON ANSWERS TO QUESTIONS IN #1 ABOVE, DETERMINE EQUATION TO BE USED.
- IF USING EQUATION 4.2.2.1a(b) OR (c) DETERMINE CHEMISTRY COEFFICIENT TO BE USED FROM TABLE #1 AT LEFT.
- FIND CORRECT TABLE TO BE USED BASED ON EQUATION AND CHEMISTRY COEFFICIENT.
- FIND ALLOWABLE RATE OF PLACEMENT BASED ON MAXIMUM ALLOWABLE PRESSURE ON FORMWORK SYSTEM AND TEMPERATURE OF CONCRETE AT TIME OF PLACEMENT.

Equation 4.2.2.1a(b)

$C_{CPmax} = C_w C_c (150 + 9000 R/T)$

$C_w =$	1.0
$C_c =$	1.0

Rate of Placement (ft/hr)	Concrete Temperature at time of placement (degrees F)					
	50	60	70	80	90	100
	Maximum Form Pressure					
1	600.00	600.00	600.00	600.00	600.00	600.00
2	600.00	600.00	600.00	600.00	600.00	600.00
3	600.00	600.00	600.00	600.00	600.00	600.00
4	600.00	600.00	600.00	600.00	600.00	600.00
5	750.00	750.00	750.00	712.50	650.00	600.00
6	900.00	900.00	900.00	825.00	750.00	600.00
7	1050.00	1050.00	1050.00	937.50	850.00	750.00

Equation 4.2.2.1a(b)

$C_{CPmax} = C_w C_c (150 + 9000 R/T)$

$C_w =$	1.0
$C_c =$	1.2

Rate of Placement (ft/hr)	Concrete Temperature at time of placement (degrees F)					
	50	60	70	80	90	100
	Maximum Form Pressure					
1	600.00	600.00	600.00	600.00	600.00	600.00
2	600.00	600.00	600.00	600.00	600.00	600.00
3	600.00	600.00	600.00	600.00	600.00	600.00
4	600.00	600.00	600.00	600.00	600.00	600.00
5	750.00	750.00	750.00	750.00	750.00	720.00
6	900.00	900.00	900.00	900.00	900.00	828.00
7	1050.00	1050.00	1050.00	1050.00	1020.00	936.00

Equation 4.2.2.1a(b)

$C_{CPmax} = C_w C_c (150 + 9000 R/T)$

$C_w =$	1.0
$C_c =$	1.4

Rate of Placement (ft/hr)	Concrete Temperature at time of placement (degrees F)					
	50	60	70	80	90	100
	Maximum Form Pressure					
1	600.00	600.00	600.00	600.00	600.00	600.00
2	600.00	600.00	600.00	600.00	600.00	600.00
3	600.00	600.00	600.00	600.00	600.00	600.00
4	600.00	600.00	600.00	600.00	600.00	600.00
5	750.00	750.00	750.00	750.00	750.00	750.00
6	900.00	900.00	900.00	900.00	900.00	900.00
7	1050.00	1050.00	1050.00	1050.00	1050.00	1050.00

Equation 4.2.2.1a(b)

$C_{CPmax} = C_w C_c (150 + 9000 R/T)$

$C_w =$	1.0
$C_c =$	1.5

Rate of Placement (ft/hr)	Concrete Temperature at time of placement (degrees F)					
	50	60	70	80	90	100
	Maximum Form Pressure					
1	600.00	600.00	600.00	600.00	600.00	600.00
2	600.00	600.00	600.00	600.00	600.00	600.00
3	600.00	600.00	600.00	600.00	600.00	600.00
4	600.00	600.00	600.00	600.00	600.00	600.00
5	750.00	750.00	750.00	750.00	750.00	750.00
6	900.00	900.00	900.00	900.00	900.00	900.00
7	1050.00	1050.00	1050.00	1050.00	1050.00	1050.00



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90 S. FOX STREET
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PROJECT: FORMWORK PRESSURE CHART AND NOTES

SHEET TITLE: ACI 347R-14 VARIABLE DEFINITIONS AND POUR CHARTS

JOB NO.: 2015-073

DATE: 05/07/2015

DRAWN BY: TDK

SCALE: 0 1'

SHEET: 2.0

REVISION: -

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Equation 4.2.2.1a(c)

$C_{CPmax} = C_w C_c(150 + 43400/T + 2800 R/T)$

C_w= 1.0
C_c= 1.0

Rate of Placement (ft/hr)	Concrete Temperature at time of placement (degrees F)					
	50	60	70	80	90	100
	Maximum Form Pressure					
1	600.00	600.00	600.00	600.00	600.00	600.00
2	600.00	600.00	600.00	600.00	600.00	600.00
3	600.00	600.00	600.00	600.00	600.00	600.00
4	600.00	600.00	600.00	600.00	600.00	600.00
5	750.00	750.00	750.00	750.00	750.00	724.00
6	900.00	900.00	900.00	900.00	818.89	752.00
7	1050.00	1050.00	1050.00	937.50	850.00	780.00
8	1200.00	1200.00	1090.00	972.50	881.11	808.00
9	1350.00	1293.33	1130.00	1007.50	912.22	836.00
10	1500.00	1340.00	1170.00	1042.50	943.33	864.00
11	1634.00	1386.67	1210.00	1077.50	974.44	892.00
12	1690.00	1433.33	1250.00	1112.50	1005.56	920.00
13	1746.00	1480.00	1290.00	1147.50	1036.67	948.00
14	1802.00	1526.67	1330.00	1182.50	1067.78	976.00
15	1858.00	1573.33	1370.00	1217.50	1098.89	1004.00

Equation 4.2.2.1a(c)

$C_{CPmax} = C_w C_c(150 + 43400/T + 2800 R/T)$

C_w= 1.0
C_c= 1.4

Rate of Placement (ft/hr)	Concrete Temperature at time of placement (degrees F)					
	50	60	70	80	90	100
	Maximum Form Pressure					
1	600.00	600.00	600.00	600.00	600.00	600.00
2	600.00	600.00	600.00	600.00	600.00	600.00
3	600.00	600.00	600.00	600.00	600.00	600.00
4	600.00	600.00	600.00	600.00	600.00	600.00
5	750.00	750.00	750.00	750.00	750.00	750.00
6	900.00	900.00	900.00	900.00	900.00	900.00
7	1050.00	1050.00	1050.00	1050.00	1050.00	1050.00
8	1200.00	1200.00	1200.00	1200.00	1200.00	1131.20
9	1350.00	1350.00	1350.00	1350.00	1277.11	1170.40
10	1500.00	1500.00	1500.00	1459.50	1320.67	1209.60
11	1650.00	1650.00	1650.00	1508.50	1364.22	1248.80
12	1800.00	1800.00	1750.00	1557.50	1407.78	1288.00
13	1950.00	1950.00	1806.00	1606.50	1451.33	1327.20
14	2100.00	2100.00	1862.00	1655.50	1494.89	1366.40
15	2250.00	2202.67	1918.00	1704.50	1538.44	1405.60

Equation 4.2.2.1a(c)

$C_{CPmax} = C_w C_c(150 + 43400/T + 2800 R/T)$

C_w= 1.0
C_c= 1.2

Rate of Placement (ft/hr)	Concrete Temperature at time of placement (degrees F)					
	50	60	70	80	90	100
	Maximum Form Pressure					
1	600.00	600.00	600.00	600.00	600.00	600.00
2	600.00	600.00	600.00	600.00	600.00	600.00
3	600.00	600.00	600.00	600.00	600.00	600.00
4	600.00	600.00	600.00	600.00	600.00	600.00
5	750.00	750.00	750.00	750.00	750.00	750.00
6	900.00	900.00	900.00	900.00	900.00	900.00
7	1050.00	1050.00	1050.00	1050.00	1020.00	936.00
8	1200.00	1200.00	1200.00	1167.00	1057.33	969.60
9	1350.00	1350.00	1350.00	1209.00	1094.67	1003.20
10	1500.00	1500.00	1404.00	1251.00	1132.00	1036.80
11	1650.00	1650.00	1452.00	1293.00	1169.33	1070.40
12	1800.00	1720.00	1500.00	1335.00	1206.67	1104.00
13	1950.00	1776.00	1548.00	1377.00	1244.00	1137.60
14	2100.00	1832.00	1596.00	1419.00	1281.33	1171.20
15	2250.00	1888.00	1644.00	1461.00	1318.67	1204.80

Equation 4.2.2.1a(c)

$C_{CPmax} = C_w C_c(150 + 43400/T + 2800 R/T)$

C_w= 1.0
C_c= 1.5

Rate of Placement (ft/hr)	Concrete Temperature at time of placement (degrees F)					
	50	60	70	80	90	100
	Maximum Form Pressure					
1	600.00	600.00	600.00	600.00	600.00	600.00
2	600.00	600.00	600.00	600.00	600.00	600.00
3	600.00	600.00	600.00	600.00	600.00	600.00
4	600.00	600.00	600.00	600.00	600.00	600.00
5	750.00	750.00	750.00	750.00	750.00	750.00
6	900.00	900.00	900.00	900.00	900.00	900.00
7	1050.00	1050.00	1050.00	1050.00	1050.00	1050.00
8	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00
9	1350.00	1350.00	1350.00	1350.00	1350.00	1254.00
10	1500.00	1500.00	1500.00	1500.00	1415.00	1296.00
11	1650.00	1650.00	1650.00	1616.25	1461.67	1338.00
12	1800.00	1800.00	1800.00	1668.75	1508.33	1380.00
13	1950.00	1950.00	1935.00	1721.25	1555.00	1422.00
14	2100.00	2100.00	1995.00	1773.75	1601.67	1464.00
15	2250.00	2250.00	2055.00	1826.25	1648.33	1506.00

NOTES:

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- THESE CHARTS ARE ONLY FOR C_w = 1.0, CONTACT DH GLABE & ASSOCIATES IF VALUES FOR OTHER THAN NORMAL WEIGHT CONCRETE ARE REQUIRED.
- ABOVE THE BOLD LINE, FULL LIQUID HEAD, OR 600 PSF MINIMUM ALLOWABLE DESIGN PRESSURE CONTROLS. BELOW THE BOLD LINE ARE VALUES TABULATED FROM ACTUAL CALCULATIONS USING THE FORMULA DESIGNATED FOR EACH TABLE.



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SHEET TITLE: POUR PRESSURE CHARTS

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