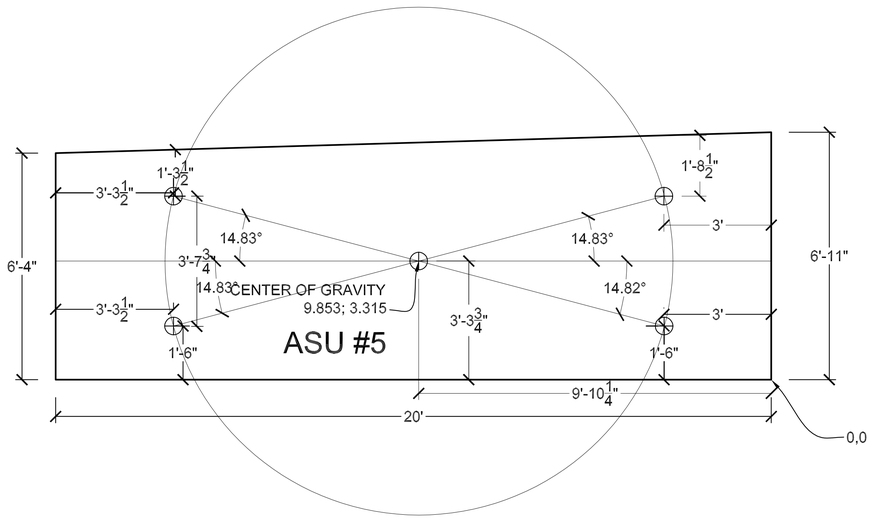
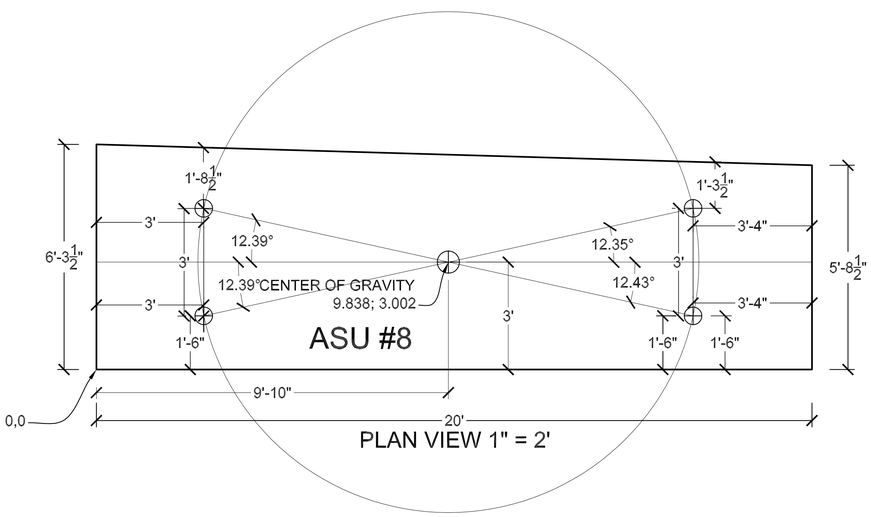


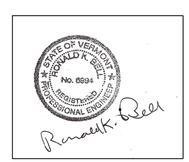


PLAN VIEW 1" = 2'

APROACH SLAB WEIGHTS

ASU #1	24,000LBS
ASU #2	30,000LBS
ASU #3	30,000LBS
ASU #4	24,000LBS
ASU #5	25,000LBS
ASU #6	30,000LBS
ASU #7	30,000LBS
ASU #8	23,000LBS

FOR ALL OTHER APPROACH SLABS WHICH ARE RECTANGULAR:
PLACE ANCHORS 1.5' FROM SIDES AND 3' FROM ENDS



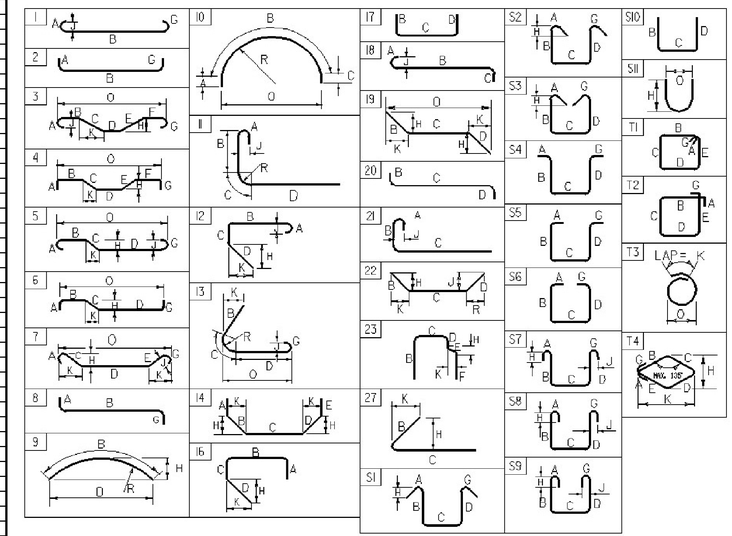
AMENDMENTS:		PLAN DESCRIPTION:	PROJECT:	CLIENT:		DATE:	SHEET
		APPROACH SLAB ACHOR LOCATION	ANDOVER BHF 016-1(29)	RENAUD BROTHERS CONSTRUCTION VERNON, VT	BELL ENGINEERING CIVIL & ENVIRONMENTAL 17 ECHO COVE WAY-SPOFFORD, NH 03462 (603) 363-9966	4-28-2015	1 OF 3

ITEM	EACH	SIZE	LENGTH	MARK	TYPE	A	B	C	D	E	F	G	H	J	K	R	O
ASU #1																	
	8	9	20'- 6"	1AP901	1	1'- 0"	19'- 6"					-- --		0'- 9"			
	8	6	19'- 6"	1AP601	STR	19'- 6"											
	4	6	3'- 7"	1AP602	4	-- --	1'- 1"	0'- 8"	-- --	0'- 8"	1'- 1"	-- --	0'- 6"				
	4	5	19'- 6"	1AP501	STR	19'- 6"											
	21	5	13'- 11"	1AP503	S11								6'- 9"				0'- 9"
ASU #2																	
	8	9	20'- 6"	1AP901	1	1'- 0"	19'- 6"					-- --		0'- 9"			
	8	6	19'- 6"	1AP601	STR	19'- 6"											
	4	6	3'- 7"	1AP602	4	-- --	1'- 1"	0'- 8"	-- --	0'- 8"	1'- 1"	-- --	0'- 6"				
	4	5	19'- 6"	1AP501	STR	19'- 6"											
	42	5	12'- 4"	1AP502	S11								5'- 11"				0'- 9"
ASU #3																	
	8	9	20'- 6"	1AP901	1	1'- 0"	19'- 6"					-- --		0'- 9"			
	8	6	19'- 6"	1AP601	STR	19'- 6"											
	4	6	3'- 7"	1AP602	4	-- --	1'- 1"	0'- 8"	-- --	0'- 8"	1'- 1"	-- --	0'- 6"				
	4	5	19'- 6"	1AP501	STR	19'- 6"											
	42	5	12'- 4"	1AP502	S11								5'- 11"				0'- 9"
ASU #4																	
	8	9	20'- 6"	1AP901	1	1'- 0"	19'- 6"					-- --		0'- 9"			
	8	6	19'- 6"	1AP601	STR	19'- 6"											
	4	6	3'- 7"	1AP602	4	-- --	1'- 1"	0'- 8"	-- --	0'- 8"	1'- 1"	-- --	0'- 6"				
	21	5	13'- 11"	1AP503	S11								6'- 9"				0'- 9"
ASU #5																	
	8	9	20'- 6"	2AP901	1	1'- 0"	19'- 6"					-- --		0'- 9"			
	8	6	19'- 6"	2AP601	STR	19'- 6"											
	4	6	3'- 7"	1AP602	4	-- --	1'- 1"	0'- 8"	-- --	0'- 8"	1'- 1"	-- --	0'- 6"				
	4	5	19'- 6"	2AP501	STR	19'- 6"											
	2	5	15'- 2"	2AP511	S11								7'- 4"				0'- 9"
	2	5	15'- 0"	2AP512	S11								7'- 3"				0'- 9"
	2	5	14'- 11"	2AP513	S11								7'- 3"				0'- 9"
	2	5	14'- 9"	2AP514	S11								7'- 2"				0'- 9"
	2	5	14'- 8"	2AP515	S11								7'- 1"				0'- 9"
	2	5	14'- 6"	2AP516	S11								7'- 0"				0'- 9"
	2	5	14'- 5"	2AP517	S11								7'- 0"				0'- 9"
	2	5	14'- 3"	2AP518	S11								6'- 11"				0'- 9"
	2	5	14'- 2"	2AP519	S11								6'- 10"				0'- 9"
	2	5	14'- 0"	2AP520	S11								6'- 9"				0'- 9"
	2	5	13'- 11"	2AP521	S11								6'- 9"				0'- 9"
ASU #6																	
	8	9	20'- 6"	2AP901	1	1'- 0"	19'- 6"					-- --		0'- 9"			
	8	6	19'- 6"	2AP601	STR	19'- 6"											
	4	6	3'- 7"	1AP602	4	-- --	1'- 1"	0'- 8"	-- --	0'- 8"	1'- 1"	-- --	0'- 6"				
	4	5	19'- 6"	2AP501	STR	19'- 6"											
	42	5	12'- 4"	2AP502	S11								5'- 11"				0'- 9"
ASU #7																	
	8	9	20'- 6"	2AP901	1	1'- 0"	19'- 6"					-- --		0'- 9"			
	8	6	19'- 6"	2AP601	STR	19'- 6"											
	4	6	3'- 7"	1AP602	4	-- --	1'- 1"	0'- 8"	-- --	0'- 8"	1'- 1"	-- --	0'- 6"				
	4	5	19'- 6"	2AP501	STR	19'- 6"											
	42	5	12'- 4"	2AP502	S11								5'- 11"				0'- 9"
ASU #8																	
	8	9	20'- 6"	2AP901	1	1'- 0"	19'- 6"					-- --		0'- 9"			
	8	6	19'- 6"	2AP601	STR	19'- 6"											
	4	6	3'- 7"	1AP602	4	-- --	1'- 1"	0'- 8"	-- --	0'- 8"	1'- 1"	-- --	0'- 6"				
	2	5	13'- 10-	2AP501	S11								6'- 8"				0'- 9"
	2	5	13'- 9"	2AP501	S11								6'- 8"				0'- 9"
	2	5	13'- 7"	2AP501	S11								6'- 7"				0'- 9"
	2	5	13'- 6"	2AP502	S11								6'- 6"				0'- 9"
	2	5	13'- 5"	2AP503	S11								6'- 6"				0'- 9"
	2	5	13'- 3"	2AP504	S11								6'- 5"				0'- 9"
	2	5	13'- 2"	2AP506	S11								6'- 4"				0'- 9"
	2	5	13'- 0"	2AP507	S11								6'- 3"				0'- 9"
	2	5	12'- 11"	2AP508	S11								6'- 3"				0'- 9"
	2	5	12'- 9"	2AP509	S11								6'- 2"				0'- 9"
	2	5	12'- 8"	2AP510	S11								6'- 1"				0'- 9"

ITEM	EACH	SIZE	LENGTH	MARK	TYPE	A	B	C	D	E	F	G	H	J	K	R	O

~ NOTES ~

1. UNLESS OTHERWISE DESIGNATED, ALL BAR REINFORCEMENT FOR CONCRETE IN SIZES UP TO AND INCLUDING NO. 18 SHALL CONFORM TO THE REQUIREMENTS OF THE "SPECIFICATIONS FOR DEFORMED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT", AASHTO M 31 (ASTM A 615-SI). ALL BARS SHALL BE GRADE 60, UNLESS OTHERWISE DESIGNATED.
2. FOR TYPICAL BENDING DETAILS, RECOMMENDED PIN DIAMETER "D" OF BENDS AND HOOKS, AND OTHER STANDARD PRACTICE, SEE CURRENT CONCRETE REINFORCING STEEL INSTITUTE "MANUAL OF STANDARD PRACTICE".
3. BARS WHICH REQUIRE MORE ACCURATE BENDING THAN STANDARD PRACTICES SHOULD HAVE LIMITS INDICATED.
4. ALL DIMENSIONS ARE OUT TO OUT OF BAR EXCEPT "A" AND "G" ON STANDARD 180 DEGREE AND 135 DEGREE HOOKS.
5. "J" DIMENSION ON 180 DEGREE HOOKS TO BE SHOWN ONLY WHERE NECESSARY TO RESTRICT HOOK SIZE. OTHERWISE, STANDARD HOOKS ARE TO BE USED.
6. "H" DIMENSION ON STIRRUPS TO BE SHOWN ONLY WHEN NECESSARY TO MAINTAIN CLEARANCES.
7. WHERE SLOPE DIFFERS FROM 45 DEGREES, DIMENSIONS "H" AND "K" MUST BE SHOWN.
8. ▲ DENOTES *BARS TO BE CUT IN FIELD.*
9. ✳ DENOTES ONE EXTRA BAR ADDED FOR TESTING PURPOSES.
10. △ DENOTES TWO EXTRA BARS ADDED FOR TESTING PURPOSES.
11. .3 IN BAR MARK SUFFIX DENOTES LEVEL III REINFORCING STEEL.



ASTM STANDARD REINFORCING BARS

BAR SIZE DESIGNATION	WEIGHT POUNDS PER FOOT	NOMINAL DIMENSIONS ROUND SECTION		
		DIAMETER INCHES	AREA INCHES ^{2}	PERIMETER INCHES
#3	0.376	0.375	0.11	1.178
#4	0.668	0.500	0.20	1.571
#5	1.043	0.625	0.31	1.963
#6	1.502	0.750	0.44	2.356
#7	2.044	0.875	0.60	2.749
#8	2.670	1.000	0.79	3.142
#9	3.400	1.128	1.00	3.544
#10	4.303	1.270	1.27	3.990
#11	5.313	1.410	1.56	4.430
#14	7.65	1.693	2.25	5.32
#18	13.60	2.257	4.00	7.09

REINFORCING SCHEDULE

REV. NO.	DATE:

BRENAUD BROS. INC.
283 FT. BRIDGEMAN RD. VERNON VT., 05354
PH. (802) 257-7383 FAX. (802) 257-7308

SHEET NAME: APPROACH SLAB PLANS

PROJECT NAME: ANDOVER

PROJECT NO: BHF 016-1 (29)

DRAWN BY: CE | CHK'D BY: | DATE: 04/29/2015

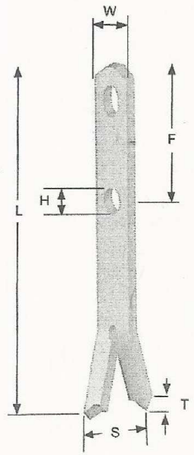
SHEET NO. 2 OF 3

FLAT STEEL

CONAC
Concrete Product Solutions

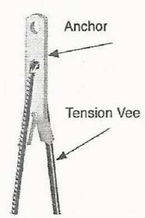
SPREAD ANCHOR

Used for both stripping and erecting. With proper edge distances can be pulled in any direction.



TON	SYS CODE	PART NUMBER	BODY LENGTH (L)	BODY WIDTH (W)	BODY THICK. (T)	BASE SPREAD (S)	HOLE LOCA. (F)	HOLE DIA. (H)	SWL TENSION (LBS)	UML TENSION (LBS)
2	2.5	F SP 02 048	4-3/4"	1-1/4"	3/16"	2-3/4"	None	None	2000	8000
2	2.5	F SP 02 040	4"	1-1/4"	3/8"	2-3/4"	None	None	2530	16000
2	2.5	F SP 02 055	5-1/2"	1-1/4"	3/8"	2-3/4"	None	None	4000	16000
4	5	F SP 04 040	4"	1-1/2"	1/2"	3-3/8"	None	None	2670	24000
4	5	F SP 04048	4-3/4"	1-1/2"	1/2"	3-3/8"	3-3/4"	7/8"	3590	24000
4	5	F SP 04 068	6-3/4"	1-1/2"	1/2"	3-3/8"	3-3/4"	7/8"	4960	32000
4	5	F SP 04 063	6-1/4"	1-1/2"	5/8"	3-3/8"	3-3/4"	11/16"	5850	32000
4	5	F SP 04 095	9-1/2"	1-1/2"	5/8"	3-3/8"	3-3/4"	11/16"	8000	32000
6	10	F SP 06 110	11"	2-1/2"	5/8"	5-1/4"	5"	1"	12000	48000
8	10	F SP 08 110	11"	2-1/2"	3/4"	5-1/4"	5"	1"	16000	64000
22	22	F SP 22 150	15"	3-1/8"	3/4"	6-1/4"	9"	1-3/8"	32800	136000
22	22	F SP 22 189	18-7/8"	3-1/8"	1"	6-1/4"	13"	1-3/8"	44000	176000

UML= Ultimate Mechanical Load in tension
Safe working loads based on 4:1 Safety Factor in 3,500 psi normal weight concrete.



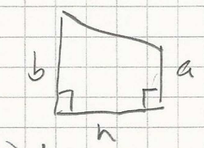
TENSION VEES	REQUIRED TO DEVELOPE REINFORCED ALLOWABLE TENSION CAPACITY					
		Concrete Strength [psi]				
Nominal System Capacity	Rebar Size	2,000	3,000	4,000	5,000	6,000
		Length of rebar before bending [in]				
2 Ton	#3	31	25	22	19	18
4 Ton	#4	41	33	29	26	24
6 Ton	#5	51	42	36	32	29
8 Ton	#6	61	50	43	39	35
22 Ton	#9	114	93	81	72	66

USE #6 BAR AND BEND AS NECESSARY TO MAINTAIN 2" MIN AT BOTTOM OF SLAB

BELL ENGINEERING
CIVIL & ENVIRONMENTAL
17 ECHO COVE WAY
SPOFFORD, NEW HAMPSHIRE 03462
(603) 363-9966

PROJECT NAME/ LOCATION: ANDOVER BHF 016-1(29)
SHEET #: 1 OF 1
CALCULATED BY: RON BELL DATE: 4-26-2015
CHECKED BY: DATE:
SCALE:

APPROACH SLABS: CALCULATE CENTROIDS OF TRAPEZOIDAL SLABS TO LOCATE LIFTING HOOK LOCATIONS:



$A = \frac{h}{2}(a+b)$

$A\bar{x} = \int_0^h x f(x)\,dx$

$= \frac{h^2}{6}(2a+b)$

$\bar{x} = \frac{\frac{h^2}{6}(2a+b)}{\frac{h}{2}(a+b)}$

$A\bar{y} = \int_0^h \frac{1}{2} f^2(x)\,dx$

$= \frac{h}{6}(b^2+ba+a^2)$

$\bar{y} = \frac{\frac{h}{6}(b^2+ba+a^2)}{\frac{h}{2}(a+b)}$

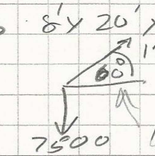
ASU #5 CENTROID = 9.853, 3.315

ASU #8 CENTROID = 9.838, 3.002

LIFTING HOOK LOCATIONS TO HAVE SAME RADIUS DIMENSION FROM CENTROID WITH EQUAL ANGLES ABOUT X-Y AXIS

FOR LARGEST SLAB 8' x 20' x 1.25' x 150 pcf = 30,000#

$\frac{30{,}000\#}{4 \text{ hook}} = 7{,}500$



∴ USE 8 TON ANCHOR

MIN. ALLOWABLE RIGGING ANGLE

REV. NO.	DATE:

RENAUD BROS. INC.
283 FT. BRIDGEMAN RD. VERNON VT., 05354
PH. (802) 257-7583 FAX: (802) 257-7308

SHEET NAME: APPROACH SLAB PLANS
PROJECT NAME: ANDOVER
PROJECT NO: BHF 016-1 (29)
DRAWN BY: CE
CHK'D BY:
DATE: 04/29/2015
SHEET NO. 3 OF 3