

**Central Steel Inc. a Harris Rebar Co.
Hoyt Block 20 – Portland, OR**

**Structural Calculations for
Levels 1.3 thru Level 5**

Block 20 - LVL-1 - B01 - PR-1
 Block 20 - LVL-1 - D01 - PR-1
 Block 20 - LVL-1 - B03 - PR-2
 Block 20 - LVL-1 - D03 - PR-2

 Block 20 - LVL-2 – B05 - PR-2
 Block 20 - LVL-2 – B05 - PR-4
 Block 20 - LVL-2 – D01 - PR-3 – 1ST Pull
 Block 20 - LVL-2 – D01 - PR-3 – 2ND Pull
 Block 20 - LVL-2 – D04 - PR-3

 Block 20 - LVL-3 – B01 - PR-6 – 1ST Pull
 Block 20 - LVL-3 – B01 - PR-6 – 2ND Pull
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 Block 20 - LVL-3 – D01 - PR-7
 Block 20 - LVL-3 – D05 - PR-6 – 1ST Pull
 Block 20 - LVL-3 – D05 - PR-6 – 2ND Pull

 Block 20 - LVL-4 – B03 - PR-9
 Block 20 - LVL-4 – B03 - PR-10
 Block 20 - LVL-4 – D03 - PR-9
 Block 20 - LVL-4 – D05 - PR-10 – 1ST Pull
 Block 20 - LVL-4 – D05 - PR-10 – 2ND Pull

 Block 20 - LVL-5 – B01 - PR-14 – 1ST Pull
 Block 20 - LVL-5 – B01 - PR-14 – 2ND Pull
 Block 20 - LVL-5 – B03 - PR-15
 Block 20 - LVL-5 – D01 - PR-15
 Block 20 - LVL-5 – D06 - PR-14

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**THIS DOCUMENT HAS BEEN REVIEWED FOR
 GENERAL COMPATIBILITY WITH DESIGN
 CONCEPT AND THE FOLLOWING IS NOTED:** Prepared By:

- ☒ NO EXCEPTIONS TAKEN
- ☐ REVISE AS NOTED
- ☐ REVISE AND RESUBMIT
- ☐ REJECTED



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REV.	DATE	BY:	CHK:	COMMENTS
0	01/26/17	LS	CAB	ISSUED FOR APPROVAL

FRICTION LOSS CALCULATIONS

DATE : Thursday, December 1, 2016

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JOB : Hoyt Block 20 Levels 1.3-5

NO. : 12913525

Central Steel, Inc. | Friction Calculations

These calculations were prepared to show PT stress losses and elongations with tendon profiles provided on structural design drawings. **ENGINEER OF RECORD TO REVIEW ADAPT INPUT PARAMETERS SECTIONS AND ALL FINAL TENDON STRESSES.**

Central did not take part in the preparation or review of said structural design and Central disclaims all liability for afore said. The stamp or seal on these calculations, pertains only to the method and assumptions used in these calculations and not to the adequacy of the structural design. NO WARRANTY, EXPRESSED OR IMPLIED, as to the adequacy of the structural design is made by virtue of any such stamp or seal.

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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: NOV 30, 2016

TIME: 11:48:54

PROJECT TITLE :
Block 20-LVL-1-B01-PR-1

SPECIFIC TITLE :
B01-PR-1

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	232.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.059	ksi
Shrinkage	2.900	ksi
Creep	2.624	ksi
Relaxation	4.026	ksi

Total long-term stress losses	10.610	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down
X1/L etc = horizontal distances to control points in geometry of the
tendon divided by span length
Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-1-B01-PR-1)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->														
			start	center	right	X1/L	X2/L	X3/L	start	center	right												
-1	----	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----
1	41.00	1	4.50	1.00	8.00	0.10	0.50	0.10	181.78	187.72	194.86												
2	29.17	1	8.00	1.00	8.00	0.10	0.50	0.10	194.86	200.77	195.32												
3	17.00	1	8.00	4.50	4.50	0.10	0.50	0.10	195.32	191.20	188.67												
CAN	7.00	1	4.50		4.50	0.00			188.67		186.56												

94.17 ft (total length of tendon)																							

SUMMARY :

Average initial stress (after release)	191.79	ksi
Long term stress losses	10.61	ksi
Final average stress	181.18	ksi
Final average force in tendon	27.72	k
Anchor set influence from right pull (201.28ksi;0.745) ..	37.22	ft
Elongation at right pull before anchor set	7.85	inch
Elongation at right pull after anchor set	7.60	inch
Total elongation after anchor set	7.60	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.70; Max along tendon 0.75

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN				
Units are in ksi				
X/L	Span 1	Span 2	Span 3	Cant
0.00	181.78	194.86	195.32	188.67
0.05	182.48	195.81	194.58	188.56
0.10	183.08	196.41	194.14	188.46
0.15	183.65	196.95	193.77	188.35
0.20	184.22	197.49	193.39	188.25
0.25	184.80	198.03	193.02	188.14
0.30	185.37	198.58	192.64	188.04
0.35	185.95	199.12	192.27	187.93
0.40	186.53	199.67	191.89	187.83
0.45	187.12	200.22	191.51	187.72
0.50	187.72	200.77	191.20	187.62
0.55	188.36	201.25	190.95	187.51
0.60	188.99	200.69	190.70	187.41
0.65	189.63	200.14	190.44	187.30
0.70	190.27	199.58	190.19	187.20
0.75	190.91	199.03	189.94	187.09
0.80	191.56	198.47	189.68	186.99
0.85	192.20	197.91	189.43	186.88
0.90	192.90	197.28	189.18	186.77
0.95	193.84	196.28	188.92	186.67
1.00	194.86	195.32	188.67	186.56

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN				
Units are in inch				
X/L	Span 1	Span 2	Span 3	Cant
0.00	4.50	8.00	8.00	4.50
0.05	4.33	7.65	7.83	4.50
0.10	3.80	6.60	7.30	4.50
0.15	3.14	5.29	6.64	4.50
0.20	2.58	4.15	6.08	4.50
0.25	2.09	3.19	5.59	4.50
0.30	1.70	2.40	5.20	4.50
0.35	1.39	1.79	4.89	4.50
0.40	1.18	1.35	4.67	4.50
0.45	1.04	1.09	4.54	4.50
0.50	1.00	1.00	4.50	4.50
0.55	1.09	1.09	4.50	4.50
0.60	1.35	1.35	4.50	4.50
0.65	1.79	1.79	4.50	4.50
0.70	2.40	2.40	4.50	4.50
0.75	3.19	3.19	4.50	4.50
0.80	4.15	4.15	4.50	4.50
0.85	5.29	5.29	4.50	4.50
0.90	6.60	6.60	4.50	4.50
0.95	7.65	7.65	4.50	4.50
1.00	8.00	8.00	4.50	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: NOV 30, 2016

TIME: 11:50:33

PROJECT TITLE :
Block 20-LVL-1-D01-PR-1

SPECIFIC TITLE :
D01-PR-1

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	315.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.438	ksi
Shrinkage	2.900	ksi
Creep	3.563	ksi
Relaxation	3.981	ksi

Total long-term stress losses	11.883	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT LEFT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-1-D01-PR-1)

LENGTH		< TENDON HEIGHT in.>		Horizontal ratios			<- STRESS (ksi) -->				
SPAN	ft	P	start	center	right	X1/L	X2/L	X3/L	start	center	right
-1----	2-----	3-----	4-----	5-----	6-----	7----	8----	9-----	10-----	11-----	12-
1	34.00	1	4.50	1.75	4.50	0.10	0.50	0.10	187.01	192.81	198.40

34.00 ft (total length of tendon)											

SUMMARY :

Average initial stress (after release)	192.77	ksi
Long term stress losses	11.88	ksi
Final average stress	180.89	ksi
Final average force in tendon	27.68	k
Anchor set influence from left pull (198.40ksi;0.735) ..	34.00	ft
Elongation at left pull before anchor set	3.01	inch
Elongation at left pull after anchor set	2.76	inch
Total elongation after anchor set	2.76	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.73; Max along tendon 0.73

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN	
=====	
Units are in ksi	
X/L	Span 1

0.00	187.01
0.05	187.62
0.10	188.33
0.15	188.92
0.20	189.48
0.25	190.04
0.30	190.59
0.35	191.15
0.40	191.70
0.45	192.25
0.50	192.81
0.55	193.35
0.60	193.90
0.65	194.45
0.70	194.99
0.75	195.54
0.80	196.08
0.85	196.62
0.90	197.16
0.95	197.72
1.00	198.40

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN	
=====	
Units are in inch	
X/L	Span 1

0.00	4.50
0.05	4.36
0.10	3.95
0.15	3.43
0.20	2.99
0.25	2.61
0.30	2.30
0.35	2.06
0.40	1.89
0.45	1.78
0.50	1.75
0.55	1.78
0.60	1.89
0.65	2.06
0.70	2.30
0.75	2.61
0.80	2.99
0.85	3.43
0.90	3.95
0.95	4.36
1.00	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: NOV 30, 2016

TIME: 11:45:21

PROJECT TITLE :
Block 20-LVL 1-B03-PR-2

SPECIFIC TITLE :
B03-PR-2

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :		
Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	227.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.25	in

CALCULATED VALUES :		
Elastic shortening	1.036	ksi
Shrinkage	2.960	ksi
Creep	2.568	ksi
Relaxation	3.790	ksi

Total long-term stress losses	10.354	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :		
Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down
X1/L etc = horizontal distances to control points in geometry of the
tendon divided by span length
Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL 1-B03-PR-2)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->		
			start	center	right	X1/L	X2/L	X3/L	start	center	right
-1----	2-----	3-----	4-----	5-----	6-----	7----	8----	9-----	10-----	11-----	12-
1	15.50	1	4.25	1.75	7.00	0.10	0.50	0.10	187.12	190.41	195.51
2	27.00	1	7.00	1.00	7.00	0.10	0.50	0.10	195.51	196.67	190.54
3	17.25	1	7.00	1.75	4.25	0.10	0.50	0.10	190.54	185.55	181.66

59.75 ft (total length of tendon)											

SUMMARY :

Average initial stress (after release)	191.56	ksi
Long term stress losses	10.35	ksi
Final average stress	181.20	ksi
Final average force in tendon	27.72	k
Anchor set influence from right pull (198.83ksi;0.736) ..	36.49	ft
Elongation at right pull before anchor set	5.07	inch
Elongation at right pull after anchor set	4.82	inch
Total elongation after anchor set	4.82	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.69; Max along tendon 0.74

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN			
=====			
Units are in ksi			
X/L	Span 1	Span 2	Span 3

0.00	187.12	195.51	190.54
0.05	187.67	196.39	189.55
0.10	188.01	196.95	189.03
0.15	188.30	197.45	188.59
0.20	188.59	197.95	188.15
0.25	188.89	198.45	187.72
0.30	189.18	198.70	187.28
0.35	189.47	198.20	186.83
0.40	189.77	197.69	186.39
0.45	190.07	197.18	185.95
0.50	190.41	196.67	185.55
0.55	190.81	196.16	185.21
0.60	191.20	195.65	184.86
0.65	191.60	195.14	184.51
0.70	191.99	194.62	184.17
0.75	192.39	194.11	183.82
0.80	192.79	193.59	183.47
0.85	193.19	193.07	183.12
0.90	193.68	192.49	182.73
0.95	194.66	191.57	182.10
1.00	195.51	190.54	181.66

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN			
=====			
Units are in inch			
X/L	Span 1	Span 2	Span 3

0.00	4.25	7.00	7.00
0.05	4.13	6.70	6.74
0.10	3.75	5.80	5.95
0.15	3.28	4.67	4.97
0.20	2.88	3.70	4.11
0.25	2.53	2.88	3.39
0.30	2.25	2.20	2.80
0.35	2.03	1.68	2.34
0.40	1.88	1.30	2.01
0.45	1.78	1.07	1.82
0.50	1.75	1.00	1.75
0.55	1.82	1.07	1.78
0.60	2.01	1.30	1.88
0.65	2.34	1.68	2.03
0.70	2.80	2.20	2.25
0.75	3.39	2.88	2.53
0.80	4.11	3.70	2.88
0.85	4.97	4.67	3.28
0.90	5.95	5.80	3.75
0.95	6.74	6.70	4.13
1.00	7.00	7.00	4.25



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: Jan 6, 2017

TIME: 13:39:36

PROJECT TITLE :
Block 20-LVL-1-D03-PR-2

SPECIFIC TITLE :
D03-PR-2

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	256.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.25	in

CALCULATED VALUES :

Elastic shortening	1.168	ksi
Shrinkage	2.960	ksi
Creep	2.896	ksi
Relaxation	3.303	ksi

Total long-term stress losses	10.328	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the
tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-1-D03-PR-2)

SPAN	ft	P	< TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->														
			start	center	right	X1/L	X2/L	X3/L	start	center	right												
-1	---	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----
1	28.75	1	4.25	1.00	7.00	0.10	0.50	0.10	164.25	168.36	173.52												
2	28.00	1	7.00	1.00	7.00	0.10	0.50	0.10	173.52	178.45	183.86												
3	28.00	1	7.00	1.00	7.00	0.10	0.50	0.10	183.86	189.09	194.83												
4	28.00	1	7.00	1.00	7.00	0.10	0.50	0.10	194.83	199.84	193.74												
5	22.42	1	7.00	1.75	4.25	0.10	0.50	0.10	193.74	188.57	184.21												

135.17 ft (total length of tendon)																							

SUMMARY :

Average initial stress (after release)	184.20	ksi
Long term stress losses	10.33	ksi
Final average stress	173.87	ksi
Final average force in tendon	26.60	k
Anchor set influence from right pull (200.10ksi;0.741) ..	37.13	ft
Elongation at right pull before anchor set	10.73	inch
Elongation at right pull after anchor set	10.48	inch
Total elongation after anchor set	10.48	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.68; Max along tendon 0.74

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN					
Units are in ksi					
X/L	Span 1	Span 2	Span 3	Span 4	Span 5
0.00	164.25	173.52	183.86	194.83	193.74
0.05	164.79	174.29	184.68	195.70	192.85
0.10	165.21	174.80	185.22	196.27	192.31
0.15	165.60	175.25	185.70	196.77	191.84
0.20	165.98	175.70	186.18	197.28	191.37
0.25	166.37	176.16	186.66	197.79	190.90
0.30	166.76	176.61	187.14	198.30	190.43
0.35	167.15	177.07	187.63	198.82	189.96
0.40	167.55	177.53	188.11	199.33	189.48
0.45	167.94	177.99	188.60	199.85	189.01
0.50	168.36	178.45	189.09	199.84	188.57
0.55	168.80	178.91	189.58	199.32	188.17
0.60	169.24	179.37	190.07	198.80	187.77
0.65	169.69	179.84	190.56	198.28	187.36
0.70	170.13	180.30	191.05	197.76	186.96
0.75	170.58	180.77	191.55	197.24	186.55
0.80	171.02	181.24	192.04	196.71	186.15
0.85	171.47	181.70	192.54	196.18	185.74
0.90	171.97	182.23	193.10	195.59	185.30
0.95	172.74	183.05	193.96	194.68	184.69
1.00	173.52	183.86	194.83	193.74	184.21

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN					
Units are in inch					
X/L	Span 1	Span 2	Span 3	Span 4	Span 5
0.00	4.25	7.00	7.00	7.00	7.00
0.05	4.09	6.70	6.70	6.70	6.74
0.10	3.60	5.80	5.80	5.80	5.95
0.15	2.99	4.67	4.67	4.67	4.97
0.20	2.46	3.70	3.70	3.70	4.11
0.25	2.02	2.88	2.88	2.88	3.39
0.30	1.65	2.20	2.20	2.20	2.80
0.35	1.37	1.68	1.68	1.68	2.34
0.40	1.16	1.30	1.30	1.30	2.01
0.45	1.04	1.07	1.07	1.07	1.82
0.50	1.00	1.00	1.00	1.00	1.75
0.55	1.07	1.07	1.07	1.07	1.78
0.60	1.30	1.30	1.30	1.30	1.88
0.65	1.68	1.68	1.68	1.68	2.03
0.70	2.20	2.20	2.20	2.20	2.25
0.75	2.88	2.88	2.88	2.88	2.53
0.80	3.70	3.70	3.70	3.70	2.88
0.85	4.67	4.67	4.67	4.67	3.28
0.90	5.80	5.80	5.80	5.80	3.75
0.95	6.70	6.70	6.70	6.70	4.13
1.00	7.00	7.00	7.00	7.00	4.25



Reinforcing Steel & Post-Tensioning Services

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FRICTION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: Jan 17, 2017

TIME: 08:22:35

PROJECT TITLE :
Block 20-LVL-2-B05-PR-2

SPECIFIC TITLE :
B05-PR-2

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	300.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.25	in

CALCULATED VALUES :

Elastic shortening	1.369	ksi
Shrinkage	2.960	ksi
Creep	3.394	ksi
Relaxation	3.096	ksi

Total long-term stress losses	10.819	ksi

FRICTION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT LEFT	END

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down
X1/L etc = horizontal distances to control points in geometry of the
tendon divided by span length
Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-2-B05-PR-2)

SPAN	ft	P	< TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->														
			start	center	right	X1/L	X2/L	X3/L	start	center	right												
-1	---	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----
1	17.75	1	4.25	1.75	7.00	0.10	0.50	0.10	181.95	185.89	190.88												
2	27.00	1	7.00	1.00	7.00	0.10	0.50	0.10	190.88	197.00	195.48												
3	14.75	1	7.00	3.00	7.00	0.10	0.50	0.10	195.48	191.02	187.06												
4	14.83	1	7.00	3.00	7.00	0.10	0.50	0.10	187.06	182.74	178.95												
5	27.00	1	7.00	1.00	7.00	0.10	0.50	0.10	178.95	173.68	168.95												
6	17.75	1	7.00	1.75	4.25	0.10	0.50	0.10	168.95	164.58	161.61												

119.08 ft (total length of tendon)																							

SUMMARY :

Average initial stress (after release)	182.56	ksi
Long term stress losses	10.82	ksi
Final average stress	171.74	ksi
Final average force in tendon	26.28	k
Anchor set influence from left pull (198.98ksi;0.737) ..	36.52	ft
Elongation at left pull before anchor set	9.40	inch
Elongation at left pull after anchor set	9.15	inch
Total elongation after anchor set	9.15	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.67; Max along tendon 0.74

Additional tendons required per low average final force.
642/26.8k = 23.95 tendons
23.95*26.8 = 641.86/26.28 (force on calcs) = 24.42= 25 tendons total

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN						
=====						
Units are in ksi						
X/L	Span 1	Span 2	Span 3	Span 4	Span 5	Span 6

0.00	181.95	190.88	195.48	187.06	178.95	168.95
0.05	182.40	191.89	194.72	186.27	178.10	168.23
0.10	183.02	192.81	193.90	185.50	177.30	167.44
0.15	183.42	193.40	193.47	185.09	176.79	167.02
0.20	183.77	193.91	193.12	184.75	176.35	166.67
0.25	184.13	194.43	192.77	184.41	175.90	166.32
0.30	184.48	194.95	192.42	184.08	175.45	165.97
0.35	184.83	195.46	192.07	183.74	175.01	165.62
0.40	185.18	195.97	191.72	183.41	174.57	165.27
0.45	185.53	196.49	191.37	183.07	174.12	164.93
0.50	185.89	197.00	191.02	182.74	173.68	164.58
0.55	186.28	197.51	190.67	182.41	173.24	164.27
0.60	186.73	198.01	190.33	182.08	172.80	164.00
0.65	187.17	198.52	189.98	181.74	172.36	163.73
0.70	187.62	198.93	189.63	181.41	171.93	163.46
0.75	188.06	198.42	189.29	181.08	171.49	163.19
0.80	188.50	197.92	188.94	180.75	171.06	162.92
0.85	188.94	197.42	188.60	180.42	170.62	162.65
0.90	189.38	196.92	188.26	180.09	170.19	162.38
0.95	189.90	196.36	187.84	179.70	169.71	162.08
1.00	190.88	195.48	187.06	178.95	168.95	161.61

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN						
=====						
Units are in inch						
X/L	Span 1	Span 2	Span 3	Span 4	Span 5	Span 6

0.00	4.25	7.00	7.00	7.00	7.00	7.00
0.05	4.13	6.70	6.80	6.80	6.70	6.74
0.10	3.75	5.80	6.20	6.20	5.80	5.95
0.15	3.28	4.67	5.45	5.45	4.67	4.97
0.20	2.88	3.70	4.80	4.80	3.70	4.11
0.25	2.53	2.88	4.25	4.25	2.88	3.39
0.30	2.25	2.20	3.80	3.80	2.20	2.80
0.35	2.03	1.68	3.45	3.45	1.68	2.34
0.40	1.88	1.30	3.20	3.20	1.30	2.01
0.45	1.78	1.07	3.05	3.05	1.07	1.82
0.50	1.75	1.00	3.00	3.00	1.00	1.75
0.55	1.82	1.07	3.05	3.05	1.07	1.78
0.60	2.01	1.30	3.20	3.20	1.30	1.88
0.65	2.34	1.68	3.45	3.45	1.68	2.03
0.70	2.80	2.20	3.80	3.80	2.20	2.25
0.75	3.39	2.88	4.25	4.25	2.88	2.53
0.80	4.11	3.70	4.80	4.80	3.70	2.88
0.85	4.97	4.67	5.45	5.45	4.67	3.28
0.90	5.95	5.80	6.20	6.20	5.80	3.75
0.95	6.74	6.70	6.80	6.80	6.70	4.13
1.00	7.00	7.00	7.00	7.00	7.00	4.25



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: Jan 6, 2017

TIME: 14:15:44

PROJECT TITLE :
Block 20-LVL-2-B05-PR-4

SPECIFIC TITLE :
B05-PR-4

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	196.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	0.895	ksi
Shrinkage	2.900	ksi
Creep	2.217	ksi
Relaxation	3.808	ksi

Total long-term stress losses	9.820	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT LEFT	END

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-2-B05-PR-4)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->														
			start	center	right	X1/L	X2/L	X3/L	start	center	right												
-1	----	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----
1	31.33	1	4.50	1.75	8.00	0.10	0.50	0.10	186.35	191.82	197.96												
2	26.17	1	8.00	1.00	8.00	0.10	0.50	0.10	197.96	198.19	192.56												
3	27.83	1	8.00	1.00	8.00	0.10	0.50	0.10	192.56	186.56	181.16												
4	12.42	1	8.00	4.50	4.50	0.10	0.50	0.10	181.16	177.21	175.61												

97.75 ft (total length of tendon)																							

SUMMARY :

Average initial stress (after release)	190.14	ksi
Long term stress losses	9.82	ksi
Final average stress	180.32	ksi
Final average force in tendon	27.59	k
Anchor set influence from left pull (201.18ksi;0.745) ..	36.93	ft
Elongation at left pull before anchor set	8.08	inch
Elongation at left pull after anchor set	7.83	inch
Total elongation after anchor set	7.83	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.69; Max along tendon 0.75

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN				
Units are in ksi				
X/L	Span 1	Span 2	Span 3	Span 4
0.00	186.35	197.96	192.56	181.16
0.05	186.94	198.89	191.61	180.45
0.10	187.63	199.90	190.68	179.70
0.15	188.18	200.50	190.10	179.32
0.20	188.70	201.03	189.59	179.02
0.25	189.23	200.80	189.08	178.72
0.30	189.75	200.28	188.58	178.42
0.35	190.27	199.75	188.07	178.12
0.40	190.79	199.23	187.57	177.81
0.45	191.30	198.71	187.07	177.51
0.50	191.82	198.19	186.56	177.21
0.55	192.37	197.68	186.06	176.99
0.60	192.95	197.16	185.57	176.83
0.65	193.53	196.65	185.07	176.68
0.70	194.11	196.14	184.57	176.53
0.75	194.69	195.62	184.08	176.37
0.80	195.26	195.11	183.59	176.22
0.85	195.84	194.61	183.10	176.07
0.90	196.41	194.10	182.61	175.91
0.95	197.04	193.52	182.05	175.76
1.00	197.96	192.56	181.16	175.61

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN				
Units are in inch				
X/L	Span 1	Span 2	Span 3	Span 4
0.00	4.50	8.00	8.00	8.00
0.05	4.36	7.65	7.65	7.83
0.10	3.95	6.60	6.60	7.30
0.15	3.43	5.29	5.29	6.64
0.20	2.99	4.15	4.15	6.08
0.25	2.61	3.19	3.19	5.59
0.30	2.30	2.40	2.40	5.20
0.35	2.06	1.79	1.79	4.89
0.40	1.89	1.35	1.35	4.67
0.45	1.78	1.09	1.09	4.54
0.50	1.75	1.00	1.00	4.50
0.55	1.83	1.09	1.09	4.50
0.60	2.06	1.35	1.35	4.50
0.65	2.45	1.79	1.79	4.50
0.70	3.00	2.40	2.40	4.50
0.75	3.70	3.19	3.19	4.50
0.80	4.56	4.15	4.15	4.50
0.85	5.58	5.29	5.29	4.50
0.90	6.75	6.60	6.60	4.50
0.95	7.69	7.65	7.65	4.50
1.00	8.00	8.00	8.00	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: Jan 25, 2017

TIME: 08:49:44

PROJECT TITLE :
Block 20-LVL-2-D01-PR-3-1st Pull

SPECIFIC TITLE :
D01-PR-3

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	315.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.438	ksi
Shrinkage	2.900	ksi
Creep	3.563	ksi
Relaxation	3.747	ksi

Total long-term stress losses	11.649	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-2-D01-PR-3-1st Pu)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->		
			start	center	right	X1/L	X2/L	X3/L	start	center	right
-1----	2-----	3-----	4-----	5-----	6-----	7-----	8-----	9-----	10-----	11-----	12-
CAN	7.58	1	4.50		8.00		0.00		183.29		187.41
1	29.00	1	8.00	1.75	8.00	0.10	0.50	0.10	187.41	192.88	196.96
2	29.00	1	8.00	1.00	8.00	0.10	0.50	0.10	196.96	190.95	183.07
CAN	5.50	1	8.00		4.50	0.00			183.07		179.87

71.08 ft (total length of tendon)											

SUMMARY :

Average initial stress (after release)	190.31	ksi
Long term stress losses	11.65	ksi
Final average stress	178.66	ksi
Final average force in tendon	27.33	k
Anchor set influence from right pull (197.94ksi;0.733) ..	36.03	ft
Elongation at right pull before anchor set	5.95	inch
Elongation at right pull after anchor set	5.70	inch
Total elongation after anchor set	5.70	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.68; Max along tendon 0.73

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN				
=====				
Units are in ksi				
X/L	Cant	Span 1	Span 2	Cant

0.00	183.29	187.41	196.96	183.07
0.05	183.44	188.26	195.99	182.91
0.10	183.59	188.82	195.38	182.75
0.15	183.73	189.33	194.83	182.59
0.20	183.88	189.83	194.28	182.43
0.25	184.03	190.33	193.73	182.27
0.30	184.17	190.84	193.17	182.11
0.35	184.32	191.35	192.62	181.95
0.40	184.47	191.86	192.06	181.78
0.45	184.62	192.37	191.50	181.62
0.50	184.76	192.88	190.95	181.46
0.55	184.91	193.39	190.38	181.30
0.60	185.06	193.91	189.82	181.14
0.65	185.21	194.43	189.26	180.97
0.70	185.36	194.94	188.69	180.81
0.75	185.50	195.46	188.13	180.65
0.80	185.65	195.98	187.56	180.49
0.85	185.80	196.50	186.99	180.32
0.90	185.95	197.09	186.34	180.16
0.95	186.10	197.89	185.33	180.00
1.00	187.41	196.96	183.07	179.87

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN				
=====				
Units are in inch				
X/L	Cant	Span 1	Span 2	Cant

0.00	4.50	8.00	8.00	8.00
0.05	4.51	7.69	7.65	7.66
0.10	4.54	6.75	6.60	7.33
0.15	4.58	5.58	5.29	7.03
0.20	4.64	4.56	4.15	6.74
0.25	4.72	3.70	3.19	6.47
0.30	4.82	3.00	2.40	6.21
0.35	4.93	2.45	1.79	5.98
0.40	5.06	2.06	1.35	5.76
0.45	5.21	1.83	1.09	5.56
0.50	5.38	1.75	1.00	5.38
0.55	5.56	1.83	1.09	5.21
0.60	5.76	2.06	1.35	5.06
0.65	5.98	2.45	1.79	4.93
0.70	6.21	3.00	2.40	4.82
0.75	6.47	3.70	3.19	4.72
0.80	6.74	4.56	4.15	4.64
0.85	7.03	5.58	5.29	4.58
0.90	7.33	6.75	6.60	4.54
0.95	7.66	7.69	7.65	4.51
1.00	8.00	8.00	8.00	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: Jan 25, 2017

TIME: 08:59:08

PROJECT TITLE :
Block 20-LVL-2-D01-PR-3-2nd Pull

SPECIFIC TITLE :
D01-PR-3

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	315.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.438	ksi
Shrinkage	2.900	ksi
Creep	3.563	ksi
Relaxation	3.747	ksi

Total long-term stress losses	11.649	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-2-D01-PR-3-2nd Pu)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->														
			start	center	right	X1/L	X2/L	X3/L	start	center	right												
-1	----	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----
1	24.42	1	4.50	1.00	8.00	0.10	0.38	0.10	173.54	177.23	182.95												
2	27.50	1	8.00	1.00	8.00	0.10	0.50	0.10	182.95	188.38	194.40												
3	19.67	1	8.00	3.00	8.00	0.10	0.50	0.10	194.40	199.08	198.23												
4	32.00	1	8.00	1.75	4.50	0.10	0.50	0.10	198.23	192.03	186.48												

103.59 ft (total length of tendon)																							

SUMMARY :

Average initial stress (after release)	189.04	ksi
Long term stress losses	11.65	ksi
Final average stress	177.39	ksi
Final average force in tendon	27.14	k
Anchor set influence from right pull (201.24ksi;0.745) ..	36.82	ft
Elongation at right pull before anchor set	8.50	inch
Elongation at right pull after anchor set	8.25	inch
Total elongation after anchor set	8.25	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.69; Max along tendon 0.75

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN				
Units are in ksi				
X/L	Span 1	Span 2	Span 3	Span 4
0.00	173.54	182.95	194.40	198.23
0.05	174.22	183.85	195.25	197.31
0.10	174.64	184.41	195.73	196.67
0.15	175.07	184.90	196.15	196.09
0.20	175.51	185.39	196.56	195.51
0.25	175.95	185.89	196.98	194.93
0.30	176.39	186.38	197.40	194.35
0.35	176.83	186.88	197.82	193.76
0.40	177.23	187.38	198.24	193.17
0.45	177.62	187.88	198.66	192.58
0.50	178.02	188.38	199.08	192.03
0.55	178.42	188.88	199.50	191.50
0.60	178.81	189.39	199.92	190.98
0.65	179.21	189.89	200.35	190.45
0.70	179.61	190.40	200.77	189.92
0.75	180.01	190.91	201.20	189.39
0.80	180.41	191.42	200.85	188.86
0.85	180.82	191.93	200.43	188.33
0.90	181.32	192.51	199.93	187.77
0.95	182.12	193.46	199.05	187.07
1.00	182.95	194.40	198.23	186.48

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN				
Units are in inch				
X/L	Span 1	Span 2	Span 3	Span 4
0.00	4.50	8.00	8.00	8.00
0.05	4.27	7.65	7.75	7.69
0.10	3.58	6.60	7.00	6.75
0.15	2.74	5.29	6.06	5.58
0.20	2.07	4.15	5.25	4.56
0.25	1.56	3.19	4.56	3.70
0.30	1.21	2.40	4.00	3.00
0.35	1.03	1.79	3.56	2.45
0.40	1.01	1.35	3.25	2.06
0.45	1.11	1.09	3.06	1.83
0.50	1.31	1.00	3.00	1.75
0.55	1.63	1.09	3.06	1.78
0.60	2.05	1.35	3.25	1.89
0.65	2.58	1.79	3.56	2.06
0.70	3.22	2.40	4.00	2.30
0.75	3.97	3.19	4.56	2.61
0.80	4.83	4.15	5.25	2.99
0.85	5.80	5.29	6.06	3.43
0.90	6.87	6.60	7.00	3.95
0.95	7.72	7.65	7.75	4.36
1.00	8.00	8.00	8.00	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: NOV 30, 2016

TIME: 13:52:46

PROJECT TITLE :
Block 20-LVL-2-D04-PR-3

SPECIFIC TITLE :
D04-PR-3

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	277.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.264	ksi
Shrinkage	2.900	ksi
Creep	3.134	ksi
Relaxation	3.766	ksi

Total long-term stress losses	11.065	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT LEFT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down
X1/L etc = horizontal distances to control points in geometry of the
tendon divided by span length
Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-2-D04-PR-3)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->														
			start	center	right	X1/L	X2/L	X3/L	start	center	right												
-1	----	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----
1	35.42	1	4.50	1.75	8.00	0.10	0.50	0.10	187.23	193.21	199.74												
2	29.75	1	8.00	1.00	8.00	0.10	0.50	0.10	199.74	197.12	191.28												
3	26.00	1	8.00	1.00	8.00	0.10	0.50	0.10	191.28	185.46	180.20												
CAN	9.25	1	8.00		4.50	0.00			180.20		176.10												

100.42 ft (total length of tendon)																							

SUMMARY :

Average initial stress (after release)	190.94	ksi
Long term stress losses	11.06	ksi
Final average stress	179.88	ksi
Final average force in tendon	27.52	k
Anchor set influence from left pull (201.61ksi;0.747) ..	38.38	ft
Elongation at left pull before anchor set	8.32	inch
Elongation at left pull after anchor set	8.07	inch
Total elongation after anchor set	8.07	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.69; Max along tendon 0.75

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN				
Units are in ksi				
X/L	Span 1	Span 2	Span 3	Cant
0.00	187.23	199.74	191.28	180.20
0.05	187.86	200.65	190.37	179.03
0.10	188.59	201.60	189.43	178.87
0.15	189.19	200.98	188.87	178.72
0.20	189.77	200.42	188.38	178.56
0.25	190.35	199.87	187.89	178.41
0.30	190.92	199.32	187.40	178.25
0.35	191.49	198.77	186.91	178.10
0.40	192.07	198.22	186.43	177.94
0.45	192.64	197.67	185.94	177.79
0.50	193.21	197.12	185.46	177.63
0.55	193.80	196.58	184.97	177.48
0.60	194.43	196.03	184.49	177.33
0.65	195.05	195.49	184.01	177.17
0.70	195.68	194.95	183.53	177.02
0.75	196.30	194.41	183.06	176.86
0.80	196.92	193.88	182.58	176.71
0.85	197.53	193.34	182.11	176.56
0.90	198.15	192.81	181.63	176.40
0.95	198.81	192.21	181.09	176.25
1.00	199.74	191.28	180.20	176.10

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN				
Units are in inch				
X/L	Span 1	Span 2	Span 3	Cant
0.00	4.50	8.00	8.00	8.00
0.05	4.36	7.65	7.65	7.66
0.10	3.95	6.60	6.60	7.33
0.15	3.43	5.29	5.29	7.03
0.20	2.99	4.15	4.15	6.74
0.25	2.61	3.19	3.19	6.47
0.30	2.30	2.40	2.40	6.21
0.35	2.06	1.79	1.79	5.98
0.40	1.89	1.35	1.35	5.76
0.45	1.78	1.09	1.09	5.56
0.50	1.75	1.00	1.00	5.38
0.55	1.83	1.09	1.09	5.21
0.60	2.06	1.35	1.35	5.06
0.65	2.45	1.79	1.79	4.93
0.70	3.00	2.40	2.40	4.82
0.75	3.70	3.19	3.19	4.72
0.80	4.56	4.15	4.15	4.64
0.85	5.58	5.29	5.29	4.58
0.90	6.75	6.60	6.60	4.54
0.95	7.69	7.65	7.65	4.51
1.00	8.00	8.00	8.00	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: NOV 30, 2016

TIME: 14:23:45

PROJECT TITLE :
Block 20-LVL-3-B01-PR-6-1st Pull

SPECIFIC TITLE :
B01-PR-6

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	248.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.132	ksi
Shrinkage	2.900	ksi
Creep	2.805	ksi
Relaxation	3.545	ksi

Total long-term stress losses	10.383	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-3-B01-PR-6-1st Pu)

SPAN	ft	P	< TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->															
			start	center	right	X1/L	X2/L	X3/L	start	center	right													
-1	----	2	----	3	-----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----	
CAN	8.00	1	3.25		7.00			0.00	172.67		176.64													
1	29.83	1	7.00	1.75	8.00	0.10	0.50	0.10	176.64	181.63	187.39													
2	27.00	1	8.00	1.00	8.00	0.10	0.50	0.10	187.39	192.92	195.60													
3	27.00	1	8.00	1.00	8.00	0.10	0.50	0.10	195.60	189.73	181.87													
CAN	5.08	1	8.00		4.50	0.00			181.87		178.67													

96.91 ft (total length of tendon)																								

SUMMARY :

Average initial stress (after release)	186.31	ksi
Long term stress losses	10.38	ksi
Final average stress	175.93	ksi
Final average force in tendon	26.92	k
Anchor set influence from right pull (197.33ksi;0.731) ..	34.48	ft
Elongation at right pull before anchor set	7.85	inch
Elongation at right pull after anchor set	7.60	inch
Total elongation after anchor set	7.60	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.67; Max along tendon 0.73

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN					
=====					
Units are in ksi					
X/L	Cant	Span 1	Span 2	Span 3	Cant

0.00	172.67	176.64	187.39	195.60	181.87
0.05	172.81	177.37	188.31	194.62	181.71
0.10	172.96	177.88	188.88	194.02	181.54
0.15	173.10	178.34	189.38	193.49	181.38
0.20	173.24	178.80	189.88	192.95	181.22
0.25	173.39	179.27	190.39	192.42	181.06
0.30	173.53	179.74	190.89	191.88	180.90
0.35	173.68	180.21	191.40	191.35	180.74
0.40	173.82	180.67	191.90	190.81	180.58
0.45	173.97	181.15	192.41	190.27	180.42
0.50	174.11	181.63	192.92	189.73	180.25
0.55	174.26	182.12	193.43	189.18	180.09
0.60	174.40	182.61	193.94	188.64	179.93
0.65	174.55	183.10	194.46	188.09	179.77
0.70	174.69	183.60	194.97	187.55	179.60
0.75	174.84	184.09	195.49	187.00	179.44
0.80	174.98	184.59	196.01	186.45	179.28
0.85	175.13	185.09	196.53	185.90	179.11
0.90	175.28	185.65	197.12	185.27	178.95
0.95	175.42	186.49	196.58	184.24	178.79
1.00	176.64	187.39	195.60	181.87	178.67

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN					
=====					
Units are in inch					
X/L	Cant	Span 1	Span 2	Span 3	Cant

0.00	3.25	7.00	8.00	8.00	8.00
0.05	3.26	6.74	7.65	7.65	7.66
0.10	3.29	5.95	6.60	6.60	7.33
0.15	3.33	4.97	5.29	5.29	7.03
0.20	3.40	4.11	4.15	4.15	6.74
0.25	3.48	3.39	3.19	3.19	6.47
0.30	3.59	2.80	2.40	2.40	6.21
0.35	3.71	2.34	1.79	1.79	5.98
0.40	3.85	2.01	1.35	1.35	5.76
0.45	4.01	1.82	1.09	1.09	5.56
0.50	4.19	1.75	1.00	1.00	5.38
0.55	4.38	1.83	1.09	1.09	5.21
0.60	4.60	2.06	1.35	1.35	5.06
0.65	4.83	2.45	1.79	1.79	4.93
0.70	5.09	3.00	2.40	2.40	4.82
0.75	5.36	3.70	3.19	3.19	4.72
0.80	5.65	4.56	4.15	4.15	4.64
0.85	5.96	5.58	5.29	5.29	4.58
0.90	6.29	6.75	6.60	6.60	4.54
0.95	6.63	7.69	7.65	7.65	4.51
1.00	7.00	8.00	8.00	8.00	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: NOV 30, 2016

TIME: 14:27:11

PROJECT TITLE :
Block 20-LVL-3-B01-PR-6-2nd Pull

SPECIFIC TITLE :
B01-PR-6

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED
Type of strand	LOW LAX
Ultimate strength of strand	270.00 ksi
Modulus of elasticity of strand	28500.00 ksi
Estimate of initial average compression	248.00 psi

Concrete strength at 28 days	5000.00 psi
Average weight of concrete	NORMAL
Estimated age of concrete at stressing	3 days
Modulus of elasticity of concrete at stressing	3122.00 ksi
Modulus of elasticity of concrete at 28 days	4031.00 ksi
Estimate of average relative humidity	80. %
Volume to surface ratio of member	4.50 in

CALCULATED VALUES :

Elastic shortening	1.132 ksi
Shrinkage	2.900 ksi
Creep	2.805 ksi
Relaxation	3.545 ksi

Total long-term stress losses	10.383 ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000 /radian
Coefficient of wobble friction (K)	0.00140 rad/ft
Ultimate strength of strand	270.00 ksi
Ratio of jacking stress to strand's ultimate strength	0.80
Anchor set	0.25 inch
Cross-sectional area of strand	0.153 inch^2
Total Number of Strands per Tendon	1
STRESSING	AT RIGHT END

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-3-B01-PR-6-2nd Pu)

SPAN	ft	P	< TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->														
			start	center	right	X1/L	X2/L	X3/L	start	center	right												
-1	---	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----
1	19.00	1	4.50	1.00	8.00	0.10	0.37	0.10	168.13	171.25	176.83												
2	22.00	1	8.00	1.00	8.00	0.10	0.50	0.10	176.83	181.83	187.43												
3	27.50	1	8.00	1.00	8.00	0.10	0.50	0.10	187.43	192.99	199.09												
4	32.33	1	8.00	1.75	7.00	0.10	0.50	0.10	199.09	194.12	186.85												
CAN	8.00	1	7.00		3.25	0.00			186.85		183.31												

108.83 ft (total length of tendon)																							

SUMMARY :

Average initial stress (after release)	186.88 ksi
Long term stress losses	10.38 ksi
Final average stress	176.50 ksi
Final average force in tendon	27.00 k

Anchor set influence from right pull (199.66ksi;0.739) ..	39.31 ft
Elongation at right pull before anchor set	8.81 inch
Elongation at right pull after anchor set	8.56 inch

Total elongation after anchor set	8.56 inch
Ratio of total elongation to tendon length after anchor set	0.08 inch/ft
Jacking force	33.05 k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.69; Max along tendon 0.74

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN					
=====					
Units are in ksi					
X/L	Span 1	Span 2	Span 3	Span 4	Cant

0.00	168.13	176.83	187.43	199.09	186.85
0.05	168.84	177.76	188.34	199.32	186.68
0.10	169.22	178.28	188.92	198.70	186.50
0.15	169.62	178.72	189.42	198.13	186.32
0.20	170.03	179.16	189.93	197.56	186.14
0.25	170.44	179.60	190.43	196.99	185.97
0.30	170.85	180.05	190.94	196.42	185.79
0.35	171.25	180.49	191.45	195.85	185.61
0.40	171.59	180.94	191.96	195.27	185.43
0.45	171.93	181.38	192.47	194.69	185.26
0.50	172.27	181.83	192.99	194.12	185.08
0.55	172.61	182.28	193.50	193.56	184.90
0.60	172.95	182.73	194.02	193.00	184.72
0.65	173.29	183.18	194.54	192.43	184.54
0.70	173.64	183.64	195.06	191.86	184.36
0.75	173.98	184.09	195.58	191.30	184.18
0.80	174.32	184.54	196.10	190.73	184.00
0.85	174.67	185.00	196.62	190.15	183.82
0.90	175.14	185.54	197.22	189.53	183.64
0.95	175.97	186.51	198.19	188.66	183.46
1.00	176.83	187.43	199.09	186.85	183.31

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN					
=====					
Units are in inch					
X/L	Span 1	Span 2	Span 3	Span 4	Cant

0.00	4.50	8.00	8.00	8.00	7.00
0.05	4.26	7.65	7.65	7.69	6.63
0.10	3.55	6.60	6.60	6.75	6.29
0.15	2.70	5.29	5.29	5.58	5.96
0.20	2.01	4.15	4.15	4.56	5.65
0.25	1.50	3.19	3.19	3.70	5.36
0.30	1.17	2.40	2.40	3.00	5.09
0.35	1.01	1.79	1.79	2.45	4.83
0.40	1.02	1.35	1.35	2.06	4.60
0.45	1.13	1.09	1.09	1.83	4.38
0.50	1.35	1.00	1.00	1.75	4.19
0.55	1.68	1.09	1.09	1.82	4.01
0.60	2.11	1.35	1.35	2.01	3.85
0.65	2.64	1.79	1.79	2.34	3.71
0.70	3.28	2.40	2.40	2.80	3.59
0.75	4.03	3.19	3.19	3.39	3.48
0.80	4.88	4.15	4.15	4.11	3.40
0.85	5.83	5.29	5.29	4.97	3.33
0.90	6.89	6.60	6.60	5.95	3.29
0.95	7.72	7.65	7.65	6.74	3.26
1.00	8.00	8.00	8.00	7.00	3.25



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: NOV 30, 2016

TIME: 14:30:40

PROJECT TITLE :
Block 20-LVL-3-B04-PR-7

SPECIFIC TITLE :
B04-PR-7

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	221.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.009	ksi
Shrinkage	2.900	ksi
Creep	2.500	ksi
Relaxation	3.795	ksi

Total long-term stress losses	10.204	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT BOTH ENDS	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-3-B04-PR-7)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->															
			start	center	right	X1/L	X2/L	X3/L	start	center	right													
-1	----	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----	
CAN	8.00	1	3.25		7.00		0.00		182.94		186.48													
1	29.83	1	7.00	1.75	8.00	0.10	0.50	0.10	186.48	193.50	199.39													
2	26.17	1	8.00	1.00	8.00	0.10	0.50	0.10	199.39	193.49	187.99													
3	27.83	1	8.00	1.00	8.00	0.10	0.50	0.10	187.99	182.13	182.80													
4	29.50	1	8.00	1.00	8.00	0.10	0.50	0.10	182.80	188.37	194.58													
5	22.83	1	8.00	1.00	8.00	0.10	0.50	0.10	194.58	197.57	191.32													
6	19.67	1	8.00	1.75	4.50	0.10	0.50	0.10	191.32	185.89	181.68													

163.83 ft (total length of tendon)

SUMMARY :

Average initial stress (after release)	189.82	ksi
Long term stress losses	10.20	ksi
Final average stress	179.61	ksi
Final average force in tendon	27.48	k
Anchor set influence from left pull (199.47ksi;0.739) ..	37.94	ft
Anchor set influence from right pull (198.84ksi;0.736) ..	34.00	ft
Elongation at left pull before anchor set	12.51	inch
Elongation at right pull before anchor set	1.08	inch
Elongation at left pull after anchor set	12.26	inch
Elongation at right pull after anchor set	0.83	inch
Total elongation after anchor set	13.09	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.68; Max along tendon 0.74

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN							
=====							
Units are in ksi							
X/L	Cant	Span 1	Span 2	Span 3	Span 4	Span 5	Span 6

0.00	182.94	186.48	199.39	187.99	182.80	194.58	191.32
0.05	183.09	188.26	198.63	187.06	183.69	195.59	190.27
0.10	183.27	189.13	197.65	186.15	184.26	196.16	189.69
0.15	183.45	189.73	197.06	185.58	184.77	196.65	189.22
0.20	183.63	190.27	196.54	185.09	185.28	197.14	188.74
0.25	183.81	190.82	196.03	184.59	185.79	197.63	188.26
0.30	183.99	191.36	195.52	184.10	186.30	198.12	187.77
0.35	184.16	191.90	195.01	183.60	186.82	198.62	187.29
0.40	184.34	192.43	194.50	183.11	187.33	198.56	186.80
0.45	184.52	192.97	193.99	182.62	187.85	198.07	186.32
0.50	184.70	193.50	193.49	182.13	188.37	197.57	185.89
0.55	184.88	194.05	192.98	181.65	188.89	197.07	185.51
0.60	185.06	194.60	192.48	181.16	189.41	196.57	185.13
0.65	185.24	195.15	191.98	180.67	189.93	196.07	184.75
0.70	185.41	195.70	191.48	180.19	190.46	195.56	184.37
0.75	185.59	196.25	190.98	179.71	190.98	195.06	183.99
0.80	185.77	196.79	190.48	180.01	191.51	194.56	183.61
0.85	185.95	197.34	189.98	180.49	192.04	194.05	183.22
0.90	186.12	197.88	189.49	181.04	192.63	193.45	182.80
0.95	186.30	198.49	188.92	181.93	193.56	192.39	182.15
1.00	186.48	199.39	187.99	182.80	194.58	191.32	181.68

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN							
=====							
Units are in inch							
X/L	Cant	Span 1	Span 2	Span 3	Span 4	Span 5	Span 6

0.00	3.25	7.00	8.00	8.00	8.00	8.00	8.00
0.05	3.26	6.74	7.65	7.65	7.65	7.65	7.69
0.10	3.29	5.95	6.60	6.60	6.60	6.60	6.75
0.15	3.33	4.97	5.29	5.29	5.29	5.29	5.58
0.20	3.40	4.11	4.15	4.15	4.15	4.15	4.56
0.25	3.48	3.39	3.19	3.19	3.19	3.19	3.70
0.30	3.59	2.80	2.40	2.40	2.40	2.40	3.00
0.35	3.71	2.34	1.79	1.79	1.79	1.79	2.45
0.40	3.85	2.01	1.35	1.35	1.35	1.35	2.06
0.45	4.01	1.82	1.09	1.09	1.09	1.09	1.83
0.50	4.19	1.75	1.00	1.00	1.00	1.00	1.75
0.55	4.38	1.83	1.09	1.09	1.09	1.09	1.78
0.60	4.60	2.06	1.35	1.35	1.35	1.35	1.89
0.65	4.83	2.45	1.79	1.79	1.79	1.79	2.06
0.70	5.09	3.00	2.40	2.40	2.40	2.40	2.30
0.75	5.36	3.70	3.19	3.19	3.19	3.19	2.61
0.80	5.65	4.56	4.15	4.15	4.15	4.15	2.99
0.85	5.96	5.58	5.29	5.29	5.29	5.29	3.43
0.90	6.29	6.75	6.60	6.60	6.60	6.60	3.95
0.95	6.63	7.69	7.65	7.65	7.65	7.65	4.36
1.00	7.00	8.00	8.00	8.00	8.00	8.00	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: NOV 30, 2016

TIME: 14:11:46

PROJECT TITLE :
Block 20-LVL-3-D01-PR-7

SPECIFIC TITLE :
D01-PR-7

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	224.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.022	ksi
Shrinkage	2.900	ksi
Creep	2.534	ksi
Relaxation	4.030	ksi

Total long-term stress losses	10.487	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-3-D01-PR-7)

LENGTH		< TENDON HEIGHT in.>		Horizontal ratios			<- STRESS (ksi) -->				
SPAN	ft	P	start	center	right	X1/L	X2/L	X3/L	start	center	right
-1----	2-----	3-----	4-----	5-----	6-----	7----	8----	9-----	10-----	11-----	12-
1	33.25	1	4.50	1.75	4.50	0.10	0.50	0.10	198.01	192.50	186.80

33.25 ft (total length of tendon)											

SUMMARY :

Average initial stress (after release)	192.47	ksi
Long term stress losses	10.49	ksi
Final average stress	181.98	ksi
Final average force in tendon	27.84	k
Anchor set influence from right pull (198.01ksi;0.733) ..	33.25	ft
Elongation at right pull before anchor set	2.94	inch
Elongation at right pull after anchor set	2.69	inch
Total elongation after anchor set	2.69	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.73; Max along tendon 0.73

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN		
=====		
Units are in ksi		
X/L	Span	1

0.00	198.01	
0.05	197.34	
0.10	196.78	
0.15	196.25	
0.20	195.72	
0.25	195.19	
0.30	194.65	
0.35	194.12	
0.40	193.58	
0.45	193.04	
0.50	192.50	
0.55	191.96	
0.60	191.42	
0.65	190.88	
0.70	190.33	
0.75	189.79	
0.80	189.24	
0.85	188.69	
0.90	188.11	
0.95	187.40	
1.00	186.80	

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN		
=====		
Units are in inch		
X/L	Span	1

0.00	4.50	
0.05	4.36	
0.10	3.95	
0.15	3.43	
0.20	2.99	
0.25	2.61	
0.30	2.30	
0.35	2.06	
0.40	1.89	
0.45	1.78	
0.50	1.75	
0.55	1.78	
0.60	1.89	
0.65	2.06	
0.70	2.30	
0.75	2.61	
0.80	2.99	
0.85	3.43	
0.90	3.95	
0.95	4.36	
1.00	4.50	



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: NOV 30, 2016

TIME: 14:03:20

PROJECT TITLE :
Block 20-LVL-3-D05-PR-6-1st Pull

SPECIFIC TITLE :
D05-PR-6

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	242.00	psi

Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.105	ksi
Shrinkage	2.900	ksi
Creep	2.738	ksi
Relaxation	4.021	ksi

Total long-term stress losses	10.763	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT BOTH ENDS	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-3-D05-PR-6-1st Pu)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->														
			start	center	right	X1/L	X2/L	X3/L	start	center	right												
-1	----	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----
1	31.50	1	4.50	1.75	8.00	0.10	0.50	0.10	186.44	191.92	198.08												
2	29.00	1	8.00	1.00	8.00	0.10	0.50	0.10	198.08	197.99	192.18												
3	29.00	1	8.00	1.00	8.00	0.10	0.50	0.10	192.18	192.42	196.90												
4	30.00	1	8.00	1.00	8.00	0.10	0.50	0.10	196.90	190.81	182.74												
CAN	5.08	1	8.00		4.50	0.00			182.74		179.54												

124.58 ft (total length of tendon)																							

SUMMARY :

Average initial stress (after release)	192.75	ksi
Long term stress losses	10.76	ksi
Final average stress	181.98	ksi
Final average force in tendon	27.84	k
Anchor set influence from left pull (201.22ksi;0.745) ..	37.41	ft
Anchor set influence from right pull (197.77ksi;0.732) ..	36.42	ft
Elongation at left pull before anchor set	10.05	inch
Elongation at right pull before anchor set	0.56	inch
Elongation at left pull after anchor set	9.80	inch
Elongation at right pull after anchor set	0.31	inch
Total elongation after anchor set	10.11	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.69; Max along tendon 0.75

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN					
=====					
Units are in ksi					
X/L	Span 1	Span 2	Span 3	Span 4	Cant

0.00	186.44	198.08	192.18	196.90	182.74
0.05	187.02	199.02	191.25	195.94	182.58
0.10	187.71	200.00	190.32	195.31	182.42
0.15	188.27	200.62	189.74	194.76	182.26
0.20	188.79	201.18	189.29	194.20	182.10
0.25	189.32	200.71	189.81	193.64	181.94
0.30	189.84	200.16	190.33	193.08	181.78
0.35	190.37	199.62	190.85	192.51	181.62
0.40	190.89	199.07	191.37	191.95	181.45
0.45	191.41	198.53	191.90	191.38	181.29
0.50	191.92	197.99	192.42	190.81	181.13
0.55	192.48	197.45	192.95	190.24	180.97
0.60	193.06	196.91	193.48	189.67	180.81
0.65	193.64	196.37	194.01	189.10	180.64
0.70	194.22	195.83	194.54	188.52	180.48
0.75	194.80	195.30	195.07	187.95	180.32
0.80	195.38	194.77	195.60	187.37	180.15
0.85	195.95	194.23	196.14	186.79	179.99
0.90	196.53	193.71	196.74	186.14	179.83
0.95	197.16	193.11	197.70	185.13	179.67
1.00	198.08	192.18	196.90	182.74	179.54

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN					
=====					
Units are in inch					
X/L	Span 1	Span 2	Span 3	Span 4	Cant

0.00	4.50	8.00	8.00	8.00	8.00
0.05	4.36	7.65	7.65	7.65	7.66
0.10	3.95	6.60	6.60	6.60	7.33
0.15	3.43	5.29	5.29	5.29	7.03
0.20	2.99	4.15	4.15	4.15	6.74
0.25	2.61	3.19	3.19	3.19	6.47
0.30	2.30	2.40	2.40	2.40	6.21
0.35	2.06	1.79	1.79	1.79	5.98
0.40	1.89	1.35	1.35	1.35	5.76
0.45	1.78	1.09	1.09	1.09	5.56
0.50	1.75	1.00	1.00	1.00	5.38
0.55	1.83	1.09	1.09	1.09	5.21
0.60	2.06	1.35	1.35	1.35	5.06
0.65	2.45	1.79	1.79	1.79	4.93
0.70	3.00	2.40	2.40	2.40	4.82
0.75	3.70	3.19	3.19	3.19	4.72
0.80	4.56	4.15	4.15	4.15	4.64
0.85	5.58	5.29	5.29	5.29	4.58
0.90	6.75	6.60	6.60	6.60	4.54
0.95	7.69	7.65	7.65	7.65	4.51
1.00	8.00	8.00	8.00	8.00	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: Jan 6, 2017

TIME: 14:28:47

PROJECT TITLE :
Block 20-LVL-3-D05-PR-6-2nd Pull

SPECIFIC TITLE :
D05-PR-6

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :		
Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	242.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :		
Elastic shortening	1.105	ksi
Shrinkage	2.900	ksi
Creep	2.738	ksi
Relaxation	4.021	ksi

Total long-term stress losses	10.763	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :		
Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down
X1/L etc = horizontal distances to control points in geometry of the
tendon divided by span length
Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-3-D05-PR-6-2nd Pu)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->														
			start	center	right	X1/L	X2/L	X3/L	start	center	right												
-1	----	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----
1	22.33	1	4.50	1.00	8.00	0.10	0.38	0.10	185.46	189.32	195.21												
2	19.67	1	8.00	4.00	8.00	0.10	0.50	0.10	195.21	199.50	198.28												
3	32.00	1	8.00	1.75	4.50	0.10	0.50	0.10	198.28	192.08	186.53												

74.00 ft (total length of tendon)																							

SUMMARY :

Average initial stress (after release)	193.34	ksi
Long term stress losses	10.76	ksi
Final average stress	182.58	ksi
Final average force in tendon	27.93	k
Anchor set influence from right pull (201.26ksi;0.745) ..	37.45	ft
Elongation at right pull before anchor set	6.27	inch
Elongation at right pull after anchor set	6.02	inch
Total elongation after anchor set	6.02	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.69; Max along tendon 0.75

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN			
Units are in ksi			
X/L	Span 1	Span 2	Span 3
0.00	185.46	195.21	198.28
0.05	186.20	195.94	197.36
0.10	186.63	196.39	196.72
0.15	187.09	196.77	196.14
0.20	187.54	197.16	195.56
0.25	188.00	197.55	194.98
0.30	188.45	197.94	194.40
0.35	188.90	198.33	193.81
0.40	189.32	198.72	193.22
0.45	189.72	199.11	192.63
0.50	190.12	199.50	192.08
0.55	190.53	199.90	191.55
0.60	190.94	200.29	191.03
0.65	191.34	200.69	190.50
0.70	191.75	201.08	189.97
0.75	192.16	201.05	189.44
0.80	192.57	200.65	188.91
0.85	192.98	200.25	188.38
0.90	193.51	199.80	187.81
0.95	194.39	199.03	187.12
1.00	195.21	198.28	186.53

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN			
Units are in inch			
X/L	Span 1	Span 2	Span 3
0.00	4.50	8.00	8.00
0.05	4.27	7.80	7.69
0.10	3.58	7.20	6.75
0.15	2.74	6.45	5.58
0.20	2.07	5.80	4.56
0.25	1.56	5.25	3.70
0.30	1.21	4.80	3.00
0.35	1.03	4.45	2.45
0.40	1.01	4.20	2.06
0.45	1.11	4.05	1.83
0.50	1.31	4.00	1.75
0.55	1.63	4.05	1.78
0.60	2.05	4.20	1.89
0.65	2.58	4.45	2.06
0.70	3.22	4.80	2.30
0.75	3.97	5.25	2.61
0.80	4.83	5.80	2.99
0.85	5.80	6.45	3.43
0.90	6.87	7.20	3.95
0.95	7.72	7.80	4.36
1.00	8.00	8.00	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: Jan 17, 2017

TIME: 09:02:17

PROJECT TITLE :
Block 20-LVL-4-B03-PR-9

SPECIFIC TITLE :
B03-PR-9

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	263.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.25	in

CALCULATED VALUES :

Elastic shortening	1.200	ksi
Shrinkage	2.960	ksi
Creep	2.975	ksi
Relaxation	3.300	ksi

Total long-term stress losses	10.436	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT LEFT	END

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-4-B03-PR-9)

SPAN	ft	P	< TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->		
			start	center	right	X1/L	X2/L	X3/L	start	center	right
-1----	2-----	3-----	4-----	5-----	6-----	7----	8----	9-----	10-----	11-----	12-
1	17.75	1	4.25	1.75	7.00	0.10	0.50	0.10	181.95	185.89	190.88
2	27.00	1	7.00	1.00	7.00	0.10	0.50	0.10	190.88	197.00	195.48
3	14.67	1	7.00	5.00	7.00	0.10	0.50	0.10	195.48	192.12	189.14
4	14.75	1	7.00	5.00	7.00	0.10	0.50	0.10	189.14	185.98	183.09
5	26.75	1	7.00	1.00	7.00	0.10	0.50	0.10	183.09	177.86	173.03
6	17.58	1	7.00	1.75	4.25	0.10	0.50	0.10	173.03	168.55	165.52

118.50 ft (total length of tendon)											

SUMMARY :

Average initial stress (after release)	184.67	ksi
Long term stress losses	10.44	ksi
Final average stress	174.23	ksi
Final average force in tendon	26.66	k
Anchor set influence from left pull (198.98ksi;0.737) ..	36.52	ft
Elongation at left pull before anchor set	9.46	inch
Elongation at left pull after anchor set	9.21	inch
Total elongation after anchor set	9.21	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.67; Max along tendon 0.74

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN						
Units are in ksi						
X/L	Span 1	Span 2	Span 3	Span 4	Span 5	Span 6
0.00	181.95	190.88	195.48	189.14	183.09	173.03
0.05	182.40	191.89	194.87	188.65	182.36	172.29
0.10	183.02	192.81	194.36	188.15	181.55	171.48
0.15	183.42	193.40	194.05	187.85	181.03	171.05
0.20	183.77	193.91	193.77	187.58	180.58	170.69
0.25	184.13	194.43	193.49	187.31	180.12	170.33
0.30	184.48	194.95	193.22	187.05	179.67	169.97
0.35	184.83	195.46	192.94	186.78	179.21	169.62
0.40	185.18	195.97	192.67	186.51	178.76	169.26
0.45	185.53	196.49	192.39	186.25	178.31	168.91
0.50	185.89	197.00	192.12	185.98	177.86	168.55
0.55	186.28	197.51	191.85	185.71	177.41	168.24
0.60	186.73	198.01	191.57	185.45	176.96	167.96
0.65	187.17	198.52	191.30	185.19	176.52	167.68
0.70	187.62	198.93	191.03	184.92	176.07	167.41
0.75	188.06	198.42	190.76	184.66	175.63	167.13
0.80	188.50	197.92	190.49	184.39	175.18	166.86
0.85	188.94	197.42	190.21	184.13	174.74	166.58
0.90	189.38	196.92	189.94	183.87	174.30	166.31
0.95	189.90	196.36	189.64	183.57	173.81	166.00
1.00	190.88	195.48	189.14	183.09	173.03	165.52

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN						
Units are in inch						
X/L	Span 1	Span 2	Span 3	Span 4	Span 5	Span 6
0.00	4.25	7.00	7.00	7.00	7.00	7.00
0.05	4.13	6.70	6.90	6.90	6.70	6.74
0.10	3.75	5.80	6.60	6.60	5.80	5.95
0.15	3.28	4.67	6.22	6.22	4.67	4.97
0.20	2.88	3.70	5.90	5.90	3.70	4.11
0.25	2.53	2.88	5.63	5.63	2.88	3.39
0.30	2.25	2.20	5.40	5.40	2.20	2.80
0.35	2.03	1.68	5.22	5.22	1.68	2.34
0.40	1.88	1.30	5.10	5.10	1.30	2.01
0.45	1.78	1.07	5.03	5.03	1.07	1.82
0.50	1.75	1.00	5.00	5.00	1.00	1.75
0.55	1.82	1.07	5.03	5.03	1.07	1.78
0.60	2.01	1.30	5.10	5.10	1.30	1.88
0.65	2.34	1.68	5.22	5.22	1.68	2.03
0.70	2.80	2.20	5.40	5.40	2.20	2.25
0.75	3.39	2.88	5.63	5.63	2.88	2.53
0.80	4.11	3.70	5.90	5.90	3.70	2.88
0.85	4.97	4.67	6.22	6.22	4.67	3.28
0.90	5.95	5.80	6.60	6.60	5.80	3.75
0.95	6.74	6.70	6.90	6.90	6.70	4.13
1.00	7.00	7.00	7.00	7.00	7.00	4.25



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: NOV 30, 2016

TIME: 14:37:01

PROJECT TITLE :
Block 20-LVL-4-B03-PR-10

SPECIFIC TITLE :
B03-PR-10

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :		
Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	223.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :		
Elastic shortening	1.018	ksi
Shrinkage	2.900	ksi
Creep	2.523	ksi
Relaxation	4.031	ksi

Total long-term stress losses	10.472	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :		
Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT LEFT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down
X1/L etc = horizontal distances to control points in geometry of the
tendon divided by span length
Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-4-B03-PR-10)

LENGTH		< TENDON HEIGHT in.>		Horizontal ratios			<- STRESS (ksi) -->				
SPAN	ft	P	start	center	right	X1/L	X2/L	X3/L	start	center	right
-1----	2-----	3-----	4-----	5-----	6-----	7----	8----	9-----	10-----	11-----	12-
CAN	7.83	1	3.25		7.00			0.00	183.39		186.90
1	32.00	1	7.00	1.75	4.50	0.10	0.50	0.10	186.90	194.16	199.41

39.83 ft (total length of tendon)											

SUMMARY :

Average initial stress (after release)	192.24	ksi
Long term stress losses	10.47	ksi
Final average stress	181.77	ksi
Final average force in tendon	27.81	k
Anchor set influence from left pull (199.41ksi;0.739) ..	39.83	ft
Elongation at left pull before anchor set	3.47	inch
Elongation at left pull after anchor set	3.22	inch
Total elongation after anchor set	3.22	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.74; Max along tendon 0.74

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN		
=====		
Units are in ksi		
X/L	Cant	Span 1

0.00	183.39	186.90
0.05	183.54	188.73
0.10	183.72	189.60
0.15	183.89	190.22
0.20	184.07	190.79
0.25	184.25	191.35
0.30	184.43	191.92
0.35	184.61	192.48
0.40	184.78	193.04
0.45	184.96	193.60
0.50	185.14	194.16
0.55	185.32	194.70
0.60	185.49	195.21
0.65	185.67	195.71
0.70	185.85	196.22
0.75	186.02	196.73
0.80	186.20	197.23
0.85	186.37	197.73
0.90	186.55	198.23
0.95	186.73	198.76
1.00	186.90	199.41

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN		
=====		
Units are in inch		
X/L	Cant	Span 1

0.00	3.25	7.00
0.05	3.26	6.74
0.10	3.29	5.95
0.15	3.33	4.97
0.20	3.40	4.11
0.25	3.48	3.39
0.30	3.59	2.80
0.35	3.71	2.34
0.40	3.85	2.01
0.45	4.01	1.82
0.50	4.19	1.75
0.55	4.38	1.78
0.60	4.60	1.89
0.65	4.83	2.06
0.70	5.09	2.30
0.75	5.36	2.61
0.80	5.65	2.99
0.85	5.96	3.43
0.90	6.29	3.95
0.95	6.63	4.36
1.00	7.00	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: Jan 6, 2017

TIME: 14:36:14

PROJECT TITLE :
Block 20-LVL-4-D03-PR-9

SPECIFIC TITLE :
D03-PR-9

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :		
Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	296.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.25	in

CALCULATED VALUES :		
Elastic shortening	1.351	ksi
Shrinkage	2.960	ksi
Creep	3.348	ksi
Relaxation	3.990	ksi

Total long-term stress losses	11.649	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :		
Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down
X1/L etc = horizontal distances to control points in geometry of the
tendon divided by span length
Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-4-D03-PR-9)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->		
			start	center	right	X1/L	X2/L	X3/L	start	center	right
-1----	2-----	3-----	4-----	5-----	6-----	7----	8----	9-----	10-----	11-----	12-
1	19.67	1	4.25	1.75	7.00	0.10	0.50	0.10	186.57	190.15	195.24
2	25.00	1	7.00	1.00	7.00	0.10	0.50	0.10	195.24	199.46	193.55
3	22.42	1	7.00	1.75	4.25	0.10	0.50	0.10	193.55	188.39	184.02

67.09 ft (total length of tendon)											

SUMMARY :

Average initial stress (after release)	192.40	ksi
Long term stress losses	11.65	ksi
Final average stress	180.75	ksi
Final average force in tendon	27.66	k
Anchor set influence from right pull (200.01ksi;0.741) ..	36.34	ft
Elongation at right pull before anchor set	5.69	inch
Elongation at right pull after anchor set	5.44	inch
Total elongation after anchor set	5.44	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.69; Max along tendon 0.74

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN			
Units are in ksi			
X/L	Span 1	Span 2	Span 3
0.00	186.57	195.24	193.55
0.05	187.11	196.13	192.67
0.10	187.47	196.68	192.13
0.15	187.80	197.16	191.66
0.20	188.13	197.64	191.19
0.25	188.46	198.13	190.72
0.30	188.79	198.61	190.25
0.35	189.12	199.10	189.77
0.40	189.45	199.59	189.30
0.45	189.78	199.95	188.83
0.50	190.15	199.46	188.39
0.55	190.56	198.96	187.99
0.60	190.97	198.47	187.58
0.65	191.38	197.98	187.18
0.70	191.79	197.48	186.78
0.75	192.21	196.98	186.37
0.80	192.62	196.49	185.97
0.85	193.04	195.99	185.56
0.90	193.53	195.42	185.12
0.95	194.40	194.48	184.50
1.00	195.24	193.55	184.02

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN			
Units are in inch			
X/L	Span 1	Span 2	Span 3
0.00	4.25	7.00	7.00
0.05	4.13	6.70	6.74
0.10	3.75	5.80	5.95
0.15	3.28	4.67	4.97
0.20	2.88	3.70	4.11
0.25	2.53	2.88	3.39
0.30	2.25	2.20	2.80
0.35	2.03	1.68	2.34
0.40	1.88	1.30	2.01
0.45	1.78	1.07	1.82
0.50	1.75	1.00	1.75
0.55	1.82	1.07	1.78
0.60	2.01	1.30	1.88
0.65	2.34	1.68	2.03
0.70	2.80	2.20	2.25
0.75	3.39	2.88	2.53
0.80	4.11	3.70	2.88
0.85	4.97	4.67	3.28
0.90	5.95	5.80	3.75
0.95	6.74	6.70	4.13
1.00	7.00	7.00	4.25



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: Jan 6, 2017

TIME: 14:38:21

PROJECT TITLE :
Block 20-LVL-4-D05-PR-10-1st Pull

SPECIFIC TITLE :
D05-PR-10

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :		
Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	242.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :		
Elastic shortening	1.105	ksi
Shrinkage	2.900	ksi
Creep	2.738	ksi
Relaxation	3.784	ksi

Total long-term stress losses	10.527	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :		
Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down
X1/L etc = horizontal distances to control points in geometry of the
tendon divided by span length
Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-4-D05-PR-10-1st P)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->		
			start	center	right	X1/L	X2/L	X3/L	start	center	right
-1----	2-----	3-----	4-----	5-----	6-----	7----	8----	9-----	10-----	11-----	12-
1	27.00	1	4.50	1.00	8.00	0.10	0.50	0.10	188.21	192.81	196.23
2	28.17	1	8.00	1.00	8.00	0.10	0.50	0.10	196.23	190.28	182.37
CAN	5.17	1	8.00		4.50	0.00			182.37		179.18

60.34 ft (total length of tendon)											

SUMMARY :

Average initial stress (after release)	190.61	ksi
Long term stress losses	10.53	ksi
Final average stress	180.08	ksi
Final average force in tendon	27.55	k
Anchor set influence from right pull (197.59ksi;0.732) ..	35.24	ft
Elongation at right pull before anchor set	5.09	inch
Elongation at right pull after anchor set	4.84	inch
Total elongation after anchor set	4.84	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.70; Max along tendon 0.73

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN			
Units are in ksi			
X/L	Span 1	Span 2	Cant
0.00	188.21	196.23	182.37
0.05	188.85	195.26	182.21
0.10	189.31	194.65	182.05
0.15	189.74	194.11	181.89
0.20	190.17	193.57	181.73
0.25	190.60	193.02	181.57
0.30	191.04	192.48	181.41
0.35	191.47	191.93	181.25
0.40	191.91	191.38	181.08
0.45	192.34	190.83	180.92
0.50	192.81	190.28	180.76
0.55	193.33	189.73	180.60
0.60	193.84	189.17	180.44
0.65	194.35	188.62	180.27
0.70	194.87	188.06	180.11
0.75	195.38	187.50	179.95
0.80	195.90	186.94	179.79
0.85	196.42	186.38	179.62
0.90	197.01	185.74	179.46
0.95	197.20	184.72	179.30
1.00	196.23	182.37	179.18

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN			
Units are in inch			
X/L	Span 1	Span 2	Cant
0.00	4.50	8.00	8.00
0.05	4.33	7.65	7.66
0.10	3.80	6.60	7.33
0.15	3.14	5.29	7.03
0.20	2.58	4.15	6.74
0.25	2.09	3.19	6.47
0.30	1.70	2.40	6.21
0.35	1.39	1.79	5.98
0.40	1.18	1.35	5.76
0.45	1.04	1.09	5.56
0.50	1.00	1.00	5.38
0.55	1.09	1.09	5.21
0.60	1.35	1.35	5.06
0.65	1.79	1.79	4.93
0.70	2.40	2.40	4.82
0.75	3.19	3.19	4.72
0.80	4.15	4.15	4.64
0.85	5.29	5.29	4.58
0.90	6.60	6.60	4.54
0.95	7.65	7.65	4.51
1.00	8.00	8.00	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: Jan 6, 2017

TIME: 14:39:31

PROJECT TITLE :
Block 20-LVL-4-D05-PR-10-2nd Pull

SPECIFIC TITLE :
D05-PR-10

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :		
Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	242.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :		
Elastic shortening	1.105	ksi
Shrinkage	2.900	ksi
Creep	2.738	ksi
Relaxation	4.021	ksi

Total long-term stress losses	10.763	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :		
Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down
X1/L etc = horizontal distances to control points in geometry of the
tendon divided by span length
Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-4-D05-PR-10-2nd P)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->														
			start	center	right	X1/L	X2/L	X3/L	start	center	right												
-1	----	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----
1	22.42	1	4.50	1.00	8.00	0.10	0.50	0.10	185.30	189.43	195.21												
2	19.67	1	8.00	4.00	8.00	0.10	0.50	0.10	195.21	199.50	198.28												
3	32.00	1	8.00	1.75	4.50	0.10	0.50	0.10	198.28	192.08	186.53												

74.09 ft (total length of tendon)																							

SUMMARY :

Average initial stress (after release)	193.21	ksi
Long term stress losses	10.76	ksi
Final average stress	182.44	ksi
Final average force in tendon	27.91	k
Anchor set influence from right pull (201.26ksi;0.745) ..	37.45	ft
Elongation at right pull before anchor set	6.28	inch
Elongation at right pull after anchor set	6.03	inch
Total elongation after anchor set	6.03	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.69; Max along tendon 0.75

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN			
=====			
Units are in ksi			
X/L	Span 1	Span 2	Span 3

0.00	185.30	195.21	198.28
0.05	185.93	195.94	197.36
0.10	186.35	196.39	196.72
0.15	186.72	196.77	196.14
0.20	187.10	197.16	195.56
0.25	187.48	197.55	194.98
0.30	187.86	197.94	194.40
0.35	188.24	198.33	193.81
0.40	188.62	198.72	193.22
0.45	189.01	199.11	192.63
0.50	189.43	199.50	192.08
0.55	189.90	199.90	191.55
0.60	190.37	200.29	191.03
0.65	190.85	200.69	190.50
0.70	191.32	201.08	189.97
0.75	191.79	201.05	189.44
0.80	192.27	200.65	188.91
0.85	192.75	200.25	188.38
0.90	193.31	199.80	187.81
0.95	194.32	199.03	187.12
1.00	195.21	198.28	186.53

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN			
=====			
Units are in inch			
X/L	Span 1	Span 2	Span 3

0.00	4.50	8.00	8.00
0.05	4.33	7.80	7.69
0.10	3.80	7.20	6.75
0.15	3.14	6.45	5.58
0.20	2.58	5.80	4.56
0.25	2.09	5.25	3.70
0.30	1.70	4.80	3.00
0.35	1.39	4.45	2.45
0.40	1.18	4.20	2.06
0.45	1.04	4.05	1.83
0.50	1.00	4.00	1.75
0.55	1.09	4.05	1.78
0.60	1.35	4.20	1.89
0.65	1.79	4.45	2.06
0.70	2.40	4.80	2.30
0.75	3.19	5.25	2.61
0.80	4.15	5.80	2.99
0.85	5.29	6.45	3.43
0.90	6.60	7.20	3.95
0.95	7.65	7.80	4.36
1.00	8.00	8.00	4.50



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: DEC 1, 2016

TIME: 08:18:55

PROJECT TITLE :
Block 20-LVL-5-B01-PR-14-1st Pull

SPECIFIC TITLE :
B01-PR-14

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	251.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.25	in

CALCULATED VALUES :

Elastic shortening	1.146	ksi
Shrinkage	2.960	ksi
Creep	2.839	ksi
Relaxation	4.014	ksi

Total long-term stress losses	10.959	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT BOTH ENDS	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-5-B01-PR-14-1st P)

SPAN	ft	P	< TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->														
			start	center	right	X1/L	X2/L	X3/L	start	center	right												
-1	----	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----
1	31.50	1	4.25	1.75	7.50	0.10	0.50	0.10	186.66	192.07	198.11												
2	29.00	1	7.50	1.00	7.50	0.10	0.50	0.10	198.11	198.34	192.65												
3	29.00	1	7.50	1.00	7.50	0.10	0.50	0.10	192.65	186.75	187.76												
4	30.00	1	7.50	1.00	7.50	0.10	0.50	0.10	187.76	193.39	199.58												
5	27.50	1	7.50	1.00	7.50	0.10	0.50	0.10	199.58	194.18	187.30												
CAN	9.83	1	7.50		4.25	0.00			187.30		183.54												

156.83 ft (total length of tendon)																							

SUMMARY :

Average initial stress (after release)	192.51	ksi
Long term stress losses	10.96	ksi
Final average stress	181.55	ksi
Final average force in tendon	27.78	k
Anchor set influence from left pull (201.33ksi;0.746) ..	37.91	ft
Anchor set influence from right pull (199.77ksi;0.740) ..	37.05	ft
Elongation at left pull before anchor set	12.29	inch
Elongation at right pull before anchor set	0.92	inch
Elongation at left pull after anchor set	12.04	inch
Elongation at right pull after anchor set	0.67	inch
Total elongation after anchor set	12.71	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.69; Max along tendon 0.75

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN						
=====						
Units are in ksi						
X/L	Span 1	Span 2	Span 3	Span 4	Span 5	Cant

0.00	186.66	198.11	192.65	187.76	199.58	187.30
0.05	187.23	199.01	191.75	188.64	199.02	187.11
0.10	187.90	199.95	190.87	189.21	198.43	186.92
0.15	188.45	200.56	190.29	189.73	197.91	186.73
0.20	188.97	201.10	189.78	190.25	197.38	186.55
0.25	189.49	201.02	189.27	190.77	196.85	186.36
0.30	190.01	200.48	188.77	191.29	196.32	186.17
0.35	190.53	199.94	188.26	191.81	195.79	185.98
0.40	191.04	199.40	187.76	192.34	195.25	185.80
0.45	191.56	198.87	187.25	192.86	194.72	185.61
0.50	192.07	198.34	186.75	193.39	194.18	185.42
0.55	192.62	197.80	186.25	193.92	193.64	185.23
0.60	193.19	197.27	185.75	194.45	193.11	185.04
0.65	193.76	196.75	185.26	194.98	192.57	184.85
0.70	194.34	196.22	184.76	195.51	192.02	184.66
0.75	194.90	195.69	184.49	196.05	191.48	184.47
0.80	195.47	195.17	184.98	196.59	190.94	184.28
0.85	196.04	194.65	185.48	197.12	190.39	184.09
0.90	196.60	194.13	186.04	197.72	189.77	183.90
0.95	197.22	193.54	186.90	198.64	188.79	183.71
1.00	198.11	192.65	187.76	199.58	187.30	183.54

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN						
=====						
Units are in inch						
X/L	Span 1	Span 2	Span 3	Span 4	Span 5	Cant

0.00	4.25	7.50	7.50	7.50	7.50	7.50
0.05	4.13	7.17	7.17	7.17	7.17	7.18
0.10	3.75	6.20	6.20	6.20	6.20	6.88
0.15	3.28	4.98	4.98	4.98	4.98	6.60
0.20	2.88	3.92	3.92	3.92	3.92	6.33
0.25	2.53	3.03	3.03	3.03	3.03	6.08
0.30	2.25	2.30	2.30	2.30	2.30	5.84
0.35	2.03	1.73	1.73	1.73	1.73	5.62
0.40	1.88	1.32	1.32	1.32	1.32	5.42
0.45	1.78	1.08	1.08	1.08	1.08	5.23
0.50	1.75	1.00	1.00	1.00	1.00	5.06
0.55	1.82	1.08	1.08	1.08	1.08	4.91
0.60	2.04	1.32	1.32	1.32	1.32	4.77
0.65	2.40	1.73	1.73	1.73	1.73	4.65
0.70	2.90	2.30	2.30	2.30	2.30	4.54
0.75	3.55	3.03	3.03	3.03	3.03	4.45
0.80	4.34	3.92	3.92	3.92	3.92	4.38
0.85	5.27	4.98	4.98	4.98	4.98	4.32
0.90	6.35	6.20	6.20	6.20	6.20	4.28
0.95	7.21	7.17	7.17	7.17	7.17	4.26
1.00	7.50	7.50	7.50	7.50	7.50	4.25



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: DEC 1, 2016

TIME: 08:20:55

PROJECT TITLE :
Block 20-LVL-5-B01-PR-14-2nd Pull

SPECIFIC TITLE :
B01-PR-14

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	251.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.25	in

CALCULATED VALUES :

Elastic shortening	1.146	ksi
Shrinkage	2.960	ksi
Creep	2.839	ksi
Relaxation	4.014	ksi

Total long-term stress losses	10.959	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-5-B01-PR-14-2nd P)

LENGTH		< TENDON HEIGHT in.>		Horizontal ratios			<- STRESS (ksi) -->				
SPAN	ft	P	start	center	right	X1/L	X2/L	X3/L	start	center	right
-1	----	2	----	3	----	4	----	5	----	6	----
----	----	7	----	8	----	9	----	10	----	11	----
----	----	12	----								
CAN	9.83	1	4.25		7.50		0.00		199.94		198.24
1	32.00	1	7.50	1.75	4.25	0.10	0.50	0.10	198.24	192.15	186.67

41.83 ft (total length of tendon)											

SUMMARY :

Average initial stress (after release)	194.17	ksi
Long term stress losses	10.96	ksi
Final average stress	183.21	ksi
Final average force in tendon	28.03	k
Anchor set influence from right pull (201.34ksi;0.746) ..	37.96	ft
Elongation at right pull before anchor set	3.67	inch
Elongation at right pull after anchor set	3.42	inch
Total elongation after anchor set	3.42	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.74; Max along tendon 0.75

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN		
=====		
Units are in ksi		
X/L	Cant	Span 1

0.00	199.94	198.24
0.05	200.12	197.35
0.10	200.29	196.73
0.15	200.47	196.16
0.20	200.65	195.58
0.25	200.83	195.01
0.30	201.00	194.44
0.35	201.18	193.86
0.40	201.31	193.28
0.45	201.14	192.70
0.50	200.96	192.15
0.55	200.78	191.63
0.60	200.60	191.11
0.65	200.43	190.59
0.70	200.25	190.06
0.75	200.07	189.54
0.80	199.89	189.01
0.85	199.71	188.48
0.90	199.53	187.93
0.95	199.35	187.25
1.00	198.24	186.67

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN		
=====		
Units are in inch		
X/L	Cant	Span 1

0.00	4.25	7.50
0.05	4.26	7.21
0.10	4.28	6.35
0.15	4.32	5.27
0.20	4.38	4.34
0.25	4.45	3.55
0.30	4.54	2.90
0.35	4.65	2.40
0.40	4.77	2.04
0.45	4.91	1.82
0.50	5.06	1.75
0.55	5.23	1.78
0.60	5.42	1.88
0.65	5.62	2.03
0.70	5.84	2.25
0.75	6.08	2.53
0.80	6.33	2.88
0.85	6.60	3.28
0.90	6.88	3.75
0.95	7.18	4.13
1.00	7.50	4.25



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: DEC 1, 2016

TIME: 08:23:43

PROJECT TITLE :
Block 20-LVL-5-B03-PR-15

SPECIFIC TITLE :
B03-PR-15

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :		
Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	313.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.25	in

CALCULATED VALUES :		
Elastic shortening	1.429	ksi
Shrinkage	2.960	ksi
Creep	3.541	ksi
Relaxation	3.980	ksi

Total long-term stress losses	11.910	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :		
Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT RIGHT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down
X1/L etc = horizontal distances to control points in geometry of the
tendon divided by span length
Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-5-B03-PR-15)

SPAN	ft	P	LENGTH < TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->		
			start	center	right	X1/L	X2/L	X3/L	start	center	right
-1----	2-----	3-----	4-----	5-----	6-----	7----	8----	9-----	10-----	11-----	12-
1	30.08	1	4.25	1.00	7.50	0.10	0.50	0.10	184.86	189.62	195.61
2	21.67	1	7.50	4.25	7.50	0.10	0.50	0.10	195.61	199.77	198.57
3	32.50	1	7.50	1.75	4.25	0.10	0.50	0.10	198.57	192.44	186.90

84.25 ft (total length of tendon)											

SUMMARY :

Average initial stress (after release)	193.26	ksi
Long term stress losses	11.91	ksi
Final average stress	181.35	ksi
Final average force in tendon	27.75	k
Anchor set influence from right pull (201.45ksi;0.746) ..	38.70	ft
Elongation at right pull before anchor set	7.11	inch
Elongation at right pull after anchor set	6.86	inch
Total elongation after anchor set	6.86	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.69; Max along tendon 0.75

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN			
=====			
Units are in ksi			
X/L	Span 1	Span 2	Span 3

0.00	184.86	195.61	198.57
0.05	185.48	196.25	197.68
0.10	185.96	196.67	197.06
0.15	186.41	197.06	196.48
0.20	186.86	197.44	195.90
0.25	187.31	197.83	195.33
0.30	187.77	198.22	194.75
0.35	188.22	198.60	194.16
0.40	188.68	198.99	193.58
0.45	189.14	199.38	193.00
0.50	189.62	199.77	192.44
0.55	190.14	200.16	191.91
0.60	190.67	200.55	191.39
0.65	191.19	200.95	190.86
0.70	191.71	201.34	190.33
0.75	192.24	201.16	189.79
0.80	192.76	200.77	189.26
0.85	193.29	200.37	188.73
0.90	193.88	199.93	188.17
0.95	194.78	199.27	187.48
1.00	195.61	198.57	186.90

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN			
=====			
Units are in inch			
X/L	Span 1	Span 2	Span 3

0.00	4.25	7.50	7.50
0.05	4.09	7.34	7.21
0.10	3.60	6.85	6.35
0.15	2.99	6.24	5.27
0.20	2.46	5.71	4.34
0.25	2.02	5.27	3.55
0.30	1.65	4.90	2.90
0.35	1.37	4.62	2.40
0.40	1.16	4.41	2.04
0.45	1.04	4.29	1.82
0.50	1.00	4.25	1.75
0.55	1.08	4.29	1.78
0.60	1.32	4.41	1.88
0.65	1.73	4.62	2.03
0.70	2.30	4.90	2.25
0.75	3.03	5.27	2.53
0.80	3.92	5.71	2.88
0.85	4.98	6.24	3.28
0.90	6.20	6.85	3.75
0.95	7.17	7.34	4.13
1.00	7.50	7.50	4.25



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: Jan 25, 2017

TIME: 09:03:30

PROJECT TITLE :
Block 20-LVL-5-D01-PR-15

SPECIFIC TITLE :
D01-PR-15

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :

Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	296.00	psi

Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.25	in

CALCULATED VALUES :

Elastic shortening	1.351	ksi
Shrinkage	2.960	ksi
Creep	3.348	ksi
Relaxation	3.755	ksi

Total long-term stress losses	11.414	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :

Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT BOTH ENDS	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down

X1/L etc = horizontal distances to control points in geometry of the tendon divided by span length

Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-5-D01-PR-15)

SPAN	ft	P	< TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->														
			start	center	right	X1/L	X2/L	X3/L	start	center	right												
-1	----	2	----	3	----	4	-----	5	-----	6	-----	7	----	8	----	9	-----	10	-----	11	-----	12	----
CAN	7.83	1	3.25		6.75				0.00			183.20						186.63					
1	29.83	1	6.75	1.75	7.50	0.10	0.50	0.10				186.63	193.54	199.30									
2	27.00	1	7.50	1.00	7.50	0.10	0.50	0.10				199.30	193.95	188.52									
3	20.42	1	7.50	1.00	7.50	0.10	0.50	0.10				188.52	183.12	178.28									
4	21.25	1	7.50	4.25	7.50	0.10	0.50	0.10				178.28	176.87	180.68									
5	10.08	1	7.50	7.50	7.50	0.10	0.50	0.10				180.68	181.96	183.47									
6	31.67	1	7.50	1.00	7.50	0.10	0.50	0.10				183.47	189.10	195.02									
7	17.00	1	7.50	7.50	7.50	0.10	0.50	0.10				195.02	197.36	199.31									
8	29.50	1	7.50	1.75	6.75	0.10	0.50	0.10				199.31	193.57	186.72									
CAN	8.00	1	6.75		3.25	0.00						186.72		183.26									

202.58 ft (total length of tendon)

SUMMARY :

Average initial stress (after release)	189.26	ksi
Long term stress losses	11.41	ksi
Final average stress	177.85	ksi
Final average force in tendon	27.21	k

Anchor set influence from left pull (199.60ksi;0.739) ..	38.11	ft
Anchor set influence from right pull (199.63ksi;0.739) ..	38.08	ft
Elongation at left pull before anchor set	14.98	inch
Elongation at right pull before anchor set	1.66	inch
Elongation at left pull after anchor set	14.73	inch
Elongation at right pull after anchor set	1.41	inch
Total elongation after anchor set	16.14	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :
At stressing 0.80; At anchorage 0.69; Max along tendon 0.74

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN							
Units are in ksi							
X/L	Cant	Span 1	Span 2	Span 3	Span 4	Span 5	Span 6
0.00	183.20	186.63	199.30	188.52	178.28	180.68	183.47
0.05	183.34	188.36	199.01	187.64	177.52	180.81	184.32
0.10	183.52	189.21	198.08	186.68	176.94	180.94	184.89
0.15	183.69	189.80	197.50	186.16	176.56	181.06	185.41
0.20	183.86	190.34	196.99	185.72	176.22	181.19	185.93
0.25	184.04	190.87	196.48	185.28	175.88	181.32	186.46
0.30	184.21	191.41	195.97	184.85	175.54	181.45	186.98
0.35	184.39	191.94	195.46	184.41	175.84	181.58	187.51
0.40	184.56	192.48	194.96	183.98	176.18	181.70	188.04
0.45	184.73	193.01	194.45	183.55	176.53	181.83	188.57
0.50	184.91	193.54	193.95	183.12	176.87	181.96	189.10
0.55	185.08	194.08	193.45	182.68	177.21	182.09	189.63
0.60	185.25	194.62	192.94	182.25	177.55	182.22	190.17
0.65	185.43	195.16	192.45	181.82	177.90	182.35	190.71
0.70	185.60	195.70	191.95	181.40	178.24	182.48	191.24
0.75	185.77	196.24	191.45	180.97	178.58	182.60	191.78
0.80	185.94	196.78	190.96	180.54	178.93	182.73	192.32
0.85	186.12	197.31	190.46	180.12	179.28	182.86	192.86
0.90	186.29	197.85	189.97	179.70	179.66	182.99	193.46
0.95	186.46	198.44	189.41	179.19	180.25	183.12	194.36
1.00	186.63	199.30	188.52	178.28	180.68	183.47	195.02

X/L	Span 7	Span 8	Cant
0.00	195.02	199.31	186.72
0.05	195.25	198.44	186.55
0.10	195.49	197.85	186.37
0.15	195.72	197.32	186.20
0.20	195.95	196.79	186.03
0.25	196.19	196.26	185.85
0.30	196.42	195.72	185.68
0.35	196.65	195.19	185.51
0.40	196.89	194.65	185.33
0.45	197.12	194.11	185.16
0.50	197.36	193.57	184.98
0.55	197.59	193.05	184.81
0.60	197.83	192.52	184.63
0.65	198.06	191.99	184.46
0.70	198.30	191.46	184.28
0.75	198.54	190.93	184.11
0.80	198.77	190.39	183.93
0.85	199.01	189.86	183.76
0.90	199.25	189.27	183.58
0.95	199.48	188.42	183.41
1.00	199.31	186.72	183.26

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN
Units are in inch

X/L	Cant	Span 1	Span 2	Span 3	Span 4	Span 5	Span 6
0.00	3.25	6.75	7.50	7.50	7.50	7.50	7.50
0.05	3.26	6.50	7.17	7.17	7.34	7.50	7.17
0.10	3.29	5.75	6.20	6.20	6.85	7.50	6.20
0.15	3.33	4.81	4.98	4.98	6.24	7.50	4.98
0.20	3.39	4.00	3.92	3.92	5.71	7.50	3.92
0.25	3.47	3.31	3.03	3.03	5.27	7.50	3.03
0.30	3.56	2.75	2.30	2.30	4.90	7.50	2.30
0.35	3.68	2.31	1.73	1.73	4.62	7.50	1.73
0.40	3.81	2.00	1.32	1.32	4.41	7.50	1.32
0.45	3.96	1.81	1.08	1.08	4.29	7.50	1.08
0.50	4.13	1.75	1.00	1.00	4.25	7.50	1.00
0.55	4.31	1.82	1.08	1.08	4.29	7.50	1.08
0.60	4.51	2.04	1.32	1.32	4.41	7.50	1.32
0.65	4.73	2.40	1.73	1.73	4.62	7.50	1.73
0.70	4.96	2.90	2.30	2.30	4.90	7.50	2.30
0.75	5.22	3.55	3.03	3.03	5.27	7.50	3.03
0.80	5.49	4.34	3.92	3.92	5.71	7.50	3.92
0.85	5.78	5.27	4.98	4.98	6.24	7.50	4.98
0.90	6.08	6.35	6.20	6.20	6.85	7.50	6.20
0.95	6.41	7.21	7.17	7.17	7.34	7.50	7.17
1.00	6.75	7.50	7.50	7.50	7.50	7.50	7.50

X/L	Span 7	Span 8	Cant
0.00	7.50	7.50	6.75
0.05	7.50	7.21	6.41
0.10	7.50	6.35	6.08
0.15	7.50	5.27	5.78
0.20	7.50	4.34	5.49
0.25	7.50	3.55	5.22
0.30	7.50	2.90	4.96
0.35	7.50	2.40	4.73
0.40	7.50	2.04	4.51
0.45	7.50	1.82	4.31
0.50	7.50	1.75	4.13
0.55	7.50	1.81	3.96
0.60	7.50	2.00	3.81
0.65	7.50	2.31	3.68
0.70	7.50	2.75	3.56
0.75	7.50	3.31	3.47
0.80	7.50	4.00	3.39
0.85	7.50	4.81	3.33
0.90	7.50	5.75	3.29
0.95	7.50	6.50	3.26
1.00	7.50	6.75	3.25



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FRICION LOSS CALCULATIONS

The following calculations are produced using ADAPT-FELT Standard 2011. This program calculates the long-term and immediate stress losses in a post-tensioned tendon. It outputs the elongations at the stressing ends and the final stress profile along the tendon.

DATE: DEC 1, 2016

TIME: 08:06:14

PROJECT TITLE :
Block 20-LVL-5-D06-PR-14

SPECIFIC TITLE :
D06-PR-14

LONG-TERM LOSS CALCULATIONS :

INPUT PARAMETERS :		
Post-tensioning system	UNBONDED	
Type of strand	LOW LAX	
Ultimate strength of strand	270.00	ksi
Modulus of elasticity of strand	28500.00	ksi
Estimate of initial average compression	256.00	psi
Concrete strength at 28 days	5000.00	psi
Average weight of concrete	NORMAL	
Estimated age of concrete at stressing	3	days
Modulus of elasticity of concrete at stressing	3122.00	ksi
Modulus of elasticity of concrete at 28 days	4031.00	ksi
Estimate of average relative humidity	80.	%
Volume to surface ratio of member	4.25	in

CALCULATED VALUES :		
Elastic shortening	1.168	ksi
Shrinkage	2.960	ksi
Creep	2.896	ksi
Relaxation	4.011	ksi

Total long-term stress losses	11.035	ksi

FRICION & ELONGATION CALCULATIONS :

INPUT PARAMETERS :		
Coefficient of angular friction (meu)	0.07000	/radian
Coefficient of wobble friction (K)	0.00140	rad/ft
Ultimate strength of strand	270.00	ksi
Ratio of jacking stress to strand's ultimate strength	0.80	
Anchor set	0.25	inch
Cross-sectional area of strand	0.153	inch^2
Total Number of Strands per Tendon	1	
STRESSING	AT LEFT END	

LEGEND :

P = Tendon profile type defined as: 1=reversed parabola;
2=partial/regular parabola; 3=harped; 4=general; 5=straight;
6=extended reversed parabola; 7=cantilever down
X1/L etc = horizontal distances to control points in geometry of the
tendon divided by span length
Stresses tabulated are after anchor set but before long-term losses.

TENDON ID, GEOMETRY AND STRESS PROFILE (Block 20-LVL-5-D06-PR-14)

LENGTH		< TENDON HEIGHT in.>		Horizontal ratios			<- STRESS (ksi) -->				
SPAN	ft	P	start	center	right	X1/L	X2/L	X3/L	start	center	right
-1----	2-----	3-----	4-----	5-----	6-----	7----	8----	9-----	10-----	11-----	12-
CAN	7.83	1	3.25		4.25			0.00	187.17		189.83
1	32.00	1	4.25	1.75	4.25	0.10	0.50	0.10	189.83	195.55	200.77

39.83 ft (total length of tendon)											

SUMMARY :

Average initial stress (after release)	194.13	ksi
Long term stress losses	11.04	ksi
Final average stress	183.09	ksi
Final average force in tendon	28.01	k
Anchor set influence from left pull (200.77ksi;0.744) ..	39.83	ft
Elongation at left pull before anchor set	3.51	inch
Elongation at left pull after anchor set	3.26	inch
Total elongation after anchor set	3.26	inch
Ratio of total elongation to tendon length after anchor set	0.08	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :

At stressing 0.80; At anchorage 0.74; Max along tendon 0.74

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN		
=====		
Units are in ksi		
X/L	Cant	Span 1

0.00	187.17	189.83
0.05	187.29	190.71
0.10	187.43	191.38
0.15	187.56	191.93
0.20	187.70	192.45
0.25	187.83	192.97
0.30	187.96	193.49
0.35	188.10	194.00
0.40	188.23	194.52
0.45	188.36	195.03
0.50	188.50	195.55
0.55	188.63	196.06
0.60	188.77	196.57
0.65	188.90	197.08
0.70	189.03	197.59
0.75	189.17	198.09
0.80	189.30	198.60
0.85	189.43	199.10
0.90	189.57	199.61
0.95	189.70	200.13
1.00	189.83	200.77

TENDON HEIGHT AT 1/20TH POINTS ALONG EACH SPAN		
=====		
Units are in inch		
X/L	Cant	Span 1

0.00	3.25	4.25
0.05	3.25	4.13
0.10	3.26	3.75
0.15	3.27	3.28
0.20	3.29	2.88
0.25	3.31	2.53
0.30	3.34	2.25
0.35	3.37	2.03
0.40	3.41	1.88
0.45	3.45	1.78
0.50	3.50	1.75
0.55	3.55	1.78
0.60	3.61	1.88
0.65	3.67	2.03
0.70	3.74	2.25
0.75	3.81	2.53
0.80	3.89	2.88
0.85	3.97	3.28
0.90	4.06	3.75
0.95	4.15	4.13
1.00	4.25	4.25