PACIFIC POST-TENSIONING LLC
3125 22nd Street
Salm, Oregon 97302
503-389-1595

Date: April 4, 2021

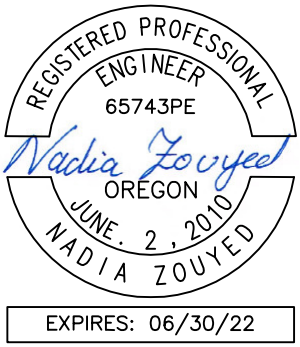
Project: **NE ALBERTA**
PORTLAND, OR

Ref: Structural drawings by Holmes Structures

Unbonded, Mono-strand Friction Calculations

Page(s)	Description	Ref. Drawing	Dated
2-3	Level 1 - Band Line A from 1 to 9	PT1.01	4/4/2021
4-5	Level 1 - Band Line h from 9 to 18	PT1.01	7/26/2020
6-7	Level 1 - Distributed b/t 1-5 from F to A	PT1.01	7/26/2020
8-9	Level 1 - Distributed b/t 6-9 from K to A	PT1.01	4/4/2021
10-11	Level 1 - Distributed b/t 14-16 from L.5 to A	PT1.01	4/4/2021
12-13	Level 1 - Distributed b/t 16-17 from M to A	PT1.01	7/26/2020

Note: Friction loss calculations are based off the most extreme tendon cases. The purpose of the friction loss calculations is to verify that the final effective forces, per these extreme cases, meet or exceed the engineer's design.



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Page(s)	Description	Ref. Drawing	Dated
2-3	Level 2 - Band Line K from 9 to 18	PT2.01	7/29/2020
4-5	Level 2 - Band Line L.5 from 10.5 to 17	PT2.01	7/29/2020
6-7	Level 2 - Band LineH from 1 to 9	PT2.01	7/29/2020
8-9	Level 2 - Distributed b/t 1-4 from K to A	PT2.01	7/29/2020
10-11	Level 2 - Distributed b/t 8-9 from K to A	PT2.01	7/29/2020

Note: Friction loss calculations are based off the most extreme tendon cases. The purpose of the friction loss calculations is to verify that the final effective forces, per these extreme cases, meet or exceed the engineer's design.

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Unbonded, Mono-strand Friction Calculations

Page(s)	Description	Ref. Drawing	Dated
2-3	Level 3 - Band Line A from 12 to 18	PT3.01	4/4/2021
4-5	Level 3 - Band Line F from 9 to 18	PT3.01	4/4/2021
6-7	Level 3 - Distributed b/t 15-16 from L to A	PT3.01	4/4/2021
8-9	Level 3 - Distributed b/t 9-10 from K to C	PT3.01	8/1/2020

Note: Friction loss calculations are based off the most extreme tendon cases. The purpose of the friction loss calculations is to verify that the final effective forces, per these extreme cases, meet or exceed the engineer's design.

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ADAPT-FELT Standard 2017

ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Apr 4, 2021 TIME: 22:31:13

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 1

S P E C I F I C T I T L E :
BANDED LINE A FROM 1 TO 9

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	363.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.482	ksi
Shrinkage	2.175	ksi
Creep	4.107	ksi
Relaxation	3.752	ksi
Total long-term stress losses	11.516	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) start	center	right -->
CAN	2.08	1	4.50		5.00			0.00	182.72		183.93
1	22.50	1	5.00	2.00	7.00	0.08	0.50	0.08	183.93	189.00	193.88
2	28.00	1	7.00	2.00	8.00	0.08	0.50	0.08	193.88	199.10	193.76
3	28.00	1	8.00	2.00	7.00	0.08	0.50	0.08	193.76	188.07	183.24
CAN	5.33	1	7.00		4.50	0.00			183.24		179.74

85.97 ft (total length of tendon)

SUMMARY :
Average initial stress (after release)..... 190.66 ksi
Long term stress losses ..... 11.52 ksi
Final average stress ..... 179.14 ksi
Final average force in tendon ..... 27.41 k

Anchor set influence from left pull (199.36ksi;0.738) .. 37.87 ft
Elongation at left pull before anchor set ..... 7.151 inch
Elongation at left pull after anchor set ..... 6.901 inch

Total elongation after anchor set ..... 6.901 inch
Ratio of total elongation to
tendon length after anchor set ..... 0.080 inch/ft
Jacking force ..... 33.05 k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.679; Max along tendon 0.738

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	182.72	183.93	193.88	193.76	183.24
0.05	182.77	185.06	194.88	192.78	181.96
0.10	182.83	185.78	195.75	191.86	181.85
0.15	182.89	186.12	196.16	191.47	181.73

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ADAPT-FELT Standard 2017

ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Jul 26, 2020 TIME: 13:49:55

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 1

S P E C I F I C T I T L E :
BANDED LINE H FROM 9 TO 18

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	274.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.119	ksi
Shrinkage	2.175	ksi
Creep	3.100	ksi
Relaxation	3.131	ksi
Total long-term stress losses	9.525	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) --> start	center	right
1	18.67	1	4.50	2.00	8.00	0.08	0.50	0.08	168.64	171.73	176.57
2	28.00	1	8.00	1.00	8.00	0.08	0.50	0.08	176.57	181.67	187.49
3	27.33	1	8.00	1.00	8.00	0.08	0.50	0.08	187.49	192.87	190.42
4	23.17	1	8.00	2.00	8.00	0.08	0.50	0.08	190.42	185.29	177.09
CAN	3.08	1	8.00		4.50	0.00			177.09		173.43

100.38 ft (total length of tendon)

SUMMARY :
Average initial stress (after release)..... 183.26 ksi
Long term stress losses ..... 9.53 ksi
Final average stress ..... 173.73 ksi
Final average force in tendon ..... 26.58 k

Anchor set influence from right pull (194.71ksi;0.721) .. 35.02 ft
Elongation at right pull before anchor set ..... 7.995 inch
Elongation at right pull after anchor set ..... 7.745 inch

Total elongation after anchor set ..... 7.745 inch
Ratio of total elongation to
tendon length after anchor set ..... 0.077 inch/ft
Jacking force ..... 33.05 k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.656; Max along tendon 0.721

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	168.64	176.57	187.49	190.42	177.09
0.05	169.16	177.49	188.48	189.42	176.91
0.10	169.39	177.86	188.86	189.08	176.72
0.15	169.68	178.33	189.36	188.61	176.54

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ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Jul 26, 2020 TIME: 14:27:34

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 1

S P E C I F I C T I T L E :
DISTRIBUTED B/T 1-5 FROM F TO A

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	305.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.245	ksi
Shrinkage	2.175	ksi
Creep	3.451	ksi
Relaxation	4.016	ksi
Total long-term stress losses	10.888	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) --> start	center	right
1	20.13	1	4.50	2.00	8.00	0.08	0.50	0.08	193.60	197.26	199.10
2	28.00	1	8.00	2.50	5.50	0.08	0.50	0.08	199.10	193.66	188.26
CAN	6.75	1	5.50		4.50	0.00			188.26		185.87

54.91 ft (total length of tendon)

SUMMARY :
Average initial stress (after release)..... 194.25 ksi
Long term stress losses ..... 10.89 ksi
Final average stress ..... 183.36 ksi
Final average force in tendon ..... 28.05 k

Anchor set influence from right pull (200.93ksi;0.744) .. 36.54 ft
Elongation at right pull before anchor set ..... 4.741 inch
Elongation at right pull after anchor set ..... 4.491 inch

Total elongation after anchor set ..... 4.491 inch
Ratio of total elongation to
tendon length after anchor set ..... 0.082 inch/ft
Jacking force ..... 33.05 k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.717; Max along tendon 0.744

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN

Units are in ksi

X/L	Span 1	Span 2	Cant
0.00	193.60	199.10	188.26
0.05	194.19	198.18	188.14
0.10	194.47	197.77	188.02
0.15	194.81	197.25	187.90
0.20	195.15	196.74	187.78
0.25	195.50	196.23	187.66

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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: Apr 4, 2021 TIME: 23:02:21

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 1

S P E C I F I C T I T L E :
DISTRIBUTED B/T 6-9 FROM K TO A

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	272.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.111	ksi
Shrinkage	2.175	ksi
Creep	3.078	ksi
Relaxation	3.559	ksi
Total long-term stress losses	9.923	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) --> start	center	right
CAN	3.14	1	4.00		4.50			0.00	173.46		174.85
1	20.67	1	4.50	4.50	8.00	0.08	0.50	0.08	174.85	177.44	181.64
2	22.50	1	8.00	1.50	8.00	0.08	0.50	0.08	181.64	186.43	192.08
3	19.00	1	8.00	1.50	8.00	0.08	0.50	0.08	192.08	197.04	195.48
4	28.00	1	8.00	2.50	5.50	0.08	0.50	0.08	195.48	190.04	183.96
CAN	2.33	1	5.50		4.50	0.00			183.96		182.21

95.74 ft (total length of tendon)

SUMMARY :
Average initial stress (after release)..... 187.10 ksi
Long term stress losses ..... 9.92 ksi
Final average stress ..... 177.18 ksi
Final average force in tendon ..... 27.11 k

Anchor set influence from right pull (199.10ksi;0.737) .. 35.51 ft
Elongation at right pull before anchor set ..... 7.792 inch
Elongation at right pull after anchor set ..... 7.542 inch

Total elongation after anchor set ..... 7.542 inch
Ratio of total elongation to
tendon length after anchor set ..... 0.079 inch/ft
Jacking force ..... 33.05 k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.681; Max along tendon 0.737

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	Cant
0.00	173.46	174.85	181.64	192.08	195.48	183.96
0.05	173.51	175.10	182.62	193.20	194.56	183.87
0.10	173.57	175.35	182.92	193.48	194.15	183.78

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DATE: Apr 4, 2021 TIME: 23:05:43

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 1

S P E C I F I C T I T L E :
DISTRIBUTED B/T 14-16 FROM L.5 TO A

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	272.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.111	ksi
Shrinkage	2.175	ksi
Creep	3.078	ksi
Relaxation	3.322	ksi
Total long-term stress losses	9.685	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) --> start	center	right
1	16.00	1	4.50	2.00	8.00	0.08	0.50	0.08	166.37	169.24	174.08
2	25.50	1	8.00	1.00	7.00	0.08	0.50	0.08	174.08	178.95	184.09
3	22.50	1	7.00	4.00	7.00	0.08	0.50	0.08	184.09	187.90	192.24
4	19.00	1	7.00	2.50	7.00	0.08	0.50	0.08	192.24	196.47	198.07
5	28.00	1	7.00	2.00	7.00	0.08	0.50	0.08	198.07	192.77	186.27
CAN	6.75	1	7.00		4.50	0.00			186.27		183.34

117.85 ft (total length of tendon)

SUMMARY :
Average initial stress (after release)..... 185.80 ksi
Long term stress losses ..... 9.69 ksi
Final average stress ..... 176.12 ksi
Final average force in tendon ..... 26.95 k

Anchor set influence from right pull (199.67ksi;0.740) .. 36.50 ft
Elongation at right pull before anchor set ..... 9.470 inch
Elongation at right pull after anchor set ..... 9.220 inch

Total elongation after anchor set ..... 9.220 inch
Ratio of total elongation to
tendon length after anchor set ..... 0.078 inch/ft
Jacking force ..... 33.05 k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.690; Max along tendon 0.740

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	166.37	174.08	184.09	192.24	198.07	186.27
0.05	166.90	175.03	184.70	193.10	197.20	186.12
0.10	167.09	175.35	185.00	193.37	196.79	185.97

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ADAPT-FELT Standard 2017

ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Jul 26, 2020 TIME: 14:53:37

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 1

S P E C I F I C T I T L E :
DISTRIBUTED B/T 16-17 FROM M TO A

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	272.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.111	ksi
Shrinkage	2.175	ksi
Creep	3.078	ksi
Relaxation	4.034	ksi
Total long-term stress losses	10.397	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) --> start	center	right
1	38.33	1	4.50	2.00	8.00	0.08	0.50	0.08	187.85	194.12	200.78
2	25.50	1	8.00	1.00	7.00	0.08	0.50	0.08	200.78	197.06	191.94
3	22.50	1	7.00	4.00	7.00	0.08	0.50	0.08	191.94	187.97	192.51
4	19.00	1	7.00	2.50	7.00	0.05	0.50	0.05	192.51	196.65	198.03
5	28.00	1	7.00	2.50	7.00	0.08	0.50	0.08	198.03	192.86	186.51
CAN	6.75	1	7.00		4.50	0.00			186.51		183.58

140.16 ft (total length of tendon)

SUMMARY :

Average initial stress (after release).....	193.60	ksi
Long term stress losses	10.40	ksi
Final average stress	183.20	ksi
Final average force in tendon	28.03	k
Anchor set influence from left pull (201.92ksi;0.748) ..	39.78	ft
Anchor set influence from right pull (199.79ksi;0.740) ..	36.60	ft
Elongation at left pull before anchor set	11.199	inch
Elongation at right pull before anchor set	0.727	inch
Elongation at left pull after anchor set	10.949	inch
Elongation at right pull after anchor set	0.477	inch
Total elongation after anchor set	11.425	inch
Ratio of total elongation to tendon length after anchor set	0.082	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.696; Max along tendon 0.748

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	187.85	200.78	191.94	192.51	198.03	186.51

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ADAPT-FELT Standard 2017

ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Jul 28, 2020 TIME: 23:10:51

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 2

S P E C I F I C T I T L E :
BANDED LINE K FROM 9 TO 18

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	371.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.515	ksi
Shrinkage	2.175	ksi
Creep	4.198	ksi
Relaxation	3.513	ksi
Total long-term stress losses	11.401	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) start	center	right -->
1	18.67	1	4.50	2.00	8.00	0.08	0.50	0.08	173.36	176.53	181.45
2	28.00	1	8.00	2.00	8.00	0.08	0.50	0.08	181.45	186.47	192.16
3	27.33	1	8.00	1.00	8.00	0.08	0.50	0.08	192.16	197.67	196.39
4	23.17	1	8.00	2.00	5.00	0.05	0.50	0.05	196.39	191.27	186.44
CAN	5.44	1	5.00		4.50	0.00			186.44		184.58

102.70 ft (total length of tendon)

SUMMARY :

Average initial stress (after release).....	188.58	ksi
Long term stress losses	11.40	ksi
Final average stress	177.18	ksi
Final average force in tendon	27.11	k
Anchor set influence from right pull (200.29ksi;0.742) ..	35.45	ft
Elongation at right pull before anchor set	8.405	inch
Elongation at right pull after anchor set	8.155	inch
Total elongation after anchor set	8.155	inch
Ratio of total elongation to tendon length after anchor set	0.079	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.691; Max along tendon 0.742

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ADAPT-FELT Standard 2017

ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Jul 29, 2020 TIME: 23:10:59

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 2

S P E C I F I C T I T L E :
BANDED LINE J FROM 10.5 TO 17

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	371.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.515	ksi
Shrinkage	2.175	ksi
Creep	4.198	ksi
Relaxation	4.450	ksi
Total long-term stress losses	12.338	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) --> start	center	right
1	75.36	1	4.50	4.50	4.50	0.08	0.50	0.08	194.37	200.58	189.48

75.36 ft (total length of tendon)

SUMMARY :

Average initial stress (after release).....	197.12	ksi
Long term stress losses	12.34	ksi
Final average stress	184.78	ksi
Final average force in tendon	28.27	k
Anchor set influence from right pull (202.74ksi;0.751) ..	45.25	ft
Elongation at right pull before anchor set	6.505	inch
Elongation at right pull after anchor set	6.255	inch
Total elongation after anchor set	6.255	inch
Ratio of total elongation to tendon length after anchor set	0.083	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.720; Max along tendon 0.751

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN

Units are in ksi

X/L	Span 1
0.00	194.37
0.05	195.40
0.10	196.43
0.15	197.47
0.20	198.52
0.25	199.57
0.30	200.62
0.35	201.68

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ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Jul 29, 2020 TIME: 23:07:20

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 2

S P E C I F I C T I T L E :
BANDED LINE H FROM 1 TO 9

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	371.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.515	ksi
Shrinkage	2.175	ksi
Creep	4.198	ksi
Relaxation	3.513	ksi
Total long-term stress losses	11.401	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) --> start	center	right
CAN	5.83	1	4.50		7.50			0.00	179.99		183.00
1	22.50	1	7.50	2.00	7.50	0.08	0.50	0.08	183.00	189.58	194.58
2	28.00	1	7.50	1.00	7.50	0.08	0.50	0.08	194.58	195.32	189.95
3	28.00	1	7.50	2.00	7.50	0.08	0.50	0.08	189.95	184.49	179.64
CAN	5.33	1	7.50		4.50	0.00			179.64		175.82

89.75 ft (total length of tendon)

SUMMARY :
Average initial stress (after release)..... 188.32 ksi
Long term stress losses ..... 11.40 ksi
Final average stress ..... 176.92 ksi
Final average force in tendon ..... 27.07 k

Anchor set influence from left pull (198.00ksi;0.733) .. 35.07 ft
Elongation at left pull before anchor set ..... 7.366 inch
Elongation at left pull after anchor set ..... 7.116 inch

Total elongation after anchor set ..... 7.116 inch
Ratio of total elongation to
tendon length after anchor set ..... 0.079 inch/ft
Jacking force ..... 33.05 k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.667; Max along tendon 0.733

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	179.99	183.00	194.58	189.95	179.64
0.05	180.11	184.95	195.67	188.99	178.18
0.10	180.27	185.96	196.67	188.13	178.05
0.15	180.42	186.30	197.08	187.75	177.93

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ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Jul 29, 2020 TIME: 23:26:02

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 2

S P E C I F I C T I T L E :
DISTRIBUTED B/T 1=4 FROM K TO A

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	289.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.180	ksi
Shrinkage	2.175	ksi
Creep	3.270	ksi
Relaxation	4.025	ksi
Total long-term stress losses	10.650	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) --> start	center	right
1	23.79	1	4.00	2.50	8.00	0.08	0.50	0.08	185.00	189.10	194.27
2	22.62	1	8.00	1.00	8.00	0.08	0.50	0.08	194.27	200.37	195.31
3	19.00	1	8.00	1.00	8.00	0.08	0.50	0.08	195.31	194.39	199.76
4	28.00	1	8.00	2.50	8.00	0.08	0.50	0.08	199.76	194.36	187.76
CAN	9.72	1	8.00		4.50	0.00			187.76		183.97

103.25 ft (total length of tendon)

SUMMARY :

Average initial stress (after release).....	193.29	ksi
Long term stress losses	10.65	ksi
Final average stress	182.64	ksi
Final average force in tendon	27.94	k
Anchor set influence from left pull (200.50ksi;0.743) ..	35.43	ft
Anchor set influence from right pull (199.98ksi;0.741) ..	37.94	ft
Elongation at left pull before anchor set	8.373	inch
Elongation at right pull before anchor set	0.530	inch
Elongation at left pull after anchor set	8.123	inch
Elongation at right pull after anchor set	0.280	inch
Total elongation after anchor set	8.403	inch
Ratio of total elongation to tendon length after anchor set	0.081	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.695; Max along tendon 0.743

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	185.00	194.27	195.31	199.76	187.76
0.05	185.46	195.41	194.09	198.85	187.57

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ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Jul 29, 2020 TIME: 23:42:53

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 2

S P E C I F I C T I T L E :
DISTRIBUTED B/T 8-9 FROM K TO A

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	289.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	4.50	in

CALCULATED VALUES :

Elastic shortening	1.180	ksi
Shrinkage	2.175	ksi
Creep	3.270	ksi
Relaxation	3.551	ksi
Total long-term stress losses	10.176	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) --> start	center	right
1	23.79	1	4.50	2.50	8.00	0.08	0.50	0.08	174.63	178.13	183.23
2	22.52	1	8.00	1.00	8.00	0.08	0.50	0.08	183.23	188.22	194.13
3	19.00	1	8.00	1.00	8.00	0.08	0.50	0.08	194.13	199.33	196.54
4	28.00	1	8.00	2.50	5.00	0.08	0.50	0.08	196.54	191.04	186.09
CAN	0.83	1	5.00		5.00	0.00			186.09		185.84

94.25 ft (total length of tendon)

SUMMARY :
Average initial stress (after release)..... 188.62 ksi
Long term stress losses ..... 10.18 ksi
Final average stress ..... 178.44 ksi
Final average force in tendon ..... 27.30 k

Anchor set influence from right pull (200.92ksi;0.744) .. 35.15 ft
Elongation at right pull before anchor set ..... 7.735 inch
Elongation at right pull after anchor set ..... 7.485 inch

Total elongation after anchor set ..... 7.485 inch
Ratio of total elongation to
tendon length after anchor set ..... 0.079 inch/ft
Jacking force ..... 33.05 k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.689; Max along tendon 0.744

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	174.63	183.23	194.13	196.54	186.09
0.05	175.12	184.27	195.33	195.61	186.08
0.10	175.41	184.58	195.61	195.19	186.07
0.15	175.75	185.03	196.07	194.67	186.05

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ADAPT-FELT Standard 2017

ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Apr 4, 2021 TIME: 23:34:06

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 3

S P E C I F I C T I T L E :
BANDED LINE A FROM 12 TO 18

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	464.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	6.00	in

CALCULATED VALUES :

Elastic shortening	1.895	ksi
Shrinkage	1.907	ksi
Creep	5.250	ksi
Relaxation	3.710	ksi
Total long-term stress losses	12.762	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) --> start	center	right
CAN	13.50	1	6.00		11.00			0.00	184.36		189.90
1	27.33	1	11.00	2.00	1.00	0.08	0.50	0.08	189.90	195.75	193.75
2	23.17	1	1.00	6.00	11.00	0.08	0.50	0.08	193.75	189.02	181.72
CAN	5.58	1	11.00		6.00	0.00			181.72		177.89

69.66 ft (total length of tendon)

SUMMARY :

Average initial stress (after release).....	189.87	ksi
Long term stress losses	12.76	ksi
Final average stress	177.11	ksi
Final average force in tendon	27.10	k
Anchor set influence from right pull (196.94ksi;0.729) ..	38.34	ft
Elongation at right pull before anchor set	5.819	inch
Elongation at right pull after anchor set	5.569	inch
Total elongation after anchor set	5.569	inch
Ratio of total elongation to tendon length after anchor set	0.080	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.683; Max along tendon 0.729

DETAIL OF STRESSES AT 1/20TH POINTS ALONG EACH SPAN

Units are in ksi

X/L	Cant	Span 1	Span 2	Cant
0.00	184.36	189.90	193.75	181.72
0.05	184.57	191.09	192.85	181.54
0.10	184.79	191.47	192.51	181.34
0.15	185.00	192.01	192.06	181.15
0.20	185.22	192.56	191.61	180.96

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ADAPT-FELT Standard 2017

ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Apr 4, 2021 TIME: 23:42:49

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 3

S P E C I F I C T I T L E :
BANDED LINE F FROM 9 TO 18

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	464.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	6.00	in

CALCULATED VALUES :

Elastic shortening	1.895	ksi
Shrinkage	1.907	ksi
Creep	5.250	ksi
Relaxation	3.247	ksi
Total long-term stress losses	12.298	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

SPAN	LENGTH ft	P	< TENDON HEIGHT in.> start	center	right	Horizontal ratios X1/L	X2/L	X3/L	<- STRESS (ksi) --> start	center	right
1	18.67	1	6.00	3.00	8.00	0.08	0.50	0.08	169.92	173.17	177.75
2	16.00	1	8.00	3.00	6.00	0.08	0.50	0.08	177.75	181.73	185.17
3	20.00	1	6.00	6.00	6.00	0.08	0.50	0.08	185.17	187.78	190.65
4	19.50	1	6.00	3.00	11.00	0.08	0.50	0.08	190.65	194.40	195.48
5	23.17	1	11.00	2.00	8.00	0.08	0.50	0.08	195.48	189.39	182.94
CAN	5.58	1	8.00		6.00	0.00			182.94		180.39

103.04 ft (total length of tendon)

SUMMARY :
Average initial stress (after release)..... 185.54 ksi
Long term stress losses ..... 12.30 ksi
Final average stress ..... 173.24 ksi
Final average force in tendon ..... 26.51 k

Anchor set influence from right pull (198.19ksi;0.734) .. 30.71 ft
Elongation at right pull before anchor set ..... 8.300 inch
Elongation at right pull after anchor set ..... 8.050 inch

Total elongation after anchor set ..... 8.050 inch
Ratio of total elongation to
tendon length after anchor set ..... 0.078 inch/ft
Jacking force ..... 33.05 k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.678; Max along tendon 0.734

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	169.92	177.75	185.17	190.65	195.48	182.94
0.05	170.50	178.68	185.43	191.29	194.13	182.81
0.10	170.73	178.90	185.69	191.56	193.77	182.68

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ADAPT-FELT Standard 2017

ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Apr 4, 2021 TIME: 23:52:54

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 3

S P E C I F I C T I T L E :
DISTRIBUTED B/T 15-16 FROM L TO A

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	258.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	6.00	in

CALCULATED VALUES :

Elastic shortening	1.053	ksi
Shrinkage	1.907	ksi
Creep	2.919	ksi
Relaxation	3.812	ksi
Total long-term stress losses	9.692	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

	LENGTH		< TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->		
SPAN	ft	P	start	center	right	X1/L	X2/L	X3/L	start	center	right
CAN	10.50	1	6.00		11.00			0.00	181.33		185.63
1	25.50	1	11.00	2.00	11.00	0.08	0.50	0.08	185.63	193.40	197.82
2	22.50	1	11.00	4.00	11.00	0.08	0.50	0.08	197.82	191.81	188.43
3	19.00	1	11.00	6.00	11.00	0.08	0.50	0.08	188.43	192.75	197.97
4	23.00	1	11.00	2.00	11.00	0.08	0.50	0.08	197.97	192.15	184.35
CAN	9.96	1	11.00		6.00	0.00			184.35		180.15

110.67 ft (total length of tendon)

SUMMARY :

Average initial stress (after release).....	190.73	ksi
Long term stress losses	9.69	ksi
Final average stress	181.04	ksi
Final average force in tendon	27.70	k
Anchor set influence from left pull (198.67ksi;0.736) ..	35.22	ft
Anchor set influence from right pull (198.08ksi;0.734) ..	32.95	ft
Elongation at left pull before anchor set	8.779	inch
Elongation at right pull before anchor set	0.609	inch
Elongation at left pull after anchor set	8.529	inch
Elongation at right pull after anchor set	0.359	inch
Total elongation after anchor set	8.888	inch
Ratio of total elongation to tendon length after anchor set	0.080	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.683; Max along tendon 0.736

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	Cant
0.00	181.33	185.63	197.82	188.43	197.97	184.35

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ADAPT-FELT Standard 2017

ADAPT POST-TENSIONING STRESS LOSS & ELONGATION PROGRAM

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: Aug 1, 2020 TIME: 23:00:04

P R O J E C T T I T L E :
NE ALBERTA - LEVEL 3

S P E C I F I C T I T L E :
DISTRIBUTED B/T 9-10 FROM K TO C

L O N G - T E R M L O S S C A L C U L A T I O N S :

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	278.00	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	3490.00	ksi
Modulus of elasticity of concrete at 28 days	4030.00	ksi
Estimate of average relative humidity	85.	%
Volume to surface ratio of member	6.00	in

CALCULATED VALUES :

Elastic shortening	1.135	ksi
Shrinkage	1.907	ksi
Creep	3.146	ksi
Relaxation	3.564	ksi
Total long-term stress losses	9.752	ksi

F R I C T I O N & E L O N G A T I O N C A L C U L A T I O N S :

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 (NE ALBERTA)

	LENGTH	< TENDON HEIGHT in.>			Horizontal ratios			<- STRESS (ksi) -->		
SPAN	ft	P	start	center	right	X1/L	X2/L	X3/L	start	center	right
1	10.50	1	6.00	2.00	22.00	0.08	0.50	0.08	166.80	170.68	185.36
2	25.50	1	22.00	2.50	11.00	0.08	0.50	0.08	185.36	193.71	198.93
3	22.58	1	11.00	2.00	8.00	0.08	0.50	0.08	198.93	192.87	186.84
CAN	9.94	1	8.00		6.00	0.00			186.84		183.37

69.07 ft (total length of tendon)

SUMMARY :

Average initial stress (after release).....	188.73	ksi
Long term stress losses	9.75	ksi
Final average stress	178.97	ksi
Final average force in tendon	27.38	k
Anchor set influence from right pull (199.68ksi;0.740) ..	33.24	ft
Elongation at right pull before anchor set	5.739	inch
Elongation at right pull after anchor set	5.489	inch
Total elongation after anchor set	5.489	inch
Ratio of total elongation to tendon length after anchor set	0.079	inch/ft
Jacking force	33.05	k

CRITICAL STRESS RATIOS :
At stressing 0.800; At anchorage 0.692; Max along tendon 0.740