



pennsylvania
DEPARTMENT OF TRANSPORTATION

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ÖÒÚœÛVT ÒÞVÁÚØÁÜœÞ ÛÚUÜVœ/VÞ

ÔUÞVÜœÖVÁI €€€Fì í hí
Y UÜSÁÜÖÖÜÁJ



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FYdfcXi Wjcb'cZWca d`YhYX'dUj Y'Ui h cf]nY

Vj ku" y qtn' y cu" ur qpuqtgf" d{ " yj g" Rgppu{ rkcplc" F gr ctvo gpv" qh" Vtcur qtvcvkqp" cpf " yj g" WLU
F gr ctvo gpv"qh" Vtcur qtvcvkqp." Hfg gtenJ ki j y c{ 'Cf o kplutcvkqp0

Vj g"eqpvgpw"qh"vj ku'tgr qtv'tghge'v'j g"xkgy u"qh"vj g"cwj qtu'y j q"ctg'tgur qpukdrg"tqt"vj g'hcew"cpf "
vj g"ceewtce{"qh"vj g'fcw'r'tgugpv'gf"j gtgk0Vj g"eqpvgpw"fq"pqv'pgeguuctkq' 'tghge'v'j g'qh'lekcn'xkgy u"
qt"r qn'ekgu"qh"vj g"WUOF gr ctvo gpv'qh"Vtcur qtw'vqp. "Hgf gten'J ki j y c{"Cf o k'puktw'vqp. "qt"vj g"
Eqo o qpy gcmj "qh'Rgppu{ k'cpkc"cv'vj g"ko g"qh'r wdr'ecv'qp0 Vj ku'tgr qtv'f qgu'pqv'eqpukw'wg" c"
ucpf ctf. "ur gek'lec'v'qp"qt'tgi w'v'v'qp0

[illegible]

805" F co ci g'O ge j cpleu'()'63

806" Rt g f k v k p'q h' R E E' R c x g o g p v' H c w n k p i' ()'64

8063" R c x g o g p v O G' H c w n k p i' O q f g n()'64

8064" Q y j g t' H c w n k p i' R t g f k v k p' O q f g n()'67

807" C f f k k q p c n' E q p u k f g t c v k p u' h q t' H c w n k p i' ()'68

8073" F co ci g' C e e w o w r c v k p' D c u g f' q p' C z r g' V { r g' ()'68

8074" W n k o c y g' H c k n t g()'68

8075" F q y g n' N q q u g p g u u' O q f g n()'68

9" 0' H r g z k d n g' R c x g o g p w' ()'6:

903" R c x g o g p v' T g u r q p u g' ()'6:

9033" H c v i w g' E t c e n k p i' ()'6:

9034" T w w k p i' ()'6;

9035" R t g f k v k p' q h' E t k k e c n' U t w e w t c n' T g u r q p u g' ()'6;

904" R t g f k v k p' q h' J O C' R c x g o g p v' H c v i w g' F co ci g' ()'73

9043" R c x g o g p v' O G' D q w q o / W r' H c v i w g' E t c e n k p i' O q f g n()'73

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R t g f k v k p' q h' J O C' R c x g o g p v' T w w k p i' ()'76

9053" R c x g o g p v O G' T w w k p i' O q f g n()'76

9054" Q y j g t' T w w k p i' R t g f k v k p' O q f g n()'77

906" C f f k k q p c n' E q p u k f g t c v k p u' h q t' J O C' R c x g o g p v' C p c n' { u k u' ()'79

9063" N k o k c v k p u' q h' O k p g t a' N k p g c t' F co ci g' J { r q y g u k u' ()'79

9064" W p k x g t u k { " q h' P g x c f c / T g p q' ()'7:

: " 0' U w o o c t { " q h' R c x g o g p v' T g u r q p u g' c p f' F co ci g' O q f g n()'7:

[illegible]

[illegible]

[illegible]

[illegible]

3'Ø'KP VT QF WE VKQP 'VQ'UWRGTNQC F U

Uwr gtmqcf gf 'xgj lengu."qt"Uwr gtmqcf u"UNu"htq"uj qtv."ctg" c"emuu"qh'xgj lengu"vj cv'gzeggf "vj g'hgi cmf " r gto kwgf "i tquu'xgj leng'y gli j v'qh'422'nkr u."cpf "v{ r lecm{ "cnuq"czng"mqcf "rko ku"*42'nkr u"cpf "56'nkr u" hqt"ukpi ng"cpf "vcpf go "czngu"tgur gev'xgn{ +0Vj g{ "ctg" cnuq"wuwm{ "o wej "rcti gt"kp"uk{ g"vj cp"v{ r lecn' xgj lengu."qhngp"qeewr { kpi "vy q"qt"o qtg"rcpgu"qh"vtchle0F wg"vq"vj gk"wpks wg"eqphki wtcvkpu."UNu" tgs vktg"ur gekn'cpcn{uku"cpf "r gto kwkpi "dghqtg"dgkpi "cmqy gf "vq"ftkxg"qp"tqcf u"kp"cm'ucv'gu." kpenmf kpi "RC0Vj ku'tgr qtv'uwo o ct{k gu'o gjv qf u"vq"cpcn{| g"vj g'ghge'v'qh"UNu"qp"hgzkdr"cpf "tki kf" r cxgo gpw"cpf "i wkf grkpgu"vj cv'y gtg"f gxgnr gf "vq"ckf "RgppF QV"kp"r tqeguukpi "UN"r gto ku"kp" c" uelgpvkle"o cppgt0

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- ~" F guetkr vkqp"qh"Uwr gtmqcf u
- ~" Rgppu{ rxcplc"Uwr gtmqcf "Xgj leng'Rtqhkrg" F gxgnr o gpv
- ~" F gxgnr o gpv'qh"Uwr gtmqcf "Y gli j v'Tgutlevkpu

Cukf g" htqo " vj g" kpxguni cvkqp" qh" j ki j y c{ " ci gpe{ " r tcevklegu." vj ku' vcum' eqpukuu" qh" o gjv qf qmji lgu"vj cv'ecp"dg"wuuf "vq" f gxgnr "c"r tqhkr"qh"uwr gtmqcf "xgj lengu"kp"Rgppu{ rxcplc"htqo " y gli j /kp/o qvkp"*Y KO + "cpf "r gto k'f cvc0Cf f kkpem{ ."rkgtcwtg"vj cv's wcpvkhgu" f co ci g'ecwuuf " d{ "vj g'xgj lengu"cpf "vj g'cuuqekcvf "r cxgo gpv'equv'y gtg" kpxguni cvgf 0Vj g' hkp f kpi u'qh'vj gug'vcumi'ctg" f kuewuuf "kp"vj g'hqmny kpi "ugevkpu0Chgt"vj cv'ncdqtcvt{ "cpf "eqo r wcvkpcn'ghhqtu'eqpf wevgf "vq" s wcpvkh{ "vj g' f co ci g'cpf "f gxgnr "i wkf grkpgu"ctg" f kuewuuf 0

4"Œ'FGUETĪRVKQP'QH'UWRGTNQC F U

Rgto kŵkpi "r tqegf wtgu"pcvkppy kf g'y gtg"lpxgunki cvgf "vq" f gxgnr "c"eqo r tgj gpukxg" f guetkr vkqp"qh" uwr gtņcf u0' Vj g" uwtxg{/dcugf " P EJ TR" uwf { ." Rtcevkegu" hqt " Rgto kŵkpi " Uwr gtj gcx{ " Nqcf" Oqxgo gpw"qp"J ki j y c{ "Rcxgo gpw" uwo o ctk gu" vj g" r qŵkku" go r m{ gf "ucvq/vq/ucvq" hqt " vj g" gxcnwcvkqp"cpf "kuwcepg"qh'uwr gtj gcx{ "eqo o gtekr'xgj leng"r gto ku"*Rcr ci kppcnku."4237+0'K"ku" gxkf gpv"ltqo " vj ku"tgxky " vj cv" vj g" f ghpkkqp"qh" uwr gtņcf u"cpf " r gto kŵkpi " hgg" xct{ "co qpi " lwtkf levkpu0

4B"Uwo o ct{ 'qh'Ucvq'Uwr gtņcf 'Y gli j v'Tgut levkpu

Vj g'hgf gtcn' qxgtpo gpv'tgi wcvgu"vj g'uk' g"cpf "y gli j v'qh'xgj leng"qp"lpxgtucvq"j ki j y c{ u."cu"qxgt" : 2' "qh"cppwcn'twem'o kgu"vtxgrgf "qeew"qp"vj g"P cvkpcn"J ki j y c{ "U{ uvo " *HJ Y C"("F QV." Rcxgo gpv'Ego r ctcvkxg"Cpcn'uku"Vgej plecn'Tgr qtv."4238+0'Vj g" hgf gtcn{ "o cpf cvgf "o czko wo " cmqy cdrq'xgj leng'y gli j w'ctg"ucvqf "lp"vj g"Eqf g"qh'Hgf gtcn'Tgi wcvkpu"cu": 2.222"r qwpf u'I tqwi" Xgj leng"Y gli j v" *I XY + "42.222"r qwpf u"ukpi rg"czrg"y gli j v."cpf "56.222"r qwpf u"vcpf go "czrg" y gli j v0*HJ Y C"("F QV."WU"Eqf g"qh'Hgf gtcn'Tgi wcvkpu."Vkrq"45."Rctv87: 090"423: +0

J qy gxgt."o cp{ "ucvgu"j cxg"gzegr vkpu"vq" vj gug"nko ku" hqt "twem" vtcpur qt vpi "egt vclp" eqo o qf kkgu"vq"r tqo qvg"dwkpguugu"cpf "gpcdrq"mecn'geqpqo le"i tqy vj 0'Vq"cee qo o qf cvg"vj gug" rcti gt"twem'ņcf u."y gli j v'tgut levkpu" hqt "uwr gtņcf "xgj leng"ctg"eqpvqmgf "d{ "lpf kxf wcn'ucvgu0' Xgj leng"vj cv'wtr cuu"vj g'o czko wo "y gli j v'tgut levkpu" hqt "cppwcn'r gto k'j qrf gtu'ctg'tghgtgf "vq"cu" uwr gtņcf u'vj tqwi j qwv'j ku'tgr qt v0'Vcdrg"3"eqpvclpu"cu"uwo o ct{ "qh'uwr gtņcf "y gli j v'vj tguj qrf u"d{ " ucvg"cpf "cp{ "qj gt'r gt vpgpv'f gvcu'tgr vpi "vq"vj gug"nko ku0'K"ku"gxkf gpv'vj cv'wtr gtņcf "f ghpkkqp" xct{ "co qpi "ucvgu0'Uqo g"lwtkf levkpu" f ghpg'uwr gtņcf u"dcugf "qp" I XY "cmqg."y j krg"qj gtu'ctg" emcuukhgf "dcugf "qp"czrg"y gli j w'qt"cu"eqo dlp cvkpu"qh'czrg"y gli j w."vtg"y gli j v'nko kv."cpf "I XY 0

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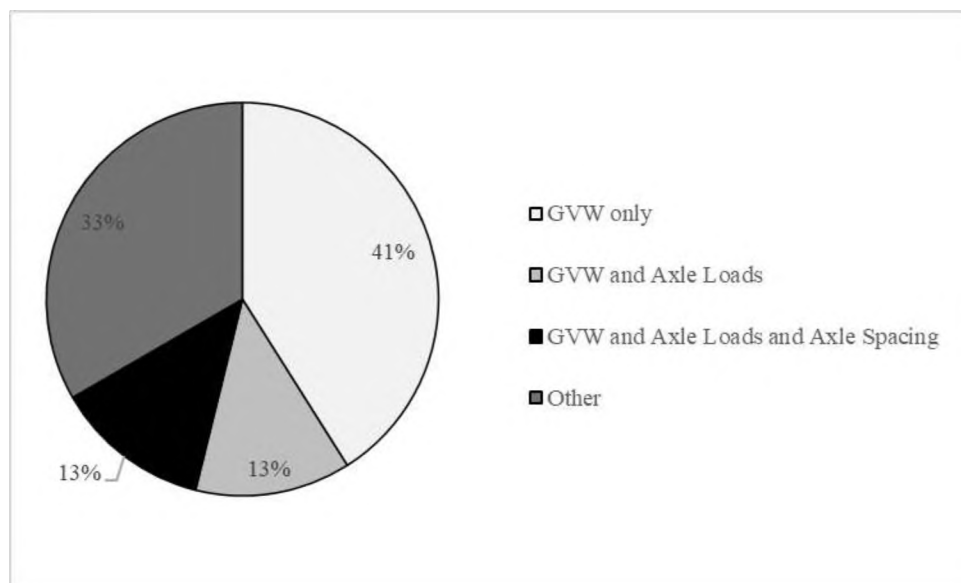
Ucvq	Uwr gtņcf " I XY " *nkr u+	Vlt g" Y gli j v' Nko k' *ldlp0+	Rgt o kvgf 'Czrg'Nqcf " Nko ku' *nkr u+ hqt " ukpi rg.'vcpf go .'vlf go ." cpf 'š wcf 'bzrgu	Ego o gpw
Crcdco c	@72	922	44.'66.'88.' : :	
Crcunc	@72	922	52.'78.'92.' : 2	
Ctk qpc	@72	/	/	

Ctnepucu	/	/	42."62."82."8:	
Ecrkqtplc	/	842	F gr gpf u"qp"czng" ur cekpi "cpf"tqwg"v{ r g	
Eqmtcf q	@422	/	49."72."87."94	
Eqppgevw	@62	822	44@."62."82." : 2	
F gny ctg	@42	/	42."62."82." : 2	
F Ø0	@46:	/	53."84." ; 5."346,	, Cewcn'y gli j v' f gr gpf u"qp" ur cekpi l'vktg" r tguwtg
Hqtkf c	@; ;	772	/	
I gqti kc	@72	/	45."."82." ; 4	
J cy clk	/	/	/	Qxgt"rgi cn'y gli j w" tgs vktg"dtkf i g" cpcn{uku
Kcj q	@422	822	F gr gpf u"qp"tqwg"v{ r g	
Kkpqlu	@: 9	/	4; ."76."97."322	
Kpf kpc	@42	: 22	4: ."6: ."82." : 2	
Ky c	@78	/	42."62."82." : 2	
Mcpucu	@72	/	46."6; ."82."87	
Mgpwem{	@422	922	42."6: ."82." : 2	
Nqwkukpc	@476	922	46."67."82." : 2	Cpcn{uku" r gthqto gf "qhh" j ki j y c{ "u{ ugo " qpn{
O clpg	@72	822	, ."5; @."84@."332	, Ulp i ng"czng" y gli j v'ko kgf "d{ " vktg"y kf vj
O ct{ rpf	@72	/	49."74."85."/	
O cucej wugwu	352"r gto k" o cz	: 22	F gr gpf u"qp"czng" ur cekpi	
O lej ki cp	@86	922	F gr gpf u"qp"tqwg." xgj leng'y kf vj ."cpf"vktg" uk g	Wpk'vktg"r tguwtgu" 747 l672"htq" tki lhgz"wpf gt" tguwkvqpu
O kppguqc	@66	822	42."62, ."82."94	, 68"y kj "dtkf i g" ej gem
O kukukr k	@; 2	772	34."6: ."791, 85."861, 94	, Czng"y gli j w"qp" kpgtucvg lhh" kpgtucvgØ' CCU VQ" ci tggo gpv'htq" I XY ">"342"nkr u

O kuqwtk	@82	/	42.'68.'82.'94	CCUJ VQ" ci tggo gpv'ht" I XY ">'342'nr u
O qpvcpc	348'r gto k' o cz	722	44.'6: .'7307.'7706	
P gdtcune	@82	/	42.'56.'82	
P gxcfc	328'r gto k' o cz	/	F gr gpf u'qp'czrg" ur celpi "cpf'tqwg"v' r g	
P gy " J co r uj ktg	/	/	4907.'72.'8907.' : 2	
P gy 'lgtug{	/	: 22	Dcugf "qp'vtg'wpk' y gli j v	
P gy 'O gzkeq	/	/	F gr gpf u'qp'tqwg	
P gy 'l qtm	@; ; Q	/	F gr gpf u'qp'tqwg.'czrg" ur celpi ."cpf'xgj keng" eqphki wtcvqp	Gpi kpggtkpi " tgxkgy 'ht'I XY "@ 362'nr u
P qtj Ectqlpc	@54	/	47.'72.'82.'8:	
P qtj 'Fcmjvc	@72	/	34, .'67.'82.'8:	, Uggg'czrg
Qj kq	@42	/	4; .'581, 72.'691, 82." 821, : 2	, Ur celpi '6'hm6'hw." 3'kp0
Qmcj qo c	@72	/	/ .62.'82.'87	
Qtgi qp	@422	822	4307 k65 lf gr gpf u'qp" ur celpi	
Rgppu{ rxcplc	@423	: 22	49.'74.'85.'94	
Tj qf g'Krcpf	342'r gto k' rko kv	/	F gr gpf u'qp'tqwg'cpf " xgj keng'eqphki wtcvqp	
Uqwj " Ectqlpc	@52	/	42.'62.'82.' : 2	
Uqwj 'Fcmjvc	@422	822	7507' "j ki j gt'y cp" dtkf i g'htto wr'y gli j v' rko ku	
Vgppguugg	382'r gto k' rko kv	/	42.'62.'82.' : 2	CCUJ VQ" ci tggo gpv'ht" I XY ">'342'nr u
Vgzcu	@4760	/	47.'68.'82.'92	Rcxgo gpv'cpcn'uku" y j gp'I XY "@722" qt'vtg'y gli j v'@8" nr u
Wcj	@47	822	4; 07.'72.'8307.'Dtkf i g" htto wr	
Xgto qpv	@72	822	F gr gpf u'qp'vtg'ukt g	
Xkti kpc	@72	/	46.'66.'971, 7607." 3221, 8607	, Kpgtuvcgl'qj gt
Y cuj kpi vqp	@422	722 822	44.'65.'87.'92	

Y guv'Xki kpkc	342'r gto k' rko kv	/	4: .67.'72.'77	
Y kueqpukp	3; 3'r gto k' rko kv	/	42.'82.'. 3.'. 2	
Y {qo kpi	@72	/	47.'77.'87.'96	

Uwt xg{ "tguwmu"itqo "y j g"PEJ TR"uwf { "ctg"uwo o ct k gf "kp"Hki wt g"30Uwr gtrncf u"ctg"o quv" eqo o qpn{ "f ghkpgf "d{ "I XY 0'C"I XY "qh"422"nkr u"qt"o qtg"ku"o quv"eqo o qpn{ "wugf "vq" f ghkpg" c" uwr gtrncf . "dw"y j gug"xgj keng"ecp"tcpi g"itqo "342"vq"722"nkr u"lp"y gli j v0Nqcf "rko ku"ht"uwr gtrncf u" f ghkpgf "y kj "I XY "cpf "czng"ncf u"j cf "I XY "tcpi kpi "itqo ": 2"vq"572"nkr u."y kj "vcpf go "czng" y gli j w"itqo "56"vq"qxgt "82"nkr u0õQvj gtõ"uwr gtrncf "f ghkpgkqpu"y gtg"itqwpf "vq"dg"o qtg"ur gekhe." cpf "tgrv kpi "vq"icexqtu"uwej "cu"xgj keng" f ko gpukqpu."cr r tqxcn"itqo "c"dtkf i g"dwgcw."qt"rko kcvkqpu" qp"vkg"y gli j v'rko ku"qpn{ 0



Hki wt g"3<Uwr gtrncf "f ghkpgkqpu" d{ "xgj keng"ej ctcevgtkukcu"Rcr ci kcppcnku."4237+

404"Uwo o ct { "qh"Ucvg"Uwr gtrncf "Rgt o kvlpi "Hggv

Nkng"uwr gtrncf "y gli j v"y j tguj qrf u."uwr gtrncf "ukpi ng/vtkr "r gto k"hggu"xct { "co qpi "lwt kuf kevqpu0 Vcdng"4"eqpvkqpu" c"uwo o ct { "qh"r gto k"hggu" d{ "ucvg0Ukpi ng/vtkr "hggu"ecp"dg"cf o kpkngt gf "cu" c"hrv" tcvg."cu" c"hwpevkqp"qh"y gli j vf kucpeg."kp"tgrv kqp"vq" I XY ."qt"cu" c"hwpevkqp"qh"r cxgo gpv"equv" tgeqxt { 0

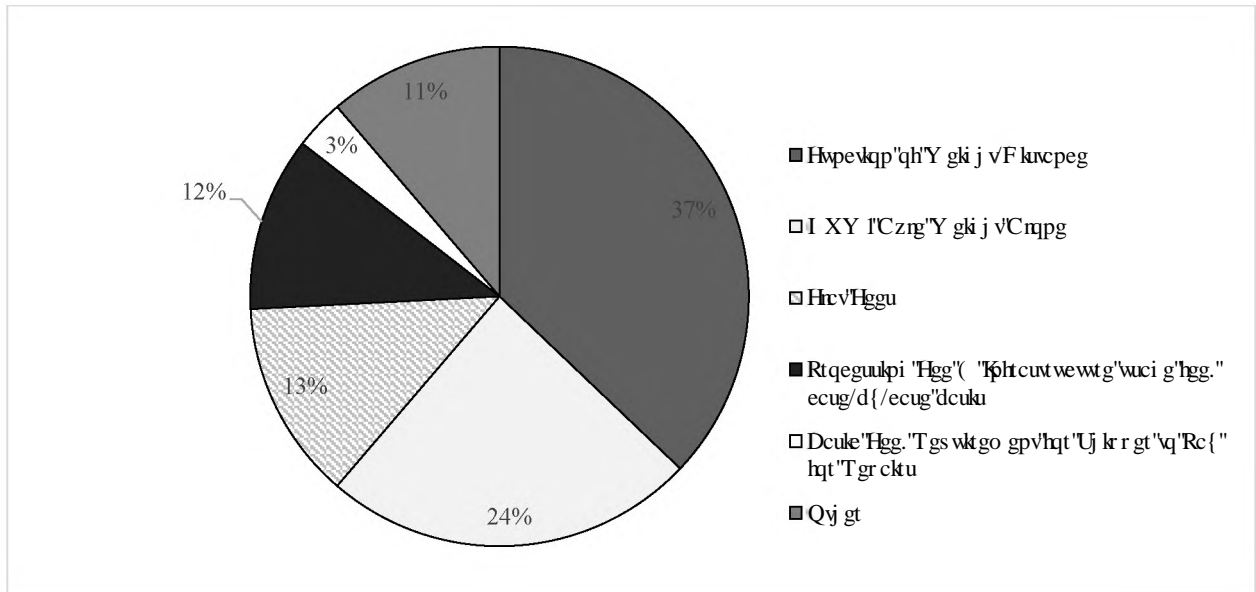
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Cncdco c	Rgto k/hgg<&322'hqt'I XY "@372."cf f kkpncn'hggu'f gekf gf "qp" c"ecug/d{/ecug" dcuku
Crcumc	Rgto k/hgg<&42'hqt'I XY "@372."cf f kkpncn'hggu'f gekf gf "qp" c"ecug/d{/ecug" dcuku
Ctk qpc	Ukpi rg/vtkr 'tgi kntcvkqp<&34 htkr ">72"o krgu="&6: htkr "@72"o krgu." Wug'hwgn'hgg<&38 htkr ">72"o krgu="&871'tkr "@72"o krgu." Encui"\$C\$"qxxgty gli j vr gto k/hgg<&970
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Hqtkf c	I XY ">"; 7<&2049 lo k I XY "; 7/334<&2054 lo k I XY "334/344<&2058 lo k I XY "354/364<&2064 lo k I XY "364/374<&2067 lo k I XY "374/384<&2069 lo k I XY "384/3; ; <&2025 B222"nd lo k I XY "@3; ; <&2025 B222"nd lo k
I gqti kc	I XY "372/3: 2<&347 I XY "@3: 2<&722'tgi ctf nguu'qh'f kncpeg"tcxgrgf
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Kpf kpc	Rgto k/hgg<&6402 Cf f kkpncn'hgg'hqt'I XY "32: /372<&2082 lo k=hqt'I XY @72"&30 lo k
Ky c	Rgto k/hgg<&32="cf f kkpncn'hggu'o c{ "dg"ngxkgf "qp" c"ecug/d{/ecug"dcuku
Mcpucu	Rgto k/hgg<&72 P q'ur gekhe"cf f kkpncn'hggu'lpf kecvgf ."dw'o qxgt'o wuv'r c{ "cm'kph'cutwewt'g" f co ci gu
Mgpwemf	Rgto k/hgg<&82."Cf f kkpncn'hgg'j cvf gr gpf u"qp"dtkf i g"cpncf uku"400pwo dgt" qh'czrgu."czrg'y gli j vl'ur cekpi +

Nqwkukpc	Rgto k'hgg<&32." Cffklkqpcn'hgg'hqt'I XY "@476<&2072kqp lo k'qh'I XY "@: 2'r nmu'hgg'hqt" utwewtcn'dtkf i g'cpcn{ uku"*&347/: 72+
O ckpg	Rgto k'hgg<"/ Cffklkqpcn'hgg'u'tcpi g'ltqo "&8"v"&49072"f gr gpf kpi "qp"j g'co qwpv'd{ "y j lej " y j g'cmqy cdng': 2'nkr 'I XY 'ku'gzeggf gf . 'tgi ctf ngui'qh'f kucpeg'v'cxgrgf
O ct{ rpf	Rgto k'hgg<&72 Cffklkqpcn'hggu<&52'hqt"j g'htu'62'nkr u'r nmu'&7'hqt"gej "cffklkqpcn'qp." r nmu'dtkf i g'cpcn{ uku'hgg
O cucej wugwu	Rgto k'hgg<&572="cffklkqpcn'hggu'o c{ "dg"f gekf gf "qp" c'ecug/d{/ecug'dcuku
O lej ki cp	Rgto k'hgg<&72="cffklkqpcn'hggu'f gekf gf "qp" c'ecug/d{/ecug'dcuku
O kppguqc	Rgto k'hgg<&58 Cffklkqpcn'hggu'dcugf "qp" f co ci g'cuuguu gpv'r gt'o krg"*czng'pwo dgt"cpf " mqcf +
O kuukur r k	Rgto k'hgg<"/ Cffklkqpcn'&2072 lo krgB222'nd
O kuqwtk	Rgto k'hgg<&37 Cffklkqpcn'&4B222'nd'kp"gzegui'qh'hi cn'I XY 'r nmu'dtkf i g'cpcn{ uku'hgg" *&647'hqt'2/72'o k'847'hqt'73/422'o k'cpf "& 47'hqt"@422'o k'o qxg+
O qpwcpc	Rgto k'hgg<&32/&72"f gr gpf kpi "qp"o krgu'f tkxgp Cffklkqpcn'hgg'hqt'I XY @22<&92"- &5072f7222'nd'qp"gzegui'hqt"gej "47" o krgu'f tkxgp
P gdtcunc	Rgto k'hgg<&42."cffklkqpcn'hggu'f gekf gf "qp"ecug/d{/ecug'dcuku
P gxcfc	&47'tgi ctf ngui'qh'I XY "cpf"o krgci g
P gy " J co r uj kg	I XY ": 2/; 2<& 072 I XY "; 2/322<&32072 I XY "@322<&4lgcej "cffklkqpcn'32'nkr u'tgi ctf ngui'qh'f kucpeg'v'cxgrgf
P gy "Lgtug{	&32'dcug'hgg"- "&7 kqp'kp"gzegui'qh': 2m'I XY "- "&7 kqp"qp'ukpi ngkcpf go " czngu"@440646'nkr u
P gy "O gzkeq	&47"- "&2047 lo krgkqp"qxgt": 806'nkr u
P gy "I qtm	Rgto k'hgg<&62/&582"f gr gpf kpi "qp"eqo o qf kv'. 'r nmu'cpcn{ uku'hgg. 'r nmu" dqp f kpi "*&32m&72m'f gr gpf kpi "qp" I XY
P qtvj Ectqrlpc	&34"- "&5B222'nd'qxgt'354'I XY 'tgi ctf ngui'qh'o krgci g
P qtvj 'F cmqvc	I XY "372/382<&52 I XY "372/392<&62 I XY "392/3: 2<&72 I XY "3: 2/3; 2<&82 I XY "@; 2<&92"- "&207 kqp lo krg"qp" I XY "@422
Qj kq	&357'hrcv'tcvg"- "&206kqp lo krg'kp"gzegui'qh'342'nkr u'I XY
Qmcj qo c	Ur gekcn'r wtr qug"qxgty gli j v'vtr 'hgg<&62" &32B222'nd'qxgty gli j v*I XY "@372'y kj ": "czngu+

Qtgi qp	& 'hgg'- 'hqt'I XY "@: : m"&lo krg'v cv'f gr gpf u'qp'I XY 'cpf 'pwo dgt'qh' czrgu"&2023/&4023 lo k+
Rgppu{ncplc	Rgto k'hgg<&47"qt"&72"- '2025 hqp lo krg'qxtg'ecttktg'u'tgi kvgtgf'y gli j v
Tj qf g'Kncpf	Rgto k'hgg<&42"- 'hqt'f kxkldrg'mqcf u'<tckrgtu"&322."tcevqtu"&72 B222'nd" qxgt'hgi cn'y gli j v'o cz "&3472+=4/. '5/. '6/czrg'twemu<&72 B222'nd"qxgt'hgi cn' rko k'o cz "&3722+'tgi ctf nguu'qh'f kncpeg'tcxgrgf
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Vgppguugg	Rgto k'hgg<&37"- 'dtkf i g'cpcn'uku'hgg"&322"vq'cewcn'equv+- "&2027 hqp lo krg
Vgzcu	Rgto k'hgg<&2"- 'hgg'f gr gpf kpi 'qp'y g'pwo dgt'qh'eqwp'vku'tcxgtugf "&492/" &32; 7+- 'o clpvgpcpeg'hgg'hqt'422">"I XY ">"4760"&597+- 'uwr gtxkukqp'hgg" hqt'422">"I XY ">"4760"&57'hqt'NQC"@: 7'hv."&722'hqt'NQC">"; 7'hv+
Wcj	Rgto k'hgg<&82"- 'hgg'tcpi kpi "&87/&672'f gr gpf kpi 'qp'I XY 'cpf 'f kncpeg" vtcxgrgf
Xgto qpv	Rgto k'hgg<&57"- 'gpi lpggtkpi 'kpur gevqp'hgu'tcpi kpi 'hqtqo "& 22"vq"&32222" f gr gpf kpi 'qp'I XY
Xkti kplc	Rgto k'hgg<&52"- "&203 lo krg hqp
Y cuj kpi vqp	Rgto k'hgg<&47"- "&6047 lo o k'- "&2072 l'222'nd lo k'hqt'I XY 'kp'gzeguu'qh'322" nkr u
Y guv'Xkti kplc	Rgto k'hgg<&42"- "&2026 hqp lo krg'qh'qxgty gli j v
Y kueqpukp	Rgto k'hgg<&327"- "&32 B222'nd'hqt'I XY "@372'nkr u'tgi ctf nguu'qh'f kncpeg" vtcxgrgf
Y {qo kpi	Rgto k'hgg<&62"- "&2028 hqp lo krg"vtcxgrgf

Cu'gxkf gpv'hqtqo "Hki wtg"4."r gto k'hgg"ej cti gf "cu" c'hwpv'qp"qh'y gli j v'f kncpeg."y j lej "ku" qh'gp'tgi wrcvf "cu"&hqp lo krg."ctg'y g'o quv'r tgcxrgp'0Vj g'ugeqpf "o quv'eqo o qp"v' r g'ku" c'hgg'dcugf " qp'I XY "qt"czrg'y gli j v."hqt"y j lej "f kncpeg"vtcxgrgf "ku"pqv'c'eqpukf gtcv'kqp'0Hrcv'hggu."o cnkpi "wr " 35' "qh'y g'tgur qpf kpi 'lwtkuf levkpu."ctg'kp'y g'tcpi g'qh"&7"vq"&772."cpf "ctg'kp'f gr gpf gpv'qh'xgj keng" y gli j v"qt" f kncpeg"vtcxgrgf 0'C"r tqegukpi "hgg"cpf "cp" kph'cutwewtg"wuci g'hgg"ur gekhe"vq" gcej " uwr gtnqcf "ecug"ku"ej cti gf "hqt"34' "qh'y g'lwtkuf levkpu."cpf "5' "wug" c"r cxgo gpv'f co ci g'equv" tgeqxtg{ "cr r tqcej . 'tgs wtkpi 'y g'uj kr r gt"vq"r c{ "hqt"cnl'kph'cutwewtg'tgr cktu0



Hki wtg"4<Xctkvwqp"qh'uwr gtrqcf "r gto k'hgg"v{ r gu"co qpi "lwtkf levkpu"*Rcr ci kppcnku"4237+

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Y KO "gej pqm' { . 'y j lej "cmqy u'lt'vj g'cwqo cve"eqngevkqp"qh'tchke"cpf "xgj leng'y gli j v'f cv'."ecp" dg"wugf "v"r qr wcv'c" f cwcducg"qh'xgj lengu'vxcgnkpi "qp"j ki j y c { u'qh'lpvgtgu'0Vj g'f cv'eqngevgf "d { " Y KO "u { ugo u'lpemf gu'r ctco gygu"uwej "cu"i tquu'xgj leng'y gli j v."czng"eqphki wtcvkqp."cpf "czng" y gli j vu0Y KO "f cv'ku'y kf gn' "rtgxncpv"cpf "rtqxkf gu"cp"wpdkugf "uco r ng"qh'xgj leng'lphtto cvkqp" ukpeg'vj g'mecvkpu'qh'yj g'u { ugo u'ctg"wpnpqy p"v"vj g'r wdne0

Cu" r tgxkqwn' { " o gpvkpgf . " cp" ceewtcvg" guiko cvg" qh' tgrxcpv" xgj leng" ej ctcevgtkueu" ku" pgeguuct { "v" f gygo kpg'vj g'gzvgpv'uwr gtrmcf "xgj lengu'ctg'tgur qpukdrg"lt'j ki j y c { "lphtcutwewtg" f co ci g'lp'Rgppu{ kxcplc0Y KO "f cv'ecp"dg"wugf "v"ej ctcevgtk g'uwr gtrmcf "xgj lengu."j qy gxgt"Y KO " f cwcducg"ctg"xgt { "rti g"cpf "eqvckp" c"eqpukf gtcdrng"co qwpv'qh'ktgrxcpv'lphtto cvkqp0Ugxgtcn' o gy qf u'v"gzvcevt'grxcpv'f cv'ltqo "Y KO "f cwcducg"ctg"cxckndrg'lp"gzkukpi "rkgtcwtg00 wnr ng" uwf lgu" j cxg" wnk gf " Y KO " f cv' " v" r tqxkf g" c" ucvkuecn' f kntkdwkqp" qh' tgrxcpv" xgj leng" ej ctcevgtkueu"0Kc'q("Ej cp."4224=O qj co o cf k'("Uj cj .3; ; 4=QDtkgp."Gptki j v.("I gwej gy ." 4232+0'Qy gt"tgugtej "j cu"hwugf "qp"enukh' kpi "xgj lengu'lpv" f hgtgpv'ecvgi qtkgu"0Hktkm'(" I j qup."4236+0Vj ku'ugevkqp" f guetkdu'c"ugngevkqp"qh'Y KO "f cv/dcugf "rtqlhg" f gxgnr o gpv'o gy qf u' gucdrukj gf "d { "xctkqu'ltgugtej gtu0

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y gli j v'y gtg"vj gp"go r m{ gf "v'uko wævg"tchle"mqf lpi "uegpctku"wulpi "c"O qpvg"Ectm"o qf gn'htq"
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wy q'r ctw0Rcwgtp"tgeqi pklqp"y cu"wugf "v'f gxgnr "c"o cvtz"qh'tvemi'htqo "vj g"P [UF QV+r gto k'
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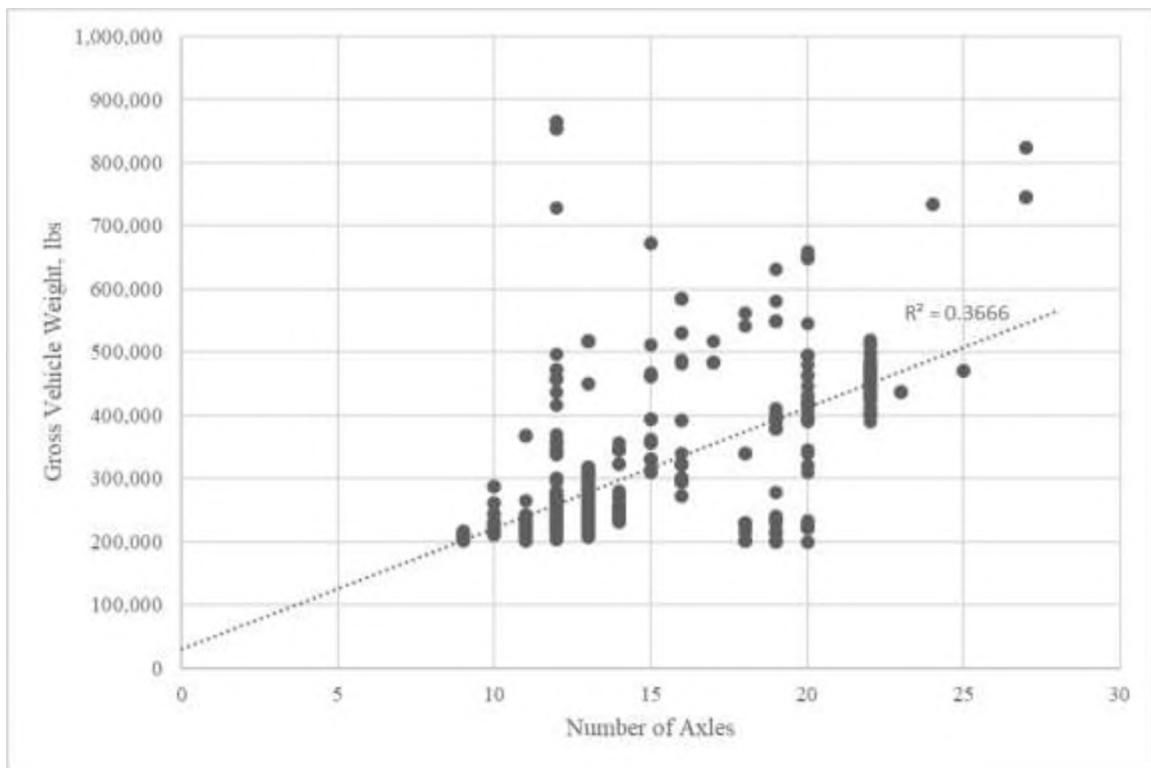
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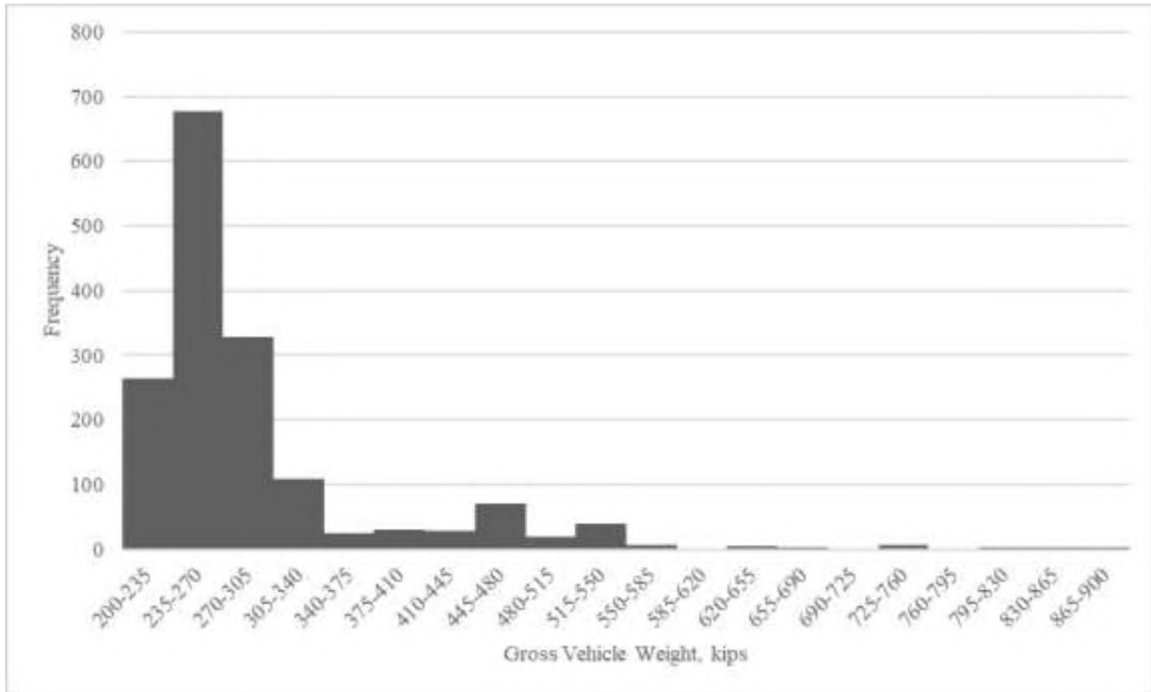
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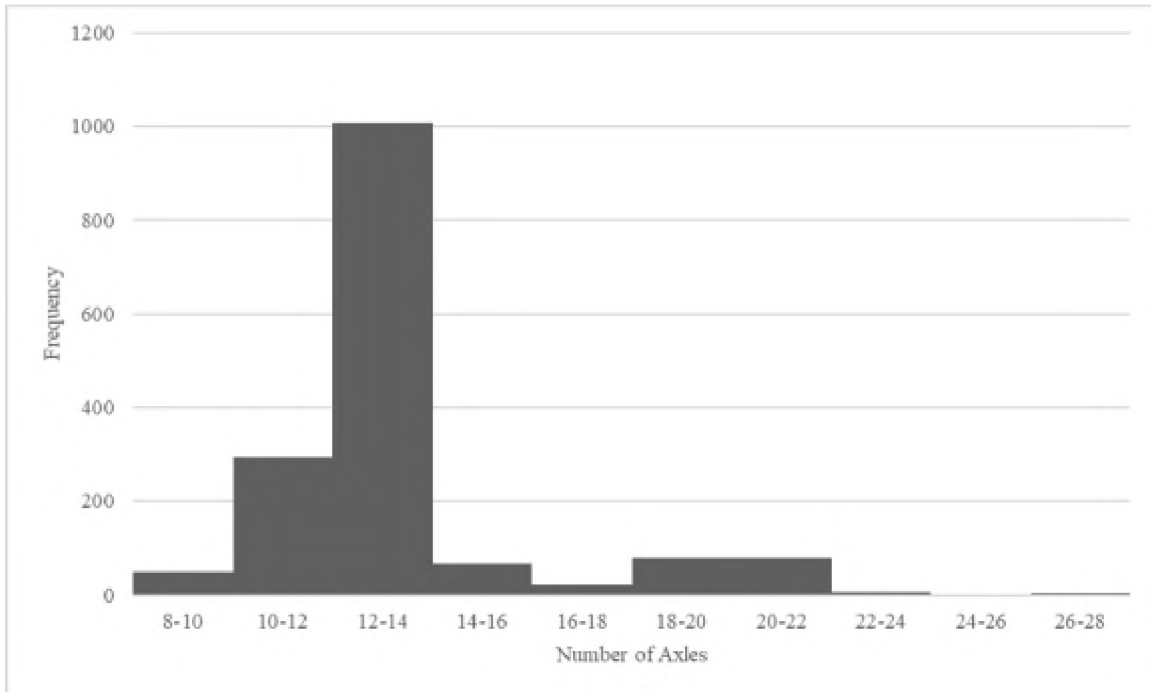
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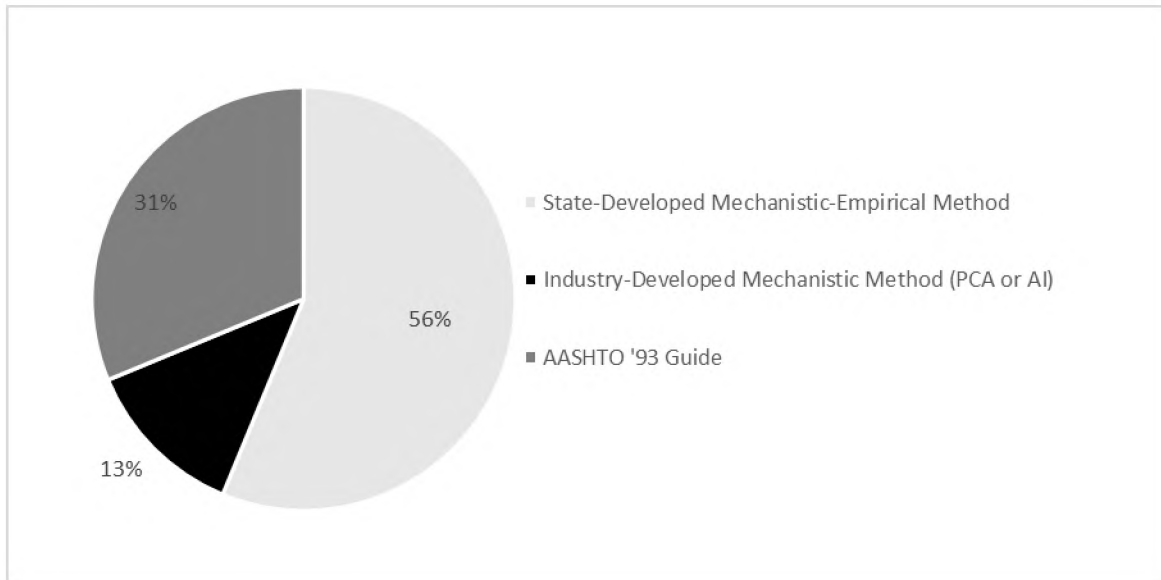
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C"P [UF QV'uwf { 'i qgu'c'ugr 'hwt'vj gt'vj cp'vj g'Qj kq'F QV'uwf { "cpf 's wcp'v'k'gu"equu'cu'cp" kpetgcug"kp'f guki p'vj kempguu'cpf "o clpvgpcpeg"vj cv'y qwrf "dg"pgeguuct { "hqt"qxyty gli j v'xgi kengu" *I j qup."gv'cr0'4237+0Vj ku'uwf { "cmqecvgf "equu'v'q'f kxkukdng'r gto k'v'wemu."ur gekn'j cwikpi 'r gto k' v'wemu." cpf " kngi cm{ " qxyty gli j v' v'wemu" dcugf " qp" o cvgtkcn' equu' cpf " eqttgevxg" o clpvgpcpeg" kpgtxgpcv'kpu'hqt'cur j cn'cpf "eqpetgvg'r cxgo gpw0Vj ku'y cu'f gvgto kpgf "wukpi 'cp'co qwpv'qh'GUCNU" vj cv'gzeggf 'vj g'o quv'ugxgtg'ngi cn'xgi keng'lp" gcej "emuu'y gli j v'ecvgi qt { 0Vj g'v'qcn'pgeguuct { "pwo dgt" qt"eqttgevxg"o clpvgpcpeg" kpgtxgpcv'kpu'tgs wktgf "hqt'c'tqcf y c { 'v'q'tgo clp'cv'cp'ceegr vcdng'KT Ky cu' f gvgto kpgf "wukpi "c"O GRF I "cr r tqcej 0K'y cu'hqwpf "vj cv'vj g'equu'cwtkdwgf "v'q'qxyty gli j v'v'wemu" qp'vj g"P [UF QV"r cxgo gpv'pgy qtm'ku'tqwi j n{ "367"o krikqp'f qmrtu'r gt" { gct."y kj "44"o krikqp" cmqecvgf "v'f kxkukdng'r gto k'v'wemu."6; "o krikqp'hqt'ur gekn'j cwikpi 'r gto k'v'wemu."cpf "95"o krikqp" hqt'kngi cm{ "qxyty gli j v'v'wemu0

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 v'chle"cpf "y gp'f k'kf gf "d{ "GUCN'rkx'gu'qh'r cxgo gpv'ugi o gpv'u'q'f gvgto kpg'w'pk'equu'r gt"GUCN0'
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 d'gec'w'ug"cr r tqcej gu'f g'x'g'ng' gf "vq" g'x'c'w'v'g"ulpi rg/v'kr "lo r ceu"ctg"q'h'gp"pq'0'Ch'gt"eq'pf v'ek'pi "
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 q'pi q'k'pi "k'p'it'cut'wewt'g"f co ci g'f wg"vq"qxgt'y gli j v'xgj lengu0'K'ku'g'x'kf gpv'it'qo "y ku't'g'x'k'gy "y cv'y g"
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J cxi pi "gzco kpgf "UNu"cpf "r gto kxpi "r tqegf wtgu."y g"pgz v'vuni'y cu"vq"cuuguo'r cxgo gpv'tgur qpug"
cpf "f co ci g"o qf gnu0'k"i gpgtcn"gz kxpi "o qf gnu"fq"pqv'eqpukf gt "y g"ghgeu"qh"UNu."y j lej "j cu"
wpls wg"eqphki wtevkpu"cpf "mqcf u"cu"eqo r ctgf "vq"v' r lecn'tchhe0Vj gtghqtg."c"ht guj "cuuguo gpv'j cu"
vq"dg"r gthqto gf "hqt"UNu0Vj g'hqmuy kpi "ugevkpu'y knlr tqxkf g'i wkf cpeg"qp<

30' S wcpvkh{ kpi "y g"fgxgnr o gpv'qh'f qy gn'mqugpguu'ht qo "uwr gtmqcf u

40' S wcpvkh{ kpi "y g"ghgew"qh'uwr gtmqcf u"qp"eqpetgv'hcwi wg

50' Guvdrkuj kpi "gzvgo g"qxgtmqcf "i wkf gnkpgu

Hcwi wg"etcenlpi "cpf "hcwvki "ctg"eqpukf gtgf "hqt"eqpetgv'r cxgo gpv."y j kg"dqwqo /wr "
etcenlpi "cpf "twwkpi "k"cnlr {gtu"ctg"eqpukf gtgf "hqt"cur j cn'r cxgo gpv0Hqt"geej "r cxgo gpv'f knvguu."
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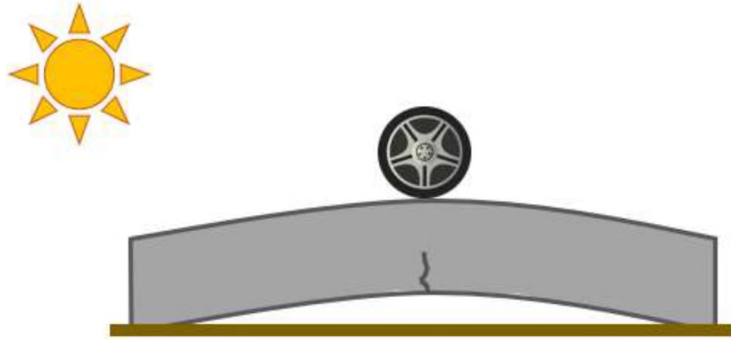
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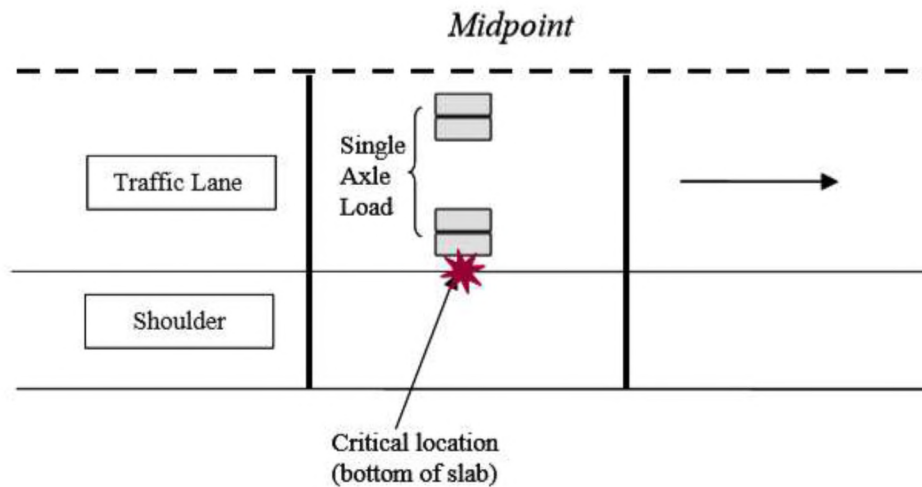
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utwewtcnlgcwgu"qhi"vj g"rcxgo gpv0

Dqwgo /wr "etcenlpi "qeeu"y j gp"vj gtg"ctg"uki pklhecpv"gpukg"utguugu"cv"vj g"dqwgo "qhi"vj g"
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qhi"vj g"rcxgo gpv"cu"vj g"pwo dgt"qhi"mqcf "cr r rdecvqpukpetgcugu0"Vj g"etkklcni"utwewtcnltgur qpug"ht"
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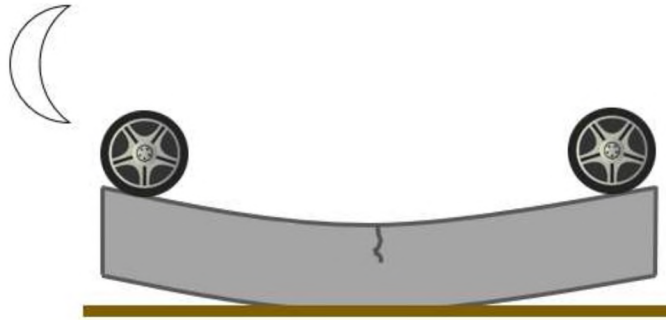


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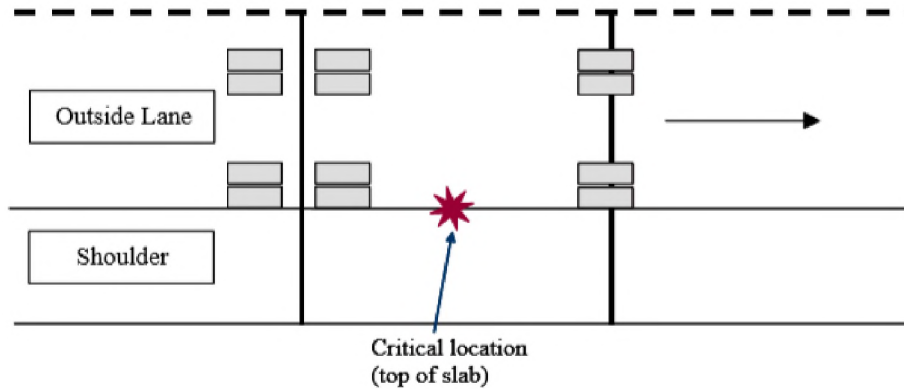


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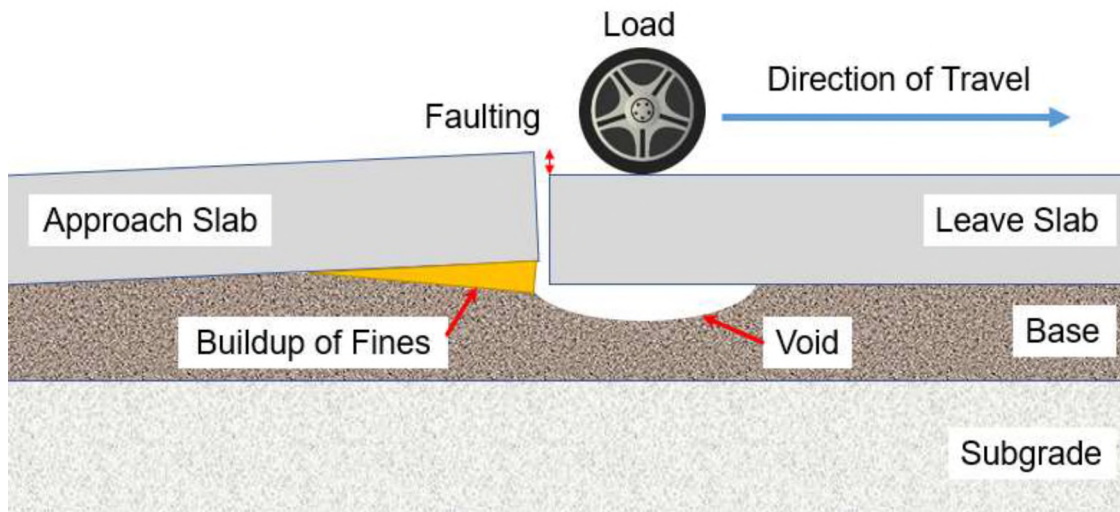
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8004''Hcwnkpi

Hcwnkpi 'ku'f ghkpgf 'cu'v'j g'f khtgpeg'lp'grgxcvqp'dgwy ggp'v'j g'cr r tqcej . 'qt'wpnqcf gf . 'urcd'cpf 'v'j g' rgcxg. 'qt'mqcf gf . 'urcd'0'Hcwnkpi 'qeevtu'cu'c'tguwn'qh'v'j g'r wo r kpi 'o ge'j cpluo 0'Rwo r kpi 'qeevtu' y j gp'htgg'o qkwtg'wpf gtpgc'v'j g'REE'urcd'o qxgu'cetquu'v'j g'lqkv'ectt { kpi '*qt'or wo r kpi o+'mqug' hkgu'lp'v'j g'dcug'qt'uwddcug'qww'qh'v'j g'lqkv'cpf 'dgpgc'v'j g'cr r tqcej 'urcd'0'Vj ku'tguwnu'lp'c'xqkf' hqto kpi 'wpf gt'v'j g'rgcxg'urcd'cpf 'c'dwkr wr 'qh'hkgu'wpf gt'v'j g'cr r tqcej 'urcd'v'j cv'ecwug'c'j ki j gt' f khtgpeg'lp'grgxcvqp'dgwy ggp'v'j g'cr r tqcej 'cpf'rgcxg'urcd'cu'uj qy p'lp'Hki wtg'330



Hki wtg'33<Vj g'r wo r kpi 'o ge'j cpluo 'tguwnu'lp'v'j g'hqto cvkqp'qh'c'dwkr wr 'qh'hkgu'cpf 'c'xqkf' wpf gt'v'j g'cr r tqcej 'cpf'rgcxg'urcd'.tgur ge'v'xgn' . 'cpf'v'j g'f gxgnr o gpv'qh'hcwnkpi 0

Hqt'r wo r kpi 'v'q'qeevt. 'hqt'f'cevqtu'o wu'dg'r tgu'p'v'<

- ''' F khtgpgvknF ghgcvkpu. 'y j lej 'ku'f ghkpgf 'cu'c'f khtgpeg'lp'grgxcvqp'dgwy ggp'v'j g' cr r tqcej 'cpf'rgcxg'urcd'0
- ''' Wpucdkk gf 'hkgu'lp'v'j g'dcug'qt'uwddcug'v'j cv'ctg'htgg'v'j'o qxg
- ''' Htgg'o qkwtg'wpf gtpgc'v'j g'REE'urcd'v'j cv'cuuknu'lp'tcpur qt v'kpi 'hkgu'cetquu'v'j g' lqkv0
- ''' Xgj keng'mqcf u

Vj g'ghge'v'xgpguu' qh'mqcf 'v'cpulgt' o ge'j cpluo u'ecp' dg'ecrwr'v'gf 'wukpi 'mqcf' v'cpulgt' ghkpgv' { '*NVG+. 'uj qy p'lp'Gs wcvkqp'30

y j gtg.

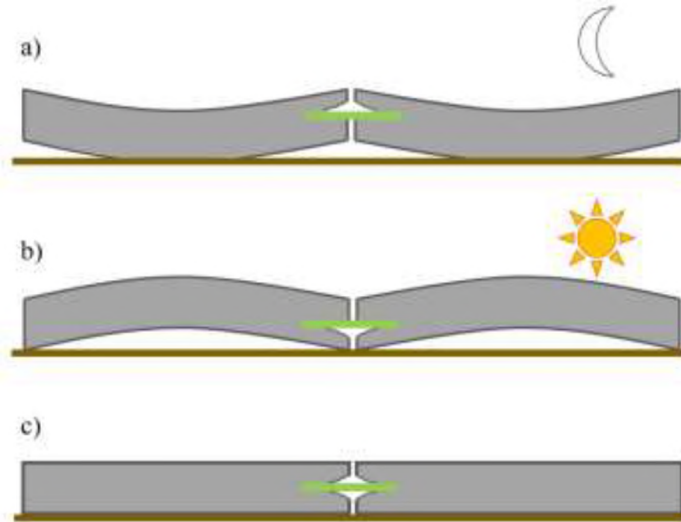
NVG'ku'yj g'mqcf "tcpuhtg"ghhkegpe{ "qh'yj g'lqkv." "

`u'ku'yj g'eqtpgt'f ghgevkqp"qh'yj g'wpmqcf gf "uud.'lp"

`.'ku'yj g'eqtpgt'f ghgevkqp"qh'yj g'mqcf gf "uud.'lp"

Qxgt"ko g."mqcf "tcpuhtg"o gej cpkuo u"lp"REE"r cxgo gpwu"dgeqo g"rguu"ghgevkxg"f wg"vq" tgr gcvgf "tchhe"mqcf u0Ci i tgi cvg"lpvgtmqenif getgcugu'f wg"vq"t'gf wevkqp'lp'yj g'uj gct"ecr cekv{ "qh'yj g" lqkv'dgecwug"qh"tgr gcvgf "xgj keng"mqcf u0Cff kkpqcm{ ."qr gpkpi "cpf "enqulpi "qh'yj g"lqkv'f wg"vq" vgo r gtcwtg"ej cpi gu'ecwug"j qwn{ 'xctkvkp'lp'lqkv'uwkhpguu'hqt'wpf qy gngf 'r cxgo gpwu0Vj g'cdkxv{ " qh'yj g'f qy gr'vq'tcpuhtg'mqcf 'f getgcugu'f wg"vq"uqengvki "ctqwpf 'yj g'f qy gr0Vj g'uqengvki 'ku'c'tguwn" qh'j ki j "eqpcev'utguugu'lp'yj g'eqpetgv'uwtqwpf lpi "eqpetgv'ecwulpi 'f gvtkqtcvkqp"qh'yj g'eqpetgv0

Vgo r gtcwtg"cpf "o qkuwtg"i tcf kgpw"chgeev' yj g"r gthqto cpeg"qh'f qy gr' dctu" yj cv"j cxg" uqengvki "ctqwpf "yj go "dgecwug"yj g'uj cr g"qh'yj g'uud'ko r cev' yj g'f gi tgg"vq"y j kej "yj g'f qy gr'ku'lp" eqpcev'y kj "yj g'uwtqwpf lpi "eqpetgv0Y j gp'yj g'uud'ku'ewtngf "f wg"vq"vgo r gtcwtg"qt"o qkuwtg" i tcf kgpv."yj g'f qy gr'eqo gu'kpq"eqpcev'y kj "yj g'uwtqwpf lpi "eqpetgv"cpf "kpetgcugu" yj g'mqcf " tcpuhtg'r qvvpkn'cu'uggp'lp'Hki wtg"340Vj g'etklecneqpf kkpq'hqt'hcwnkpi . 'y j gp'yj g'mqcf "tcpuhtg" r qvvpkn'ku'yj g'my guv."qeewtu'y j gp'yj gtg'ku'pq"vgo r gtcwtg"qt"o qkuwtg'i tcf kgpv."cu'yj g'uud'ku'hcv" y kj "yj g'f qy gr'r qukvpgf "y kj "yj g'hcuv'eqpcev'y kj "yj g'eqpetgv" *Cmpf . "423: +0



Hki wtg"34<GhgeV'qh'c'+pgi c'kxg'd+'r qukkxg'vgo r gtcwtg'cpf 'e+'pq'i tcf kgpv'qp'yj g'f qy gr0

8085''Rt gf levkp 'qh'Et h'ec n'Ut wewt c n'T gur qpug

Vj g'h'pkkg'grgo gpv'o gj qf "ku"eqo o qpn' "wugf "v'f gvgto kpg'yj g'ut wewt c n't gur qpugu"40'ut guugu" cpf "f gh'ge v'kpu+"qh'REE"r cxgo gpw0'Vj ku'ecp"dg"ceeqo r rkuj gf "wulpi "gkj gt "c"40'F "cpcn' uku'y kj " r cxgo gpv'ur gekhe" r tqi tco u"uwej "cu"KUNCD" *Mj c| cpqxlej ." gv' cr0"4222+0' Rcxgo gpv'ur gekhe" r tqi tco u"5F "HGO "cpcn' uku"r tqi tco u"uwej "cu"GxgtHG" *F cxkf u."4225+."qt"5F "i gpgtcn'r wtr qug" h'pkkg'grgo gpv'uqlhy ctg'uwej ."cu"CDCS WU" *CDCS WU."4233+."ctg'cmq'cxckrdng0

Vj g' r cxgo gpv' tgr qpugu" kpeqr qtcvgf " kpq" yj g' f guki p" r tqegu" kp" Rcxgo gpv' O G" hqt" r tgf levkp "f knt guu"kp" LRE"y gtg'f gvgto kpgf "wulpi "KUNCD" *Cr r rkgf "T gugctej "Cuuqekvgu" *CTC+." 4226+0'KUNCD"y cu'ugrgevgf "f wg"v'ku"ceewtce{ "cpf "eqo r wcvkpcn'gh'he kpe{ " *Cr r rkgf "T gugctej " Cuuqekvgu" *CTC+." 4226+0' O qtqgxt." pwo gtqwu" o qf gnu' ecp" dg" dvej gf " cpf " r tqeguugf " xgt { " gh'he kpv' "kp"KUNCD0'Vj gtgh'gtg."KUNCD"y cu'ugrgevgf "hqt" f gvgto k'kp "yj g'v'pukg'ut guugu"cv'yj g' vqr "cpf "dqwqo "qh'REE"urdu'hqt" cpcn' | kpi "yj g'gh'ge w'qh'uwr gtrqcf u0

GxgtHG'cmqy u'wugtu"v'o qf grf qy gnu'd{ "ur gekh' kpi "c"u'k'hp guu'tgr tgugpv'kpi "yj g'k'pvtcev'kp" dgwy ggp" yj g'f qy gr'cpf "yj g'eqpetgv"qt"d{ "ur gekhecm' "ugrgevp "yj g'mqugpguu"qh'yj g'f qy gr0'kp" cf f k'kp." yj g'o qf gr'qwr wu'yj g'gu'ko cvgf "f qy grf gh'ge v'kpu"cpf "eqpvcev'ut guu'dgwy ggp" yj g'f qy gr' cpf "eqpetgv." yj lej "ecp" yj gp"dg" wugf "v'gu'ko cvg" yj g'r qv'pvcn'hqt" k'petgcugf "f qy gr'mqugpguu0' Wprkng'GxgtHG."KUNCD"o qf gnu'lq'pv'hqcf "t'cpuhgt" wulpi "ur t'kpi "grgo gpw'uq'ut guugu"cpf "f gh'ge v'kpu" kp" yj g'f qy gnu'ecppq'v'dg'f gvgto kpgf 0'GxgtHG"y cu'cmq'ej qugp"qxgt"qy gt"i gpgtcn'r wtr qug" h'pkkg' grgo gpv'r tqi tco u'f wg"v'ku"eqo r wcvkpcn'gh'he kpe{ 0

y j gtg.

$P_{kl,mno,p}^{?}$ "cmqy cdrg"pwo dgt "qh'hqcf "cr r ~~ke~~cvkpu"cv'eqpf k~~k~~qp" $k'_{l,m'h'o} . 'p$
 $OTk^{?}$ "REE"o qf w~~w~~u"qh'twr wtg"cv'ci g'k'r uk
 $kl,mno,p^{?}$ "cr r ~~kgf~~ "utguu"cv'eqpf k~~k~~qp" $k'_{l,m'h'o} . 'p$."r uk
 E_3 ."E4"? "ec~~kd~~tcv~~k~~qp"eqpu~~cpw~~"~~h~~qt"i m~~d~~cn'o qf gn" E_3 "? "4~~2~~=E4"? "3044+

C"tch~~le~~"y cpf gt"cp~~cn~~ uku'ku'lpeqtr qtcvgf "kp~~v~~"y j g'h~~wi~~ wg"f co ci g'uwo o c~~v~~qp"q"ceeqwpv'hqt"
xctk~~v~~qp"lp"r~~v~~gtcn'y j ggn'r qu~~k~~qp0Vq"tgr~~v~~g"i~~wi~~ wg"f co ci g"q"etcent~~pi~~ ."c"o qf gn'y cu'h~~w~~"q"464"
etcent~~pi~~ "qdugt~~x~~c~~v~~qp" *U~~ce~~j u."Xcpf gpdqu~~e~~j g."("Up{ f gt."4237-0Vj ku"hg~~n~~f "ec~~kd~~tcvgf "t~~c~~puhg"
h~~w~~pe~~v~~qp"tgr~~v~~g'u'h~~wi~~ wg"f co ci g"q"etcent~~pi~~ <

$$\sim \sim \sim ? " \frac{3}{3-2074} \frac{7409}{FD} \quad *6+$$

y j gtg.

$ETM^{?}$ "r tgf ~~ke~~vgf "co qwpv'qh'dqwqo /wr "qt"qr /f qy p"etcent~~pi~~ ."h~~ic~~e~~v~~qp
 $HF^{?}$ "q~~v~~cn'qr /f qy p"qt"dqwqo /wr "h~~wi~~ wg"f co ci g."h~~ic~~e~~v~~qp

Vj g"ewttgpv'o ge~~j~~ cp~~k~~u~~ke~~/go r k~~le~~cn'f gu~~k~~i p"i w~~k~~f g"cuuwo gu'y cv'c"u~~nc~~d'o c{ "etcent~~h~~itqo "gk~~j~~ gt"
dqwqo /wr "qt"qr /f qy p."dw'pqv'dq~~v~~j "u~~k~~o w~~nc~~pgq~~w~~u~~n~~ 0Vj g'h~~q~~m~~y~~ k~~pi~~ "gs w~~c~~v~~k~~qp"f g~~v~~gto k~~pg~~u'y j g"q~~v~~cn'
co qwpv'qh'etcent~~pi~~ <

$$T \sim \sim \sim ? " * \sim \sim / "Bottom \ up - " \sim \sim / "Top \ down / " \sim \sim / "Bottom \ up \quad " \sim \sim / "Top \ down \quad \quad *7+$$

y j gtg.

$VETCEM^{?}$ "q~~v~~cn'etcent~~pi~~ ." $ETM_{Dqwqo/wr}^{?}$ "r tgf ~~ke~~vgf "co qwpv'qh'dqwqo /wr "etcent~~pi~~ ."h~~ic~~e~~v~~qp
 $ETM_{qr/fqyp}^{?}$ "r tgf ~~ke~~vgf "co qwpv'qh'dqwqo /wr "etcent~~pi~~ ."h~~ic~~e~~v~~qp

80404''Qy gt 'Hcvi wg'Nhg'Rt gf levkp 'O qf gnu

Vq"ecrewrcv"hcvi wg"f co ci g."y g"pwo dgt"qh"cr r rdecvkpu"wpvkl'hckwtg"o wuv"dg"r tgf levkf 0'kp"y g" rkgtcwtg."y gtg"ctg"o cp{ "hcvi wg"nhg"r tgf levkp"o qf gnu"y cv'ctg"f gtxgf "htqo "f hhtgtpv"fcv"ugvu" *kq0"rxdqtcvt{ "ur geko gpu"qt"hgfr "ugevkpu"cpf "y cv'ctg"qh"fhhtgtpv"o cv go cvlecn'hqto u"*g0 0" nji ctkj o le."gxr qpgpvcn"gw00'O quv"o qf gnu."uwej "cu"y g"Rcxgo gpvO G"hcvi wg"nhg"r tgf levkp" o qf gn"r tgf lev"y g"pwo dgt"qh"cr r rdecvkpu"wpvkl'hckwtg"ht"eqpetgv"dcugf "qp"ut guu"tcvkq0Ut guu" tcvkq"ku"fhkpgf "cu<

$$S \text{ " ? " } \frac{\quad}{M^{\quad}} \quad *8+$$

y j gtg.

UT"? "ut guu"tcvkq

"? "qvcn'vgpukg"ut guu"fwg"vq"tchhe"cpf "ewtrkpi "cv'urcd"gf i g."r uk

OT"? "o qf wwu"qh'tw wtg."r uk

Qy gt "hcvi wg"nhg"r tgf levkp"o qf gnu"eqpukf gt"hcvtu"uwej "cu"ut guu"tcpi g"cpf "ut guu" tngxgtucn0Ukpeg"y g"o kpk wo "ut guugu"lp"c"REE"r cxgo gpv'ctg"tctgn{ "l gtq"f wg"vq"gpvktqpo gpvcn' eqpf kkpku."c"ut guu"tcpi g"cr r tqcej "o c{ "dg"cdrg"vq"i kxg"o qtg"ceewtcvg"f gr levkp"qh"y g"hcvi wg" f co ci g"lp"y g"r cxgo gpv0Vj g"Ccu/Lcnqdugp"hcvi wg"nhg"r tgf levkp"o qf gn"y j lej "y cu"fgxgnr gf " hqt"eqpetgv"dgco u."lpeqtr qtcvgu"c"hcvt "vq"ceeqwpv'hqt"ut guu"tcpi g"ghgeu"Ccu/Lcnqdugp."3; 92-0 Ugxgtcn'tgugctej gtu'cf cr vgf "y g"Ccu/Lcnqdugp"o qf gn'hqt"hcvi wg"nhg"cuuguu gpv'qh'r mlp"eqpetgv" dgco u"*Vgr hgtu."3; 9; =\ j cpi ."Rj kkr u."("Y w."3; ; 8+"cpf "REE"r cxgo gpw" *F qo gplej kp"(" O ctej kppc."3; : 3=J krgt"("Tqgurgt."4227+0Vj g"ut guu"tcpi g"ku'pqv'ewtgpw{ "ceeqwpvgf "hqt"lp"y g" hcvi wg"f co ci g"ecrewrcvqp"lp"Rcxgo gpvO G0Hqt"y ku"vq"dg"f qpg."y g"gpvktqpo gpvcn'ut guugu" y tqwi j qw"y g"nhg"qh"gej "ecndtcvkp"ugevkp"y qwrf "pggf "vq"dg"npqy p0

Ugxgtcn'uwf lgu"j cxg"uj qy p"y cv'cngtpevpi "vgpukp/eqo r tguukp"e{ engu."qt"ut guu"tngxgtucn." j cxg"c"pgi cvkxg"ko r cev'qp"y g"hcvi wg"nhg"qh"eqpetgv"*Eqtpgrkuugp."3; : 6=\ j cpi ."Rj kkr u."("Y w." 3; ; 8+0Vj g"hcvi wg"nhg"r tgf levkp"o qf gnu"fgxgnr gf "lp"y g"ug'uwf lgu"eqpukf gt"dqy "y g"vgpukg"cpf " eqo r tguukg"dgj cxkqt"qh"eqpetgv0Vj g"hcvi wg"nhg"r tgf levkp"o qf gn'fgxgnr gf "d{ "\ j cpi "gv'cn0hqt" r mlp"eqpetgv"ceeqwpv"ht"ut guu"tngxgtucn"cmipi "y kj "mqf kpi "hgs wpe{ 0'kp"r tgrko kpct{ "hpksg"

grgo gpv'pcpn{ ugu'qh'lwur gtrqcf 'xgj kergu'qp'REE'r cxgo gpw. 'k'ku'qdugt xgf 'y cv'lwur gtrqcf 'xgj kergu' ecp'lpf weg'utguu'tgxgtucni'*cndgk'cv'ny 'utguu'ucvgu0

O cp{ 'h'vki wg'hkg'r tgf kevqp'o qf gnu'ctg'f gtxgf 'htqo 'hcdqtcvqt { 'dgco 'qt'umcd'h'vki wg'vguu0
 k'p'hcdqtcvqt { 'vguu.'eqpetgv'ur geko gnu'ecp'dg'hqtegf 'v'k'k'v'c'f guk'gf 'h'ecv'k'p'0k'p'y g'h'grf . 'REE' "
 r cxgo gpw'gzj kdk'h'vki wg'h'k'w'g'c'v'c'xctkgv{ 'qh'f'h'htg'p'v'h'ecv'k'p'u'f'wg'v'q'gp'x'k'q'p'o gp'v'c'p'f' "
 ur r q'tv'eqpf'k'k'p'u'0O q'tg'q'x'g't.'cu'gzj kdk'gf'd{ 'T'q'g'ur'g't'c'p'f' 'D'c't'g'p'd'g'ti . 'y g'h'g'z'w'c'r'l'w't'g'p'i y 'q'h'i'w'm'f' "
 ur r q't'v'g'f' 'eqpetgv'ur'cd'u'k'u'r'c'ti g't' 'y' c'p' 'y' g'o qf w'm'u'q'h't'w'r'w't'g'q'h'c' 'eqpetgv'd'g'co '*T'q'g'ur'g't' (" "
 D'c't'g'p'd'g'ti . '3 ; ; +0Vj k'u'k'u'hp'q'y p'cu'y g'ouk' g'gh'ge'v'0H'q't' 'y' g'ug't'g'c'u'q'p'u. 'k'k'u'k'o r q't'v'c'p'v'v'q'w'ug' "
 h'vki wg'hkg'r tgf kevqp'o qf gnu'h'q't' 'y' g'r tgf kevqp'q'h'eqpetgv'r cxgo gpw'y k'y 'ecw'k'p'y j gp'y g{ " "
 y g't'g'f' g'x'g'q'r g'f' 'dc'ug'f' 'q'p'f'c'v' 'h'q'o 'dgco 'hcdqtcvqt { 'ur geko gnu0

k'p'Vcdrg'6.'c'lw'o o ct { 'q'h'eqpetgv'h'vki wg'hkg'r tgf kevqp'o qf gnu'cx'k'k'cdrg'k'p'y g'h'k'g't'c'w't'g' "
 k'u'lj q'y p0

Vcdrg'6<Uwo o ct { 'q'h'Eqpetgv'H'vki wg'N'kg'Rt'gf kevqp'O qf gnu'lp'N'k'g't'c'w't'g

H'vki wg'O qf gn	F'c'v'U'q'w't'eg	G's'w'c'k'p'p	E'g'o o gpw
CTC'4226'*Rcxgo gpvO G' " H'vki wg'O qf gn+	IRER'Hgrf' " Ugev'k'p'u	$m_i \frac{N_{f k' l m n}}{?} \frac{M}{j k l m n} \frac{C}{+u} - "206593$	H'k'w'g'eq'tt'g'ur'q'p'f'u'v'q' " 72' 'ur'd'et'c'c'ni'p'i
R'c'c'nt'f'c'p'f' 'V'c{cd'k'3; : 7' " *REC'H'vki wg'O qf gn+	N'cd'q't'c'v'q't { " " D'g'co u	$m_i *W' "33059"/"34099" \frac{S}{fo} \frac{S}{x} "2077$ $N ? \frac{r}{604799} \frac{6547}{2067} \frac{f o}{2067} > \frac{2077}{2067}$ $N ? "Unl m ted fo" S "Ö2067$	
F'c't'v'g't'3; 99'g'tq/ " O'c'k'p'g'c'p'eg'H'vki wg' " O'q'f'gn+	N'cd'q't'c'v'q't { " " D'g'co u	$m_i *+? "39083"/"39083" S$ $m_i *+? "38083"/"39083" S$	72' 'R't'q'd'c'd'k'k'v{ 'q'h' " H'k'w'g' " 46' 'R't'q'd'c'd'k'k'v{ 'q'h' " H'k'w'g' "
F'c't'v'g't'g'v'c'r'03; ; 5' " *E'c'r'k'd't'c'v'g'f' 'O'g'e'j'c'p'k'u'k'e' " F'g'u'k'i'p'H'vki wg'O qf gn+	CCU' Q' " T'q'c'f' 'V'g'u'v' " H'g'r'f' " " Ugev'k'p'u	$m_i *W' "J" \frac{S}{L} \frac{7089}{20254} \frac{m_i *3/4}{20498} "$	R'?" 'R't'q'd'c'd'k'k'v{ 'q'h'H'k'w'g' "
F'c't'v'g't'g'v'c'r'03; : : " " *GT'G'U'E'Q'G'H'vki wg' " O'q'f'gn+	E'q't'r' "q'h' " G'p'i'k'p'g'g't'u' " H'g'r'f' " " Ugev'k'p'u	$m_i *+? "4085S^{304}$	
V't'g{d'k'i' "g'v'c'r'03; 99'*CTG' " H'vki wg'O qf gn+	CCU' Q' " T'q'c'f' 'V'g'u'v' " H'g'r'f' " " Ugev'k'p'u	$N ? "45.66S /5043$	
O'c'k'f' c'f'g'i' 'c'p'f' 'K'x'g'u' " 3; : 5'*T'K'E' 'F'k'w'g'u' " H'w'p'ev'k'p'+	CCU' Q' " T'q'c'f' 'V'g'u'v' " H'g'r'f' " " Ugev'k'p'u	$N ? "44.42S /604;$	

Hqzy qtvj { "3; : 7" *Hqzy qtvj { "Hkgrf "Hvki wg" O qf gn+	Eqtr "qh" Gpi kpggtu" Hkgrf " Ugevkqpu	$nqV^{*+}?"30545^{\frac{6u}{S}}-207: : "$	
Tqgungt "3; ; :	Ncdqtcvqt { " Urcdu	$N ? "T^{\frac{f}{1}} \frac{304; 8: 15409}{S} \frac{1}{I}$	
Ccu/Lcnqdugp "3; 92	Ncdqtcvqt { " Dgco u	UT " ? "3"/" *3"/" +nqi *+N	" ? "O cvgtkcnRctco gygt" T " ? "Tcvkq "qh"O kpk wo " Crr rkgf "Utguu"vq" O czko wo "Crr rkgf "Utguu
Vgr hgtu "3; 9;	Ncdqtcvqt { " Dgco u	UT " ? "3"/" *3"/" +nqi *+N	Cf lwugf "Ccu/Lcnqdugp" 3; 92" "vq" " ? "208: 7" hqt " eqpetgyg
Fqo gplej kpk'cpf O ctej kpppc "3; : 3	Ncdqtcvqt { " Dgco u	UT " ? "3"/" *3"/" +nqi *+N	Cf lwugf "Vgr hgtu "3; 9; " " ? "208: 7"vq" " ? "208: 76"vq" ceeqwpv hqt "Hkgrf "Hvkiwg" cpf "o cvgtkcnr tqrgtv " xctkcvkqp
Eqtpgrkuugp "3; : 6" *HgzwtcnUtguu" Tgxgtucn+	Ncdqtcvqt { " Dgco u	$nqi^{*+N}; Q 3"/"9067" \frac{m}{M} \frac{x}{c} "3Q 5" \frac{m}{f} \frac{n}{c}$	$m \ x$ " ? "O czko wo HgzwtcnUtguu" $m \ n$ " ? "O kpk wo Eqo rtguukxg "Utguu" "f c " ? "Eqo rtguukxg Utgpi vj
\ j cpi "gv'cnf "3; ; 8" *HgzwtcnUtguu" Tgxgtucn+	Ncdqtcvqt { " Dgco u	$\frac{m}{f} \frac{x}{c} " ? f "] 3"/" * 3"/" + nqi^{*+N}$	$m \ x$ " ? "O czko wo "Utguu $m \ n$ " ? "O kpk wo "Utguu /h" ? "TgrgxcpvUcve" Utgpi vj "Vgpukg"qt" Eqo rtguukxg+ En? "Htgs wpe { "Kphwpeg" Eqghlekgpv" $R = \frac{m}{m} \frac{n}{x} \frac{M}{f'c}$ " ? "O cvgtkcnRctco gygt" *208: 7" hqt "eqpetgyg+

805 "Cf f klpkpcnEqpuf gt cvkpu' hqt "Hvki wg" Et cenlpi

805B "Nko kvkpu'qh"O kpgt'Nkpgct "Fco ci g"J { r qvj guku

Kp"o quv"r cxgo gpv'f guki p"r tqegf wtgu. "kpenmf kpi "vj g"Rcxgo gpvO G"f guki p"r tqegf wtg. "fco ci g"ku" cuuwo gf "vq"ceewo wrcvgnkpgctn { "kp"ceeqtf cpeg"y kj "O kpgt'J { r qvj guku"O kpgt. "3; 67-0J qy gxgt. " ugxgtcn'uwf kgu"j cxg" f go qpustcvgf "vj cv'eqpetgyg"ceewo wrcvgnfco ci g"pqpikpgctn { "J qm gp. "3; : 4=" Qj. "3; ; 3c-0Eqpetgyg" fco ci g"ceewo wrcvknj cu"dggn"uj qy p"vq"qeewt "kp"vj tgg" f kpkpev"uci gu<c" f gegngtcvki "ceewo wrcvkn"uci g. "c"nkpgt"ceewo wrcvkn"uci g. "cpf "cp"ceegngtcvki "ceewo wrcvkn" uci g"Xgi c. "Dj cvk" ("P kqpp. "3; ; 7-0Vj gtghqtg. "kic"uwr gtrqcf "ku"cr r kkgf "vq" c"r cxgo gpv'f wtkpi "vj g" ceegngtcvki "ceewo wrcvkn"uci g. "vj g" fco ci g"o c { "dg"o qtg"uki pkklecpv"vj cp"y j gp"cr r kkgf "kp"vj g" nkpgt"uci g"O kpgt'J { r qvj guku" f qgu"pqv'ceeqwpv' hqt "vj g" fco ci g" f "utguu"ucvgn"qh"vj g"eqpetgyg"

ecwugf "d{ "tchle"mqcf lpi u'ceewo wrcvf "r tkt "v"j g"cr r necvkp"qh"j g"uwr gtmqcf 0Rcxgo gpv"ci g"
o c{ "dg"cp"lphwgpvcn'hcevt"y j gp"ej ctcevtk lpi "f co ci g"ecwugf "d{ "uwr gtmqcf u'ukpeg"j gug"xgi kergu"
ecp"tcxgnqp"qnf gt"tqcf u0

804''Hicewtg'O gejcpleu

Hicewtg" o gejcpleu" cr r tqcej gu" ctg" qhgp" wugf " v" g"zr rkp" o gejcpluo u" qh" h'ki wg" f co ci g"
ceewo wrcvkp"j cv'tg"pqv'f kgevn{ "uj qy p"d{ "UP "ewtxgu"cpf "O kpgt"u'f co ci g"j { r qj guku"*Mqmw" "
QP gln"Rqr qxleu."("Uj cj ."4222="Uckp"("Muj gp."422: =I cgf keng."Tqgung."("Uj cj ."422; +0Hicewtg"
o gejcpleu"o qf gnu"ctg"dcugf "qp"etcenlr tqrci cvkq0kpeqpetgvg"cpn{ | gf "d{ "j gug"o qf gnu."cp"lplkcn"
etcen"ku"ur gekhgf "cv'c" f guktgf "mcevkp"cpf "c"etklecne'etcenlrgpi j "ku" f ghkpgf "cu" h'kwtg0Cu'e{ erke"
mqcf lpi "ku"cr r rkgf ."j g"lplkcn'etcenli tqy u'cv'c" f gegrgtcvpi "tcvg0Gxgpwcm{ ."j g"etcen'dgi kpu"vq"
i tqy "cv'cp"ceegrgtcvpi "tcvg"wpvkl'gtcej gu"j g"etklecne'etcenlrgpi j "Mqmw"QP gln"Rqr qxleu."("
Uj cj ."4222+0

Hicewtg" o gejcpleu" ku" c" vqqn" hqt" o gejcpluke" cuuguu gpv" qh" h'ki wg" etcenli tqy j "kp"
eqpetgvg0J qy gxgt."j gtg"ctg" f h'kewngu"kp"ko r ngo gpvpi "hicewtg" o gejcpleu"vq"o qf gn'h'ki wg"
f co ci g"lp"REE"r cxgo gpv0k"j g"hgaf ."c"etcenlecp"lplkcv"cv'xctkqwu"mcevkpu" f gr gpf lpi "qp"j g"
h'wewcvpi "gpvktqpo gpvne'eqpf klqpu0Cf f klqpcn{ ."k"ku" f h'kewnv"vq" f gvgto kpg" k"cp"lplkcn'etcenl
rgpi j "cpf "k" c"etklecne'etcenlrgpi j "vq" f ghkpg"cu" h'kwtg0Ncuw{ ."j g"lpvgtcevkp"dgvy ggp"etcenli"kp"
REE"r cxgo gpv"*g0 0"dgvy ggp"dqwqo /wr "cpf "vqr /f qy p"etcenu"ku"pqv'hwaf "wpf gtuwqf 0

805''Fco ci g'O gejcpleu

Fco ci g"o gejcpleu"ecp"dg" wugf "v"o qf gn'j g"gxqmwkq"qh"lpvgtpcnf co ci g"lp"eqpetgvg" f wtkpi "e{ erke"
mqcf lpi "Cmej g."4226="Xgi c."Dj cvk"("P kzqp."3; ; 7+"k"ngw"qh"UP "ewtxgu"cpf "O kpgt"u'f co ci g"
j { r qj guku0Fco ci g"o gejcpleu"ku" c" wughw"vqqn" hqt" o gejcpluke" cuuguu gpv"qh"j g" f gi tcf cvkq"qh"
eqpetgvg0J qy gxgt."uko krt"vq" hicewtg" o gejcpleu."j gtg"ctg" f h'kewngu"kp"ko r ngo gpvpi "f co ci g"
o gejcpleu"vq"o qf gn'f co ci g"lp"REE"r cxgo gpv0Vj g"xctkcdrgu"eqo o qpn{ "ej qugp"vq" tgr tguvp"
f co ci g"lp" f co ci g"o gejcpleu"o qf gnu"*g0 0"utclp+"ctg" f h'kewnv"vq"o gcuwtg" hqt"j g"gpvktg" h'kwo g"
qh" c"REE"r cxgo gpv0Cf f klqpcn{ ."j g"cr r necdkw{ "qh"o cp{ "f co ci g"o gejcpleu"o qf gnu" hqt"
eqpetgvg"y qwaf "dg"chgevgf "d{ "gpvktqpo gpvne'eqpuf gtcvkpu0

806'' Rt gf levkqp'qhlREE 'Rcxgo gpvHcwnkpi

806B'' Rcxgo gpvO G'Hcwnkpi 'O qf gn

Rcxgo gpv'O G'f gvgto kpgf u'vj g'hcwnkpi "ceewo wrvkqp'hqt'c'r cxgo gpv'utwewtg'qp'c'o qpvy n' "dcuku" vj tqwi j "vj g'hqmqy kpi 'uvgu u'*Cr r rkgf "Tgugcte j "Cuuekcygu"*CTC+. '4226+<

- 30' F ghkpg'erko ckle'cpf "tchhle"eqpf kkkpu
- 40' Ecnewwv'f ghgevkpu
- 50' Ecnewwv'lpkkn'o czko'wo 'hcwnkpi
- 60' Guvdrkuj "lqkv'NVG'hqt'vj g'lpetgo gpvnr'gtkqf
- 70' Guvdrkuj "lqkv'NVG'hqt'vj g'lpetgo gpvnr'gtkqf
- 80' Guvdrkuj "lqkv'NVG'hqt'vj g'lpetgo gpvnr'gtkqf

Vq"ceeqwpv'hqt"o qpvy n' "xctkcvkp"lp"vgo r gtcwtg"cpf "o qkwtg."vj g"Gpj cpegf "Kvgi tcvf " Erko ckle'O qf gn*GKEO +ku'wugf "vq"ecnewwv'xcnvgu"vq"dg'wugf "lp"vj g'hcwnkpi "gs wcvkpu."uwej "cu'vj g" hgg| kpi "tcvkq"*HT+"cpf "cxgtci g"cppwcn'f c{u'y kj "tclphcm"*Y gF c{u+0'Kp"cf f kkkp."vj g"GKEO " i gpgtcvgu'j qwn' "vgo r gtcwtg'r tqhkgu'qh'vj g'r cxgo gpv'utwewtg'vq"dg'wugf "vq"f gvgto kpg'vj g'ewtrkpi " qh'vj g'urcd'f wg'vq"vgo r gtcwtg'i tcf kpvu0

Vj g'Rcxgo gpvO G'hcwnkpi "o qf gn'kpeqtr qtcvgu'vj g'f khtgtpvkn'gpgti { "eqpegr v'y j lej "ecp" dg"ecnewwv'f'y kj "Gs wcvkp"*9+0

$$DE \approx \frac{k}{4} \cdot \frac{E}{3} + \frac{E}{322} \quad *9+$$

y j gtg.

DE ? "f khtgtpvkn'gpgti { "qh'vj g'u{ uvgu . 'r uk
 \ " ? "o qf wvu'qh'uwdi tcf g'tgcevkqp. 'r ukllp
 \ " ? "eqtpgt "f ghgevkqp"wpf gt "vj g'hqcf gf "urcd. 'lp
 \ u ? "eqtpgt "f ghgevkqp"wpf gt "vj g'hqcf gf "urcd. 'lp
 NVG ? "hqc'f "tcpuhtg "ghhkepe { "qh'vj g'lqkv."

Vj g'f hgtgpvcn'gpgti { "qh'v'j g'u{ ugo 'ku'uki p'hecpv' { 'phwpegf 'd{ "v'j g'NVG'qh'v'j g'u{ ugo 0'
 Vj g'v'qvcn'NVG'ku'h'wpev'kp'qh'v'j tgg'o gej cpluo u'qh'hqcf "tcpuhgt. 'y j lej "ctg'lpf k'kf wcm' { 'f gvgto kpgf "
 cpf "cf'lwngf "o qp'v'j n' <

$$LTE_{?322} = \frac{1}{3} \left(\frac{TE_{dowel}}{100} + \frac{TE_{gg}}{100} + \frac{TE_{bse}}{100} \right) \quad *, +$$

y j gtg.

$LTE_{?} = \frac{1}{3} \left(\frac{TE_{dowel}}{100} + \frac{TE_{gg}}{100} + \frac{TE_{bse}}{100} \right)$

$LTE_{dowel} = \frac{1}{3} \left(\frac{TE_{dowel}}{100} + \frac{TE_{gg}}{100} + \frac{TE_{bse}}{100} \right)$

$LTE_{gg} = \frac{1}{3} \left(\frac{TE_{dowel}}{100} + \frac{TE_{gg}}{100} + \frac{TE_{bse}}{100} \right)$

$LTE_{bse} = \frac{1}{3} \left(\frac{TE_{dowel}}{100} + \frac{TE_{gg}}{100} + \frac{TE_{bse}}{100} \right)$

30' Ecrewrcv'lp'etgo gpvcn'ej cpi g'lp'h'wv'kpi 'hqt'i k'xgp'o qp'v'j

Wulpi "v'j g'ecrewrcv'f "lq'kp'NVG. "v'j g'o czko wo "o gcp"tcpuxgtug"hcwv'kpi "cpf "lp'etgo gpvcn'
 ej cpi g'lp'h'wv'kpi "hqt" "c"i k'xgp'o qp'v'j "ku'f gvgto kpgf "y kj "Gs wcv'kpu", "/35+0' Vj g'o qf gn'v'j gp"
 ecrewrcv'u'v'j g'mqu'qh'hqcf "tcpuhgt "ecr cek' { "hqt" gcej "qh'v'j g'v'j tgg'o gej cpluo u'qh'NVG" "ci i tgi cvg"
 k'pvgtmem'f qy gnu. "cpf "dcug+0

$$F_{ULTM} = \frac{1}{3} \left(\frac{F_{ULTM}}{100} + \frac{F_{ULTM}}{100} + \frac{F_{ULTM}}{100} \right) \quad *, +$$

y j gtg.

$F_{ULTM} = \frac{1}{3} \left(\frac{F_{ULTM}}{100} + \frac{F_{ULTM}}{100} + \frac{F_{ULTM}}{100} \right)$

$F_{ULTM} = \frac{1}{3} \left(\frac{F_{ULTM}}{100} + \frac{F_{ULTM}}{100} + \frac{F_{ULTM}}{100} \right)$

$F_{ULTM} = \frac{1}{3} \left(\frac{F_{ULTM}}{100} + \frac{F_{ULTM}}{100} + \frac{F_{ULTM}}{100} \right)$

$E'OD = \frac{1}{3} \left(\frac{E'OD}{100} + \frac{E'OD}{100} + \frac{E'OD}{100} \right)$

DE. "? "uwo "qh"vj g" f ghqto cvkqp"gpgti { "kp"o qpjy "k"ewttgpv'o qpjy + "r ukllp"
 `cu"o czko wo "o gcp"o qpjy n{ "urcd"eqtpgt" f ghgevkqp" f wg"vq"ewtrkpi "cpf "
 y ctr kpi . "kp
 ps ? "qxgtdwtf gp"qp"uwdi tcf g. "nd
 P₄₂₂ "? "r gtegpv'uwdi tcf g"o cvgtkcnr cuukpi "vj g"%422"ukxg. "
 Y gF c{ u"? "cxgtci g"cppwcnf c{ u"qh'tckpfcim"i tgcvg"vj cp"208"kp0tckpfcim"
 ` 3. " 4. í ` 9 "? "ecnkdtcvkqp"eqghhekgpvu0

$$\begin{aligned} \text{` 34"?" } \quad \text{` 3" } \quad \text{` 4" } \quad F^{2047} & \quad *34+ \\ \text{` 56"?" } \quad \text{` 5" } \quad \text{` 6" } \quad F^{2047} & \quad *35+ \end{aligned}$$

40' Ecrewrcvg"ewo wrcvkg'hrcwnkpi

Vj g"qvcnhrcwnkpi "ecp"dg"ecrewrvcg"y kj "Gs wcvkqp"*36+0Ugr u"6"vj tqwi j "8"ctg"tgr gcvgf "gcej "
 o qpjy "w"vq"vj g"gp"qh"vj g"rcuv'o qpjy "qh"vj g" f guki p"rkig"qh"vj g" r cxgo gpv0

$$Fault_m ? " \hat{U}_{23}^{m\omega} \cdot Fault \quad *36+$$

y j gtg.

$Fault_m$? "qvcnhrcwnkpi "chigt"o "pwo dgt"qh'o qpjy u. "kp
 ê F₂₀₄₇gej "o qpjy n{ "ej cpi g"kp"o gcp"tcpuuxtug"lqkv'hrcwnkpi . "kp

Cu"uggp"kp"vj ku"ugtkgu"qh"gs wcvkqpu"wgf "hqt"r tgf levkpi "vj g" f gxgnr o gpv'qh'hrcwnkpi . "vj gtg"
 ctg"ugxgp"eqghhekgpv"vj cv'o wuv'dg" f ghkpgf "vj tqwi j "c"ecnkdtcvkqp"r tqegu"i"E: "ku" f ghkpgf "vj tqwi j "
 vj g"qr vko k cvkqp"r tqegu" f wtkpi "ecnkdtcvkqp+0Vj gug"eqghhekgpv"j cxg"dggp" f ghkpgf "vj tqwi j "c"
 pcvkpcn'ecnkdtcvkqp"r tqegu"vj cv'kpenf gf "hrcwnkpi " f cv"itqo "5; 9"IRER"r tqlgeu"cpf "ctg"itugf "kp"
 Vcdrg"7"*Ucej u. "Xcpf gpdquwej g. "("Up{ f gt. "4237+0

Vcdrg"7"<Eqghhekgpv"itqo "vj g"rcvgu'pcvkpcn'ecnkdtcvkqp"*Ucej u"gv'cn04237+0

Ecnkdtcvkqp"Eqghhekgpv	Xcnwg
E ₃	207; 7
E ₄	30858

E5	2022439
E6	2022666
E7	472
E8	2069
E9	905
E:	622

8060'Qvj gt 'Hcwnkpi 'Rt g flevkqp 'O qf gnu

Vj g" Rqtvrpf " Ego gpv" Cuuqekvqp" *REC+" f gxgnr gf " c" hcnkpi " o qf gni wukpi " O kpgt" rpgct" ewo wrcvkg" f co ci g"eqpegr v*Y w."O cem"Qmco qvq."("Rcenrtf."3; ; 5+0Vj ku'o qf grf qgu"pqv"ceeqwpv" hqt"ugcuqpcn"xctkcvqp"cpf "cuuwo gu"rpgct"ceewo wrcvqp"qh" f co ci g0Ncdqtcvqt { "uwf kgu"eqpenmf gf " vj cv" f co ci g"lppkcmf "ceewo wrcvgt"tcr kf n{ "dghqtg"r rvcgwpi " *Vgnrt "("Ecu j gm"3; 7; =O ctewa"J 0." 3; 73+0Vj g"cuuwo r vqp"qh"rpgct" f co ci g"ceewo wrcvqp" f qgu"pqv"ceeqwpv" hqt"r tkqt" f co ci g"cv"vj g" lqpv0

Ugxgtcn"qvj gt "o qf gnu"j cxg"dggp" f gxgnr gf "vq"r tgf lev"vj g" f gxgnr o gpv"qh" hcnkpi 0Cu" c" r ctv" qh"vj g"Utcvgi k"J ki j y c{ "Rtqi tco "Rtqlgev."Uko r uqp"gv"cn0wugf "Nqpi "Vgto "Rcxgo gpv"Rgthqto cpeg" *NVRr+" f cvc"vq" f gxgnr "ugr ctcvg" hcnkpi "o qf gnu" hqt" f qy grgf "cpf "wpf qy grgf "r cxgo gpv0k" vj gug" o qf gnu." hcnkpi "ku" ecrewrcvgf "cu" c" hnpvqp" qh" ewo wrcvkg"3: /nkr "gs wxcrgpv" ukpi rg" czrg" nqcf u" *GUCN+: "lqpv"ur cekpi . "cxgtci g" o qf wnu" qh" uwdi tcf g" tgcwqp. "r cxgo gpv" ci g. "uwr r qt v" eqpf kkpqu. " cpf "f tclpci g" r ctco gvgtu" *Uko r uqp. "gv"cn0"3; ; 6+0Vj gug" o qf gnu" kpeqtr qtcvg" enko cve" eqpf kkpqu" vj tqwi j " kpr wu" qh" o gcp" cppwcn" r tgekr kcvqp" cpf " o gcp" htggj kpi " kpf gz0" Uko kctn{ . " [w" gv" cn0" f gxgnr gf "o qf gnu" hqt" f qy grgf "cpf "wpf qy grgf "r cxgo gpv" hcnkpi "cu" r ctv" qh" c" Hgf gtcn"J ki j y c{ " Cf o kpkntcvqp" *HJ Y C+" Tk kf "Rcxgo gpv" Rgthqto cpeg" cpf "Tgj cdkkcvqp" *TRRT+" r tqlgev" *f w" Fctvgt. "Uo kj . " lcp i . "(" cpf " Mj c| cpqxlej . "3; ; 8+0' Hcnkpi "ku" f ghkpgf "y kj " vj g" uco g" ugv" qh" r ctco gvgtu" cu" Uko r uqp" gv"cn0" y kj " vj g" kpenwukqp" qh" vj g" kpr w" qh" vj g" o gcp" pwo dgt" qh" f c{ u" y kj " o czko wo "vgo r gtcwtg" cdqxg"; 2" f gi tggu" Hcj tgpj gk0Vj gug" gctn{ " hcnkpi "o qf gnu" r tgf lev" hcnkpi " kp" c" uko r rknle" o cppgt" cpf "ctg" qhgp" rko kgtf "vq" vj g" f cvcugv" y kj " y j lej " vj gug" o qf gnu" y gtg" f gxgnr gf 0

Qvj gt " hcnkpi "o qf gnu" wugf "O kpgt" u"j { r qvj guku" vq" f gvgto kpg" hcnkpi "cu" c" hnpvqp" qh" vj g" tcvq" qh" cr r rkgf "GUCNu" vq" cmqy cdrg" GUCNu0Vj ku" cr r tqcej "y cu" wcnpg" kp" c" tgecnldtcvqp" qh" vj g" 3; 9; "P cvkqpcn" Rcxgo gpv" Equv0 qf gni *P CREQO +r gthqto gf "y kj "NVRr" f cvc" d{ "Vkwu/I nqxtg" g0" cn0" *Vkwu/I nqxtg. "Qy wuw/Cpy k" ("O (K"3; ; ; +) cpf "hqt" o qf gnu" f gxgnr gf "d{ " [w" gv" cn0" *f w" Mj c| cpqxlej . "Tcq. "Fctvgt. "("Xqp" S vkwpu."3; ; ; +0Cmj qwi j " vj ku" cr r tqcej "guvko cvgu" hcnkpi "cv" xctkqu" r qkpwi" vj tqwi j qw" vj g" rkg" qh" vj g" r cxgo gpv. "k" cuuwo gu" vj cv" vj g" f co ci g" ceewo wrcvqp" ku"

rkpgct0Vj ku'cr r tqcej "cnuq'f qgu'pqv'veng'kp vq'cee qwpv'enko cve"eqpf kkpup'v'j cv'xct { "v'j tqwi j qw'v'j g" { gct0

807'Cf f kkpucdEqpuf gt cvkpup'hqt 'Hcwnkpi

807B''Fco ci g'Ceewo wrcvqp'Dcugf'qp'Czrg'V{rg

C"uwf { "y cu'r gthqto gf "cv'O lej ki cp"Ucvg"Wp kxgtuk { "v'f gvgto kpg'v'j g'ghge'v'qh'o wnk/czrg'xgj kengu" qp'v'j g'f gxgnr o gpv'qh'hcwnkpi "v'j tqwi j "c'rdqtcvqt { "uwf { "cpf "o ge'j cpluke"cpn { uku"*Ej cvk"gv'cn0" 422; +0' Vj g"rdqtcvqt { "gzi gtlo gpv' vq"uwf { "lqlpv' h'cwnkpi "wpf gt" o wnkrg" czrg" mcf kpi u" y cu" kpeqpenukxg" f w'g'v'c"n'cn'qh'uki p'k'ecp'v'f gvgtkqtcvqp" f gur kg" c"n'cti g'pwo dgt"qh'mcf "tgr gvkqp0' Y j kg" k' y cu" f gvgto kpgf " v'j cv' o wnk/czrg" eqphki wrcvqpup' kpf weg" j ki j gt" f co ci g. " v'j gtg" y gtg" f kuetgr cpeku'y kj "v'j g'tguwu'itqo "v'cpf go "czrg'xgj kengu0

80704''Wnlo cvg'Hchwtg

Ukpeg'uw'gtmcf "czrg"eqphki wrcvqpup'j cxg" c"j ki j "eqpegpvcvqp"qh'y gli j v'qxtg" c"i kxgp"ctgc. "v'j gtg" ku" r qvgpv'cn' hqt " c" ukpi rg" mcf " cr r n'ecvqp" vq" kpf weg" h'cwnkpi0' Vj g" Co gtkecp" Eqpetgvg" Kpukwvg" r wdrkuj gf "Gs wcvqp"*37+"v'f ghkpg'v'j g" o czko wo "cmqy cdrg"dgctkpi "utguu'cu" c" h'pvcvqp"qh'f qy gn' f lco gvg" cpf "eqpetgvg"eqo r tguukxg"utgpi v'j O'Gxgp"v'j qwi j "v'j ku'tgrcvqpup' kr "ku'v'j qwi j v'v'q"dg" xgt { " eqpugtxcvkg. "r tgnko kpct { "h'pkyg"grgo gpv'cpn { ugu'kpf kcvg'v'j cv'ugxgtcn'uw'gtmcf u'r tqf weg"dgctkpi " utguugu'v'j cv'gzeggf "v'j g'rko ku'f gvgto kpgf "wukpi "v'j ku'gs wcvqp"*CEKEqo o kwgg'547."3; 78+0

$$llow' ble ? "f_c' \frac{4-d}{3} + \quad *37+$$

y j gtg.

$llow' ble ?$ "o czko wo "cmqy cdrg"dgctkpi "utguu'dgvy ggp'v'j g'f qy gn'cpf "v'j g eqpetgvg. "r uk

f_c "?"eqo r tguukxg"utgpi v'j "qh'v'j g'eqpetgvg. "r uk

f "?"f lco gvg"qh'v'j g'f qy gn'kp

8075'Fqy gn'Nqqupguu'O qf gnu

Vq" dgwtg" ceeqwpv' hqt " v'j g" f gxgnr o gpv' qh' f qy gn' mqupguu. " Dwej " r gthqto gf " c" rdqtcvqt { " kpxguki cvqp"v'f gxgnr "c'r tgf kcvkg"mqupguu"o qf gr0k'cf f kkp"v'q'cee qwpv'kpi "hqt"mcf "o ci plkwf g" cpf "pwo dgt"qh'cr r n'ecvqpup'v'j ku'o qf gn'v'cngu'kp vq'cee qwpv'v'j g'r tgupeg"qh'UQ4'kp'v'j g'ci i tgi cvg'v'q"

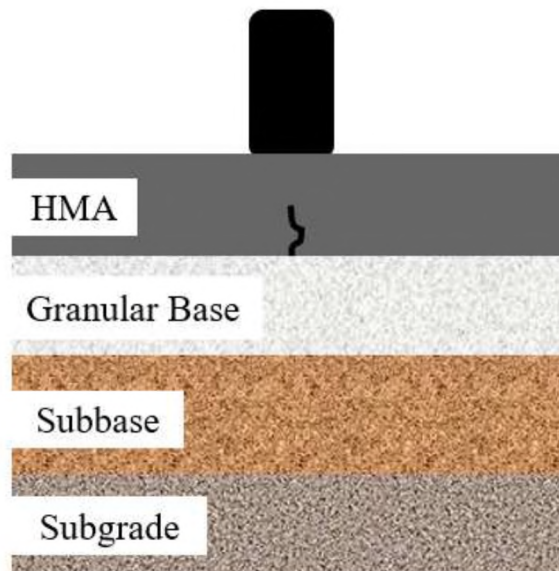
guko cvg'vj g'cdtcukxgpguu'qh'vj g'eqpetvg0Vj ku'o qf grlj cu'uko kvkpu'f wg'vq'vj g'f gr gpf gpeg'qp'c"
pqp/fko gpukqpcnr ctco gvg't'vj cv'ku'f kkewn'vq'f kgevn' "guko cvg'v Dwej "(\ qmki gt."3; ; 8+0

902'HNGZHDNG'RCXGO GPVU

908''Rcxgo gpv'Tgur qpug

908B'Hcvi wg'Etcenlpi

Hcvi wg'etcenlpi 'ku'c'rqcf/tgrv'gf 'f kwtguu'vj cv'qee'wtu'lp'J O C''j qv'o kzgf 'cur j cn+'r cxgo gpw0Vj g' rqcflpi 'eqpfklqpu'qp'vj g'r cxgo gpv'utwewtg'cpf 'vj g'vj kempguu'qh'vj g'r cxgo gpv'f gvgto kpg'y j gyj gt' vj g'etcenlpi 'ku'dqwgo /wr 'qt'vqr/fqy p0Dqwgo /wr 'etcenlpi 'ku'ecwugf 'd{ 'tgr gcvgf 'tchle'rqcf lpi u' vj cv'tguwn'lp'vgpukg'utguugu'cpf 'utckpu'cv'vj g'dqwgo 'qh'vj g'cur j cn'rc{ gt0Vj ku'tguwnu'lp'vj g'hcvi wg' etcenlpi 'kpkckvpi 'cv'vj g'dqwgo 'qh'vj g'cur j cn'rc{ gt.'cu'uj qy p''lp'Hki wtg'350'K'vj g'r cxgo gpv' utwewtg'j cu'c'ucdkk' gf 'dcug.'h'cvi wg'etcenlpi 'y knlkpkcv'cv'vj g'dqwgo 'qh'vj g'dcug0



Hki wtg'35<Dqwgo /Wr 'Etcenlpi 'lp'J O C''Rcxgo gpv

Vj g'f gi tgg'qh'h'cvi wg'etcenlpi 'lp'J O C''r cxgo gpw'j cu'dggp'uj qy p'v'q'dg'ch'gevgf 'd{ 'vj g' o cvgtkn'r tqr gt'vku'qh'vj g'cur j cn''k0'f { pco le'o qf wnu.'cur j cn'eqpvgpv'lp'dkpf gt.'ck'eqpvgpv+' *Cur j cn'Kpukw'g.'3; : 4+0Vj g'etklecn'tgur qpug'rqecv'qp'rupi kwf kpcn{ 'cpf 't'cpuxgtugn{ 'hqt'h'cvi wg' etcenlpi 'lp'J O C''r cxgo gpw'ku'f gr gpf gpv'qp'vj g'utwewtcn'r tqr gt'vku'qh'vj g'r cxgo gpv'utwewtg' cpf 'vj g'czng'eqphki wcvkqpu'lp'vj g'tchle'utgco 0'C'f gvckrgf 'cpcn{ ulu'ku'v{ r kecn{ 'pggf gf 'vq' f gvgto kpg'vj ku'rqecv'qp0

90804'Twɔkpi

Twɔkpi . "cɔɔq"npqy p"cu"r gto cpɡpɔ'f ɡhɔto cɔkqɔ. "ku" c" ɔqcf / tɡɔɔvɡf "f kɔɔtɡuɔ" ɔj cv" qeewtu" ɔp" J O C" r cxgo ɡpɔ'cu" c" tɡuɔɔn' qh' xgt ɔkɔɔn' eqo r tɡuɔkxg' utɔkɔpɔ' hɔqo "cp" czɔg' ɔqcf O H cɔvɔtu' eqpɔtkɔɔkɔpi "vɔ" ɔj g" f ɡxɡɔɔr o ɡpɔ' qh' twɔkpi "ɔp" ɔj g" cur j cɔɔ' nɔ{ gt "kɔɔɔɔf g" qxɡtɔqcf u. "ɔqcf ɔkpi "f wɔkpi "gz vɔgo g" j ɡcv" o kɔ " kɔɔɔɔɔkɔkɔ{ . "cpf "vgo r ɡtɔwɔt g" uɔueɡɔ ɔkɔkɔkɔ{ O T wɔkpi "ecp" cɔɔq "f ɡxɡɔɔr "ɔp" ɔj g" ɔpɔɔqɔɔf "uɔr r qɔkpi " nɔ{ ɡtu" dɔɔɡf "qɔ" ɔj g" nɔ{ gt "r tqr ɡt ɔkɔu" cpf "ɔj kɔɔpɡuɔɡu" ɔp" ɔj g" ut wɔwɔt ɡO V { r kɔɔɔɔ{ . "twɔkpi "qeewtu" ɔp" ɔj g" ɔpɔɔqɔɔf "uɔr r qɔkpi " nɔ{ ɡtu" dɡɔɔwɔɡ" ɔj g" r cxgo ɡpɔ' ut wɔwɔt g" ku" ɔj kɔ. "ɔpɔɔɔɔɔɡ. "qt "pɔqɔ' uɔhɔkɔpɔɔf " uɔhɔO R cxgo ɡpɔO G' cuɔwɔ ɡu" ɔj cv" pɔ' r gto cpɡpɔ'f ɡhɔto cɔkqɔ "qeewtu" ɔp" ɔj go kɔɔɔɔ{ "uɔɔkɔkɔ ɡf " nɔ{ ɡtu" *C r r ɔkɡf "T ɡuɡɔɔej "C uɔqɔkɔvɡu" *C T C +. '4226+0

Vj g" etkɔkɔɔn' ut wɔwɔt cɔn' tɡur qɔpɔɡ "hɔt" twɔkpi "ku" xgt ɔkɔɔn' utɔkɔpO Vj g" ɔqɔcɔkqɔ "qh" ɔj g" etkɔkɔɔn' utɔkɔp "y kɔn' xɔt { "y kɔj " ɡɔɔej " nɔ{ ɡtO H qɔt " cur j cɔɔ' nɔ cpf " dɔɔɡ" nɔ{ ɡtu. " ɔj g" etkɔkɔɔn' xgt ɔkɔɔn' utɔkɔpɔ " ctɡ" eqo o qɔɔɔɔ{ " ɡxɔɔɔɔvɡf " cv" o kɔ / f ɡɔɔ ɔj " qh' ɡɔɔej " nɔ{ ɡt " *qɔt " ɡɔɔej " uɔɔɔɔɔ{ ɡt " kɔh' f ɡhɔkɔɡf + O H qɔt " ɔj g" uɔɔɔɔ tɔf ɡ. " ɔj g" etkɔkɔɔn' xgt ɔkɔɔn' utɔkɔp " ku" eqo o qɔɔɔɔ{ " ɡxɔɔɔɔvɡf " cv" ɔj g" ɔqɔ " qh' ɔj g" nɔ{ ɡtO

Qp" ɔj g" uɔɔhɔɔɔɡ " qh" ɔj g" cur j cɔɔ' nɔ " twɔkpi " ku" r tɡuɡpɔ' cu" ɔpɔ kɔɔf kɔɔɔn' f ɡɔ tɡuɔkɔpɔO Vj ɡuɡ" f ɡɔ tɡuɔkɔpɔ " eqo o qɔɔɔɔ{ " qeewtu" ɔp" ɔj g" y j ɡɡɔɔ cvj " cpf " ecɔp " ɔqcf " vɔj " j { f tqr nɔkpi " cu" k' cɔhɔɡɔwɔ " ɔj g" uɔɔhɔɔɔɡ " f tɔkɔci ɡ" qh" ɔj g" tɔqcf O Vj ɡ" f ɡɔ tɡuɔkɔpɔ " ctɡ" vɔ r kɔɔɔɔ{ " dɔqcf ɡt " kɔh' ɔj g" r gto cpɡpɔ' f ɡhɔto cɔkqɔ " f ɡxɡɔɔr ɡf " ɔp" ɔj g" ɔɔy ɡt " nɔ{ ɡtu" qh' ɔj g" r cxgo ɡpɔ' ut wɔwɔt ɡO Vj ɡ" r gto cpɡpɔ' f ɡhɔto cɔkqɔ " hɔqo " cɔn' nɔ{ ɡtu" ku" cɔewɔ wɔɔvɡf " vɔ " r tɡf kɔvɔj ɡ" o ci p kɔɔf ɡ" qh' twɔkpi " ɡz j kɔkɔɡf " qɔ" ɔj g" uɔɔhɔɔɔɡ " qh' ɔj g" cur j cɔɔnO

90805'Rt ɡf kɔkqɔ 'qh' Et kɔkɔɔn' Ut wɔwɔt cɔn' T ɡur qɔpɔɡ

Vj g" etkɔkɔɔn' ut wɔwɔt cɔn' tɡur qɔpɔɡ "hɔt" dɔqɔo / wɔ " et cɔɔnɔkpi " ku" ɔj g" j qɔkɔ qɔɔɔn' ɔpɔkɔɡ " utɔkɔp " cv" ɔj g" dɔqɔo " qh' ɔj g" uɔɔkɔkɔ ɡf " nɔ{ ɡtO Vj ɡ" etkɔkɔɔn' ut wɔwɔt g" tɡur qɔpɔɡ "hɔt" twɔkpi " ku" ɔj g" xgt ɔkɔɔn' utɔkɔp " cv" ɔj g" ur ɡɔkɔkɔf " ɔqɔcɔkqɔ " r tɡxɔkɔwɔɔf " f ɡhɔkɔɡf " ɔp" ɔj g" nɔ{ gt " qt " uɔɔɔɔɔ{ ɡt " qh' kɔvɡt ɡuɔO Vq " f ɡvɡto kɔɡ " ɔj g" ɡuɡ " utɔkɔpɔ. " J O C " r cxgo ɡpɔ' ctɡ " eqo o qɔɔɔɔ{ " o qf ɡɔɔf " wɔkpi " hɔkɔɡɔt " ɡɔɔɔkɔ " cɔɔɔnɔ{ uku " qt " hɔkɔɡ " ɡɔɔo ɡpɔ' cɔɔnɔ{ ukuO N kɔɡɔt " ɡɔɔɔkɔ " cɔɔnɔ{ uku " ku" c " eqo r wɔɔkɔpɔɔɔf " ɡhɔkɔpɔ " vɔqɔɔ " wɔɡf " vɔ " ecɔewɔɔvɡ " ɔj g" ut ɡuɔɡu. " utɔkɔpɔ. " cpf " f kɔɔɔɔɔo ɡpɔ' kɔ " c " r cxgo ɡpɔ' ut wɔwɔt ɡO Vj ɡ" r cxgo ɡpɔ' o qf ɡuɔ " et ɡɔvɡf " ɔp" nɔ{ ɡt ɡf " ɡɔɔɔkɔ " cɔɔnɔ{ uku " uɔhɔy ctɡ " ctɡ " uki p kɔkɔpɔɔf " uko r nɔkɔf O Uqo ɡ" qh' ɔj g" cuɔwɔ r ɔkɔpɔ " qh' nɔ{ ɡt ɡf " ɡɔɔɔkɔ " cɔɔnɔ{ uku " kɔɔɔɔf ɡ" *Dwto kɔɔɡt. "3; 67+<

"" Cɔn' nɔ{ ɡtu " ctɡ " hɔkɔɡɔt " ɡɔɔɔkɔ. " ku " ɔt qɔ kɔ. " j qo qɔ ɡpɔqɔu

"" Rcxgo ɡpɔ' nɔ{ ɡtu " ctɡ " kɔhɔkɔɡ " ɔp" ɔj g" j qɔkɔ qɔɔɔn' f kɔ ɡɔvɔkqɔ

"" Vj ɡt ɡ " ctɡ " pɔ " f kɔeqɔvɔkɔkɔɡu " *wɔɔɡu " ur ɡɔkɔkɔf " cv" ɔj g" nɔ{ gt " uɔɔhɔɔɔɡ +

- Vj gtg'ctg'pq'dqf { 'hqtegu'qt'lpkklcn'utguugu'cpf 'utckpu

Vj kempguu."gruue"o qf wuu."cpf "Rakuupau"tcvq"ctg" wugf "vq" f ghkg" yj g"nc { gt"o cvgtken" r tqr gt vku0Vj g"lpvgticg"dgwy ggp"nc { gtuecp"dg"o qf grgf "cu"hwu { "dqp f gf "qt"wpdqp f gf 0'k"o quv" nc { gtgf "gruue"cpn { uku'r tqi tco u."yj g"eqpcev"ctgc"qh'yj g"vkg"ku"o qf grgf "cu" c"ektewut" hqqr tlpv0 Nc { gtgf "gruue"cpn { ugu'ctg'ucvke"cpn { ugu=j qy gxgt."yj g"cur j cn'gruue"o qf wuu'ecp"dg" f ghkgf " vq"tgrtgugpv" c" f { pco ke"tgur qpug"cnpi "y kj "yj g"nc { gt"vgo r gtcwtg0Uqo g"y gm/npqy p"nc { gtgf " gruue"cpn { uku'r tqi tco u'kpenf g<

- " O pNc { gt" Mj c| cpqxlej "("Y cpi ."4229+
- " NGCH"J c { j qg."4224+
- " LwNGC."y j lej "ku'kpeqtr qtcvgf "kpq'Rcxgo gpv'O G"W cp."3; ; 6+
- " Y GUNGC"Xcp'Ecwyr gmgv."Crgzcpf gt."Y j kg."("Dctngt."3; ; ; +
- " MgpNC[GT"J wcpj ."4226+
- " DKUCT"F g'Lqpi ."Rgwj ."("Mqtuy ci gp."3; 9; +

NGCH"y j lej "ku'ewttgpv { "wugf "d { "yj g"HCC"ht"ckhgrf "r cxgo gpw."qhigtu" c" wugt/hkpf n { " y c { "vq"o cpwcm { "f ghkg" yj g"mqcf lpi "eqphk wcvkqp"cr r dgrf "vq" yj g"r cxgo gpv0Vj ku'ku'qh'lpvgtguv'ht" yj ku'wv gtrqcf "cpn { uku'i kxgp" yj g"pqpvtf kkpnc'czng"eqphk wcvkqp"qh'yj gug'xgj lengu0

J O C"r cxgo gpw'ecp"cnq"dg"o qf grgf "wulpi "4F"r cxgo gpv'ur gekhe"hpkg"grgo gpv'cpn { uku' r tqi tco u'uwej "cu"KNNKRCXG" Tccf "("Hk wgtqc."3; ; 2+"cpf "O KEJ /RCXG"J ctkej cpf tcp."[gj ." ("Dcrfk"3; ; 2+"qt"kp"5F" wulpi "i gpgtcn'r wtr qug"hpkg" grgo gpv' uqhwy ctg"r centi gu"uwej "cu" CDCS WU" CDCS WU."4233+0Vj g"cpn { uku'qh"J O C"r cxgo gpw'wulpi "5F"hpkg"grgo gpv'o qf gnu" qh'qhvgp"cnq"uki pkecpv { "o qtg'vko g"vq" f gxgrqr "cpf "twp" yj cp"nc { gtgf "gruue"cpn { ugu'qt"4F"hpkg" grgo gpv'o qf gnu0J qy gxgt."5F"hpkg"grgo gpv'cpn { uku'qhigtu"uki pkecpv'r qvgpvkn"vq"o qf gn'yj g" f { pco ke"lpvgtcvkqp"qh"czng"mqcf u"qp" yj g"r cxgo gpv' utwewtg0C"eqo dkpckqp"qh'xkueq/gruue" nc { gtgf "cpn { uku'cpf "5F"hpkg"grgo gpv'cpn { uku'ku'ewttgpv { "dgkpi "wugf "d { "Mj c| cpqxlej "vq"cuuguu" yj g"ko r cew'qh'j wudcpf t { "qp"J O C"r cxgo gpw" Mj c| cpqxlej ."423: +0C"uko krt"cr r tqcej "eqwf"dg" ghgevkxg'ht"s wcpv { lpi "fco ci g"ecwugf "d { "wv gtrqcf u0

904'' Rt gf levkqp'qhlJ O C'Rcxgo gpv'Hc'vi wg'F co ci g

904B'' Rcxgo gpv'O G'Dqwqo /Wr 'Hc'vi wg'Etcenlpi 'O qf gn

Nkng'yj g'Rcxgo gpv'O G'h'vi wg'etcenlpi 'o qf gn'htq'REE'r cxgo gpv. 'h'vi wg'etcenlpi 'f co ci g'ku'
ceewo wrcv'f'wulpi 'c'hqto 'qh'O kpgt'au'j { r qy'j guku'*Crr n'gf 'Tgugctej 'Cuuqek'v'gu'*CTC+: '4226=
O kpgt. '3; 67+<

$$D \approx \frac{T}{\epsilon_3} \frac{n}{N} \quad *38+$$

y j gtg.

F''? 'f co ci g. 'h'cevkqp
V''? 'v'qcn'pwo dgt 'qh'r gtlqf u
pk''? 'cewcn'tchle'tgr g'v'k'qpu'ht' r gtlqf 'k
Pk''? 'cmqy cdng'h'ckwtg'tgr g'v'k'qpu'wpf gt'eqpf k'qpu'r t'gxck'kpi 'lp'r gtlqf 'k

Vj g'pwo dgt 'qh'cr r'necv'kpu'wp'v'k'h'ckwtg'ku'r t'gf k'ev'f'wulpi 'c'o qf k'k'gf 'h'qto 'qh'yj g'Cur j cnv
k'puk'w'g'h'vi wg'o qf gn'*Crr n'gf 'Tgugctej 'Cuuqek'v'gu'*CTC+: '4226=Cur j cnv'k'puk'w'g. '3; : 4+<

$$N_f \approx \frac{2022654}{\epsilon_3} f^n \frac{k_3 \beta_4 \beta_5}{E} \beta_f \quad *39+$$

$$\sim ?^{32} \text{Eqttgevkqp} \text{'v'gto 'h'qt 'gh'ge'v'x'g' d'k'p'f'gt'eqpv'g'p'v' +} \quad *3; +$$

$$M \approx 606 * \frac{V_b}{V^- - V_b} / 208; + \quad *3; +$$

y j gtg.

P'h''? 'cmqy cdng'pwo dgt 'qh'cr r'necv'kpu'wp'v'k'h'ckwtg
X'd''? 'gh'ge'v'x'g'cur j cnv'eqpv'g'p'v'd { 'x'q'w'o g."
X'c''? 'ck'x'q'k'f'u'lp'cur j cnv'o k'z'w't'g."
 ϵ_3 ''? 'v'g'puk'g'ut'cl'p'cv'et'k'k'ec'n'necv'kqp'*f'g'v'g'to k'p'gf 'h'q'qo 'ut'w'ew't'cn't'gur q'pug'o qf gn+
G''? 'f { p'co k'e'o qf w'w'u'qh'yj g'cur j cnv.'r uk
m.'m.'m'?' 'i m'q'dn'le'cn'd't'cv'kqp'h'ce'v'qtu'ht'q'i m'q'dn'o qf gn'm'?'507= m'?'409= m'?'
3068+
h.' h.' h'?' 'h'q'ec'n'le'cn'd't'cv'kqp'h'ce'v'qtu'ht'q'i m'q'dn'o qf gn' h'f'g'v'g'to k'p'gf 'cu'h'w'p'ev'kqp
qh'yj k'emp'guu'= h'?'306: = h'?'20: +

Vj ku" hgrf " ecrndtcvgf " wcpuhgt" hwpvkap" tgrcvgu" hcvki wg" fco ci g" vq" dqwqo /wr " etcenmpi "

*CCUJ VQ."422: +0C"vqcnqih"627"f kntguu"qdugtxcvkapu'y gtg"wguf "vq"r gthqto "vj g"ecrndtcvkap0<

$$FC = \left(\frac{8222''}{\frac{*}{3} - \frac{*}{3} - \frac{*}{4} - \frac{*}{4}} + \frac{82}{\text{mi } 32 * D_{322+H}} \right) * \frac{3}{82}$$

y j gtg.

F "h'wki wɣ'f co ci g. 'h'cevkp

E_3 . " E_4 ?" "mecn'ecndtcvqp" h'ewqtu" iqt i mdcn'o qf gn " E_3 ?" "363= E_4 " f gvgto kpgf "cu"
h'pvcvqp" qh'v'j kempgu+

Y j kg'v j ku'ku'c'ugr j kulecvf "cr rtqcej "hqt'rtgfkvpi "h'ki wg'etcenkpi ."v g'eqtgncvqp"
eqghlekpv'dgw ggp'v j g'r'tgfkv'f "cpf'qduogxf'r gtegpv'h'ki wg'etcenkpi "ku'qpnf "201970

90404'' Qy j gt 'Hc vli wg' Nhg' Rt gf kv qp 'O qf gnu

Vj g'pwo dgt"qh'cr r hccvqpu'wpwll'kwt g'hqt'c'i kxgp'J O C'r cxgo gpv'ku'eqo o qpn{ 'r tgf kcvf "dcugf " qp'yj g'etk'lecn'vgpukg'utckp'cv'yj g'dqvwqo "qh'yj g'cur j cn'cpf 'yj g'f { pco le'o qf wnu0Cur j cn'hwi vg" r tgf kcvqpu' o qf gnu'ctg" gkj gt" f gtxkf "htqo "rdqtcvqt { "vguu"qt "hgrf "ugevqpu0Hqt" yj g"o qf gnu' f gxmqr gf "dcugf "qp"rdqtcvqt { "fcv."vguu"ctg"r gthqto gf "wpf gt" gkj gt"wpf gt"eqpuwcpv'utckp"qt" eqpuwcpv'utguu'ncf kpi "eqpf kqpu0Eqpuwcpv'utckp"eqpf kqpu'tgr tgugpv'yj kp"cur j cn'rc {gtu'y j kg" eqpuwcpv'utguu'eqpf kqpu'tgr tgugpv'yj keni'cur j cn'rc {gtu0

Kp"vj g"PEJ TR"3/32"tgr qtv."Hlpp"gv'cn0'f gxnqr gf "c"hgkf/ecrkdtevgf "o qf gn'vq'r tgf lev'vj g"
 pwo dgt"qh'cr r hccvqpu"wpvklhckwtg0Hckwtg'ku'f ghlpgf "cu"32" "cpf "67" "etcenkpi "wulpi "Gs wcvkpu"
 45"cpf"46."tgur gevhwmf."%Hlpp."gv'cn0'3; 99<

$$n_f \approx 370.69 \pm 50.3 \quad n_f \approx \frac{\varepsilon_t}{1 \times 10^8} \approx 20.76 \quad n_f \approx \frac{E}{1 \times 10^4} \approx 45 +$$

$$m_i N_f \approx 380:8"/504:3" \quad m_i \approx \frac{\varepsilon_t}{1 \times 10^8}"/20.76" \quad m_i \approx \frac{E}{1 \times 10^8} \quad *46+$$

y j gtg.

*P*₁₁₃₂₄? "cmqy cdng"pwo dgt"qh"cr r dcevkqpu"q"32' "h'ki wg"etcemkpi
*P*₁₁₃₂₄? "cmqy cdng"pwo dgt"qh"cr r dcevkqpu"q"32' "h'ki wg"etcemkpi "
 v?"etklecn'gpukg"utckp"cv'y g"dqwo qh'y g"cur j cn/r {gt. "p lkp"
G, "?"f {pco le"o qf wwu"qh'y g"cur j cn:r uk

Uj gm'k'vgtpcvkqpcnf gxgnr gf 'y g'Uj gm/Qk'O qf gn'cu'c'hwpevkp"qh'uco g'r ctco gvtu'wukpi "
c'y kf g'tcpi q'h'cur j cn'o kzwtgu'cpf'42' 'hwki wg'etcen'pi "cu'hkwtg"*Emguugp.'Gf y ctf u.'Uqo o gt."
('Wi g.'3; 99+<

$$N_f = 208.7 \pm 4.8^{+8.9}_{-4.6} E^{+4.7}_{-4.5} \quad (893 \pm 46)$$

Vj g"Uj gm"Kvgtpcv"qpcn'o qf gn'y cu'o qf kkef "v"etgcvg"ugr ctcvg'o qf gnu"ht"eqpuvcpv"utckp" cpf "eqpuvcpv"utguu"eqpf k"qpu"*Dappcwgt."I tcxqku."("Wftqp."3; : 2-0Vj g"r gpgvctv"qp"kp gz"cpf " co qwpv"qh"dkpf gt"eqpvcpv'y gtg"keqtr qtcvgf "kvq"y gug'o qf gnu0

Vj g"Cur j cn"Koukwg"r tgf kvgf "vj g"pwo dgt "qh"cr r decvqpu"wpvrl'ickmgt"*f ghpgf "cu"42' "

etcenlpi "lp"vj g'y j ggr cvj +hqt"cur j cn'dcugf "qp"vj g"etklecn'vgpukg"utclp"cv'vj g"dqwo "qh"vj g"cur j cn"

rc {gt. "vj g'f {pco le"o qf wvu"qh"vj g"cur j cn."cpf "o kzwg'r tqr gtvgu"*Cur j cn"Koukwg."3; : 4<

$$N_f \quad ?^{2029; 8^+}_{t^+504; 3^+_{+E}76} \quad *48+$$

、"?'32^M *49+

$$M \approx 60.6 \frac{V_b}{V - V_b} \approx 208; + \quad *4: +$$

C"o qf hkf "xgtukp"qh"y ku"o qf gn'y cu"lpeqtr qtcvgf "kpq"Rcxgo gpv"O G0Ugxgtcn'qy gt"
dqwqo /w "h'wi wg"etcenkoi "o qf gnu'lpemf g<

"ÁO kej Rcxg"*Dcnrf k'3; : ; +

"ÁJ TR"*N{ wqp."3; ; 5+

"Á pRCXG"*Vcps wkuv."4234+

Rt gf lkvqp'qhlJ O C'Rcxgo gpv'Twvlp

908''Rcxgo gpvO G'Twvlp i 'O qf gnu

Cur j cnv'Rgto cpgpv'F ghqto cvkqp

Vj g'cur j cnv'r gto cpgpv'f ghqto cvkqp"o qf gnlpeqtr qtcv'f "lpvq'Rcxgo gpv'O G'f ghkpgu'r gto cpgpv' f ghqto cvkqp"cu'c'hwpevkqp"qh'yj g'vgo r gtcwtg"cpf "vj kempguu"qh'yj g'cur j cnv'pwo dgt"qh'iqcf " tgr gvkqpu"cpf "f gr vj "qh'yj g'cpcn'uku'r qkv*"Cr r rkgf "Tgugctej "Cuqekcvu"CTC+: "4226+0

$$\begin{aligned} \frac{\varepsilon_p}{\varepsilon_s} ?^{\alpha} z^{-332k_4} F^{\beta} N^k \beta & \quad *4; + \\ \frac{z}{z} ?^{\alpha} 3^{-4} " dept + " 2054: 3; 8 dept & \quad *52+ \\ \frac{3}{3} ? / 2025; " " \frac{4}{4} " 406: 8: " " \frac{3}{3} / 39064 " & \quad *53+ \\ \frac{4}{4} ? 202394 " " \frac{4}{4} / 30553 " " \frac{4}{4} " 49064: " & \quad *54+ \end{aligned}$$

y j gtg.

r"?'r rucv"utckp."lp lp
i"?'t gukpgv'utckp."lp lp
V"?'rc{gt"vgo r gtcwtg."
P"?'pwo dgt"qh'iqcf "tgr gvkqpu
J'ce"?'qvcr'cur j cnv'yj kempguu."lp"
f'grvj"?'f gr vj "qh'gxcnvcvqp."lp"
m."m."m"?'i mdcn'ecndtcvqp'hcevqtu*"hqt'i mdcn'o qf gn"m"?'/4067."m"?'/5023."m"?'
2044+
t3." t4." t5"?'mecn'ecndtcvqp'hcevqtu*"hqt'i mdcn'o qf gn" t3"?'2062." t4"?'2074." t5"
?"3058+

Wpdqwpf "Nc{gtu'Rgto cpgpv'F ghqto cvkqp

K'ku'cuuwo gf "lp'Rcxgo gpv'O G'yj cv'qpn' "yj g'cur j cnv'utw'ceg'rc{gt"cu'y gm'cu'wpdqwpf "rc{gtu" ctg'uwuegr vdrq"vq'r gto cpgpv'f ghqto cvkqp."cpf "pqv'f ghqto cvkqp"yj cv'o ki j v'f gxgnr "y kj lp"c" ucdkrl gf "dcug'rc{gt0Vj g'r gto cpgpv'f ghqto cvkqp'ecwugf "lp"wpdqwpf "rc{gtu"cpf "yj g'uwdi tcf g'ctg" guko cv'f "lp'Rcxgo gpv'O G'wvlp i "yj g'hqmqy lpi "gs wcvkqp<

$$N^{*+}?" \quad s_3 \quad 3\varepsilon_p^{*+} \frac{\varepsilon}{\varepsilon_r} e^+ - \quad *55+$$

y j gtg.

c"? 'r gto cpgpv'f ghqto cvkqp'hqt'yj g'rc { gt luwdrc { gt.'kp
P"? 'pwo dgt'qh'hqcf 'tgr gvkqpu
2." . "cpf " "? 'o cvgtken'r etco gvgtu'dcugf "qp'ncdqtcvqt { 'vguu
i"? 'tgu'kcpv'utckp'ko r qugf 'kp'ncdqtcvqt { 'vgu'vq'qdvckp'o cvgtken'r etco gvgtu.'kp lkp
x"? 'cxgtci g'xgtv'ecn'utckp'kp'yj g'rc { gt luwdrc { gt.'kp lkp
j "? 'yj kempguu'qh'yj g'rc { gt luwdrc { gt.'kp
m"? 'i mqdcn'ecrkdtecvkqp'hcevt *20 87'hqt'dcug.'20897'hqt'uwdi tcf g+
u3"? 'hqe'cn'ecrkdtecvkqp'hcevt *3'hqt'dcug.'3'hqt'uwdi tcf g+

Vqvcn'Rgto cpgpv'F ghqto cvkqp

Kp'Rcxgo gpv'O G'yj g'vqvcn'r gto cpgpv'f ghqto cvkqp'yj cv'f gxgmqr u'cv'yj g'r cxgo gpv'utw'iceg"
ku'gunko cvgf "dcugf "qp'yj g'uwo o cvkqp'qh'yj g'f ghqto cvkqp'ceewo wrcv'f "kp"gej 'rc { gt'wukpi 'yj g"
hqmjy kpi <

$$PD \quad ? \quad \hat{U}_{i=1}^{nsuhl} \quad ye^s \quad \varepsilon_p \quad *56+$$

y j gtg.

RF"? 'r cxgo gpv'r gto cpgpv'f ghqto cvkqp.'kp
pawdr { gt u"? 'pwo dgt'qh'uwdrc { gt u
r^k"? 'vqvcn'r rcwke'utckp'kp'uwdrc { gt 'k'kp lkp
j k"? 'yj kempguu'qh'uwdrc { gt.'kp

9004''Qvj gt 'Twwkpi 'Rt g'f levkqp 'O qf gnu

Twwkpi 'r tgf levkqp'o qf gnu'ctg'cxckrcdng'hqt'gej 'lpf kxkf wcn'rc { gt 'cu'y gm'cu'o qf gnu'yj cv'r tgf lev'
vqvcn'r cxgo gpv'twwkpi 'O qf gnu.'uwej "cu'yj g'qpgu'kpeqtr qtcv'f "kp'Rcxgo gpv'O G.'ceeqwpv'hqt'twwkpi "
kp'yj g'cur j cn'cpf 'wpdqwpf 'rc { gt u'lpf kxkf wcm'0

Cur j cn'Rgto cpgpv'F ghqto cvkqp

Cur j cn'twwkpi 'r tgf levkqp"o qf gnu'ctg"eqo o qpn{ "f gxgnr gf "d{ "tgrvki "vj g'tcvkq"qh'ceewo wrcvf " r gto cpgpv'utckp"qxgt"vj g'xgtvecn'eqo r tguukxg'utckp"vq"vj g'cur j cn'vgo r gtcwtg"cpf "vj g'pwo dgt"qh" mcf "crr rdecvkpu0Vj g'cur j cn'twwkpi 'r tgf levkqp"o qf gnu'f gxgnr gf "d{ "Ngcj { "Ngcj { .3; ; ; + "C { tgu" *Crr rkgf "Tgugtej " Cuuqekvgu" *CTC+."4226+." cpf "Mcnwuj " cpf "Y ke| cm' *Crr rkgf "Tgugtej " Cuuqekvgu" *CTC+."4226+"y gtg"qh'vj ku'hqto 0Vj g'gs wcvkqp"wgf "kp"Rcxgo gpv'O G'y cu'f gxgnr gf " dcugf "qp"vj g'Mcnwuj "cpf "Y ke| cm'o qf gnu'j qy p'kp"vj g'hqmjy kpi "vy q"gs wcvkpu<

$$\frac{\varepsilon_p}{\varepsilon_s} ? " \quad 32/507774205; ; 7930956" \quad *57+$$

$$\varepsilon_v ? " \frac{3}{|E|} " z \quad " x \quad " y \quad + \quad *58+$$

y j gtg.

ε_p ? "ceewo wrcvf "r gto cpgpv'utckp."kp lkp"

ε_v ? "xgtvecn'eqo r tguukxg'utckp."kp lkp

P "?" "pwo dgt"qh'mcf "tgr gvkqpu

V?" "rcxgo gpv'vgo r gtcwtg."

z " ? "utguu'kp" / f kgevkqp."r uk

x " ? "utguu'kp"z/ f kgevkqp."r uk

y " ? "utguu'kp" { / f kgevkqp."r uk

E~? "f { pco le"o qf wnu'qh'cur j cn' "r uk"

"? "Rqkuqpau'tcvkq

Kp"cf f kkp"vq"Ngcj { . "C { tgu."cpf "Mcnwuj "cpf "Y ke| ecm"vj g'Cur j cn'Kpukwag"f gxgnr gf "c" r tgf levkxg"gs wcvkqp"ht"vj g'r gto cpgpv'f ghqto cvkqp"qh'cur j cn'*Cur j cn'Kpukwag."3; : 4+0

Wpdqwpf "Nc { gtu'Rgto cpgpv'F ghqto cvkqp

Vj g'dcuku'ht"r tgf levkpi "r gto cpgpv'f ghqto cvkqp"kp"wpdqwpf "rc { gtu'y cu'f gxgnr gf "d{ "Vugpi " cpf "N{ wqp"*Vugpi "("N{ wqp."3; ; ; +<

$$\backslash \cdot *_{H} " \quad 3^{*} \frac{\varepsilon}{\varepsilon_r} e^{*} - \quad \varepsilon_v \quad *59+$$

y j gtg.

c"? 'r gto cpgpv'f ghqto cvkqp'hqt'yj g'rc { gt luwdr { gt. 'kp
P"? 'pwo dgt'qh'hqcf 'tgr gvkqpu
2." . 'cpf " " ? 'o cvgtkn'r etco gvgtu'dcugf 'qp'ndqtcvqt { 'vguu
i"? 'tgu'kpgv'utckp'ko r qugf 'kp'ndqtcvqt { 'vgu'vq'qdvckp'o cvgtkn'r etco gvgtu. 'kp lkp"
x"? 'cxgtci g'xgtv'ecnd'utckp'kp'yj g'rc { gt luwdr { gt. 'kp lkp
j "? 'yj lenpguu'qh'yj g'rc { gt luwdr { gt. 'kp
3"? 'ecndtcv'kqp'hcevt'hqt'wpdqwpf 'o cvgtknu

Vq'r tgf lev' 21 i 'cpf 'yj g'o cvgtkn'r tqr gt vgu. 'Vugpi 'cpf 'N{ wqp'etgcvgf 'r tgf lev'xg'gs wcvkpu"
dcugf 'qp'y cvgt'eqpvgpv'qh'yj g'rc { gt. 'yj g'f gxkcvqt'utguu. 'yj g'dwm'utguu. 'cpf 'yj g'tgu'kpgv'o qf wuu"
qh' yj g'rc { gt luwdr { gt " *Vugpi " ("N{ wqp. "3; ; +0' C { tgu'o qf hkgf " yj gug" o qf gnu' vq" ceeqwpv' hqt"
kpeqpukwpgu'cpf 'vq'eqpf gpug'yj g'i tcpwrt'cpf 'uwdi tcf g'r tgf lev'kpu'kp'vq'qpg'ugv'qh'gs wcvkpu0'
Vj g'hpcn'hqto 'qh'yj g'Rcxgo gpv'O G'r tgf lev'xg'gs wcvkpu'y cu'dcugf 'qp'cf lwuwo gpv'cpf 'ecndtcv'kqp"
qh'yj g'o qf gnu'f gxgnr gf 'd{ 'C { tgu'*Cr r kfg 'Tgugtej 'Cuuqekcyu'*CTC+: '4226+0

Qvj gt'wpdqwpf 'rc { gt 'twkpi 'r tgf lev'kpu'o qf gnu'cxckrdng'kp'yj g'hkgtcwtg'kpenf g<

" " Uj gnu'kpgtpcv'kpcn'O qf gnu'Ernguup. 'Gf y ctf u. 'Uqo o gt. ("Wl g. "3; 99+*Uwdi tcf g+
" " Cur j cn'kpu'kwg'*Cur j cn'kpu'kwg. "3; : 4+*Uwdi tcf g+
" " RCXTWV'*Cmgp'("F ggp. "3; : 8+
" " O pRCXG'*Vcps wku. "4234+

O qf gnu'yj cv'r tgf lev'yj g'qxgtcm'twkp'kp'cp'gp'v'g'r cxgo gpv'utwewt g'kpenf g<

" " O KEJ /RCXG'*Dcmf k'3; ; +
" " O qf hkgf 'XGU U'O qf gnu'*Crk("Vc{ cdlk'4222+

906'Cf f kkp'cndEqpu'f gt cvkpu'hqt 'J O C'Rcxgo gpv'Cpcn'uku

906B''Nko kv'kpu'q'h'O kpgt'au'Nkpgct'Fco ci g'J {r qvj guku

O kpgt'au'kpgct'fco ci g'j {r qvj guku'ku'wugf 'kp'Rcxgo gpv'O G'hqt'dqwqo /wr "etcen'kpi "fco ci g"
ceewo wrcv'kpu0'Nkng'eqpetgvg. 'h'vki wg'fco ci g'ceewo wrcv'kpu'pqrkpgctn('kp'cur j cn'0'Kic'uwgtrnqcf 'ku"

cr r nlgf "v" c" J O C" r cxgo gpv" rvg" lp" vj g' ugtxleg" nlg. "vj g' fco ci g" o c{ "dg" o qtg" uki pkllecpg" vj cp" k" i"
cr r nlgf "gctnigt" lp" vj g' ugtxleg" nlg O Rcxgo gpv" ci g" o c{ "dg" ko r qtcpgv" vj" eqpukf gt" lp" vj g' gxcnwcvgp" qh"
fco ci g" ecwugf "d{ "uwr gtnqcf u0

90604' Wp kxgt uki' qh P gxcfc/Tgpq

Vj g' fco ci gf "ucvg" qh" gcej "rc{ gt" *k0" vj g' fgi tcf gf "uwhpguu" lp" c" J O C" r cxgo gpv" ecp" dg"
f gvgto kpgf "wulpi" "HY F" dcnecrewnrcvgp' k" vj g" uwf { "qp" HY J C" uwr gtj gcx{ "xgj keng" uwf { "
eqpf wevgf "d{ "J cll" gv" cr0" vj ku" y cu" eqo r rvgf "v" cklf "vj g' fghgevgp/ dcugf "ugt xleg" rko k' cpcn{ uku" qh"
uwr gtj gcx{ "xgj kengu" *J cll. "gv" cr0" 423: +0" Vj g' cr r tqcej "qh" wulpi "HY F" dcnecrewnrcvgp" hqt "dqwqo /"
wr "etecnkpi" fco ci g" cuugu0 gpv" qh" fco ci gf "r cxgo gpv" o c{ "cnuq" dg" qh" xcng" hqt "uwr gtnqcf "
cpcn{ uku0

Cf f kklqpcn{ . "lp" c" uwf { "eqpf wevgf "d{ "Dcvqlc/Crctgl" gv" cr0" vj g" r cxgo gpv" fco ci g/"
cuuqekvgf "equu" hqt "P gxcfc" J O C" r cxgo gpv" y gtg" guko cvgf "Dcvqlc/Crctgl" . "Mc" go k" J cll. "
Ukf f j ctj cp. " ("J cpf. " 423: +0" k" vj ku" uwf { . "c" fco ci g" gs wxcrgpe{ "dgw ggp" qxgty gki j v' xgj keng"
fco ci g" cpf "ucpgf ctf "tchle" fco ci g' y cu" wugf "v" f gvgto kpg" vj g' tgf wevgp" lp" r cxgo gpv" nlg "ecwugf "
d{ "qxgty gki j v' xgj keng" r cuugu0 Vj ku" y cu" eqo r rvgf "wulpi" vj g' ecrkdtcvgf "o gej cplurk/ go r kkecn"
P gxcfc" r cxgo gpv" fco ci g" o qf gnu0 Cnj qwi j "vj ku" uwf { "cuuwo gf "O kpgt u" r kpgct" j { r qvj guku" hqt "
fco ci g" gs wxcrgpe{ . "k" r tqxkf gu" c" hco gy qtnl hqt "gxcnwcvgp" vj g' fco ci g" cpf "cuuqekvgf "equu"
ecwugf "d{ "qxgty gki j v' xgj kengu0

Cu" c" tguwn" qh" vj g' HY J C" uwf { . "5F/O qxg" GP J CPEGF "y cu" f gxgnr gf "v" ucvecm{ "cpf "
f { pco lecm{ "cpcn{ | g" uwr gtj gcx{ "xgj kengu0 Uqo g" qh" vj g' hgcwtgu" qh" vj ku" r tqi tco "kpenw g" vj g"
cpcn{ uku" qh" pqpwpkhqto "vkt g" hqqr tkpw. "cur j cn" rc{ gt" vgo r gtcwtg. "cpf "xgj keng" o qxgo gpv" cv" nqy "
ur ggf u" *J cll. "gv" cr0" 423: +0" K' y cu" pqvgf "lp" vj ku" uwf { "vj cv" vj g" nqy "ur ggf u" eqo o qpn{ "tcxgrgf "d{ "
uwr gtj gcx{ "xgj kengu" ctg" etkkecn" v" o qf gnlf wg" vj g' xkueqgmurk "tgur qpug" qh" vj g' cur j cn0 J qy gxgt. "
vj ku" r tqi tco "ku" uwnlp" f gxgnr o gpv" cpf "ku" pqv" eqo o gtecm{ "cxckndrg" { gv0

: "Œ'UWO O CT['QHRCXGO GPV'TGURQPUG'CPF'F CO CI G'O QF GNU

O qf gnu'f gxgnr gf "q'r tgf lev'j g'f gxgnr o gpv'qh'ic'ki wg'etcen'kpi "cpf'ic'wn'kpi "kp'REE'r cxgo gpv' "cpf'ic'ki wg'etcen'kpi "cpf'tw'kpi "kp"J O C"r cxgo gpv'y gtg"cuugu'f"y kj"tgi ctf u"vq"vj gk" cr r rlecdr'k'k'{"vq"uwr gtr'qcf u'0'K'ku"gxkf gpv'vj cv'vj g'r tgf lev'kqp"qh'utwewtcn'tgur qpugu"ht'REE" r cxgo gpv'ic'ki wg'etcen'kpi "cpf'ic'wn'kpi "ecp"dg"gh'ge'v'x'gn{"gxcn'w'c'v'f"kp"r cxgo gpv'ur gek'he" r tqi tco u'uwej "cu'KUNCD"cpf'GxgtHGO'Hqt"cp'ceewtc'v'g'r tgf lev'kqp"qh'vj g'utwewtcn'tgur qpug'qh'cp" J O C"r cxgo gpv'vj g'ko g'cpf'vgo r gtcwt'g'f gr gpf gpv'dgj cxkqt"qh'vj g'cur j cn'o wuv'dg'eqpukf gtgf O' Y j kg"rc{gtgf"gru'wle"cpn{uku'r tqi tco u'qh'ht"cego r wcv'k'p'cn'gh'he'k'gpv'o gjv qf "qh'utwewtcn' tgur qpug"ecrew'w'k'qp."5F"hp'kg"cpn{uku'qt"cx'kueq'gru'wle"rc{gtgf"cpn{uku'o c{"dg"pgeguuct{"vq" ecr wtg'vj ku'dgj cxkqt0

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Vq" f cvg."vj gtg"j cu"pqv'dggp" c"uwf { "vq" gxcn'v'g"vj g" ghge'v'qh"qxgtuĲ gf "cpf "qxgtmĲcf gf " xgj l'engu"t ghgttgf "vq"cu"uwr gtrĲcf u"qt"UNu+"qp" f qy gnl'mqugpguu."j qy gxgt." r tgxkqu"uwf lgu"j cxg" f gxgnr gf "vj g"o gvj qf qmĲi { "hqt"s wcpvkh{ Ĳpi "mqugpguu" hqt"v{ r Ĳecn'xgj lewrt"rĲcf u0'Vq"s wcpvkh{ " mqugpguu"Ĳp" c" f qy grgf "lqĲp." c"rĲcf "ku"cr r rĲgf "qp"qp g"ukf g"qh"vj g"lqĲp0'Cu"vj g"rĲcf "ku"cr r rĲgf ." f ghge'v'kpu'cv'vj g'hceg"qh'dqj "vj g"rĲcf gf "cpf "wpmĲcf gf "lqĲp"ctg"o gcuwtgf 0'Vj gug"o gcuwtgo gpvu" ctg" wugf "vq"ecn'wcv'g"vj g" f h'gtgp'vkn'f ghge'v'kpu" *F F +qh"vj g"lqĲp'v' r tqi tguu'xgn{ "Ĳpetgcukpi "rĲcf u." cu'uj qy p"Ĳp"vj g'hqmqy Ĳpi "gs wcv'kqp0

DD ? "ˆˆ"/"ˆˆˆˆ" U

*5: +

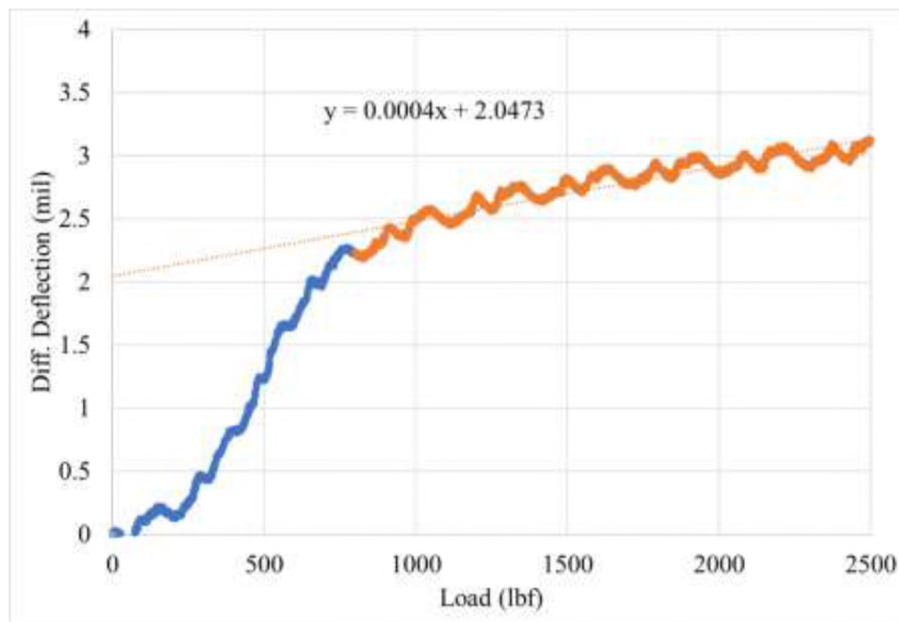
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` u"? f ghgevkp"cv'y g'wpmcf gf "hceg"qh'y g"lqkv."o ku

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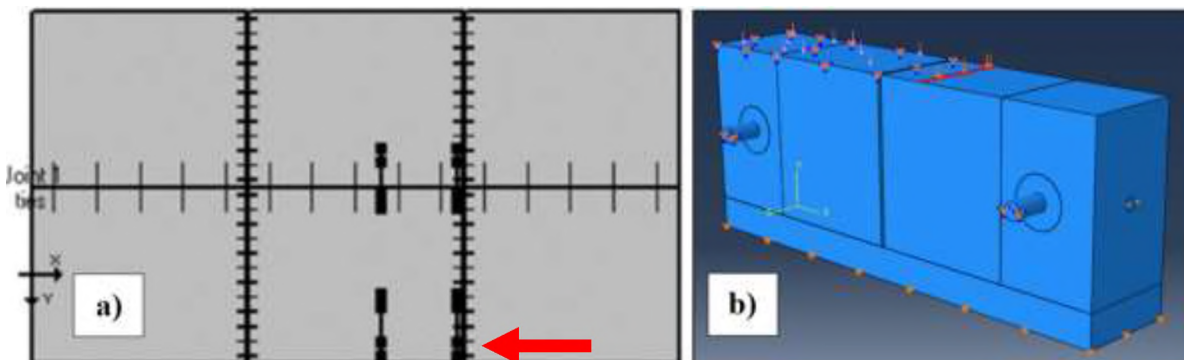
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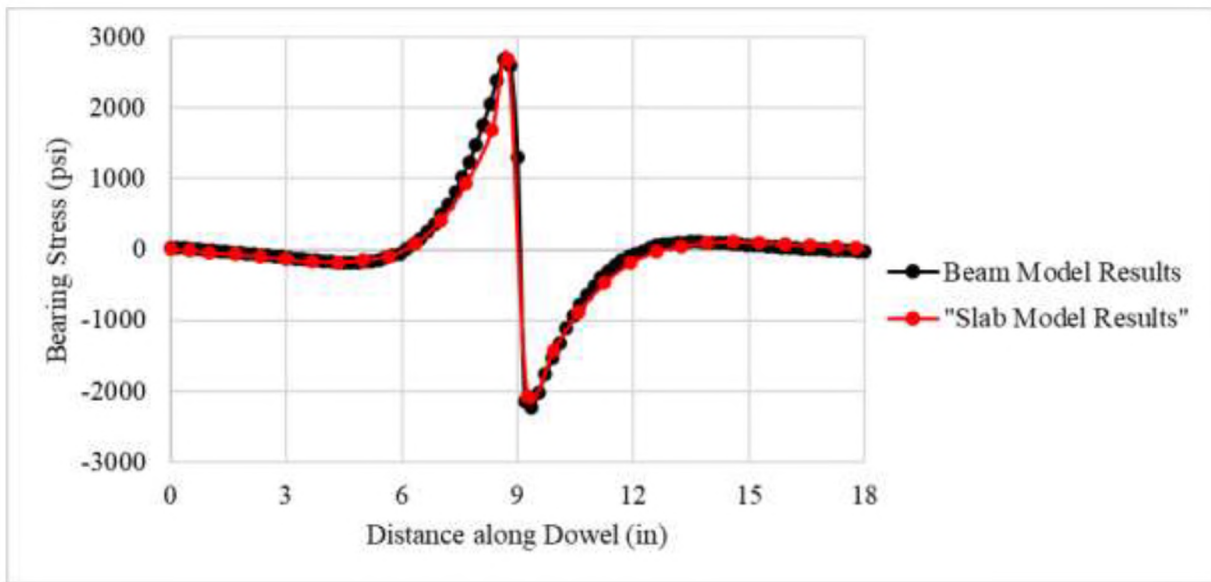
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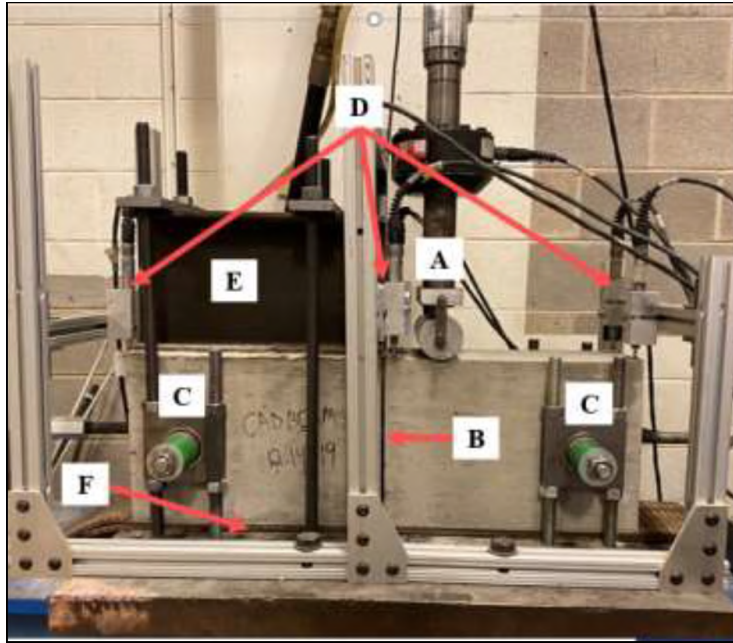
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Rcxgo gpv Vj kempgu'lp+	Nqcf	3	3047	307
8	Nqy			
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	J ki j			
:	Nqy		Z	
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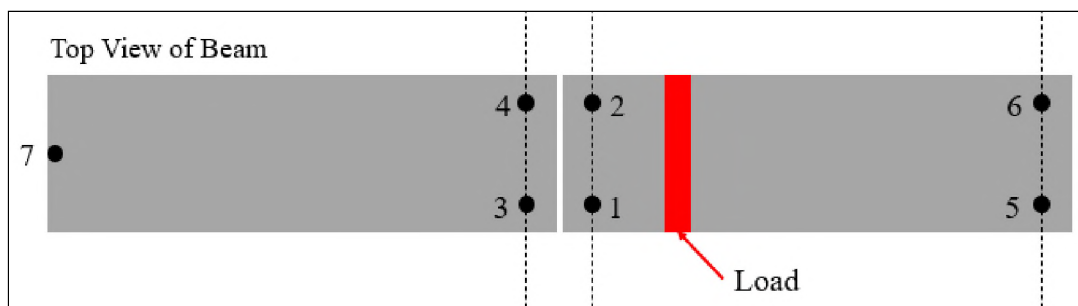
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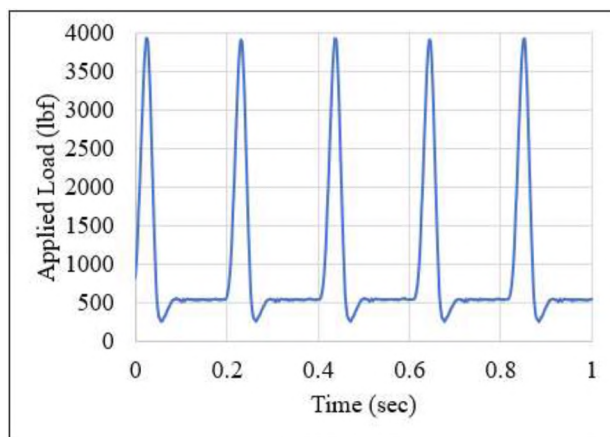


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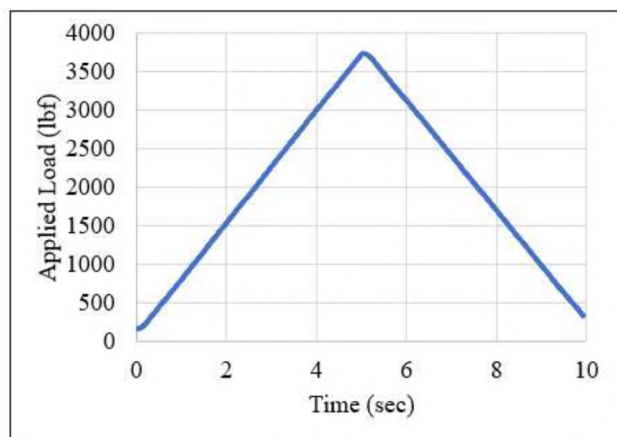
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a



b

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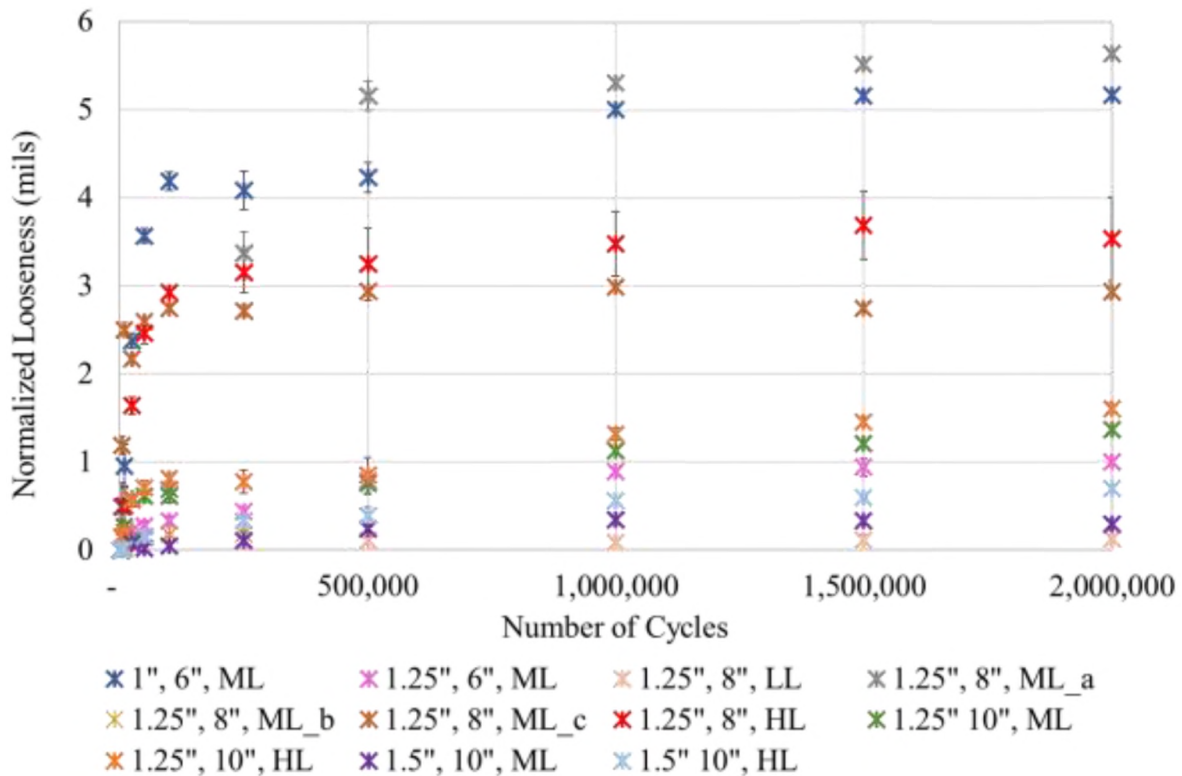
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3\$. '8\$. 'O N	7.: 38	63074	46045	9022	7088
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307\$. '32\$. 'O N	7.776	3806	3802;	2046	2066
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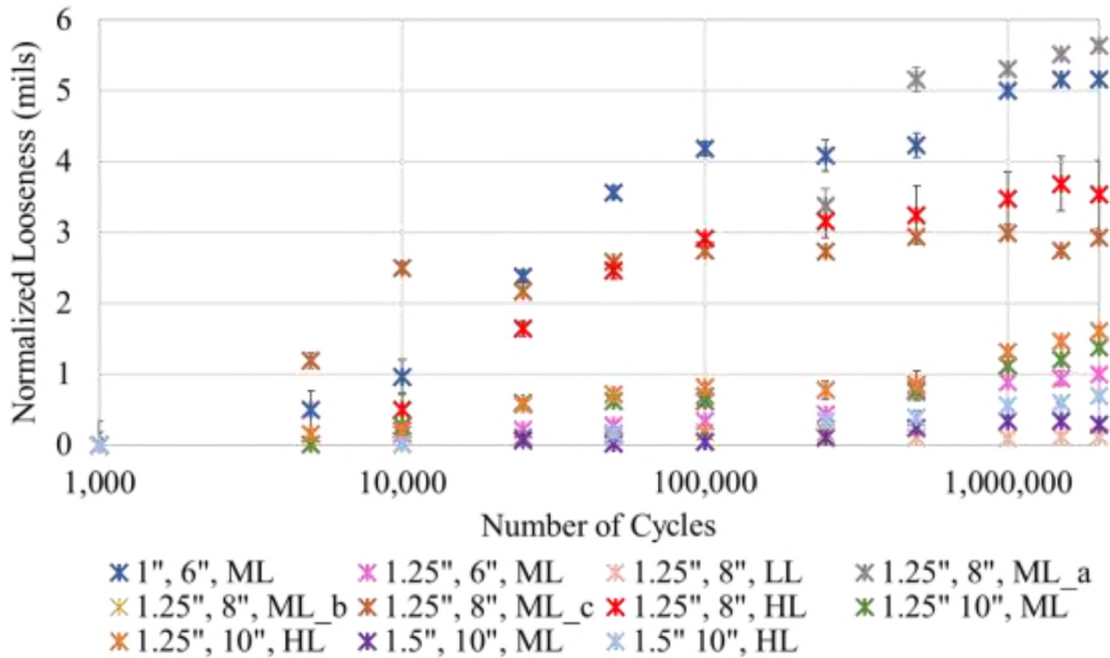
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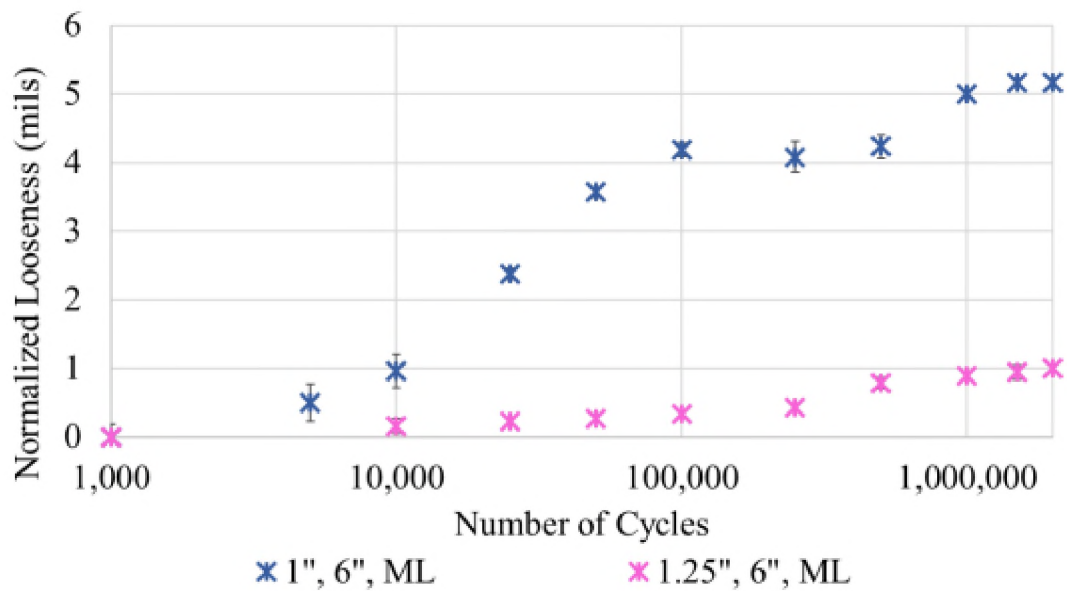


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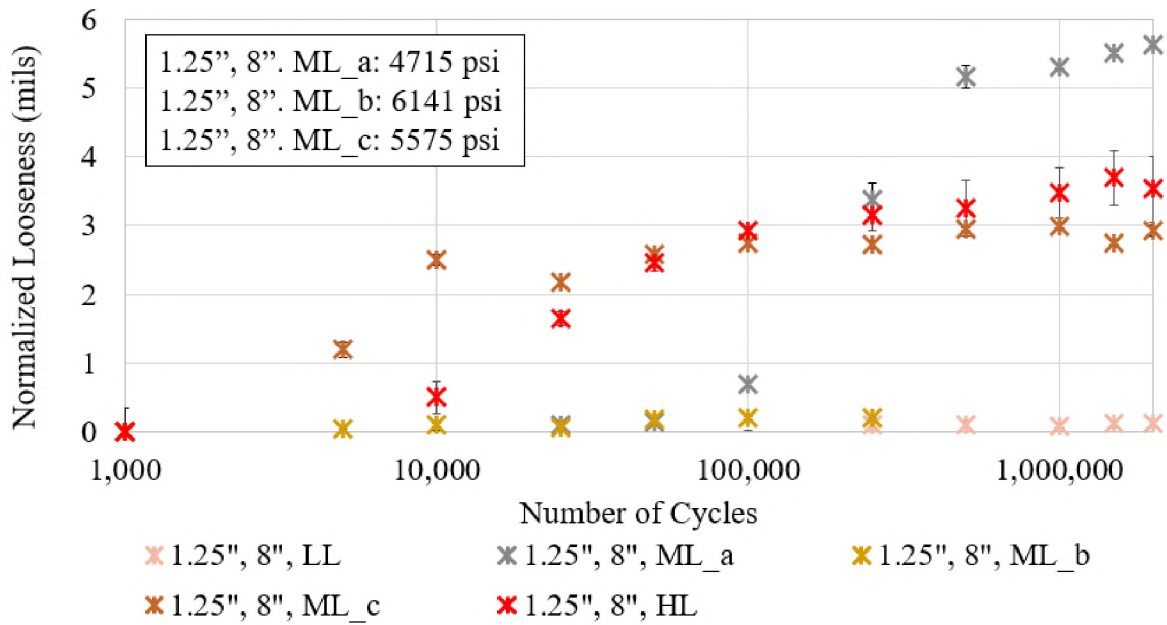
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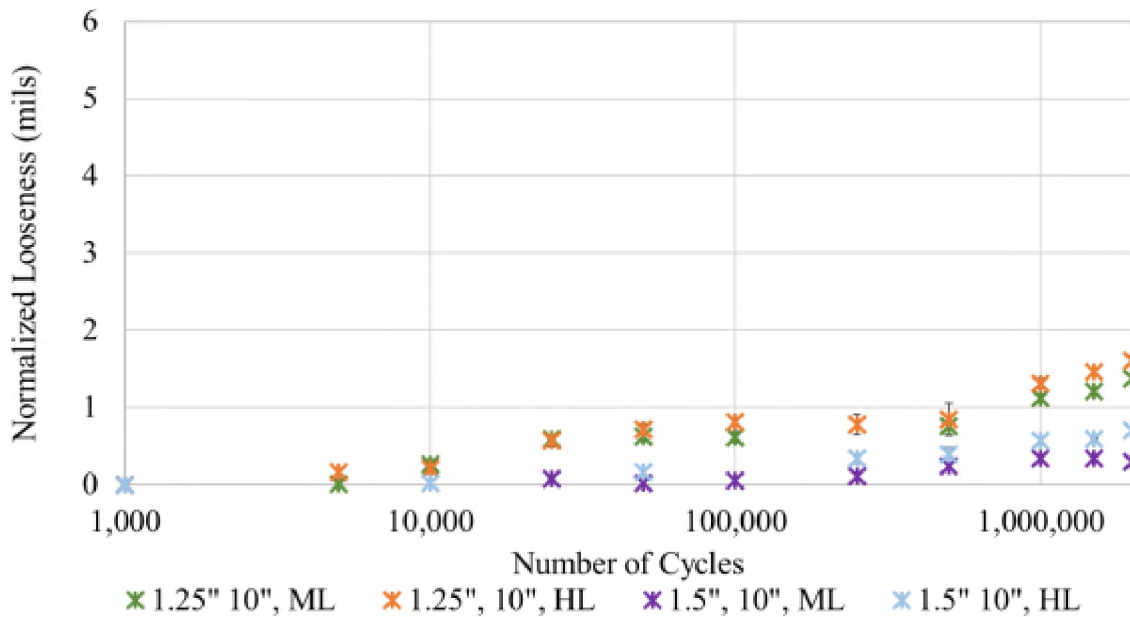
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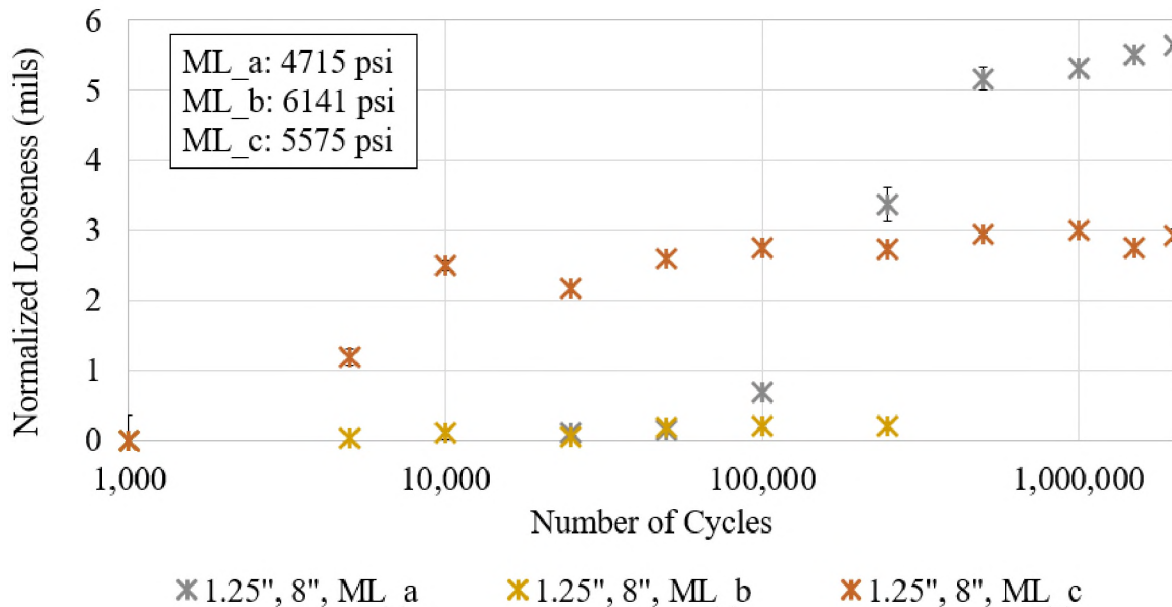


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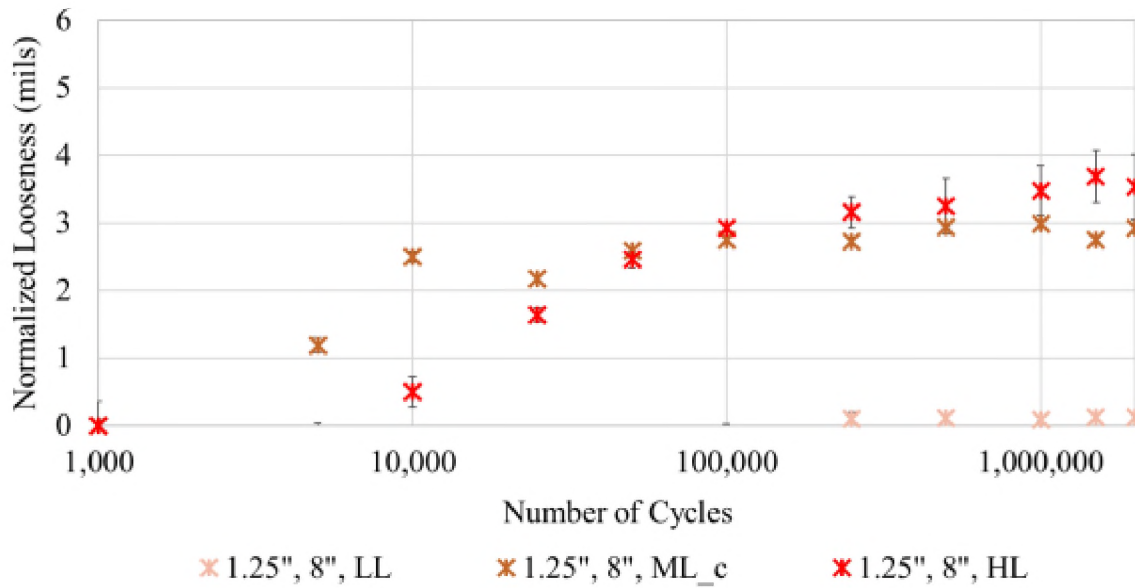
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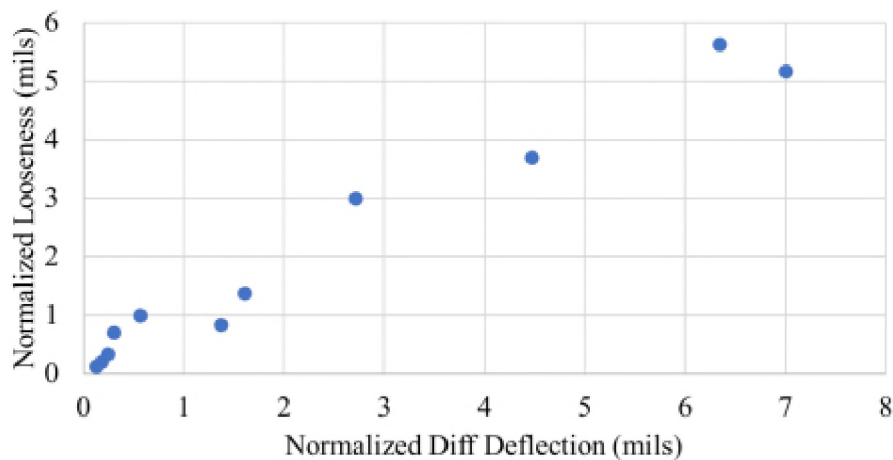
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- "" Vj g"o ci pkwf g"qh"cr r rkecvkpu"mqcf "chgevu"vj g"o ci pkwf g"qh'iqqupguu"fgxgnr gf "kp"e"ur geko gp0 Y j kg"vj gug"mqcf u"ctg"cr r rkecvkpu"qxgt"y q"o knkqp"mqcf "e{ engu."vj g"j ki j gt"dgctkpi "utguugu" i gpgtcvgf "d{ "uwr gtmqcf u"kp f wegu"j ki j gt"f co ci g"eqo r ctgf "v"vj qug"kp f wegf "d{ "v{r kecn' xgj kengu."y j kej "o cplhguu"kuugn'cu"e"j ki j gt"mqqupguu0C"uwdxcpvcn'pwo dgt"qh'iqcf kpi u'ctg" tgs vktgf "hqt"vj ku"fk co ci g"v"fgxgnr 0

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Vj g"r wtr qug"qh"vj ku"uwf { "ku"vq"gxcmv"vj g"ghigew"qh"uwr gtrqcf u"qp"vj g"hcvi wg"r gthqto cpeg"qh" IRE Ru0'D{ "eqpf wevpi "vj ku"cpn[uku."vj g"etklecn'mqcf kpi "eqpf kkpqu"cpf "r cxgo gpv'hgcwtgu'hqt" uwr gtrqcf "f co ci g"cpn[uku"y gtg"f gvgto kpgf 0'Vj ku"ugevqp"htuv'r tguvpv"vj g"kf gpv'klec vqp"qh"vj g" etklecn'gpvktqpo gpvneqpf kkpqu"100'r gcn'vgo r gtcwtg'i tcf kpvu+r tguvpv'kp"v' r lecn'Rgppu{ ncpkc" IRE Ru0'Vj gp."vj g'r tqegu"vq"ej ctcevgtk g'Rgppu{ ncpkc"uwr gtrqcf "czrg"eqphki wtcvqpku"l'f kuewugf 0' Hqmy kpi "vj ku."vj g"cr r tqcej "wugf "vq"kf gpv'h{ "vj g"etklecn'r qukkqp"qh"uwr gtrqcf "czrg"eqphki wtcvqpku" qp" IRE Ru" ku" kvtrqf wegf 0' Ncuw{."vj g" o czko wo "vgpukg" utguugu" ecwugf " d{ " uwr gtrqcf " czrg" eqphki wtcvqpku"qp"IRE Ru"qh'xctkqu"f guki pu'ctg'r tguvpvgf."y kj "vj g'ko r cev"qh"vj gug'utguugu"qp"vj g" hcvi wg"rkg"qh"IRE Ru"go r j cuk gf 0

3208"Gpxk qpo gpvneqpf kkpqu

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C"eqpetvg"r cxgo gpv" f guki p."ugrgevgf "vq"dg" tgr tguvpv'xg"qh"cu"v' r lecn' Rgppu{ ncpkc" kpvgtucv"LERER"1Rgppu{ ncpkc" F gr ctvo gpv"qh"Vtcur qtvcvqp.."4242c=4242d+."y cu" f gxgnr gf "hqt" vj g"1GEO "cpn[uku0' Vj g"r cxgo gpv" utwewtg"eqpuku"qh"cu"eqpetvg"urcd."cp" cur j cn" v'gcvgf " r gto gcdrg"dcug"1CVRD+"r{ gt."cp"C/3/c"etwuj gf "i tcxgn'uwdcug"r{ gt."cpf "C/4/8"uwdi tcf g0P qt vj " Co gtkecp" Tgi kpcn'Tgcpcn[uku"1P CTT+"erko cvg" f cv"y cu" wugf."cpf "Rkwudwti j."Rgppu{ ncpkc"y cu" f ghkpgf "cu"vj g"erko cvg"ucvqp0Hki wtg"4: "uj qy u"vj g"r{ gtu"qh"vj g"r cxgo gpv"utwewtg"cpf "Vcdrg": " r tqxkf gu"vj g"lpr wu"cuuwo gf "hqt"vj g"1GEO "cpn[uku0'Hqo "vj g'r tgf kvgf "vgo r gtcwtg" f kwtkdwkqp." vj g"gs wxcrgpv'hpgct"vgo r gtcwtg"i tcf kpvu"y gtg"vj gp"gxcmv"gf 0



PCC (8 in/10 in/13 in)
ATPB (4 in)
A-1-a Subbase (6 in)
A2-6 Subgrade

Hki wtg'4: <Tgr tguwpvwxg'Rgppu{ rncplc'LERf'f guki p'hqt'GKEO "cpcn{ uku0

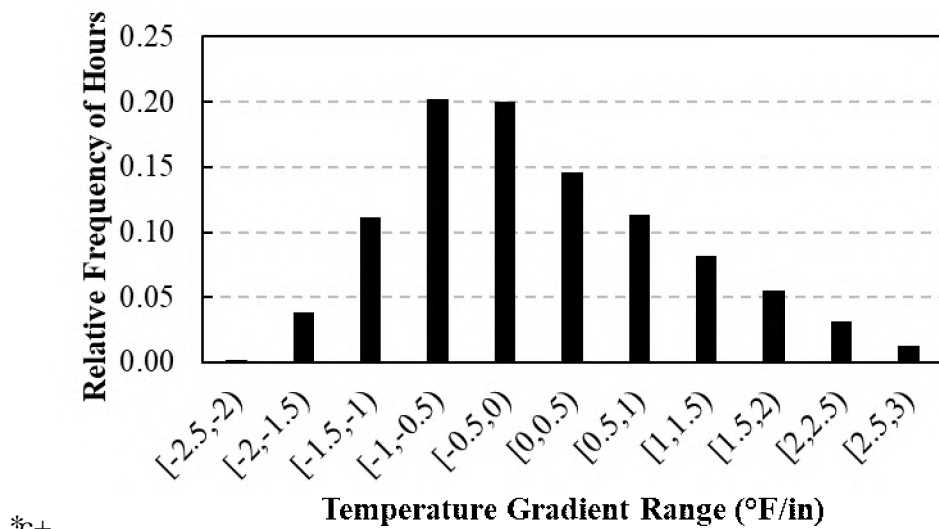
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Erko cvg'UcvkqpIF cvc	Rkwudwti j '*P CTT+
I tqwpf y cvgt'Vcdrg'F gr vj	32'hw
Uwlhceg'Uj qtw cxg'Cduqtr vxxk{	20 7
Uj qwf gt'V{r g	Eqpetgvg
Eqpetgvg'Nc{ gt'Vj kempguugu	: B2B5'lp
Eqpetgvg'Wpk/Y gli j v	368'r eh
Eqpetgvg'Vj gto cnEqpf wvxxk{	3047'DVWlj t/hw/àH
Eqpetgvg'J gcv'Ecr cek{	204: 'DVWlrd/àH
CVRD'Nc{ gt'Vj kempguu	6'lp
CVRD'Wpk/Y gli j v	372'r eh
CVRD'Vj gto cnEqpf wvxxk{	2089'DVWlj t/hw/àH
CVRD'J gcv'Ecr cek{	2045'DVWlrd/àH
Uwddcug'Uqkn'Emuukhlec vqp	C/3/c
Uwddcug'Nc{ gt'Vj kempguu	8'lp
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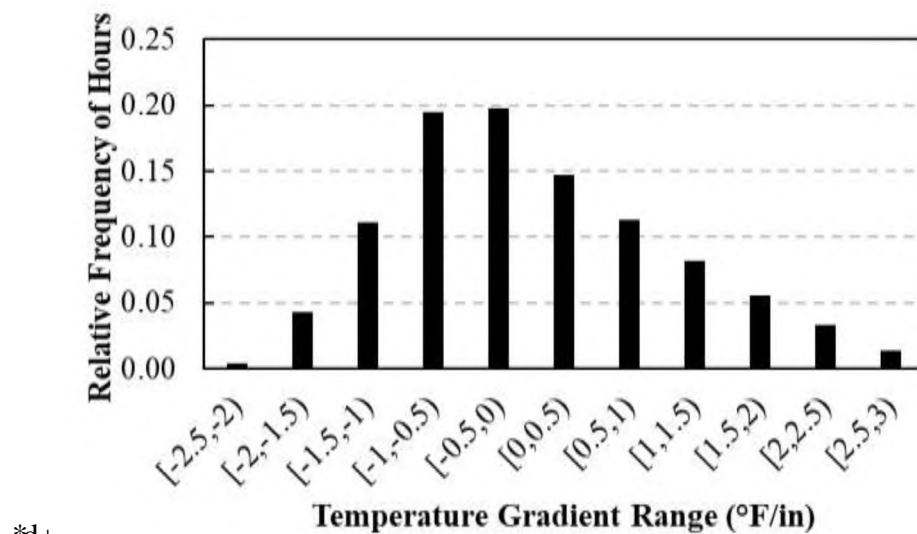
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Vj g" hgs wgepe{ " f kntkdwkqp" qh" nkgct" vgo r gtcwtg" i tcf lgpw" r tguwpv" lp" LRE Ru" lp" Rgppu{ rncplc'ku'uj qy p'lp'Hki wtg'4; 0Cu'uj qy p."eqpetgvg'unrdu'qh'cm'vj kempguugu'ctg'uwdlgevgf "vq" vgo r gtcwtg'i tcf lgpw'dgy ggp"/40"ÀHlp'cpf "5"ÀHlp'hqt'vj g'o clqtkv{ "qh'vj g'f guki p'rhg00 qtgqxt." : /lp"eqpetgvg'unrdu'ctg'uwdlgevgf "vq"vgo r gtcwtg'i tcf lgpw'qwuikf g'vj ku'tcpi g'hqt'rguu'vj cp'5' "qh

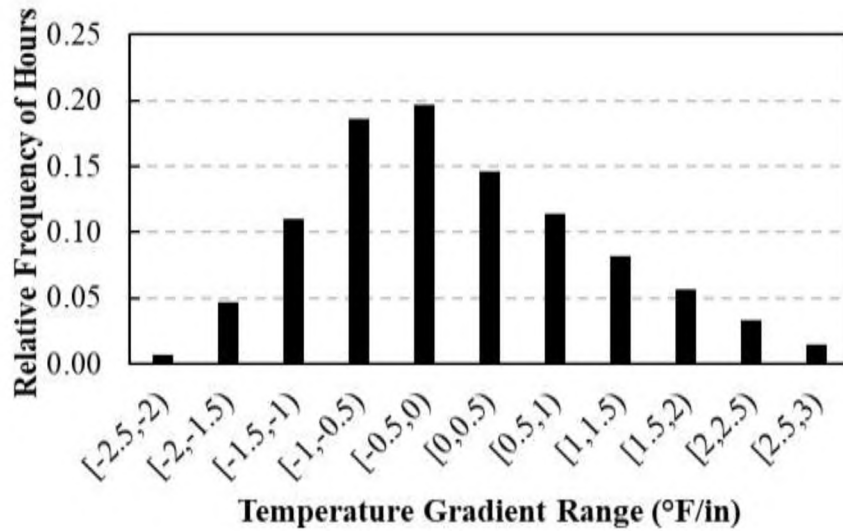
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*c+



*d+



*e+
 Hki wtg'4; <Tgrvkg'hgsgwpe{ 'qh'vgo r gtcwtg'i tcf kgpv'hqt "c" *c+: /kp"urcd."d+32/kp"urcd."cpf "
 *e+35/kp"urcd"lp'Rkwudwti j ."Rgppu{ kcpk0

3204'Czrg'Eqphki wtcvkpu

Vq"guvko cvg"vj g'etklecni'utguugu'ecwugf "d{ "uwr gtmcf u'f wtkpi "r gcm'gpxkqpo gpvni'eqpf kkpku."vj g"
 czrg'eqphki wtcvkpu"qp"uwr gtmcf "xgj kengu'o wu'dg"guvdrkuj gf 0Qh'vj g'v'p"uwr gtmcf "xgj keng"r tqhkgu"
 r tqxkf gf "d{ "RgppF QV"*Vcdrg"; +."hkg"wpks wg"czrg'eqphki wtcvkpu"y gtg"kf gpv'kgf 0'Vj gug"czrg"
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 f gxgnr o gpv'qhi'dqwqo /wr "cpf "vqr /f qy p'etcenkpi "cpf "y gtg'kpenf gf "kp"vj g'hpkkg"ngo gpv'cpcn{ uku."
 cu'uj qy p"kp"Hki wtg'520kpeo r rvg'r wni'twenf gcknu"y gtg'i kxgp'hqt "UN3"cpf "UN4"uq"vj g'cpcn{ uku"
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Xgj keng	I tqu Xgj keng" Y gli j v.'td	F guet lr vkqp
UN3	738.838	Rwni'Vtwen<3"ulpi rg"czrg"cpf "3"vcpf go "czrg."ur cegf "360"hw'cr ctv."3: .222" nd lukpi rg" czrg" cpf " 62.222" nd kcpf go " czrg." 4" vkgululpi rg" czrg" cpf " : " vkgululpi go "czrg Vtckrgt<42" ulpi rg" czrgu." ur cegf " ; 08" hw' cr ctv." 44.; 54" nd lukpi rg" czrg." 6" vkgululpi rg"czrg
UN4	: 87.666	Rwni'Vtwen<4"ulpi rg"czrg"cpf "4"vcpf go "czrg."ur cegf "360"hw'cr ctv."3: .222" nd lukpi rg" czrg" cpf " 62.222" nd kcpf go " czrg." 4" vkgululpi rg" czrg" cpf " : " vkgululpi go "czrg Vtckrgt<46" ulpi rg" czrgu." ur cegf "60"hw'cr ctv."3: .254"nd lukpi rg"czrg."6"vkgululpi rg"czrg

UN5	7: 2.222	<p>Rwni'Vtwem'3"ulpi ng"czrg"cpf "3"vtf go "czrg."ur cegf "350"hw'cr ctv."42.222"nd lulpi ng"czrg"cpf "76.222"nd htf go "czrg."4"vlgululpi ng"czrg"cpf "34"vlgultkf go "czrg</p> <p>Vtckrgt<34"vcpf go "czrgu."ur cegf "dgwy ggp"340/340"hw'cr ctv."59.472"nd hcpf go "czrg.": "vlgulucpf go "czrg</p> <p>Rwj "Vtwem'3"ulpi ng"czrg"cpf "3"vcpf go "czrg."ur cegf "3; 0"hw'cr ctv"3; .222"nd lulpi ng" czrg" cpf " 62.222" nd hcpf go " czrg." 4" vlgululpi ng" czrg" cpf " 34" vlgulucpf go "czrg</p>
UN6	752.246	<p>Rwj Rwni'Vtwem'3"ulpi ng"czrg"cpf "3"vtf go "czrg."ur cegf "350"hw'cr ctv."42.222"nd lulpi ng"czrg"cpf "82.222"nd htf go "czrg."4"vlgululpi ng"czrg"cpf "34"vlgultkf go "czrg</p> <p>Vtckrgt<: "vcpf go "czrgu."ur cegf "360"hw'cr ctv."68.475"nd hcpf go "czrg.": "vlgulucpf go "czrg</p>
UN7	752.222	<p>Rwni'Vtwem'3"ulpi ng"czrg"cpf "3"vtf go "czrg."ur cegf "360"hw'cr ctv."3; .222"nd lulpi ng"czrg"cpf "94.222"nd htf go "czrg."4"vlgululpi ng"czrg"cpf "34"vlgultkf go "czrg</p> <p>Vtckrgt<: "vcpf go "czrgu."ur cegf "360"hw'cr ctv."66.722"nd hcpf go "czrg.": "vlgulucpf go "czrg</p> <p>Rwj "Vtwem'3"ulpi ng"czrg"cpf "3"vtf go "czrg."ur cegf "340"hw'cr ctv."37.; 22"nd lulpi ng"czrg"cpf "8: .322"nd htf go "czrg."4"vlgululpi ng"czrg"cpf "34"vlgultkf go "czrg</p>
UN8	685.222	<p>Rwni'Vtwem'3"ulpi ng"czrg"cpf "3"vtf go "czrg."ur celpi "lphqto cvkqp"pqv'r tqxkf gf."38.222"nd lulpi ng"czrg"cpf "85.222"nd htf go "czrg."4"vlgululpi ng"czrg"cpf "34"vlgultkf go "czrg</p> <p>Vtckrgt<: "vcpf go "czrgu."ur celpi "lphqto cvkqp"pqv'r tqxkf gf."64.222"nd hcpf go "czrg.": "vlgulucpf go "czrg</p> <p>Rwj "Vtwem'3"ulpi ng"czrg"cpf "3"vcpf go "czrg."ur celpi "lphqto cvkqp"pqv'r tqxkf gf."36.222"nd lulpi ng"czrg"cpf "62.222"nd hcpf go "czrg."4"vlgululpi ng"czrg"cpf "vlgulucpf go "czrg</p>
UN9	: 76.538	<p>Rwni'Vtwem'P IC</p> <p>Vtckrgt<46"ulpi ng"czrgu."ur cegf "60"hw'39.: 22"nd lulpi ng"czrg."6"vlgululpi ng"czrg</p>
UN:	672.292	<p>Rwni'Vtwem'3"ulpi ng"czrg"cpf "3"vcpf go "czrg."ur cegf "3; 0"hw'cr ctv"3; .222"nd lulpi ng" czrg" cpf " 62.222" nd hcpf go " czrg." 4" vlgululpi ng" czrg" cpf " : "vlgulucpf go "czrg</p> <p>Vtckrgt< 42" ulpi ng" czrgu." ur cegf " ; 0" hw' cr ctv." 3; 026" nd lulpi ng" czrg." 6" vlgululpi ng"czrg</p>
UN;	P IC	<p>Rwni'Vtwem'3"ulpi ng"czrg"cpf "3"vtf go "czrg."ur cegf "380"hw'cr ctv."pq"mqcf "lphqto cvkqp"r tqxkf gf."pq"vlg"lphqto cvkqp"r tqxkf gf</p> <p>Vtckrgt<: "vcpf go "czrgu."ur cegf "38"hw'cr ctv."pq"mqcf "lphqto cvkqp"r tqxkf gf.": "vlgulucpf go "czrg</p> <p>Rwj "Vtwem'3"ulpi ng"czrg"cpf "3"vcpf go "czrg."ur cegf "42"hw'cr ctv."pq"mqcf "lphqto cvkqp"r tqxkf gf."vlg"lphqto cvkqp"lqt"ulpi ng"czrg"pqv'r tqxkf gf "cpf " : "vlgulucpf go "czrg</p>

3205'Hlplkg'Grgo gpv'Cpcn(uku

3205B''O qf gnlFgxgr o gpv

Y kj "y g'r gcnl'gpxktqpo gpvcl'eqpf kklqpu"cpf "uwr gtrqcf "czrg"eqphki wtcvklpu"guvdrkuj gf."y g'pgzv" uwr "y cu"vq"kf gpvkh{"y g"etkklccl'czrg"r quklqpu"qp"y g"eqpetgv"urcd"lqt"gej "czrg"eqphki wtcvklp0' Mpqy nfi g"qh'y ku'r quklqpu"ku"pgeguuct{"vq"s wcpvkh{"y g"o czko wo "vgpukg"utguugu'y cv'ecp"qeevt" cu"c"tguwn'qh'y g"uwr gtrqcf "cr r nlecckp0'Wukpi "y g'r cxgo gpv'hplkg"grgo gpv'o qf grkpi "uqhy ctg" KUNCD'Mj c| cpqxlej . 'gv'cl0'4222+ 'y g'hxg'uwr gtrqcf "czrg"eqphki wtcvklpu'y gtg'gej 'i'pggtcvgf "qp" c'62/h'd{"3; 7/h'LRER'o qf grly kj "y g'r ctco gvtu'qwrkpgf 'lp"Vcdrg"320Cu'lpf kcvgf 'lp"Vcdrg"32." y tgg'eqpetgv"urcd'y kempguugu*: 'lp."32'lp."cpf "35'lp+"cpf "y tgg'vgo r gtcwtg'i tcf kcpw"/40'ÅHlp." 50'ÅHlp."cpf "2'ÅHlp+"y gtg'eqpuf gtgf 0'LRERu'y kj ": /lp"cpf "32/lp"eqpetgv"urdu'y gtg'o qf grgf " y kj "cur j cn'cpf "eqpetgv"uj qwf gtu0'LRERu'y kj "35/lp"eqpetgv"urdu'y gtg'qpn("o qf grgf "y kj " eqpetgv"uj qwf gtu0

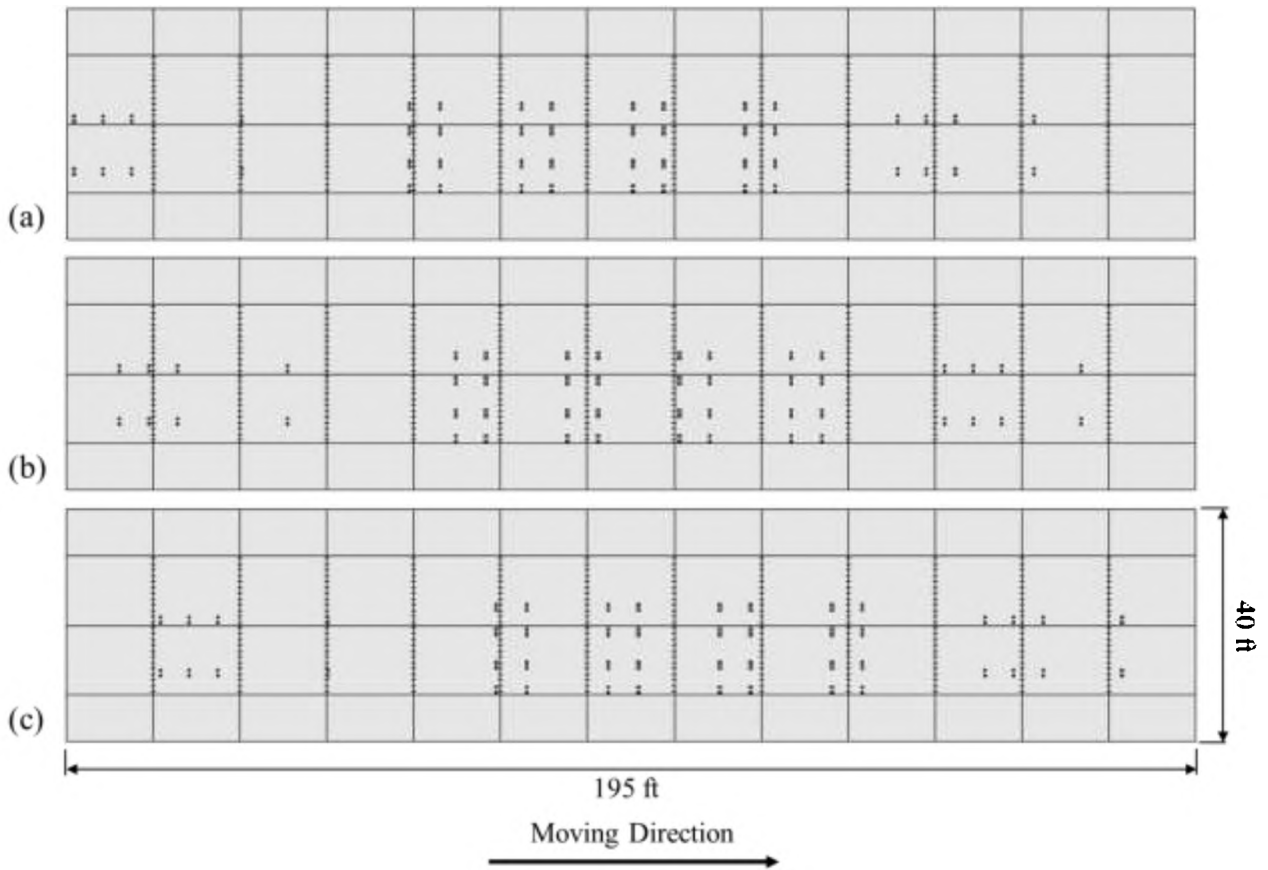
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Vq"eqo r ctg"y g'utguugu"ecwugf "d{"uwr gtrqcf u"vq"c"fguki p"rqcf."hplkg"grgo gpv'cpcn(uku'qh' y g'LRER'o qf grly cu'cnq"eqpf wcvf "y kj "cp"3: /nkr "ukpi rg"czrg"fguki p"rqcf "r rnegf "cv'o kf urcd0'Vj g" 3: /nkr "ukpi rg"czrg"j cf "lqwt"vktgu'y kj "gej "ugv'qh'f wcn'vktgu"7/h'cr ctv0'Gcej "ugv'qh'f wcn'vktgu'y cu" ur gekhkf "vq"j cxg"c"vktg'y kf y "qh": "lp."egpvt"vq"egpvt"vktg"ur celpi "qh"34"lp."cpf "c"vktg'r tguwtg"qh' ; 2'r uk0

Vcdrg'32<'KUNCD'kpr wr' r ctco gvtu' hqt' h'pkg' gngo gpv' cpcn{ uku0

I gqo gvt {	
Lqkp'Ur celpi	37'lv
Uj qwf gt'Y kf vj	21: 'lv
Ncpg'Y kf vj '*Vy q'Ncpgu+	34'lv
Urd'Vj kempguu	: B2 B5'kp
Eqpet gvg'Rt qr gt vlgv	
Rqkuqp'Tcvkq	28:
Grcurke'O qf wnuu	68" "328'r uk
Eqghelkpv'qh'Vj gto cñGzr cpukqp'Eqghelkpv	607" "32/8'kp lk p lAH
Wpk'Y gli j v	372'r eli
Uwdi t cf g'Rt qr gt vlgv	
O qf wnuu'qh'Uwdi tcf g'Tgcevklqp	422'r ek
Lqkp'Rt qr gt vlgv	
Nqpi kwf kpcñLqkp'NVG	20
Vtcpuvgtug'Lqkp	F qy grgf
F qy grlRt qr gt vlgv	
Qwukf g'F kco gvg	3047 B07'kp
Kpukf g'F kco gvg	2'kp
Lqkp'Y kf vj	208'kp
Grcurke'O qf wnuu	3072" "329'r uk
Rqkuqp'Tcvkq	204
O qf wnuu'qh'F qy grlUwr r qtv	702" "327'r uk lkp
F qy grlNqpi vj	; 'kp
F qy grlUr celpi	34'kp
Vgo r gt cwtg	
I tcf kpv	21407 B5"AHkp

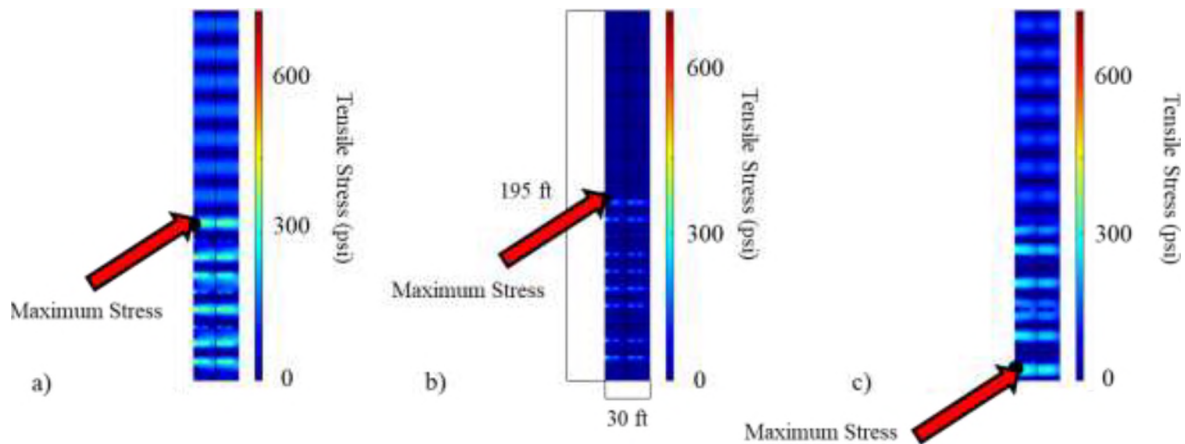
P qvg<Cur j cñ'uj qwf gtu'ctg'tgr tguvgf 'lp'KUNCD'd { 'lpr wwkpi 'l gtq'hqt'uj qwf gt'y kf vj =3047/lp"
f qy grl'f kco gvg'y cu'qpn { 'cp'lpr wv'y j gp": /kp"eqpetgvg'urdu'y gtg'o qf grgf 0



Hki wtg"53<Hlpkg"grgo gpv'o qf gr'qh'LRE Ru'y kj 'lwr gtrmcf "UN6+r megf "cv*c+lplkcn'r quklqp"%d+"
o kf f ng'r quklqp"%e+hkpcnr quklqp0

32(54)"Hlpkg'Gigo gpv'Cpcrfuku'Tguwnu

Hki wtg"54"f gr lew'yj g'r tdegua'qh'kf gpv'kpi "yj g'o czko wo "vgpukng'utguu'ecwugf "d{ 'lwr gtrmcf u0Hqt"
LRE Ru'y kj "yj g'r gcm'r quklxg'vgo r gtcwtg'i tcf kgpv'cpf "pq"vgo r gtcwtg'i tcf kgpv."yj g'o czko wo "
vgpukng'utguu'qeewtg'f "cv'yj g'dqwqo "qh'yj g'eqpetgvg'urcd'hqt"gej "twp0Hqt'LRE Ru'y kj "yj g'r gcm'
pgi c'xg'vgo r gtcwtg'i tcf kgpv."yj g'o czko wo "vgpukng'utguu'v'r kcm{ "qeewtg'f "cv'yj g'vqr "qh'yj g"
eqpetgvg'urcd"dgwy ggp"yj g'cr r rlec'vqp"qh'eqpugewxg'czng'mqcf u."cu'y qwr f "dg"gzr gev f 0



Hki wtg'54<K gpwhecvkp"qh'o czko wo "vgpukg'utguu'ecwugf"d{ "UN3"cv'etklecn'czng'r qukkqpu'hqt"
 *c+:/kp"eqpetgvg'urcd."r gcnlr qukkxg'vgo r gtcwtg'i tcf kgpv."cur j cn'uj qwrf gt"*d+:/kp"eqpetgvg'urcd."
 | gtq'vgo r gtcwtg'i tcf kgpv."cur j cn'uj qwrf gt"*e+:/kp"eqpetgvg'urcd."r gcnlpgi cvkxg'vgo r gtcwtg'
 i tcf kgpv."cur j cn'uj qwrf gt0

Vcdrg'33'uj qy u'yj g'o czko wo "vgpukg'utguugu'ecwugf"d{ "gcej "uwr gtmqcf "czng"eqphki wtcvkqp"
 cmppi "y kj "yj g"eqttgur qpf kpi "h'vki wg"r gthqto cpeg"r tgf levkqp"qh'uwr gtmqcf "czng"eqphki wtcvkqpu0'
 Uwr gtmqcf "xgj kergu"UN3."UN6."cpf "UN7"j cxg"czng"eqphki wtcvkqpu"yj cv'ecwug"uki phhecpv\ "j ki j gt"
 utguugu'yj cp"c'f guki p'ukpi rg"czng'mqcf 0UN3"eqpukuu"qh'32"eqpvkpwqwu"czng'mqcf u'qh'cr r tqzko cvgn{ "
 45.222"rd"gej ."ur cegf "; 0'h'cr ctv0Vj ku"eqphki wtcvkqp"ecwugf "yj g'rti guv'vgpukg'utguu'tgi ctf nguu"
 qh'yj g'vgo r gtcwtg'i tcf kgpv'r tugpv0Vj g'vgpukg'utguugu'ecwugf "d{ "UN6"y gtg'eqo r ctedng'vq"yj qug"
 qh'UN30'UN6"eqpukuu"qh'c"r wni'twem"r wuj "twem"cpf "tckrgt"y kj "h'qwt"vcpf go "czng"mqcf u'qh'
 cr r tqzko cvgn{ "68.222"rd."ur cegf "360'h'cr ctv0Vj g'vgpukg'utguugu'hqt "UN7"y gtg'urki j v\ "rguu'yj cp"
 yj qug'h'qo "UN3"cpf "UN60UN7"eqpukuu"qh'c"r wni'twem"r wuj "twem"cpf "tckrgt"y kj "6"vcpf go "czng"
 mqcf u'qh'cr r tqzko cvgn{ "66.722"rd."ur cegf "360'h'cr ctv0H'qo "yj g'czng"eqphki wtcvkqpu"gxcnwcvgf ."kv"
 ku"qdugtvgf "yj cv'yj g"j gcxkn{ "mqcf gf "ukpi rg"cpf "vcpf go "czngu"qp"yj g"tckrgtu"qh'yj gug"uwr gtmqcf "
 xgj kergu'tguwn'kp"uki phhecpv'vgpukg'utguugu'lp"IRE Ru0

Vcdrg"33<T guwnu"qh'uwr gtnqcf 'hpksg'gngo gpv'cpcnf uku'cpf 'h'wi wg'r gthqto cpeg'r tgf k'vqp0

Nqcf " Ecug	Rqukskg'Vgo rgtcwtg'I tcf lgpv			Pgi c'vkskg'Vgo rgtcwtg'I tcf lgpv			\ gtq'Vgo rgtcwtg'I tcf lgpv		
	Vgpukg Ut guu'ruk	P _{hi}	' 'Nlig" Eqpuwo gf " It qo 'Qpg" Rculpi	Vgpukg Ut guu'ruk	P _{hi}	' 'Nlig" Eqpuwo gf " It qo 'Qpg" Rculpi	Vgpukg Ut guu'ruk	P _{hi}	' 'Nlig" Eqpuwo gf " It qo 'Qpg" Rculpi
UCa: aC	748	; 4	308	368	Wpiko kgf	/	532	5.322.222	>20
UCa32aC	64;	7.: 22	>20	348	Wpiko kgf	/	44:	Wpiko kgf	/
UCa: aE	646	9.522	>20	373	Wpiko kgf	/	434	Wpiko kgf	/
UCa32aE	572	3: 2.222	>20	34;	Wpiko kgf	/	37:	Wpiko kgf	/
UCa35aE	478	Wpiko kgf	/	322	Wpiko kgf	/	332	Wpiko kgf	/
UN3a: aC	828	5	322	5: 9	58.222	>20	639	; .922	208
UN3a32aC	69;	922	306	53:	3.522.222	>20	4: ;	Wpiko kgf	/
UN3a: aE	6; 5	5: 2	50	4: ;	38.222.222	>20	4; 4	Wpiko kgf	/
UN3a32aE	5; 9	45.222	>20	478	Wpiko kgf	/	429	Wpiko kgf	/
UN3a35aE	4: 9	Wpiko kgf	/	3; 3	Wpiko kgf	/	359	Wpiko kgf	/
UN4a: aC	724	482	608	527	7.822.222	>20	533	4.922.222	>20
UN4a32aC	646	9.522	204	49:	Wpiko kgf	/	44:	Wpiko kgf	/
UN4a: aE	682	3.822	20	4; 2	Wpiko kgf	/	489	Wpiko kgf	/
UN4a32aE	5; 5	49.222	>20	487	Wpiko kgf	/	3; 9	Wpiko kgf	/
UN4a35aE	528	6.: 22.222	>20	399	Wpiko kgf	/	358	Wpiko kgf	/
UN5a: aC	73:	352	608	566	462.222	>20	542	3.322.222	>20
UN5a32aC	653	5522	204	53:	3.522.222	>20	459	Wpiko kgf	/
UN5a: aE	664	7522	208	4: 6	Wpiko kgf	/	459	Wpiko kgf	/
UN5a32aE	592	96.222	>20	486	Wpiko kgf	/	399	Wpiko kgf	/
UN5a35aE	49:	Wpiko kgf	/	434	Wpiko kgf	/	347	Wpiko kgf	/
UN6a: aC	7; 4	7	: 2	593	92.222	>20	5; ;	43.222	>20
UN6a32aC	6; 8	552	304	58;	99.222	>20	525	9.: 22.222	>20
UN6a: aE	6: 7	752	20	537	3.; 22.222	>20	4; 7	Wpiko kgf	/
UN6a32aE	628	37.222	>20	534	4.722.222	>20	437	Wpiko kgf	/
UN6a35aE	532	4.: 22.222	>20	486	Wpiko kgf	/	375	Wpiko kgf	/
UN7a: aC	769	59	33	564	482.222	>20	576	372.222	>20
UN7a32aC	67:	3.922	204	563	4: 2.222	>20	485	Wpiko kgf	/
UN7a: aE	673	4.522	204	4; 4	Wpiko kgf	/	473	Wpiko kgf	/
UN7a32aE	59:	74.222	20299	4: ;	Wpiko kgf	/	3: :	Wpiko kgf	/
UN7a35aE	4: 7	Wpiko kgf	/	466	Wpiko kgf	/	356	Wpiko kgf	/

P qvg<0Nqcf 'Ecug0'ku'eqpuwewgf 'cu'hqmqy u<Uwr gtnqcf 'Xgi keng'*UN+'qt 'Ucpf ctf 'Czrg"

*UC+aaUrd'Vj k'npguu'*k+aUj qwr gt 'V{r g'*E? Rqt w'pf 'Ego gpv'Eqpetgvg'cpf 'C? Cur j cn"

Eqpetgvg+

Vq'guko cvg'yj g'f co ci g'yj cv'eqwf "dg'cwtkdwgf "vq'yj g'o czko wo "vgpukg'ut guu'kf gpwkhgf."

yj g'pwo dgt'qh'cmqy cdrg'cr r necv'qpu'dghqtg'h'wi wg'h'kwtg'y qwr "qeew'y cu'guko cvg' "wulpi 'yj g"

REC'h'wi wg'gs w'vqp.'uj qy p'lp'Gs w'vqp'5; "Rcemt f "("Vc{cdlk'3; : 7+0Vj g'o qf wnu'qh'tw w'tg"

qh'yj g'eqpetgvg'y cu'cuwo gf "vq'dg'872'r uk<

m_i N_f? "33059"/"34099`" S f o `S "x'207"

*5; +

N_f ? " $\frac{604799}{1S \text{ `"/}206547 \text{ J}}$ " f o `2067"> "S'207"

*62+

y j gtg.

N_f ? "y j g"pwo dgt"qh'o czko wo "vgpukg"ut guu"cr r rlec vkpu"wpvkl'ic'kwtg

S` "? "y j g"tcvkq"dgvy ggp"etk'lecn'ut guu"cpf "o qf wmwu"qh'twr wtg"qh"y j g"eqpetgvg0

Vj g"hc'ki wg"rhg"equpuwo gf "y cu'ecrewr'vgf "hqt"gc'ej "mqcf"ecug'dcugf "qp"y j g"hc'ki wg" r gthqto cpeg"gu'ko cvgf "wukpi "y j g"REC"hc'ki wg"gs wcvkqp."cu'uj qy p"lp"Gswcvkqp"620

' 'Fat gue'L fe "önsuned ? " $\frac{n}{N_f}$ " "322

*64+

y j gtg.

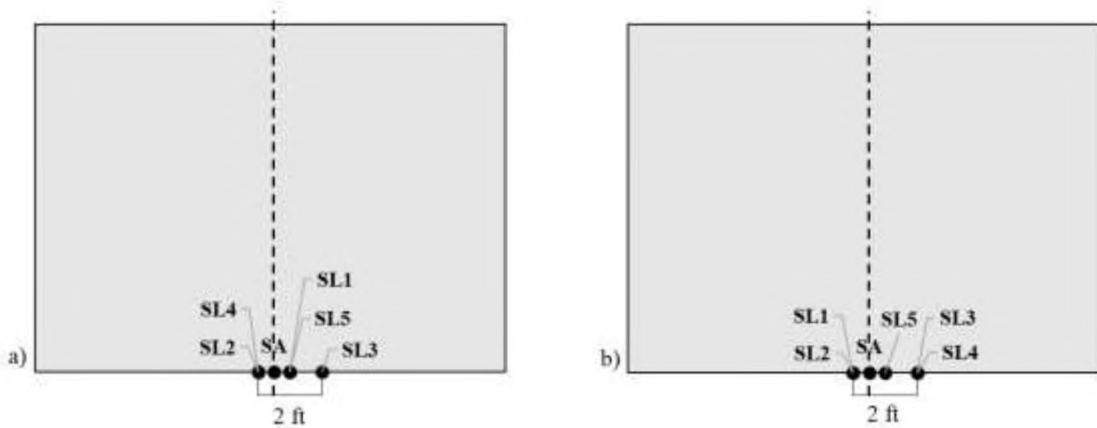
n. "? "y j g"pwo dgt"qh'o czko wo "vgpukg"ut guu"cr r rlec vkpu"r gt"qpg"uwr gtmqcf "xgj keng" r cuukpi

N_f ? "y j g"pwo dgt"qh'o czko wo "vgpukg"ut guu"cr r rlec vkpu"wpvkl'ic'kwtg0

Vj g"hc'ki wg"r gthqto cpeg"cpf "hc'ki wg"rhg"equpuwo gf "tguwmu"ctg"uj qy p"lp"Vcdrg"330"Vj g" ut guugu'ecwugf "d{ "uwr gtmqcf u'ctg"qdugt'xgf "v"j cxg"c"uki p'k'lecpv'ko r cev'qp"y j g"hc'ki wg"rhg"qh": /kp" cpf " 32/kp" eqpetgvg" urdu"y j gp" c" ncti g" r qukkxg" vgo r gtcwtg" i tcf kgpv' ku" r tgugpv'0 O k'pqt" qt" k'puki p'k'lecpv'f co ci g" qeewt'gf. "tgi ctf'ngu" qh' urdu"y j k'empguu. "y j gp" ncti g" pgi cvkxg" vgo r gtcwtg" i tcf kgpv' qt" pq" vgo r gtcwtg" i tcf kgpv' ku" r tgugpv'0 Eqpetgvg" urdu"y j cv'ctg"35/kp"y j k'emi'ctg"uj qy p"v"q" g'zr gtlgpeg"xgt{ "h'kwg"hc'ki wg" f co ci g"y j gp" c" ncti g" r qukkxg" vgo r gtcwtg" i tcf kgpv' ku"lp"y j g" urdu"cpf" pq"hc'ki wg" f co ci g"y j gp" c" ncti g" pgi cvkxg" vgo r gtcwtg" i tcf kgpv' qt" pq" vgo r gtcwtg" i tcf kgpv' ku" r tgugpv'0 Cff'klqpcmf. "cu'uj qy p"lp"Vcdrg"33. "r cxgo gpv' ut wewtgu"y kj "eqpetgvg"uj qwrf gtu"ctg" uj qy p"v"q" g'zr gtlgpeg"o wej "ngu"hc'ki wg" f co ci g"y j cp" r cxgo gpv' ut wewtgu"y kj "cur j cn'uj qwrf gtu. " cu'y j g"eqpetgvg"uj qwrf gt"ku"gh'gevkxg"lp"t'gf w'ekpi "gf i g' ut guugu0

Vq"lp'xgu'ki cvg"j qy "y j g"etk'lecn'ut guugu'ecwugf "d{ "uwr gtmqcf u'ch'ge'v'y j g"y j k'ppgt" urdu"y kj " y j g" r gcm'r qukkxg" vgo r gtcwtg" i tcf kgpv. "y j g"mqecvkpu"qh"y j g"etk'lecn'ut guugu"y kj "t'gur ge'v"v"y j g" o k'f urdu"y gtg" f g'vgt o k'pgf 0'k'p' H'ki wtg"55. "k'v'ku"qdugt'xgf "y j cv'y j g"o czko wo "ut guu"mqecvkqp" hqt"cm'qh" y j g"uwr gtmqcf "czrg"eqph'ki w'cvkpu"ku"cv'o k'f urdu"pgct"y j g"m'pi k'w'f k'pcn'gf i g'luj qwrf gt"lq'kp'v"400"cv"

vj g'Rcxgo gpv'O G'etk'ecn'utguu'tgur qpug'hqecv'qp '*Cr r'kgf 'Tgugcte'j 'Cuqek'v'gu '*CTC+ '4226+0
Vj g'tg'htg.'cm'y kn'eqp'v'kdwg'v'q'vj g'f'gxgnr o gpv'q'h'dqwqo /w' 'et'cen'kpi 0

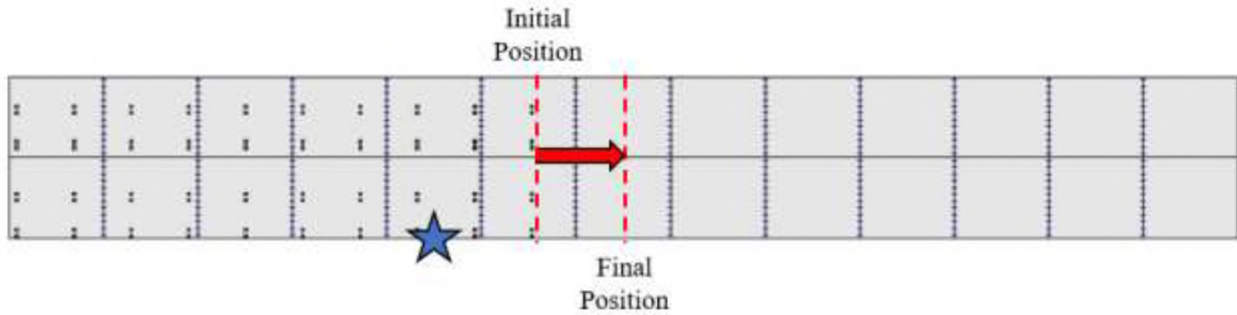


Hki wtg'55<O czko wo "vgpuk'g'utguu'hqecv'kpu'qp'34/h'v'd{ '37/h'v'eqpet'gv'urcd'h'qt '*c+: /k'p'eqpet'gv'
urcd'y kj 'vj g'r gcm'r qukk'x'g'vgo r gtcwt'g'i tcf k'gp'v'cpf '*d+32/k'p'eqpet'gv'urcd'y kj 'vj g'r gcm'
r qukk'x'g'vgo r gtcwt'g'i tcf k'gp'v'0

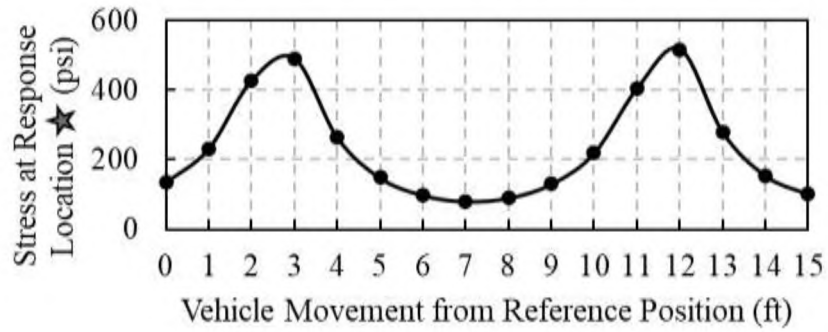
3206"Ut guu'Rwngu

Vj g'o czko wo "utguugu'f'gvto k'pgf "k'p'vj g'h'k'kg'g'ngo gpv'cpcn'f'uku'y g'tg'wugf "v'q'r'tgf'kv'vj g'h'v'ki'wg'
r'kg'eqpuwo gf "d{ "c"uwr'gtm'cf "cr r'k'ecv'k'p'0'Vj g'utguugu'i'gp'gtc'v'gf "d{ "uwr'gtm'cf'u'y g'tg'h'm'v'j'gt'
k'px'g'uki'cv'gf "k'p't'gi'ctf'u'v'q'vj g'utguu't'cpi g'd'gwy'ggp'r'wngu.'vj g'utguu't'cpi g'd'gwy'ggp'vj g'o czko wo "
utguu'cpf "vj g'ew'r'kpi "utguu.'cpf "utguu't'gx'gtucn'0'Cu'r't'gx'k'q'wun' "uj'qy'p.'vj g'vj'k'p'p'gt'urcd'u'y g'tg'
q'd'ug't'x'gf "v'q'g'z'j'k'k'v'uki'p'h'k'ecp'v'vgpuk'g'utguugu'y j'gp'vj g'r gcm'r qukk'x'g'vgo r gtcwt'g'i tcf k'gp'v'y'cu'
r't'g'ug'p'0'Vj g'h'v'ki'wg'f'co'ci'g'eq'tt'gur'q'pf'kpi "v'q'vj'gug'utguugu'y'q'w'f' "dg'o'k'ki'cv'gf "v'q'u'q'o'g'f'gi't'gg'
f'gr'gp'f'kpi "qp'vj g'ew'r'kpi "utguu'r't'g'ug'p'v'k'p'vj g'IRER0'C'f'f'k'k'q'p'cm'f'.'vj g'IRERu'y'kj' "l'gt'q'vgo r gtcwt'g'
i'tcf'k'gp'v'o'c{ "dg'uw'd'lg'ev'gf "v'q'utguu't'gx'gtucn.'y j'k'ej "ct'g'np'qy'p' "v'q'f'get'gcug'vj g'h'v'ki'wg' "r'kg'q'h'
eqpet'gv' "Eqtp'g'n'ug'p.'3; : 6= \ j'cpi.'Rj'k'n'r'u'(" 'Y'w'3; ; 8+0'V'q'g'z'r'm't'g'd'q'vj'utguu't'cpi g'cpf'utguu'
t'gx'gtucn.'vj g'x'ct'k'v'k'p' "k'p'utguu'cv'vj g'et'k'ecn'utguu't'gur'qpug'hqecv'qp '*k'g'0' o'k'f'urcd'cv'
n'p'g'l'uj'q'w'f'gt' "l'q'k'p'v'cu'g'cej "uwr'gtm'cf "o'q'x'gf "cm'pi "vj g'IRER'y'cu's'w'cp'v'k'kg'f'0'Vj g'h'q'ewu'q'h'vj'ku'
c'pcn'f'uku'y'cu'qp'vj g': /k'p'IRERu.'cpf "vj g'o'q'x'go'gpv.'k'f'gp'v'k'kg'f'et'k'ecn't'gur'qpug'hqecv'qp.'cpf "
eq'tt'gur'q'pf'kpi "utguugu'ct'g'uj'qy'p'k'p'Hki'wtg'56/Hki'wtg'5: 0

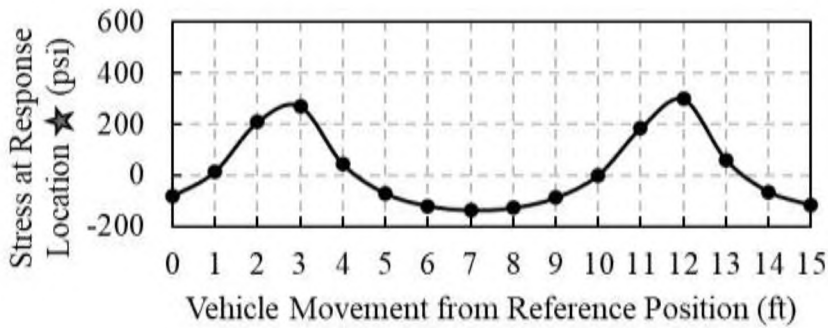
*c+



*d+

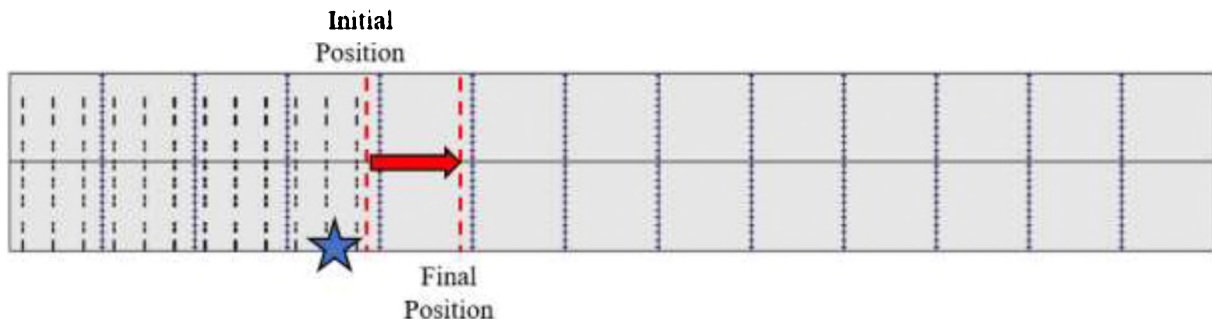


*e+

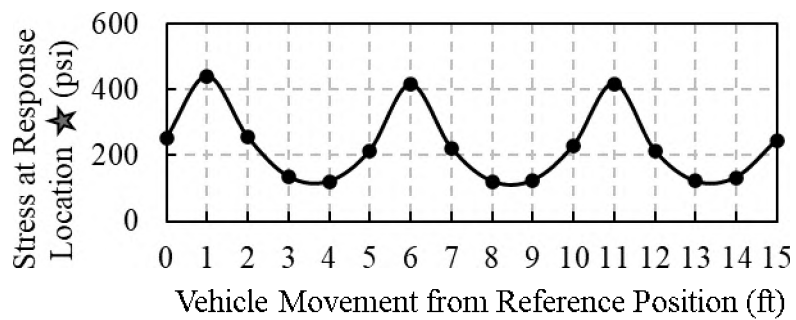


Hki wt g"56<Utgau'r wug"cpn{ uku'y j gt g"*c+f gr leu'y g'uwr gtrqcf "o qxgo gpv'qh"UN3"*d+f gr leu"
 utguu'r tqhrg"ecwugf "d{ "UN3"cv'yj g"etklecnu'tguu'tgur qpug'mqecvqp'hqt'r gcnir qukkxg'vgo r gtcwtg"
 i tcf lgpv'cpf "e+f gr leu'yj g'utguu'r tqhrg"ecwugf "d{ "UN3"cv'yj g"etklecnu'tguu'tgur qpug'mqecvqp'hqt"
 c' gtq'vgo r gtcwtg'i tcf lgpv0

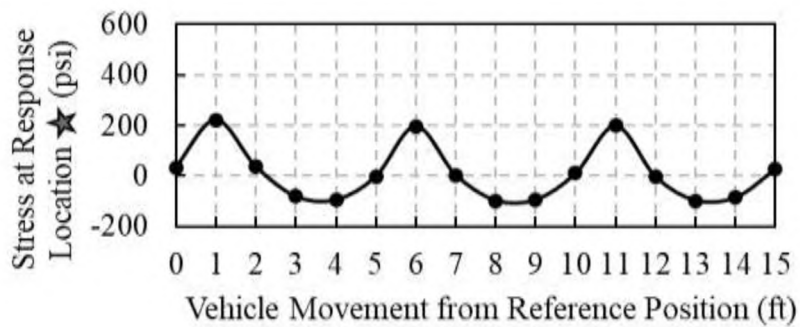
*c+



*d+

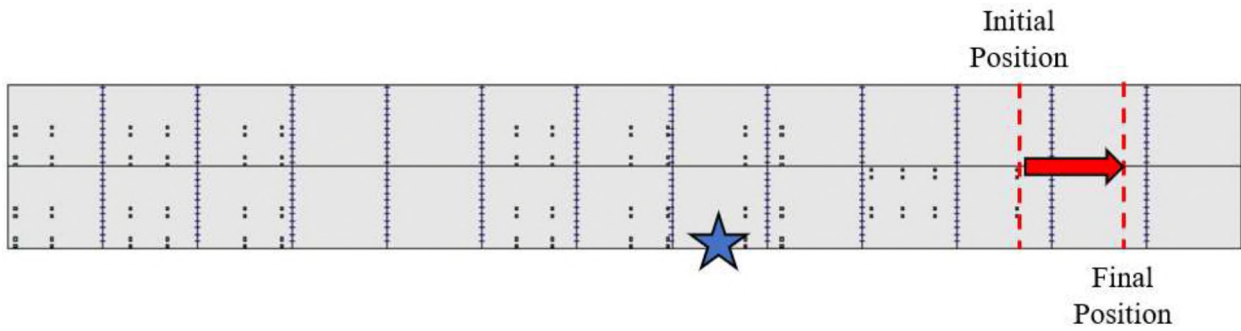


*e+

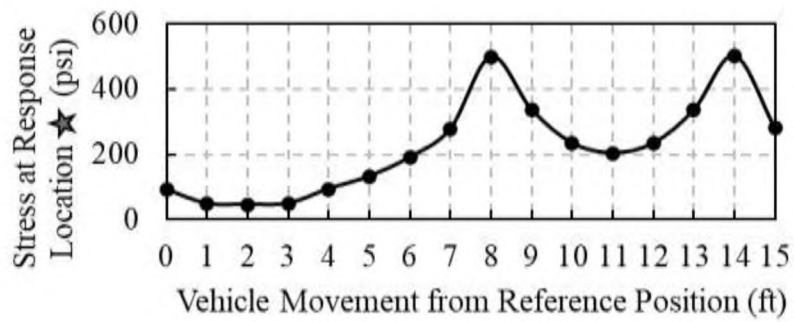


Hki wtg"57<Ut guu'r wng'cpcn(uku'y j gtg"*c+f gr leu'yj g'uw r gtnqcf "o qxgo gpv'qh"UN4"*d+f gr leu'yj g"
 ut guu'r tqhkg"ecwugf "d{ "UN4"cv'yj g'etklecn'ut guu'tgur qpug'hqecvkqp"ht'r gcnlr qukkxg\go r gtcwtg"
 i tcf kgpv'cpf "*e+f gr leu'yj g'ut guu'r tqhkg"ecwugf "d{ "UN4"cv'yj g'etklecn'ut guu'tgur qpug'hqecvkqp"ht"
 | gtq"vgo r gtcwtg"i tcf kgpv0

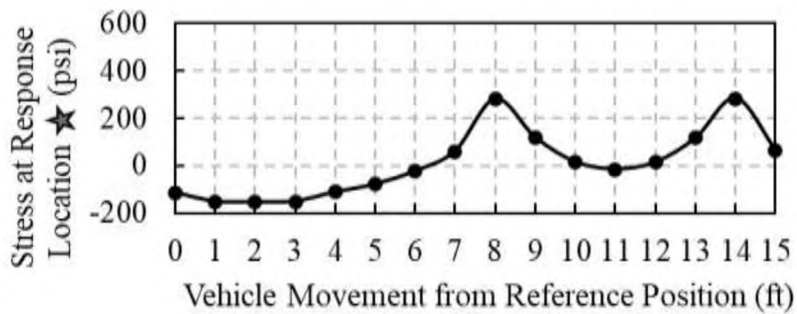
*c+



*d+

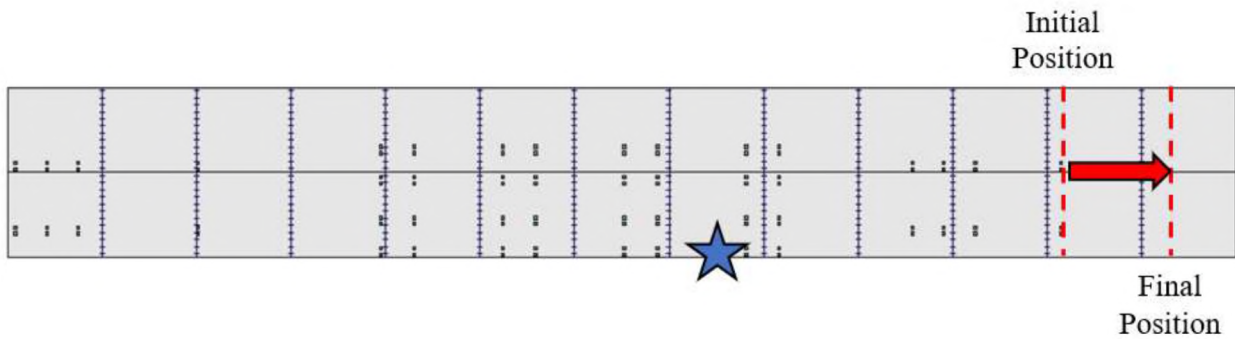


*e+

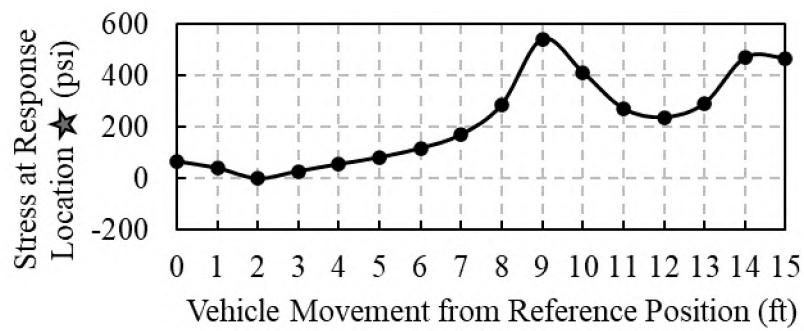


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 ut guu'r tqhkg"ecwugf "d{ "UN5"cv'yj g'etkkecnl'ut guu'tgur qpug'hqecv'qp'hqt'r gcn'r quklxg"vgo r gtcwtg"
 i tcf kgpv'cpf "e+f gr leu'yj g'ut guu'r tqhkg"ecwugf "d{ "UN5"cv'yj g'etkkecnl'ut guu'tgur qpug'hqecv'qp'hqt"
 | gtq"vgo r gtcwtg'i tcf kgpv0

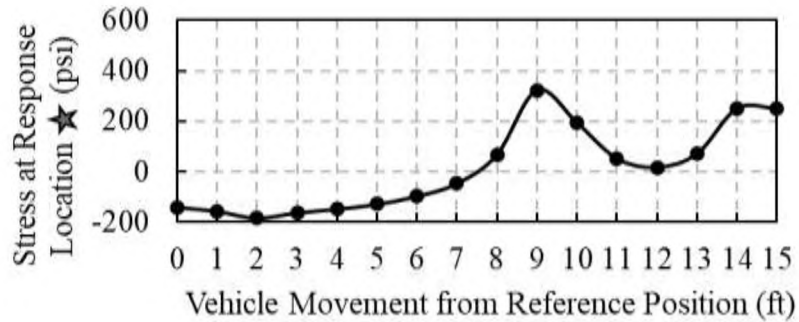
*c+



*d+

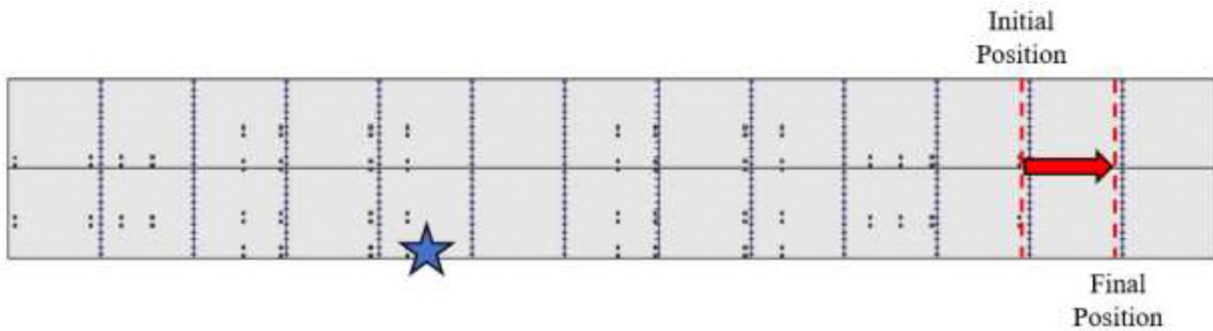


*e+

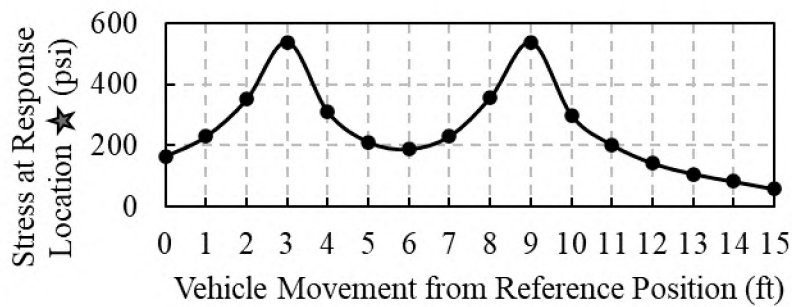


Hki wtg"59<Ut guu'r wng'cpcn(uku'y j gtg"*c+f gr leu'yj g'uw r gtqcf "o qxgo gpv'qh"UN6"*d+f gr leu'yj g"
 ut guu'r tqhkg"ecwugf "d{ "UN6"cv'yj g'etklecn'ut guu'tgur qpug'hqecvkqp"ht'r gcnlr quklxg\go r gtcwtg"
 i tcf kgpv'cpf "e+f gr leu'yj g'ut guu'r tqhkg"ecwugf "d{ "UN6"cv'yj g'etklecn'ut guu'tgur qpug'hqecvkqp"ht"
 | gtq"vgo r gtcwtg'i tcf kgpv0

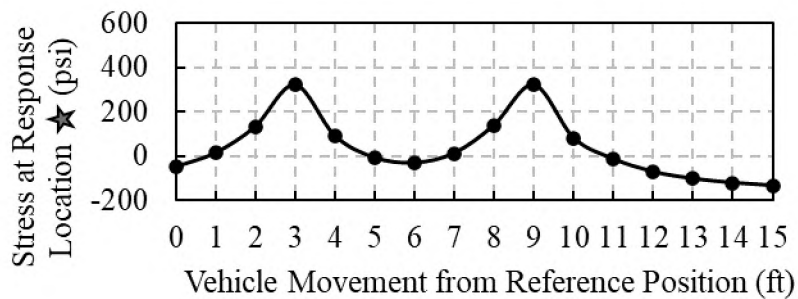
*c+



*d+



*e+



Hki wtg'5: <'Utgau'r wng'cpcn' uku'y j gtg'*c+f gr leu'yj g'uwr gtmcf 'o qxgo gpv'qh'UN7'*d+f gr leu'
 yj g'utguu'r tqhkg'ecwugf 'd{ 'UN7'cv'yj g'etklecn'utguu'tgur qpug'mecvqp'hqt'r gcn'r quklxg"
 vgo r gtcwtg'i tcf kgpv'cpf '*e+f gr leu'yj g'utguu'r tqhkg'ecwugf 'd{ 'UN7'cv'yj g'etklecn'utguu'
 tgur qpug'mecvqp'hqt' gtq'vgo r gtcwtg'i tcf kgpv0

Eqpukf gt'yj g'utguu'r wngu'i gpgtcvgf 'd{ 'uwr gtmcf 'cr r rkecvqp'qp'eqpetgv'urdu'y kj 'c'r gcn'
 r quklxg'vgo r gtcwtg'i tcf kgpv'*Hki wtg'56d/Hki wtg'5: d+0Vj g'utguu'dgy ggp'h'vi wg'e{ ergu'hqt'UN3"
 ku'cr r tqzko cvgn{ '322'r uk'y j lej 'ku'cdqww'622'r uk'hguu'yj cp'yj g'o czko wo 'utguu0Hqt'UN4.'yj g"
 o kpko wo 'utguu'dgy ggp'h'vi wg'e{ ergu'ku'cnq'cr r tqzko cvgn{ '322'r uk'y j lej 'ku'572'r uk'hguu'yj cp"

vj g'o czko wo "utguu0Hqt"UN5."UN6."cpf "UN7"400"vj g'vcpf go "czrg"uwr gtnqcf u+."vj g'utguu"dgwy ggp" r gcmu'ku'cr r tqzko cvgn("522"r uk'rguu'vj cp'vj g'o czko wo "utguu0

P gzv."eqpukf gt"vj g'utguu'r wngu'i gpgtcvzf "d{ "uwr gtnqcf "cr r nccvqp"qp"eqpetgvg"umdu'y kj " pq"vgo r gtcwtg"i tcf kgpv'r tguqp0Cu'uj qy p"kp"Hki wtg'56e/Hki wtg'5: e."vj g'utguu'c'vj g'etkkekcn'utguu" tgu qpug"mccvqp"ku'uj qy p"vq"tgxgtug"dgwy ggp"vgpukqp"cpf "eqo r tguukqp0Vj g'utguu'r wngu"itqo " vj g"ukpi rg"czrg"uwr gtnqcf u"wpf gti q"cdqww"322"r uk"kp"eqo r tguukqp"kp"dgwy ggp"ukpi rg"czrg"hcvi wg" e{ergu0Vj g'utguu'r wngu"itqo "vj g'vcpf go "czrg"uwr gtnqcf u"gzj kdk'utguu'tgxgtucnu"*vr "vq"372/422" r uk"kp"o ci pkwf g+"dgwy ggp"vcpf go "czrg"hcvi wg"e{ergu0D{ "eqo r ctupi "vj gug'tguwmu"vq"vj qug"itqo " \ j cpi "gv'cn0" j cpi ."Rj knkr u."("Y w'3; ; 8+."vj g'hcvi wg"itkg"qh'vj g'eqpetgvg'y qwf "qpn("dg'urki j v(" f getgcugf "d{ "vj gug'o ci pkwf gu'qh'utguu'tgxgtucn0

Vq"kp'xguvi cvg"vj g'ghgcu'qh'vj g'utguu'tcpi g'dgwy ggp"vj g'o czko wo "utguu"cpf "vj g'ewtrupi " utguu."vj g'hcvi wg" fco ci g'r tgf levgf "vj tqwi j "vj g"REC"gs wcvqp"y cu"eqo r ctgf "vq"vj g'hcvi wg" fco ci g'r tgf levgf "wukpi "c"utguu'tcpi g'fco ci g'o qf gr0Vj g'fco ci g'o qf gn'f gxgnr gf "d{ "Vgr hgtu" hqt"eqpetgvg"dgco u"*Vgr hgtu."3; 9; +ceeqwpv"itqt"utguu'tcpi g0Vj ku'y cu'cf cr vgf "d{ "F qo gpkej kp'k" cpf "O ctej kpppc"*F qo gpkej kp'k("O ctej kpppc."3; : 3+"hqt"eqpetgvg"r cxgo gpv'fco ci g'cpcn(uku"cu" hqmjy u<

$$S^{-} \text{ " ? " 3 / " } \quad * 3 / \text{ " } + m_i * + N_f \quad * 65 +$$

Y j gtg.

S⁻ " ? " vj g'tcvkq"dgwy ggp"etkkekcn'utguu"cpf "o qf wmu'qh'twr wtg'qh"vj g'eqpetgvg " ? " vj g"eqghlekgpv"vq"ceeqwpv"itqt"hgri"cpf "o cvgtken'xctkcvqp"*f gvgto kpgf "d{ " F qo gpkej kp'k"cpf "O ctej kpppc"vq"dg"20; 76+

$$R = \frac{m \cdot \tilde{n}}{m \cdot x}$$

N_f ? "vj g'pwo dgt"qh'utguu'cr r nccvqp"wpvkn'ic'kwtg0

Vj ku'fco ci g'o qf gn'y cu'wugf "kp"vj ku'cpcn(uku"vq"uwf { "vj g'ghgcu'qh'utguu'tcpi g"qp"vj g' fco ci g'ecwugf "d{ "uwr gtnqcf u0Vj g'fco ci g"kp"IRERu'y kj "cp": /kp"urcd"cpf "cur j cn'uj qwf gt.": /kp" urcd"cpf "eqpetgvg"uj qwf gt."cpf "32/kp"urcd"y kj "cur j cn'uj qwf gt"y gtg"uwf kgf 0Vj g'o czko wo " ewtrupi "utguugu"kp"vj gug"vj tgg"r cxgo gpv'f guki pu"y gtg"qdugtxgf "vq"dg"cr r tqzko cvgn("397"r uk" 397"r uk"cpf "372"r uk"tgu r gev'xgn(0Vj gug"utguugu"y gtg"gecj "kpr w'cu"vj g'o kpk wo "utguu"kp"vj g'

utguu'tcpi g'gs wcvkp0Vj g'o kpo wo 'utguu'ku'cuwo gf 'v'q'dg'2'r uk'ht'cm'ecugu'y j gp'pq'vgo r gtcwtg"
i tcf kcpv'ku'r tguvp0Vcdrg"34"uj qy u'vj g'eqo r ctuqp'kp'hvki wg'fco ci g'r tgf kvkp'dgwy ggp'vj g'REC"
fco ci g'o qf gn'cpf 'vj g'fco ci g'o qf gn'eqpukf gtlpi 'utguu'tcpi g0

Cu'uj qy p'kp"Vcdrg"34."d{ "eqpukf gtlpi "utguu'tcpi g."vj g'r tgf kvgf "hvki wg'fco ci g'kp"vj g"
LRE Ru'y kj "vj g'r gcn'r qukkxg"vgo r gtcwtg"i tcf kcpv'f getgcugu'uki p'k'ecpv0'0Hqt'kpucpeg."eqpukf gt"
vj g'ecug'y j gp"UN3'ku'cr r nkgf "v'q'vj g": /kp'LRE Ru'y kj "vj g'r gcn'r qukkxg"vgo r gtcwtg"i tcf kcpv0'Wukpi "
vj g'REC"gs wcvkp."vj g'r tgf kvgf "hvki wg"nkg"eqpuwo gf "ku'cr r tqzko cvgn{ "5' "cpf "7' "ht'LRE Ru"
y kj "c'eqpetgv"cpf "cur j cn'uj qwf gt.'tgur gevkg n{ 0Y j gp'wukpi "vj g'F qo gplej kp'cpf "O ctej kppc"
fco ci g'o qf gn'vj g'r tgf kvgf "hvki wg"nkg"eqpuwo gf "ku'cr r tqzko cvgn{ "204' "eqpetgv"uj qwf gt+"
cpf "2048' "cur j cn'uj qwf gt+0Vj ku'tguwn'kp'f kvgu'vj cv'vj g'o czko wo "utguugu'f gvto kpgf "kp"vj g"
h'p'kg"grgo gpv'cpcn{ uku'o c{ "pqv'dg"cu'fco ci kpi "cu'r tgf kvgf "d{ "vj g'REC"gs wcvkp0'ku'ko r qtcvpv'
v'pqv'vj cv'vj gtg'ku'uqo g'kpj gtgpv'xctkcdk n{ "dgwy ggp'o qf gnu'f wg'v'j qy "vj g{ "y gtg'f gxgnr gf 0'
Vj g'REC"gs wcvkp"y cu'f gxgnr gf "htqo "eqpetgv"dgco "v'guv'f cvc"cpf "vj g'F qo gplej kp'cpf "
O ctej kppc"fco ci g'o qf gn'y cu'f gxgnr gf "htqo "Co gtlecp'Cuuqekcvkp"qh'Ucvg"J ki j y c{ "Q'hekn"
*CCU Q+"tqcf "v'guv'f cvc0' Tgi ctf ngu" qh' vj ku' f k'htgpeg." utguu" tcpi g" ku' qdugt xgf "v'q" dg" c"
eqpukf gtcvqp'kp"vj g'fco ci g'cpcn{ uku'ht'uwr gtrqcf u0

Vcdrg"34<"Hvli wg"f co ci g'r tgf lewkp"lt qo "REC"f co ci g'o qf gn"Rcemtf"("Vc{cdlk'3; : 7+"cpf"f co ci g'o qf gn'r tguqpvf "d{ "
F qo gplej kp'k'cpf "O ctej kppc" *F qo gplej kp'k("O ctej kppc."3; : 3+0

Nqcf " Ecug	Rqulkg'Vgo rgtcwtg'I tcf lgpv					\ gtq'Vgo rgtcwtg'I tcf lgpv				
	Vgpukg" Utgul" ruk	P _{fi} *REC+	' 'Hvli wg" Nltg" Eqpuwo gf " lt qo 'Qpg" Rculpi	P _{fi} *F IO +	' 'Hvli wg" Nltg" Eqpuwo gf " lt qo 'Qpg" Rculpi	Vgpukg" Utgul" ruk	P _{fi} *REC+	' 'Hvli wg" Nltg" Eqpuwo gf " lt qo 'Qpg" Rculpi	P _{fi} *F IO +	' 'Hvli wg" Nltg" Eqpuwo gf " lt qo 'Qpg" Rculpi
UN3a: aC	828	5	322	32	322	639	; .922	208	7.922	>2084
UN3a32aC	69;	922	306	33.222	208	4; ;	Wprko kgf	/	8; 2.222	>208
UN3a: aE	6; 5	5: 2	508	: .722	208	4; 4	Wprko kgf	/	7; 2.222	>208
UN4a: aC	724	482	608	6.822	208	533	4.922.222	>208	4; 2.222	>208
UN4a32aC	646	9.522	204	662.222	>208	44;	Wprko kgf	/	8.722.222	>208
UN4a: aE	682	3.822	20	: ; .222	>208	489	Wprko kgf	/	3.722.222	>208
UN5a: aC	73;	352	608	3.922	208	542	3.322.222	>208	432.222	>208
UN5a32aC	653	5.522	204	482.222	>208	459	Wprko kgf	/	6.822.222	>208
UN5a: aE	664	7.522	208	562.222	>208	459	Wprko kgf	/	6.722.222	>208
UN6a: aC	7; 4	7	: 2	43	3;	5; ;	43.222	>208	33.222	>208
UN6a32aC	6; 8	552	304	5.822	208	525	9.; 22.222	>208	622.222	>208
UN6a: aE	6: 7	752	20	36.222	>208	4: 7	Wprko kgf	/	992.222	>208
UN7a: aC	769	59	33	492	3	576	372.222	>208	82.222	>208
UN7a32aC	67:	3.922	204	63.222	>208	485	Wprko kgf	/	3.922.222	>208
UN7a: aE	673	4.522	204	3: 2.222	>208	473	Wprko kgf	/	4.922.222	>208

3207 "Uwo o ct { 'qhUwr gt mcf 'Rwng' Cpcn{ uku

kp'vj ku'uwf { . "vj g'o czko wo "vgpukg'utguugu'ecwugf "d{ "uwr gt mcf "czrg"eqphki wtcvkpu"qp"IRE Ru'y gt g" f gvgto kpgf "hqt"xctkqu'eqpetgvg"urcd"vj lempguugu"cpf "uj qwf gt "v{ r gu'wulpi "hpksg"grgo gpv'cpcn{ uku0" Vj g'lo r cev'qh'vj ku'utguu"qp"vj g'h'vki wg'rkig"qh'vj gug"IRE Ru'y cu'guko cvgf "wulpi "vj g"REC"hc'vki wg" f co ci g'o qf gr0Vj g'ulpi rg"cpf "vcpf go "czrgu"vj cv'y gt g"j gcxkn{ "mcf gf "kp'vj g'vckgt "r qt vqp"qh'vj g" uwr gt mcf "y gt g"qdugtxgf "vq'ecwug"uki pkhlecpv'h'vki wg"f co ci g'lp": /kp"cpf "32/kp"eqpetgvg"urdu'y j gp" rcti g'r quklxg"vgo r gtcwtg"i tcf kgpv'y gt g"r tgugp0Uwr gt mcf u'f kf "pqv'i tgcwn{ "ko r cev'vj g'h'vki wg" rlxgu"qh"35/kp"eqpetgvg"urdu"wpf gt "cp{ "vgo r gtcwtg"i tcf kgpv'eqpf klqp"cpf "qh": /kp"cpf "32/kp" eqpetgvg"urdu'y j gp" c'pgi cvkxg"vgo r gtcwtg"i tcf kgpv'qt"pq"vgo r gtcwtg"i tcf kgpv'y cu'r tgugp0Vj g" r tgugpeg"qh'vkgf "eqpetgvg"uj qwf gtu'uki pkhlecpv{ "tgf wegf "vj g'h'vki wg"f co ci g'lp"IRE Ru'ecwugf "d{ " uwr gt mcf u0Cu'uj qy p"lp'vj g'utguu'r wng"cpn{ uku."d{ "ceeqwv'vpi "hqt"utguu'tcpi g."vj g'h'vki wg'rkig" eqpuwo gf "htqo "uwr gt mcf u'ku'r tgf levgf "vq" f getgcug0Utguu'tgxgtucn'y gt g"uj qy p"vq"pqv'dg" c'rcti g" eqpegt p'hqt"uwr gt mcf "f co ci g'cpcn{ uku0

Vj tqwi j "vj ku'eqo r wcvkpcn'cpcn{ uku."vj g'f guki p"hgwtgu"qh"IRE Ru"vj cv'tg"uwuegr vdrig"vq" uki pkhlecpv'h'vki wg"f co ci g'htqo "cr r rlec vqp"qh'c"uwr gt mcf "y gt g'kf gpv'vkgf 0Ur gekhlec n{ .": /kp"cpf " 32/kp"IRE Ru'y kj "cur j cn'uj qwf gtu'ctg"qdugtxgf "vq"dg"qh'r tko ct { "eqpegt p0O qt gqxt. "vj ku'cpcn{ uku" uj qy gf "vj cv'vj g'f co ci g'lo r qugf "d{ "uwr gt mcf u'ku'i tgcwn{ "kphwpegf "d{ "vj g'vgo r gtcwtg"i tcf kgpv' kp'vj g'eqpetgvg"urcd"cpf "vj wu."vj g'vko g'qh'f c{ "vj cv'vj g'mcf "ku'cr r rkgf 0Y kj "vj gug'pwo gtlecn'hkpf lpi u." c"mdqtcvqt { "uwf { "y cu'f gxgmrgf "vq" gxcnwvg"vj g'ghigewu"qh"qxgt mcf u"qp" f co ci gf "IRE Ru."cu" f kuewuugf "kp"Ugevkp"340

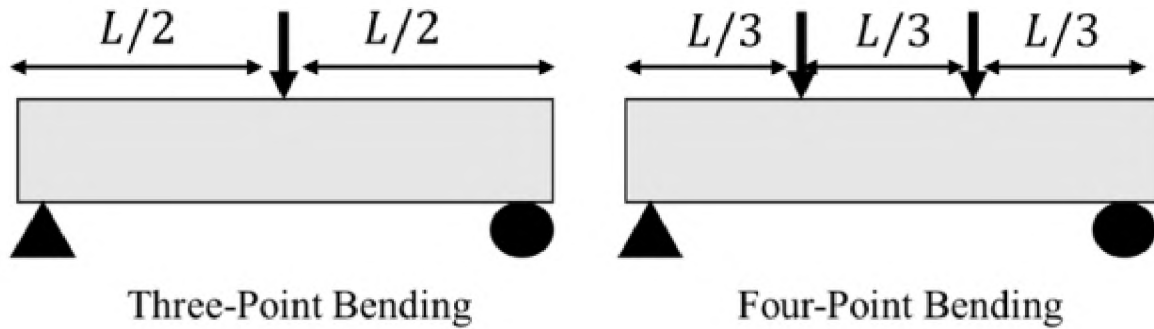
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Vj ku'ugev'kp"eqxgtu"vj g'f g'xgr o gpv'qh"vj g'ndqtcvqt { "uwf { "vj cv'y cu'r gthqto gf "vq"gxcmv'g"vj g' gh'ge'v'qh"qxgtm'cf u'qp" f co ci gf "LRE Ru 0 Hk uv."vj g'v'guv'ugv'wr "hqt"vj g'ndqtcvqt { "uwf { "ku'r t'gugp'vgf 0' Vj gp."vj g'g'zr g'tko gpv'cn' f guki p."eqxgt'kpi "vj g'tcpi g'qh"r ctco g'vgtu"cpf "vj g'v'gu'kpi "r tqegf wt'gu" k'pen'f gf "kp"vj g'ndqtcvqt { "uwf { ."ku'f k'uewu'gf 0

3308'Vguv'Ugwv

3308''Nqcf'kpi 'V{rg

Vq'f g'vgt o k'pg"vj g'm'cf k'pi "v{r g'hqt"vj g'ndqtcvqt { "uwf { ."vj g'o g'ej c'p'k'uo "qh'h'v'ki wg'f co ci g'kp'LRE Ru" ku'eqpuk'f g'tgf 0 H'v'ki wg'f co ci g'q'ee'wtu'cv'vj g'v'qr "cpf "dqwqo "qh'c"eqpet'g'v'g'ur'd"ht'qo "t'gr g'cv'gf "v'gpuk'g" ut'guu'cr r n'ecv'k'p'u 0'Vj g'h'v'ki wg'r gthqto c'peg"qh'eqpet'g'v'g'kp"v'gpuk'p"j cu'dggp"eqo o q'pn { "uwf k'gf "kp" vj g'ndqtcvqt { "vj tqwi j "eqpet'g'v'g'dgco "h'v'ki wg'v'guu"O w'tf q'eni { "Mgungt."3; 7: =J k'uf q'th { "Mgungt." 3; 88=T'ckj d { ."3; 9: =Qj ."3; ; 8=Qj ."3; ; 3c=Ej c'wk"gv'cn 0'422; =T'qgungt."3; ; : -0J q'y p'kp'H'ki wt'g" 5; ."eqpet'g'v'g'dgco u'ecp"dg'm'cf gf "kp"vj tgg/r q'kp'v'cpf "h'qwt/r q'kp'v'dgpf k'pi "vq"kp'f w'eg"v'gpuk'g"ut'guu 0' H'qwt/r q'kp'v'dgpf k'pi "ku'r t'gh'gtt'gf "qxgt"vj tgg/r q'kp'v'dgpf k'pi "d'ge'cw'g"vj g'r g'cm'v'gpuk'g"ut'guu"ku'cr r n'k'gf " qxgt" c"t'gi k'qp"t'cvj g't"vj cp" c"m'ec'k' gf "r q'kp'v 0'Vj ku't'gf w'egu"vj g'r t'q'd'cd'k'k'v { "qh'qxgt'gu'ko c'v'kpi "vj g' h'v'ki wg'ut'gpi vj "qh'vj g'eqpet'g'v'g."i k'xgp"vj cv'c"n'ti g't'ct'gc"ku'ue'cp'pgf "hqt" f'gh'ge'u 0'Eqpet'g'v'g'dgco u'ecp" cnuq"dg"uko r n { "uwr r q't'vgf "qt" h'wm { "uwr r q't'vgf 0' H'wm { "uwr r q't'vgf "eqpet'g'v'g'dgco u'ectt { "m'cf "ch'gt" et'cen'k'pi ."y j k'ej "t'gr n'ecv'gu"vj g'd'gj c'x'k'qt"qh'c"LRER 0'Vj wu."h'wm { "uwr r q't'vgf "eqpet'g'v'g'dgco u'j c'x'g" c" i t'g'ev't' h'gz'w'cn'ut'gpi vj "vj cp'uko r n { "uwr r q't'vgf "eqpet'g'v'g'dgco u'*T'qgungt."3; ; : -0J q'y g'xgt."v'gpuk'g" ut'guu"cpf "et'cen'k'pi "ecp"dg" f'k'g'ev'gf "vq" c"ur g'ek'h'e"t'gi k'qp"d { "wuk'pi "uko r n { "uwr r q't'vgf "eqpet'g'v'g'dgco u." y j k'ej "o c'ngu'k'v'g'cu'k'gt"vq"cp'cn { | g'vj g'r t'qi t'guuk'p"qh'h'v'ki wg'f co ci g'kp"eqpet'g'v'g 0



Hki wtg⁵; <Nqcf kpi "v\ r gu'hqt"eqpetgv"dgco "h'wi wg'uwwf lgu"N'tghgtu"v"y'j g'dgco "ur cp+0

Vj g'h'wi wg"qh"eqpetgv"urdu"ecp"cnq"dg"uwwf lgf "kp"y'j g'rdqtcvqt { ."cu'uj qy p"d { "Tqgungt" cpf "I cgf leng"gv'cn0"i cgf leng."Tqgungt."("Uj cj ."422; =Tqgungt."3; ; : +0Eqpetgv"urdu"j cxg'i tgcvtg" h'wi wg'tgukucpeg"y'j cp"eqpetgv"dgco u'f wg"v"ur geko gp"uk g'cpf "uwr r qtv'eqpf kkpqu"*Tqgungt."4228=" Tqgungt."3; ; : +0Y j kg"o qtg"tgr tgugpvcxg"qh'h'kf "eqpf kkpqu."eqpetgv"urdu"ctg"f k'h'ew"v"q"ecuv" cpf "vgu0

Vq"o gg'v'y'j g'i qcn"qh'y'j ku'tgugctej . "y'j g'h'wt/r qkp'v'dgpf kpi "h'wi wg"vgukpi "y cu'r gthqto gf "qp" uko r n' "uwr r qtv'eqpetgv"dgco u0Vj tqwi j "y'j ku'cr r tqcej . "y'j g'gh'gew"qh'qxgtmcf u'ecp"dg"f k'gew" cpf "eqpukungpvn" s wcpw'kgf "cu'c'h'wpev'kp"qh'gz'kukpi "fco ci g0

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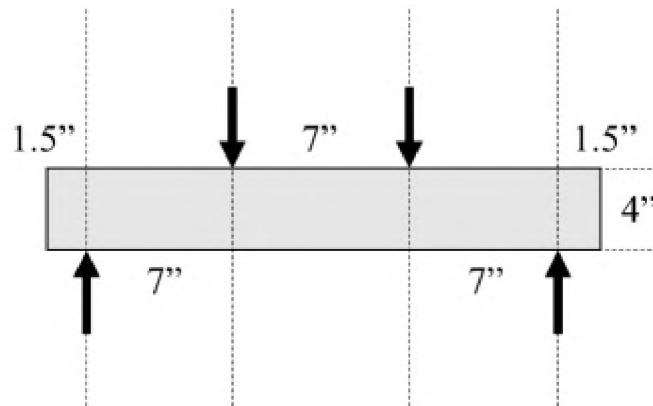
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- " Vj g'h'gzwtcn'ecr cekv { "ku'h'guu"y'j cp"uj gct'ecr cekv {
- " Vj g'ungpf gtpguu'tcvkq"qh'y'j g'dgco "ku'cv'h'gcu'v'y'j tgg
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Vq"o gg'v'y g'i qcmu"qh'y ku'tgugctej . 'y g'uco g'eqpetg'gdco "f lo gpukqpu"cu'wugf "d{ "Ej cwk' gv'cr0y gtg'ej qugp0Vj gug'f lo gpukqpu"cmqy "hqt'y g'ghgevxg"cpn{ uku"qh'qxgtmqf u'qp"y g'h'vki wg" rkg"qh'eqpetg'g'cpf "ctg'uwhhkegpv{ "uo cm'uq"y cv'o cp{ "eqpetg'gdco u'ecp"dg'ecuv'cv"qpeg0Vj g' hqwt/r qkp'v'dgpf kpi "eqphki wtcvkqp"wugf "hqt'y ku'eqpetg'gdco "uk g'ku'uj qy p'kp'Hki wtg'620

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J knf qth'cpf "Mgurt'3; 88	Hqwt/Rqkp'v'Dgpf kpi	8'kp'd{ "8'kp'd{ "82'kp
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Tqgurt'3; ; :	Hqwt/Rqkp'v'Dgpf kpi	8'kp'd{ "8'kp'd{ "43'kp
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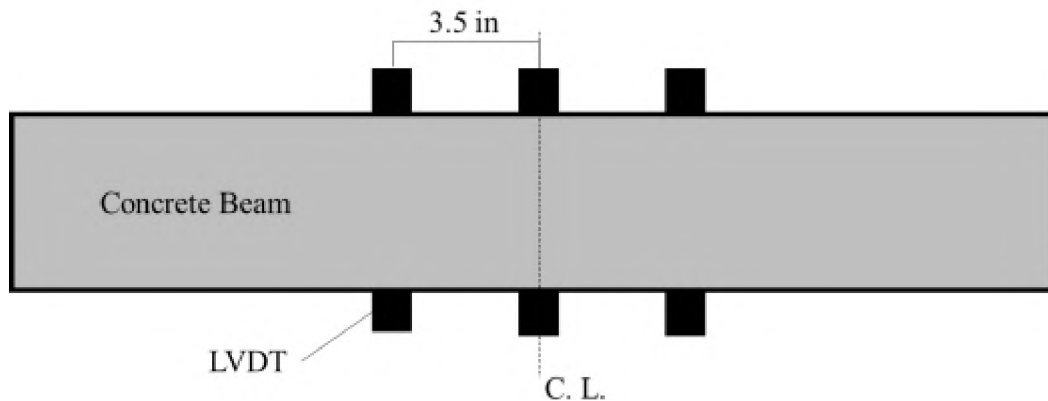
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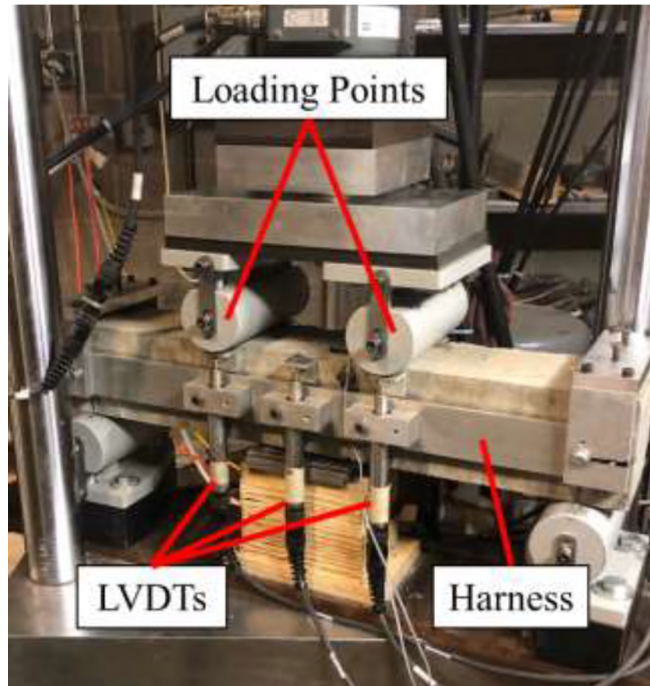
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Hki wtg"63<"Vqr "xkgy "qh"vj g"NXF V"rc{ qww0



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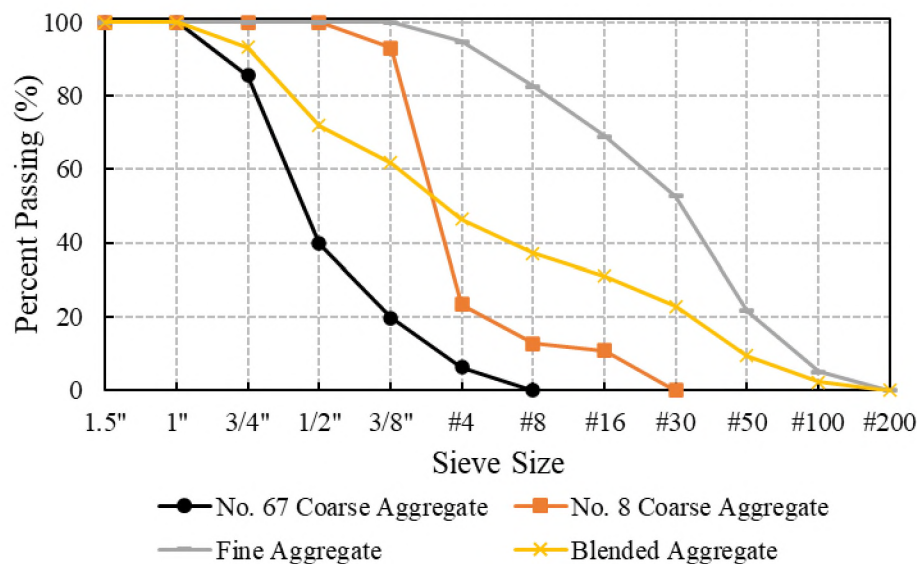
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P q0': 'Eqctug'Ci i tgi cvg'*ndlf ⁵ +	522
Hkpg'Ci i tgi cvg'*ndlf ⁵ +	3.568
Ego gpv'*ndlf ⁵ +	797
Y cvgt'*ndlf ⁵ +	476
Uknc'Ckt'582'Ckt'Gpvtckpgt'*q B22'nd"ego gpv+	307
Uknc'o gpv'URO P 'Uwr gtr ncvkck gt'*q B22'nd"ego gpv+	504
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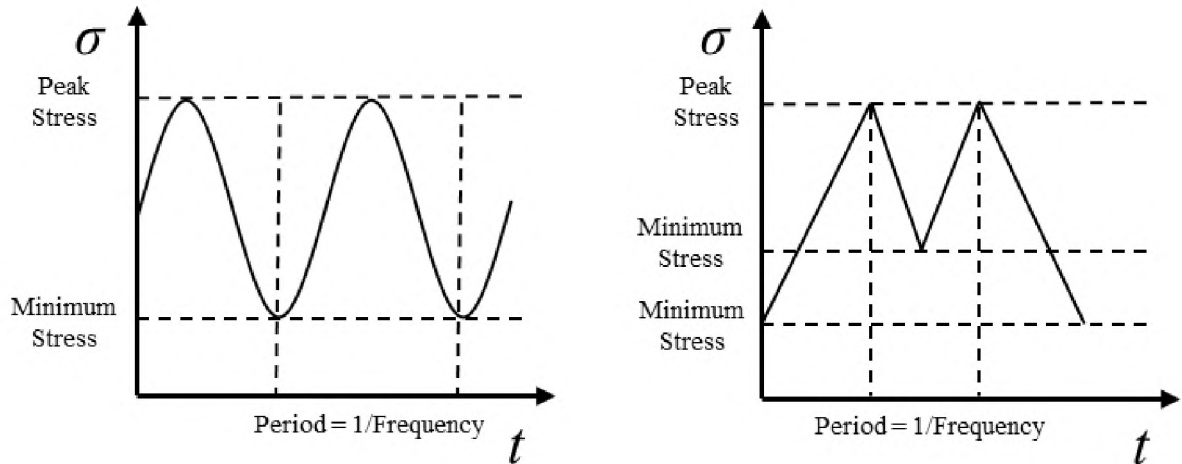
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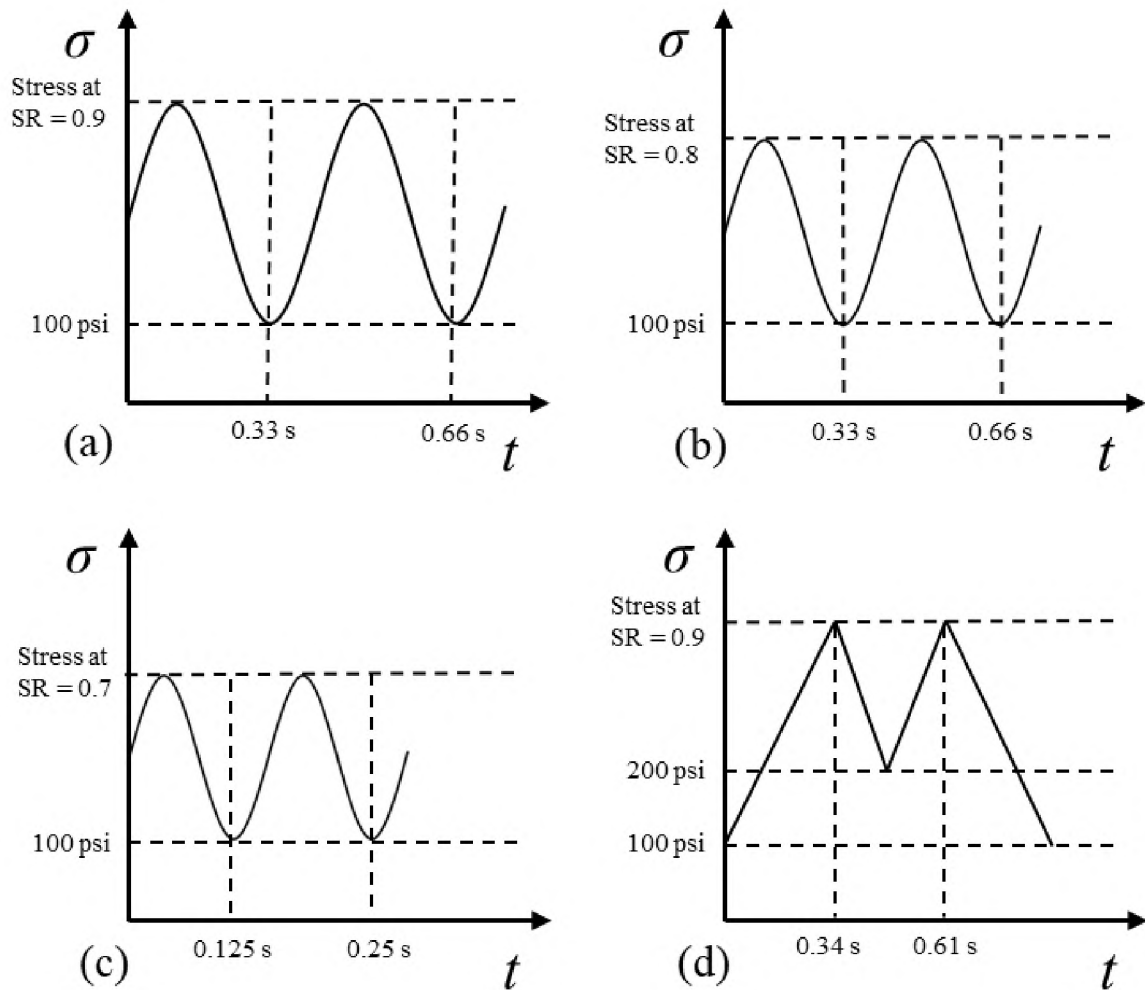
K'ku'etklecn\q"ugrgevc"mqcf kpi "htgs wgpe{ "vj cv'tgr nkecvu"vj g"dgi cxkqt"qh'uwr gtmqcf u."y j kej " ecp"j cxg"j ki j "utguu'tcvkq"vj cv'ctg"cr r nkgf "xgt{ "unqy n\ 0Hqt"kpucpeg."eqpukf gt"vj g"l cpnng"ft{ gt" uwr gtmqcf "vkr "vj cv'qeewtgf "kp"F gego dgt"qh"423; "kp"Rgppu{ ncpkc0Ur ggf u'cu'nqy "cu"37"o r j "y gtg" pqvgf "d{ "RgppF QV0

Hqt"vj ku'uwf { ."y j gp" c"ukpi ng"czng"mqcf kpi "r wng"ku'cr r nkgf "cv'c"utguu'tcvkq"qh"20 "qt"20 ."c" mqcf kpi "htgs wgpe{ "qh"5"J | "y cu'ugrgevgf 0Vj ku'tgr tgugpv"vj g"o qxgo gpv'qh"UN3"*htqo "Ugevkqp"33+" cv'c"ur ggf "qh"37"o r j 0Y j gp" c"vcpf go "czng"mqcf kpi "r wng"ku'cr r nkgf "cv'c"utguu'tcvkq"qh"20 ."vj g" mqcf kpi "htgs wgpe{ "y cu"3"J | 0Vj ku'tgr tgugpv"vj g"o qxgo gpv'qh"UN6"*htqo "Ugevkqp"33+"cv'c"ur ggf " qh"37"o r j 0Y j gp" c"ukpi ng"czng"mqcf kpi "r wng"y cu'cr r nkgf "cv'c"utguu'tcvkq"qh"20."vj g"mqcf kpi " htgs wgpe{ "y cu": "J | 0Cp"lpetgcug"kp"vj g"mqcf kpi "htgs wgpe{ "hqt"vj ku'utguu'tcvkq"vq" f getgcug"vgvupi " vko g"y cu" f ggo gf "ceegr vcdng" ukpeg" ku" nguu"ugpukxg" vq" mqcf kpi "htgs wgpe{ " *J uw"3; : 3+" cpf " eqo o qpn\ "vgvuf "cv'j ki j gt"mqcf kpi "htgs wgpeku"vj cp"utguu'tcvkq"qh"20 "cpf "20 "Uj k"Hy c."("Vcp." 3; ; 5=\ j cpi ."Rj knkr u."("Y w"3; ; 8+0

Ut guu'Rt qhkgu

C"vqcn\qh'hqwt"utguu'r tqhkgu"y gtg"kpemf gf "kp"vj ku'uwf { ."cu"uj qy p"kp"Hki wtg"670Ukpi ng" czng"utguu'r tqhkgu"y gtg"i gpgtcvgf "y kj "r gcn'lo czko wo "utguu'tcvkq"qh"20."20 ."cpf "20 "wukpi "c"

ulpwuqkf cn'y cxg'hwpevkqp."cu'uggp'lp'Hki wtg'67c/e0Hqt'yj g'vcpf go "czng'wtguu'r tqhkg."qpn{ "c'wtguu" tcvkq"qh'2Q "y cu'eqpukf gtgf "wukpi "c'ewuqo "y cxghqto "yj cv'tco r gf "f k ge v{ "vq"yj g'vcti gv'xcnwgu."cu" uj qy p'lp'Hki wtg'67f0



Hki wtg'67<Utguu'r tqhkgu"qh"*c+"ulpi ng"czng"cv'c'wtguu'tcvkq"? "2Q ."d+"ulpi ng"czng"cv'c'wtguu'tcvkq" qh'20 ."e+"ulpi ng"czng"cv'wtguu'tcvkq"? "2Q."cpf "f+"vcpf go "czng"cv'c'wtguu'tcvkq"qh'2Q 0

Vj g'wtguu'r tqhkgu"y gtg"i gpgtcvgf "d{ "yj g'vukpi "u{ uvg0 "d{ "ur gekh{ lpi "yj g'vcti gv'mqcf u"lp" yj g"O VUİ "O wnr wtr qug"Grkg"uqhwy ctg0 Vq"fq"yj ku."eqpetvgg"dgco u"ctg"vguvgf "uvclecm{ "vq" f gvgt0 lpg"yj g'cxgtci g'hgzwtcn'wtgpi yj ."cu'ecrewvvgf "y kj "Gs wcvkqp"64"E5; IE5; O/43."4243+<

$$f \sim \frac{PL}{b^4}$$

*66+

y j gtg.

f " "y g'ngzwtnl'utgpi vj "qh'vj g'dgco . 'r uk

P ? "vj g'r gcn'mqcf "cr r nkgf "d{ "vj g'vgnkpi "o cej kpg. 'rd

L ? "vj g'ur cp'ngpi vj . 'kp

b ? "vj g'y kf vj "qh'vj g'dgco "cv'htcewtg. 'kp

"? "vj g'f gr vj "qh'vj g'dgco "cv'htcewtg. 'kp

Vj gp. "vq" f gvgto kpg" vj g'mqcf "kpr w'cv'gcej "utguu" tcvkq "100" 20. "20 . "20 +. "Cs wcvkqp" 65" ku" wugf <

$$pp \sim \frac{P_{pp} L}{b}$$

*67+

y j gtg.

pp " "y g'cr r nkgf "utguu. 'r uk

S " "y g'utguu' tcvkq

f " "y g'cxgtci g'ngzwtnl'utgpi vj "qh'vj g'eqpetgvg" dgco u"qp'vj g'vgnkpi "f c{ . 'r uk

P pp ? "vj g'mqcf "eqttgur qpf kpi "vq" vj g'cr r nkgf "utguu. 'rd

L ? "vj g'ur cp'ngpi vj . 'kp

b ? "vj g'y kf vj "qh'vj g'dgco . 'kp

"? "vj g'f gr vj "qh'vj g'dgco . 'kp

330404" HgzwtcnUtgpi vj u

Vq"gzco kpg" vj g'kphwpeg" qh'utgpi vj "qp" vj g'hcvi wg" hgzwtcn'eqpetgvg" dgco u"uwdlgevfg "vq" vj g'utguu" r tqh'ngu'f gr levfg "kp" Hli wtg" 66. 'hcvi wg" dgco u'y gtg" vugvf "cv" vj q'ngxgnu" qh'eqpetgvg" utgpi vj <öpgy " r cxgo gpvö" cpf "öqrf "r cxgo gpvö0Vj g'pgy "r cxgo gpv'eqpf kkp" y cu'f gh'kpfg "cu" j cxkpi "c" o qf wnu" qh" twr wtg" dgwy ggp" 722" cpf "822" r uk0Vj g'qnf "r cxgo gpv'eqpf kkp" y cu'f gh'kpfg "cu" j cxkpi "c" o qf wnu" qh' twr wtg" dgwy ggp" 922" cpf " : 22" r uk0

Hgzwtcn'utgpi vj "vguu" qh" 6/kp" d{ "6/kp" z" 46/kp" eqpetgvg" dgco u'y gtg" wugf "vq" guxcdrkuj "vj g" utguu" tcvkqu" hqt" vj g'hcvi wg" vgnkpi 0Vj g'ngzwtnl'utgpi vj u" qh'eqpetgvg" dgco u" qh'vj ku" uk g" y gtg" qdugt xgf "vq" dg' i tgcvgt "vj cp" vj cv'qh'eqpxgpvkpcn' o qf wnu" qh' twr wtg" dgco u" kmwutcvfg "kp" Ugev kqp

35+"0'k'pungcf "qh'ecukpi "cf f k'kqpcn'8/k'p'd{ "8/k'p'd{ "43/k'p"eqpetgv"dgco u."eqo r tguukxg"utgpi yj "
 v'gukpi "y cu'eqpf w'evgf "qp'6/k'p'd{ ": /k'p'e{ r'kpf gtu'cpf "uwdugs wgpv'tguwmu'y gtg'wugf "v'f gvgto kpg'yj g"
 utgpi yj "eqpf k'kqpu0'Vj g'h'qmqy kpi "t'gr'v'k'p'uj kr "G'w'v'k'p'66+"y cu'wugf "v'f eqttgr'v'g"eqo r tguukxg"
 utgpi yj "v'q"o qf w'wmu'qh'twr wtg."cu'uwi i gungf "d{ "yj g'Co gt'k'ep"Eqpetgv"Rcxgo gpv'Cuuqek'v'k'p"
 *CEK'422: +<

MO `"? "45"45"

*68+

y j gtg.

MO`"? "yj g'o qf w'wmu'qh'twr wtg."r uk

f_c"? "yj g'eqo r tguukxg'utgpi yj ."r uk

Qp'cxgtci g."pgy "r cxgo gpv'utgpi yj "y cu'cej k'x'x'g'f "ch'gt'5'f c{ u'v'q'8/9'f c{ u'qh'ewt'kpi ."cpf "qrf "
 r cxgo gpv'utgpi yj "y cu't'gcej gf "ch'gt'36'f c{ u'v'q'4: "f c{ u'qh'ewt'kpi "h'qt'yj g'eqpetgv"o k'z wtg'f guki p"
 wugf "k'p'yj ku'uwf { 0D{ "v'gukpi "cv'y q'rg'x'gm'qh'utgpi yj "y k'j q'w'c'ngt'kpi "yj g'o k'z wtg'f guki p."c'o qtg"
 f k'ge'v'eqo r ct'ku'p'qh'yj g'gh'ge'w'qh'h'gz wt'cn'utgpi yj "c'p'f "ci g'qp'yj g'h'v'ki w'g'h'g'qh'yj g'eqpetgv"
 ecp'dg'o cf g0

33045''H'v'ki w'g'V'guk'pi

Vj ku'rdqtcvqt { "uwf { "eqpuk'v'g'f "qh'c'eqpucpv'co r r'k'w'f g'v'guv'r tqi tco "c'p'f "c'f co ci gf "eqpetgv"v'guv"
 r tqi tco 0'Vj g'eqpucpv'co r r'k'w'f g'v'guv'r tqi tco "g'p'cd'ngu'cp'c'p'cn{ uku'qh'yj g'gh'ge'v'qh'uw'r gt'm'q'cf "
 ut'gu'gu'qp'yj g'h'v'ki w'g'h'g'qh'eqpetgv"cpf "r tq'x'k'f gu'c'd'cu'ku'h'qt'yj g'f co ci gf "eqpetgv"v'guv'r tqi tco 0'
 Vj g'f co ci gf "eqpetgv"v'guv'r tqi tco "s'w'cp'v'k'gu'yj g'gh'ge'v'qh'qx'gt'm'q'cf u'qp'yj g'h'v'ki w'g'h'g'qh'eqpetgv"
 dgco u'cu'c'h'v'p'ek'v'k'p'qh'yj g'r g'teg'p'v'h'g'eqpuwo gf "k'p'yj g'eqpetgv0

Eqpucpv'Co r r'k'w'f g'V'guv'Rtqi tco

k'p'yj g'eqpucpv'co r r'k'w'f g'h'v'ki w'g'v'guv."c'h'q'cf "k'p'w'w'eqttgur q'p'f k'pi "v'q'q'p'g'qh'yj g'h'q'wt'ut'guu"
 r tq'h'kgu."y cu'c'r r'ngf "e{ e'k'ecm{ "v'q'c'eqpetgv"dgco "w'p'v'k'i'h'ck'w'g'0'Gcej "qh'yj g'h'q'wt'ut'guu'r tq'h'kgu"
 *U'ge'v'k'p'34040B+"y gtg'g'x'c'w'v'g'f "h'qt"gej "qh'yj g'utgpi yj "eqpf k'k'qpu"U'ge'v'k'p'34040A0H'ck'w'g'y cu"
 f gh'k'p'g'f "cu'eqo r ng'v'h'c'ewt'g'qh'yj g'dgco 0'Vq'g'uko cv'g'yj g'h'q'cf "k'p'w'h'qt'eqpucpv'co r r'k'w'f g'h'v'ki w'g"
 v'guv"kp'yj g'pgy "r cxgo gpv'eqpf k'k'q'p."yj g'h'gz wt'cn'utgpi yj "y cu'g'w'cd'rk'uj gf "d{ "v'gukpi "cv'ng'cu'v'y q"
 eqpetgv"dgco u'qp'yj g'f c{ "yj g'h'v'ki w'g'v'gukpi "y cu'r g'th'q'to gf 0'U'k'peg'h'gz wt'cn'utgpi yj "i c'k'p'q'ee'wt'g'f "

unqy n{ "dg{ qpf "36"fc{ u'qh'o qku'ewtkpi . "hgzwtcn'utgpi yj "vgukpi "y cu'eqpf wevgf "y kj kp"vy q"fc{ u' qh'eqpucpv'co r rkwf g'hcvi wg'vgukpi "kp"yj g"qrf "r cxgo gpv'eqpf kxqp"vq"kf gpvkh{ "yj g"mqcf "kpr w0

Fco ci gf "Eqpetgvg'Vguv'Rtqi tco

Kp"yj g"fco ci gf "eqpetgvg'vguu. "eqpetgvg"dgco u'y gtg'htuv'hcvi wgf "vq"v'cti gv'fco ci g'ucvg" wukpi "yj g"mqcf "kpr w'eqtgur qpf lpi "vq"yj g"ukpi ng"czng'utguu'r tqhkg"y kj "c"utguu'tcvkq"qh"200Qpeg" yj g'v'cti gv'fco ci g'ucvg"y cu'cej kxgxf. "yj g'eqpetgvg"dgco u'y gtg"qxgtmqcf gf "y kj "vgp'hcvi wg"e{ ergu" cv'c"utguu'tcvkq"qh"20 "qt"20 0Ncuw{ . "yj g'utguu'tcvkq"y cu'tgwtpgf "dcen'vq"20"cpf "cr r rkgf "e{ erkecm{ " wpvki'hcviwgtg'Vj g"fco ci gf "eqpetgvg'vguv'r tqi tco "y cu'utwewtgf "kp"yj ku'o cppgt"vq"gxcmwcv"yj g" ghigew"qh'vj g"qxgtmqcf u'cu'c"hwpevkqp"qh'r gtegpv'rhkg"eqpuwo gf 0

Fco ci g'ucvgu"tgrtgugpvkpi "37' . "72' . "cpf": 7' "rhkg"eqpuwo gf "y gtg"ej qugp"htq"yj ku" cpcn{ uku'vq'tgrtgugpv"yj g'f hgtgpv'uci gu'qh'pqpnrpget"fc ci g'ceewo wncvkp00 kpf hwn'eqpukf gtcvkqp" y cu'i kxgp"qp"j qy "vq"cej kxg"yj g"fco ci g'ucvgu"tgrtgugpvkpi "gcej "r gtegpv'rhkg"eqpuwo gf 0I kxgp" yj cv'hcvi wg'vguv'fcv"ecp"dg's wkg'xctkcdg. "yj g'fco ci g'ucvgu"y gtg"pqv'ko r qugf "d{ "yj g'r tgf levkpi " yj g"pwo dgt"qh'hcvi wg"e{ ergu"tgs wktgf "cv'c"utguu'tcvkq"qh"200' kpuvgf. "yj g"pqpnrpget"fc ci g" r ctco gvg"qh'pqto crk gf "eqo r rkpeg. "tgrtgugpvkpi "yj g'tgf wevkqp"qh'ukh'pguu"kp"yj g'eqpetgvg. "y cu" wugf 0'P qto crk gf "eqo r rkpeg"y cu'tgrcvgf "vq"yj g'r gtegpv'rhkg"eqpuwo gf "kp"yj g'eqpetgvg"wukpi "c" tgrcvkpuj kr "f gxgnr gf "htqo "yj g'eqpucpv'co r rkwf g'vguv'tguwmu00 qtg"cdqw"vj g'f gxgnr o gpv'cpf " r tgf levcdkx{ "qh'vj ku'tgrcvkpuj kr "ku'f kuewugf "kp"Ugevkqp"50

Vq"tgcej "c"v'cti gv'pqto crk gf "eqo r rkpeg"kp"ci kxgp"vguv. "c"ugv'pwo dgt"qh'hcvi wg"e{ ergu. " tcpi lpi "htqo "722/52.222"fgf lpi "qp"yj g'cpv'ekr cvgf "r tqi tguukqp"qh'fco ci g'kp"yj g'dgco . "y gtg" cr r rkgf 0'Vj gp. "yj g'eqo r rkpeg"y cu'ecrewcvgf "htq"gxgt{ "uwdugs wgpv'e{ erg"wukpi "Gs wcvkqp"67<

$$C_i = \frac{\hat{m}^n x / \hat{m}^n}{P_{\hat{m}^n x} / P_{\hat{m}^n}} \quad *69+$$

y j gtg.

\ . " ? "eqo r rkpeg"htq"e{ erg" k "kp lnd

\ . \hat{m}^n ? "yj g'o czko wo "f ghgevkqp"htq"e{ erg" k "kp

\ . \hat{m}^n ? "yj g'o kpko wo "f ghgevkqp"htq"e{ erg" k "kp

$P_{\hat{m}^n ?} x$ "yj g'o czko wo "mqcf "htq"e{ erg" k "nd

$P_{\hat{m}^n} ?$ "yj g'o kpko wo "mqcf "htq"e{ erg" k "nd

$$\frac{no^m}{?} \quad *6: +$$

˘no m ? ʔj g'pqtɔ cɪk gf'eqo r ɪcpeg'ɪqt'e{eng'k
 ˘ʔ? ʔj g'ɪpɪkɪn'eqo r ɪcpeg.'ɪpɪnd

Vj g'f co ci gf "eqpetgw"gv'r tqi tco "kpenf gf "cpcn(ugu'qh"eqpetgw"dgco u'qh"dqj "utgpi y "

eqpf kkp0Vq"guno cvg"y g"mcf "lpr w"ht"f co ci gf "eqpetgw"hcvi wg"gvu"lp"y g"pgy "r cxgo gpv

eqpf kkp."cv'rguv'y q"dgco u'y gtg"gvuf "lp"mgzwg"qp"y g'f c{ "qh"gvkpi 0Ukpeg"mgzwtn"utgpi y "

i clp"qeewtgf "unqy n{ "dg{ qpf "36"f c{ u'qh"o qkv"ewt kpi . "mgzwtn"utgpi y "gvkpi "y cu"eqpf wevgf "

y kj kp"y q"f c{ u'qh"f co ci gf "eqpetgw"hcvi wg"gvkpi "lp"y g"qnf "r cxgo gpv'eqpf kkp"v"kf gpvkh "y g"

mcf "lpr w0

332

Vcdrg'37<Gzr gtlo gpcnlf guki p'o ctkz 'hqt'vj g'eqpucpv'co r rkwf g'vuv'r tqi tco . 'y kj 'vj g'pwo dgt" qh'tgr rkecvu'uj qy p'hqt"geej "eqo dlpvkap"qh'r ctco gvgtu0

		Nqcf lpi 'Ecugu			
		Upi rg'Czrg			Vcpf go 'Czrg
		UT"? '20	UT"? '20	UT"? '20	UT"? '20
Hgzwt cn Utgpi vj	P gy 'Rcxgo gpv" *722/822'r uk+	6	6	6	6
	Qrf 'Rcxgo gpv" *922/: 22'r uk+	5	5	6	5

Vcdrg'38<Gzr gtlo gpcnlf guki p'o ctkz 'hqt'vj g'fco ci gf "eqpetgw'vuv'r tqi tco . 'y kj 'vj g'pwo dgt"qh' tgr rkecvu'uj qy p'hqt"geej "eqo dlpvkap"qh'r ctco gvgtu0

		Upi rg'Czrg'Nqcf lpi 'Ecugu					
		Utgau'Tcvkq"? '20			Utgau'Tcvkq"? '20		
		F co ci g" Ngxgn"? " 207	F co ci g" Ngxgn"? " 2072	F co ci g" Ngxgn"? " 20 7	F co ci g" Ngxgn"? " 207	F co ci g" Ngxgn"? " 2072	F co ci g" Ngxgn"? " 20 7
Hgzwt cn Utgpi vj	P gy 'Rcxgo gpv" *722/822'r uk+	5	5	5	5	5	5
	Qrf 'Rcxgo gpv" *922/: 22'r uk+	5	5	5	5	5	5

340'NCDQTCVQT['TGUNVUCPF'PCPN[UKU

340'Ecu'Uwo o ct{

C"qxcn'qh'86'dgco u'y gtg'ecuv'hqt'r gthqto kpi 'h'vki wg'v'gukpi . '352'6/kp'd{ ": /kp'e{ rkp'gtu'y gtg'ecuv' hqt"ej ctcevgtk kpi "y g"eqo r tguukxg"utgpi y "cpf "gruuk"o qf wwu."cpf " ; ; "dgco u'y gtg'ecuv'hqt" ej ctcevgtk kpi "y g'hgzwtcn'utgpi y 0Vj gug'ur geko gpu'y gtg'o cf g'hqo 'p'kg'f'k'htgtpv'ecuv'0k'p

Vcdrg'39."c'uwo o ct{ "qh'y g'h'guj "eqpetgvg'r tqr gt'v'gu'cpf "ci i tgi cvg'o q'kw'wtg'eqpvgpw'hqt"gej "ecuv" ku'r tqxkf gf 0Vj g"vcti gv'unwo r "cpf "ck"eqpvgpv'y gtg'4"l'pej gu'cpf "7' ".t'gur gev'xgn' 0'Chgt"ecuv'kpi " cni'ur geko gpu'y gtg'ewt'gf "p"cee'qtf cpeg'y kj 'CUVO 'E3; 4'wp'v'ki'y g'v'ko g'qh'v'gukpi *E3; 4E3; 4O/" 43."423; +0

Vcdrg'39<H'guj "eqpetgvg'r tqr gt'v'gu'cpf "ci i tgi cvg'o q'kw'wtg'eqpvgpw0

Ecu	Uwo r " *kp+	Ch'Eqpvgpv' * +	O q'kw'wtg'Eqpvgpv'q'li' Eqctug'Ci i tgi cvg'* +	O q'kw'wtg'Eqpvgpv'q'li' H'pg'Ci i tgi cvg'* +
3	307	607	208	204
4	3	702	20:	208
5	307	707	203	204
6	3	702	2048	2044
7	3	707	207	204;
8	3	607	20;	20:
9	3	602	208	20:
:	307	607	207	2042
;	5	702	206	205

340'O cvgt kniRt qr gt v'gu

34008''Eqo r tguukxg'Utgpi yj

Hqt'Ecu'3/8."eqo r tguukxg"utgpi y "v'gukpi "y cu'eqpf wevgf "y ggm' "hqt"wr "v'q'4: "f c{ u'chgt"ecuv'kpi 0' Hqt'Ecu'9/; . "eqo r tguukxg"utgpi y u'y gtg'o gcuwt'gf "qpn' "wr "v'q": "f c{ u'chgt"ecuv'kpi "uk'peg'h'v'ki wg" v'gukpi "y cu'pqv'eqpf wevgf "hqt"utgpi y u'tgr t'gugpv'v'xg"q'li' y cv'q'h'cp"q'rf gt"r cxgo gpv'y kj "y g" ur geko gpu'hqo "y gug'ecuv'0C"eqo r ngv'uwo o ct{ "qh'cni'eqpetgvg'e{ rkp'gtu'ecuv'hqt"y ku'uwf { "ku'kp" yj g'Vcun'6'Cr r gp'f kz 'C'*Vcdrg'C3+0Cni'y g'e{ rkp'gtu'h'v'k'gf "kp'eqpg"cpf "uj gct0

H'ki wtg'68/H'ki wtg'6: "uj qy "y g"eqo r tguukxg"utgpi y "i clp"ewt'xgu'hqt"gej "ecuv'0C"uko k'rt" v'gpf "hqt"utgpi y "i clp"ku'q'dugt'xgf "hqt"cn'ecuv'0Vj g"eqo r tguukxg"utgpi y "l'petgcugu"uki p'k'hecpv' " "k'g'0"v'q'dgvy ggp"c'o gcp"qh'5.222'r uk'cpf "6.222'r uk'f'wt'kpi "y g'h'kuv'hgy "f c{ u'q'h'o q'ku'ewt'kpi 0Vj gp." yj g"eqo r tguukxg"utgpi y "l'petgcugu"d{ "cdqw'3.222'r uk'hqo "5"v'q'9"f c{ u'0'Chgt"9"f c{ u."y g"

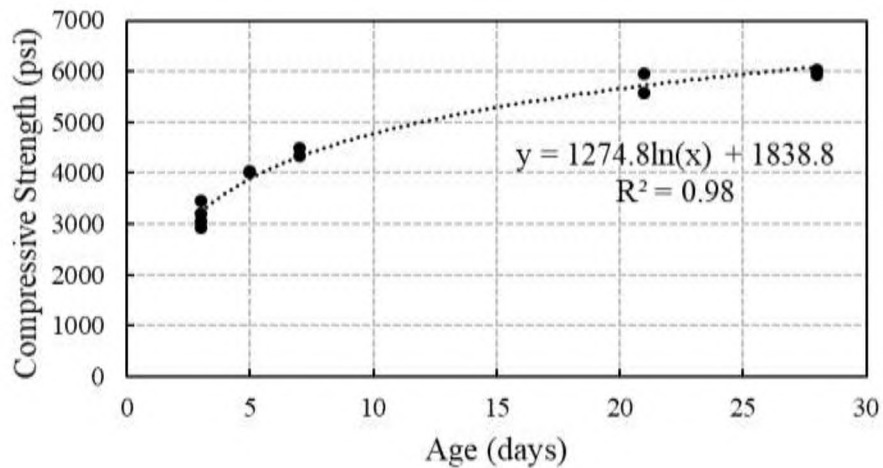
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i clp"ewtxg"hwggu0Vj g"o gcp"4: /f c{ "eqo r tguukxg"utgpi yj "y cu"v{ r kcm{ "cdqw"8.222"r uk0Vj g"

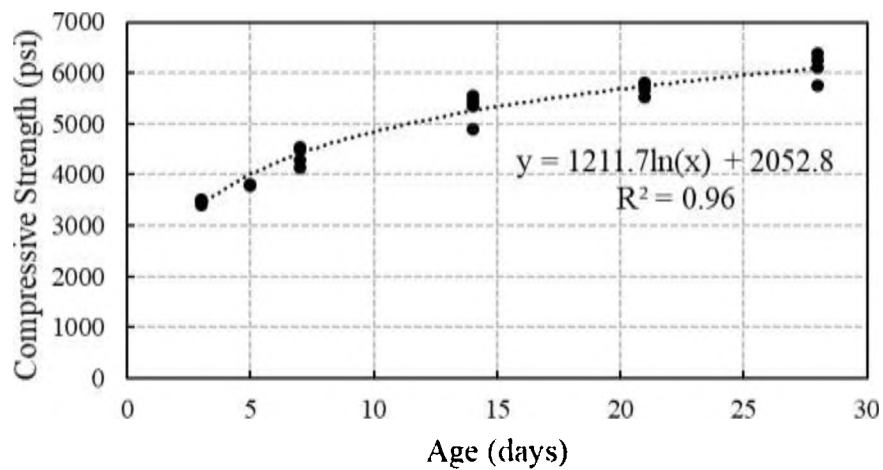
eqo r tguukxg"utgpi yj "i clp"ewtxg"ctg"dguv"hw'y kj "c"qi ctkj o le"qt"r qy gt"hwpevkp0Vj g"eqghlekgpu"

qh" f gvgto kpcvkp" hqt" yj g" hwgf " qi ctkj o le" cpf "r qy gt" ewtxgu" y gtg" dgw ggp" 20 6" cpf " 20 : ."

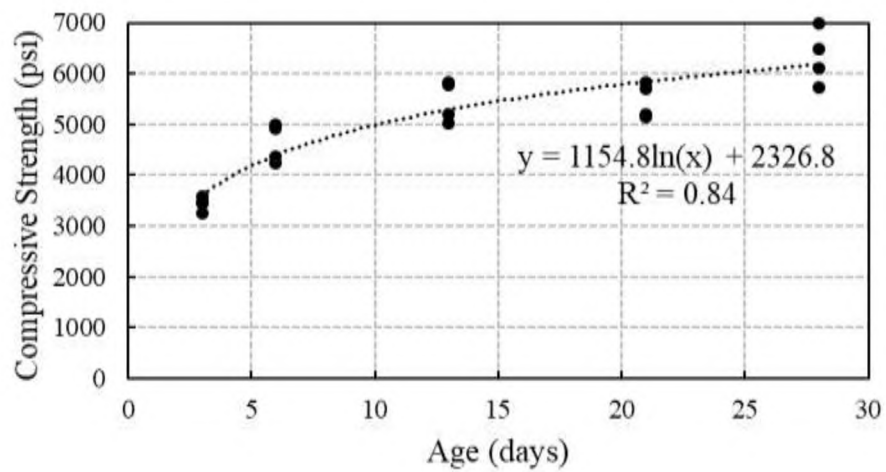
kpf kcvkpi "c"xgt{ "i qqf "hw0



*c+

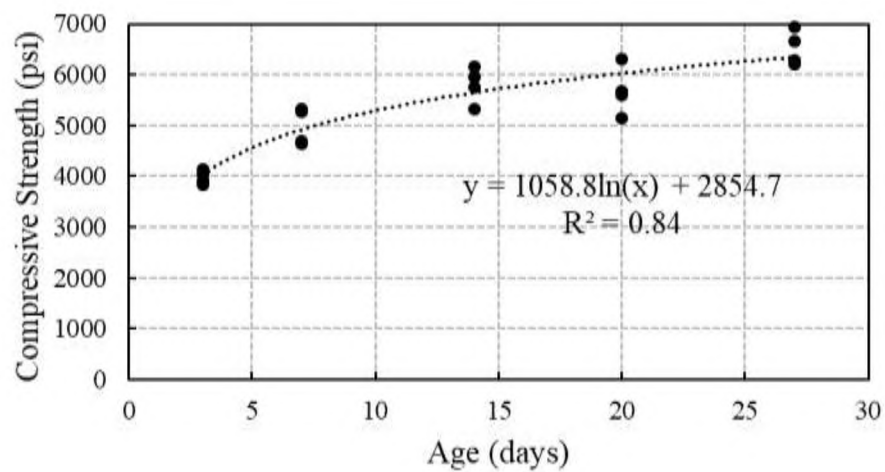


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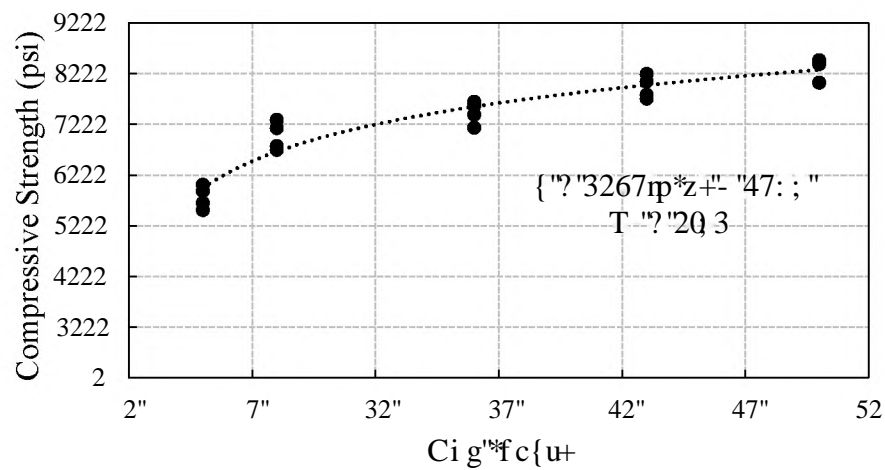


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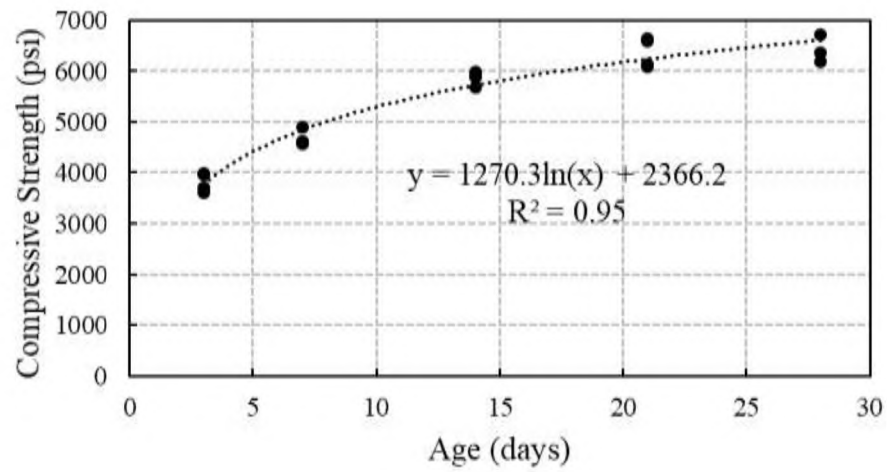
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*c+

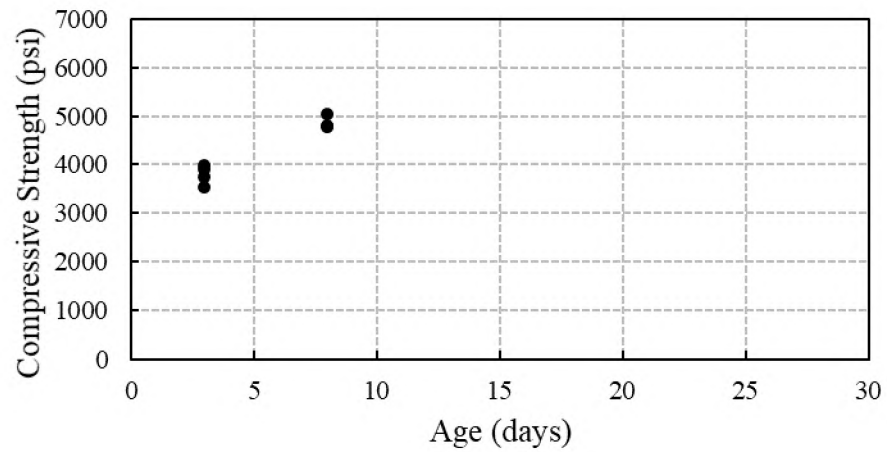


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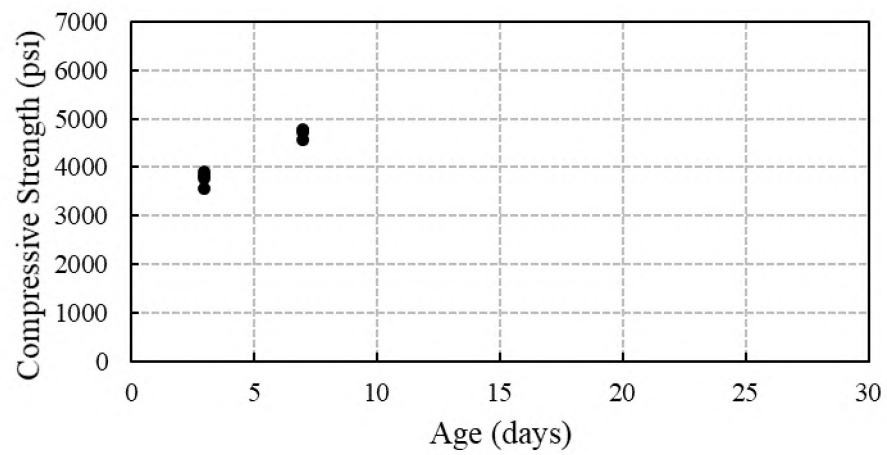


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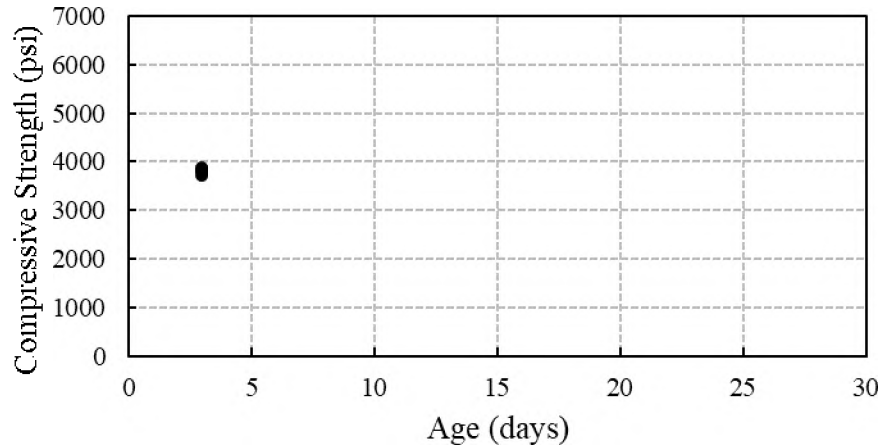
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*c+



*d+



(c)

Hli wtg'6: <Eqo r tguukxg'utgpi vj 'i clp'ewtxgu'hqt '*c+'Ecuv'9*d+'Ecuv': 'cpf '*e+' Ecuv'; 0

Eqttgrcvgf'Hgzwtcn'Ut gpi vj

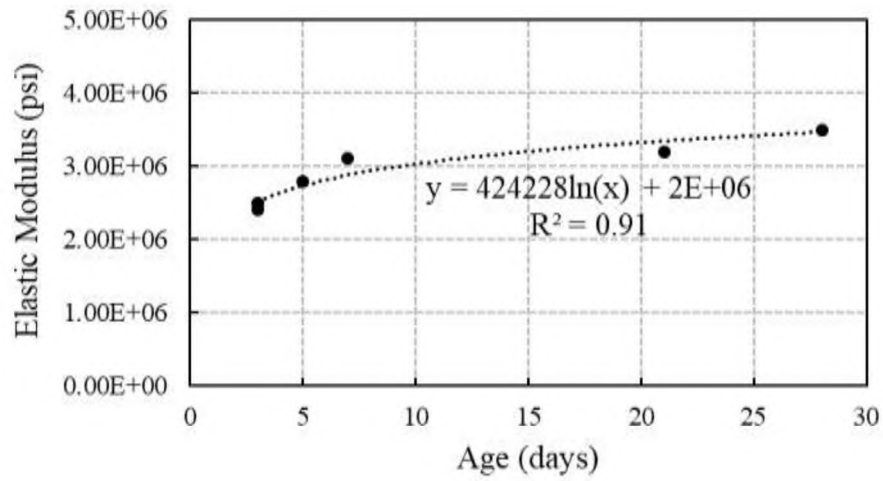
Vj g"CERC"eqo r tguukxg'utgpi vj "vq"o qf wwu'qh'twr wtg'eqttgrcvkqp"*Gs wcvkqp"66+"y cu" cr r nkgf "vq"gej "eqo r tguukxg'utgpi vj 0Vj g'vcti gv'eqo r tguukxg'utgpi vj "tgr tgugpvkpi "vj cv'qh'c"pgy " r cxgo gpv'y cu"5.422"vq"6.422"r uk0Vj g'vcti gv'eqo r tguukxg'utgpi vj "tgr tgugpvkpi "vj cv'qh'c"qrf " r cxgo gpv'y cu"7.522"vq"8.722"r uk0Vj g'pgy "r cxgo gpv'vcti gv'eqo r tguukxg'utgpi vj "gs wcvkpi "vq"c" o qf wwu'qh'twr wtg'qh'722"vq"822"r uk'y cu'cej kxgf "cv'dgy ggp"5"vq"8"qt"9"f c{ u0Vj g'qrf "r cxgo gpv' vcti gv'eqo r tguukxg'utgpi vj "gs wcvkpi "vq"c"o qf wwu'qh'twr wtg'qh'922"vq": 22"r uk'y cu'cej kxgf "cv' dgy ggp"36"cpf"4: "f c{ u0

34045'Grucle'O qf wwu

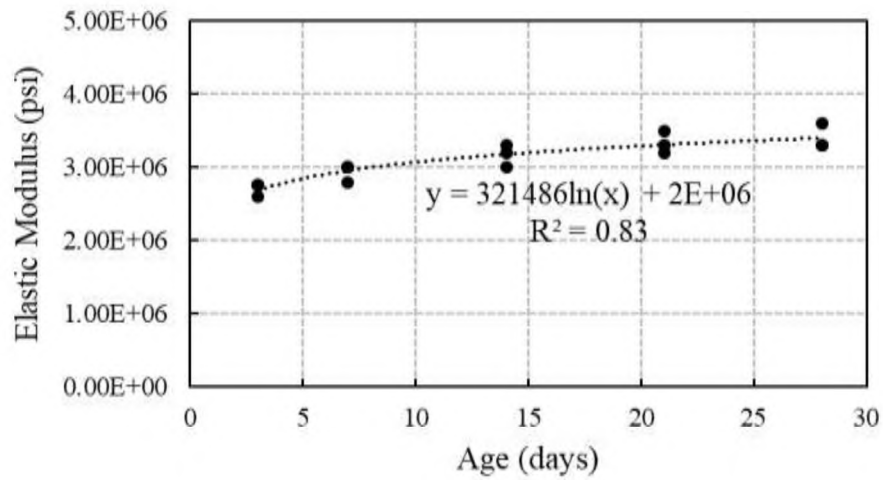
Hqt"Ecuv"3/8."grucle"o qf wwu'vukpi "y cu'eqpf wevgf "y ggm{ "wpvki"4: "f c{ u'qh'o qluv'ewtkpi "y cu" tgcej gf 0Hqt"Ecuv"9/; ."grucle"o qf wwu'vuw'y gtg'qpn{ "eqpf wevgf "cv'vj tgg'cpf "ugxgp"vq"gli j v'f c{ u" chgt"ecuvkpi "ukpeg"vj ku'eqpetvgf"y cu'qpn{ "wugf "hqt"ecuvkpi "vj g"pgy "r cxgo gpv'utgpi vj "hcvki wg" dgco u0Grucle"o qf wwu'tguwu'ctg'kpenmf gf "kp"Vcunl6"Vcdrg"C3"qh'Cr r gpf kz"C0

Hli wtg'6; /Hli wtg'73"uj qy "vj g'f gxnqr o gpv'qh'vj g'ukhpguu'qh'vj g'eqpetvgf'hqt"gej "ecuv0C" uko kct'tgpf "kp"vj g'f gxnqr o gpv'qh'ukhpguu'ku'qdugtxgf "hqt"vj g'eqpetvgf"tqo "cm'ecuv0Vj g'o gcp" grucle"o qf wwu'qh'vj g'eqpetvgf"ku'v{ r lecm{ "dgy ggp"4.722.222"r uk'cpf"5.222.222"r uk'chgt"5"f c{ u" qh'o qluv'ewtkpi 0Chgt"9"f c{ u."vj g'grucle"o qf wwu'qh'vj g'eqpetvgf"uwtr cuugu"5.222.222"r uk0Vj gp." vj g'eqpetvgf"i clpu'ukhpguu'cv'c'f getgcukpi "tcvg"wpvki"vj g'ewtxg"hcwgpu"cv'cr r tqzko cvgn{ "4: "f c{ u0 Vj g'o gcp"4: /f c{ "grucle"o qf wwu"y cu"eqo o qpn{ "dgy ggp"5.522.222"cpf"5.922.222"r uk0Vj g'

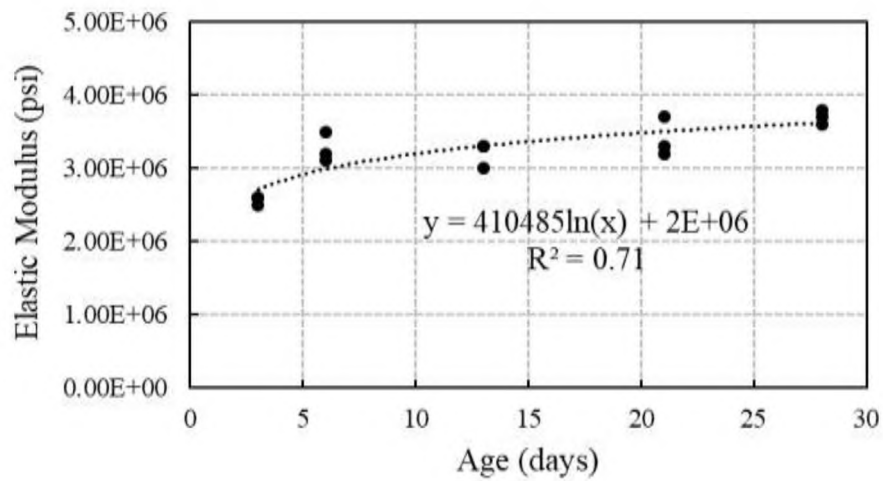
gruile'o qf wwu'xu0\ko g'tgrcvkpuij k'ku'dguv'f ghkpgf'y kj "c'mi ctkj o le'hmpcvkp0Vj g'eqghlekgpu"
qhi'f gvgto kpcvqp"ht"vj g'hkvgf"mi ctkj o le"ewtxgu'y gtg"dgy ggp"202"cpf "20 3."kpf lecvkpi "c'i qqf "
vq'xgt{ 'i qqf 'hk0



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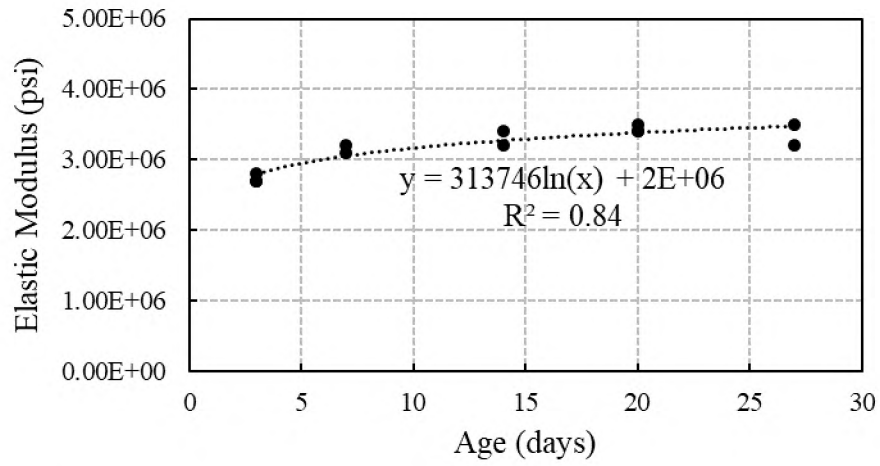


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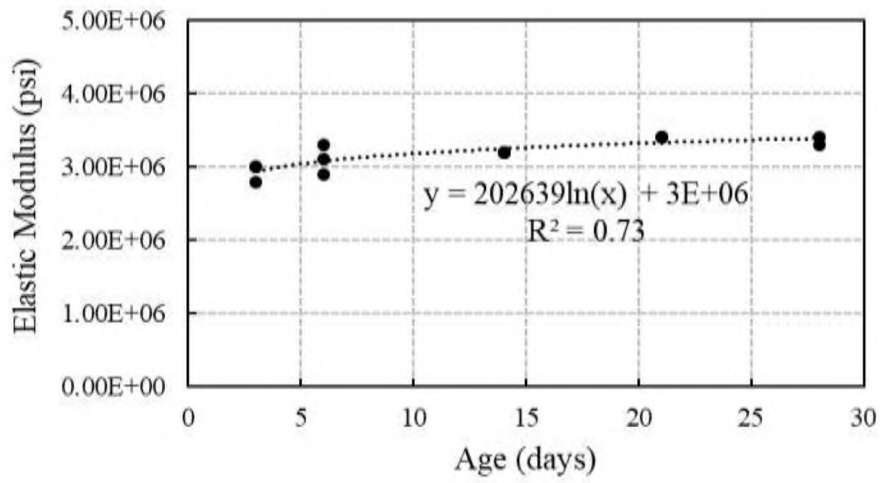


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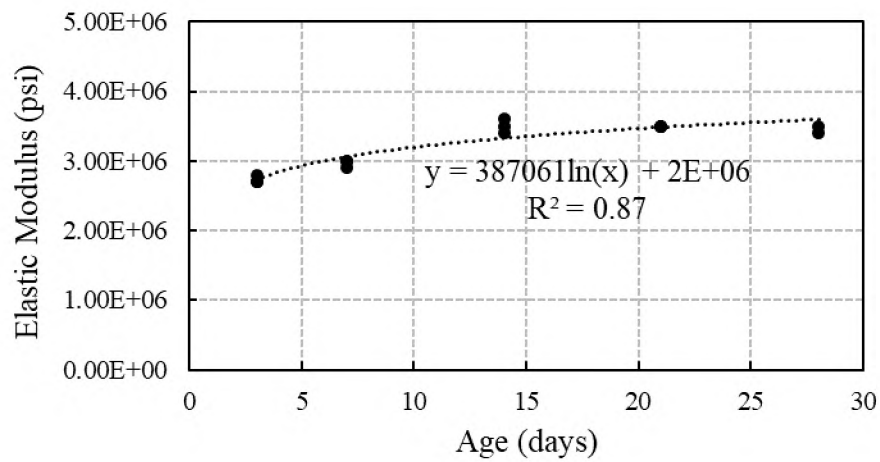
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*c+

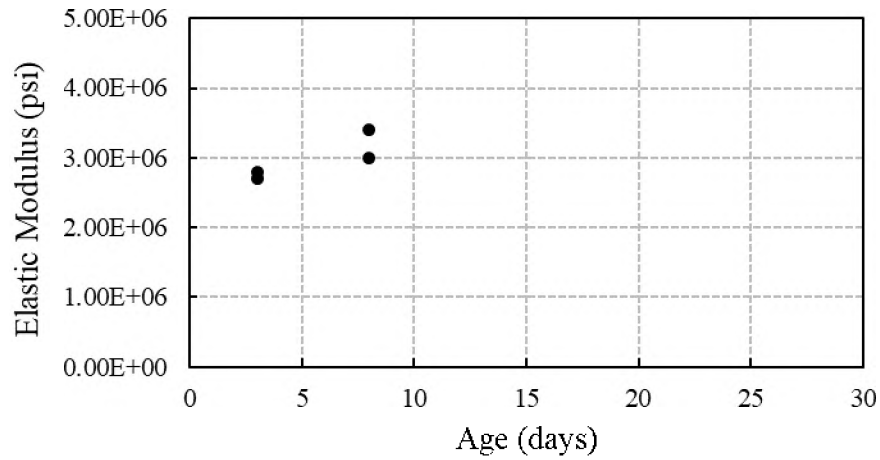


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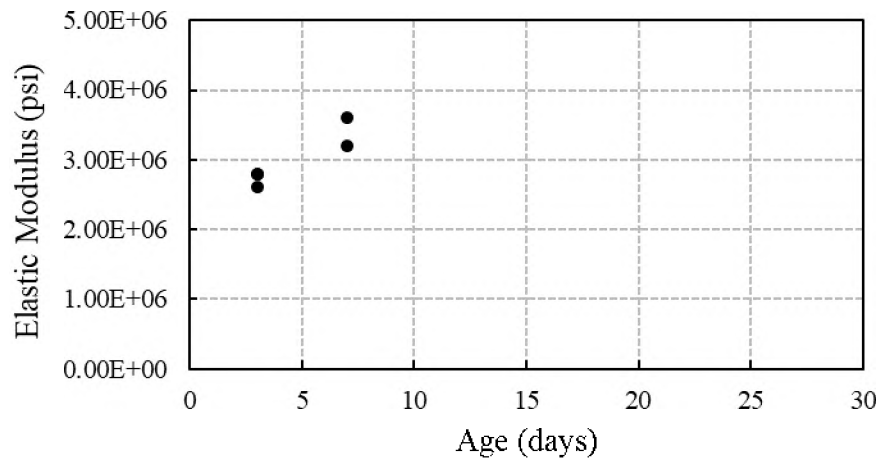


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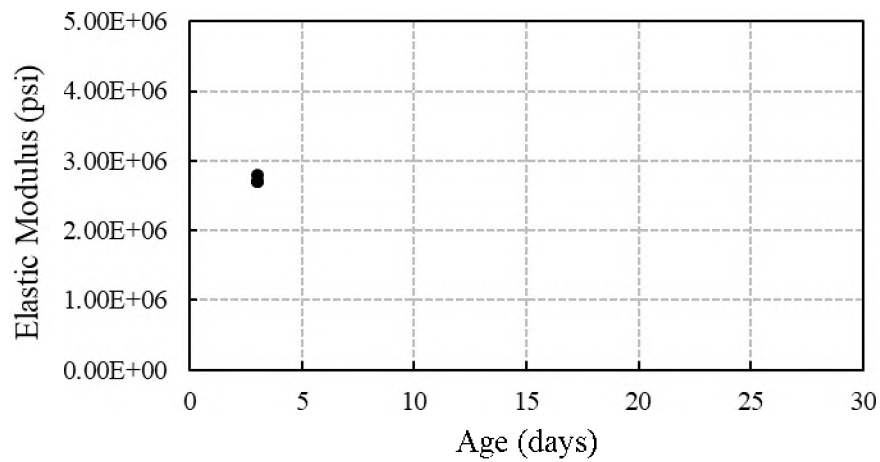
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*c+



*d+



*e+

Hli wtg'73<Gruxle"o qf wwu'i clp"ewtxgu'hqt "%c+'Ecuv'9"%d+'Ecuv': "cpf "%e+'Ecuv"; 0

34045'HlgzwtcnUt gpi y'

HlgzwtcnUt gpi y' "guvpi "y cu'eqpf wevgf "qp"y g'6/kp'd{ "6/kp'd{ "46/kp"eqpetgv"dgco u"vq"
guvdrkuj "y g'4: /fc{ "hlgzwtcnUt gpi y' "i clp"ewtxg0Vj ku'cmqy gf "y g'hlgzwtcnUt gpi y' "vq"dg's wcpwllgf "

hqt"vj g"uco g"uo cmgt"dgco "uk g"vj cv'y cu"wguf "y j gp'r gthqto kpi "vj g'hvki wg"vgvki 0Ur geko gpi'htqo " Ecu'3'y gtg"wguf "hqt"vj ku'r wtr qug0Vj g'hgzwtcn'utgpi vj "qh'vj g"6/kp"d{ "6/kp"d{ "46/kp"dgco u'y cu" cnuq"o gcumtgf "vq"guvdrkuj "vj g"utguu"tcvku"htq"vj g'hvki wg"vgvki ."cu"ucvuf "kp"Ugevkqp"340'C" eqo r ngv'uwo o ct{ "qh'vj g'hgzwtcn'utgpi vj u'hqt"vj ku'dgco "uk g'ku'r tqxkf gf "kp"vj g"Vcum6'Crr gpf kz" C"*Vcdng"C4+0Vj g'hgzwtcn'utgpi vj u'qh'vj g"uo cmgt"dgco u'y gtg"qdugt xgf "vq"dg"cdqw/42' "i tgcvt" vj cp"vj g'hgzwtcn'utgpi vj u'guvko cvgf "wvki "vj g"eqo r tguukxg"utgpi vj u"*Ugevkqp"350+0B+. "o quv'ikng{ " kpf kcvki "c"uk g"ghge'0

Eqpetgv"dgco u'vgvuf "chgt"5"vq"9"fc{ u'hkrgf "gkj gt"o quv{ "ctqwpf "vj g'ci i tgi cvg"qt"vj tqwi j " cpf "ctqwpf "vj g'ci i tgi cvg0Eqpetgv"dgco u'vgvuf "dgvy ggp"36"cpf "4: "fc{ u'hkrgf "gkj gt"vj tqwi j "cpf " ctqwpf "vj g'ci i tgi cvg"qt"o quv{ "vj tqwi j "vj g'ci i tgi cvg0Vj g'hkmt g'f gxgmr gf "kp"vj g'tgi kqp"dgvy ggp" vj g"vy q"mqcf kpi "npgu"htq"gej "gvu'r gthqto gf 0Hki wtg"74"fgv leu"gzco r ngu"qh'v{ r kcn'etcentkpi "cv" hkmtg0

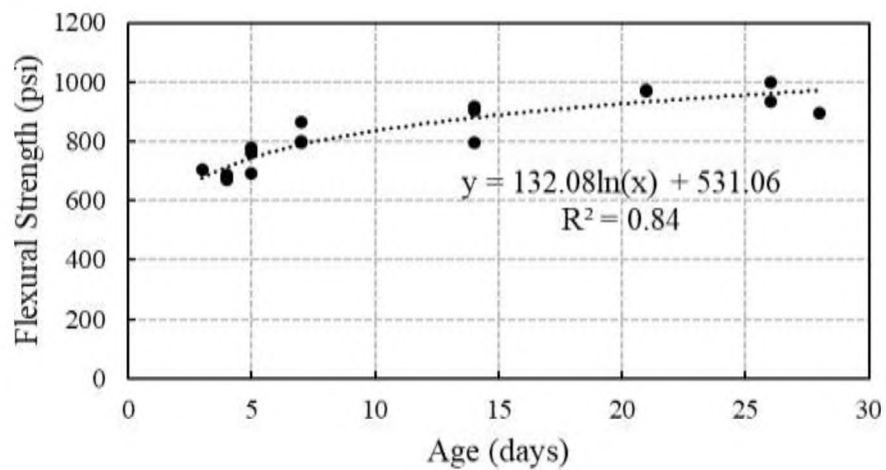




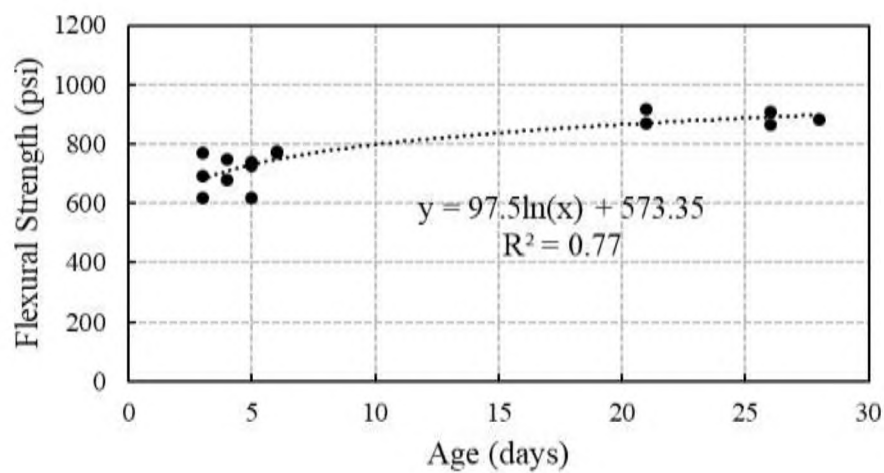
*f +

Hki wtg"74<Hkwtg"etcemu'hqt"*c+"HNaE7aD7"*ci g"? "6/f c{ +*d+"HNaE6aD3"*ci g"? "5/f c{ +*e+"
HNaE8aD: "*ci g"? "39/f c{ +*f +HNaE5aD34"*ci g"? "42/f c{ +0

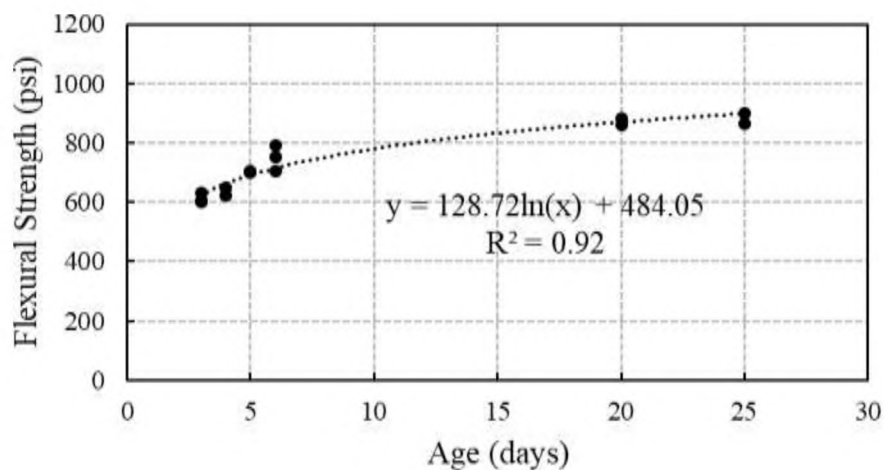
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utgpi vj "i clp"ku'qdugtxgf 'hqt"cm'ecuv0Vj g'o gcp'hgzwtn'utgpi vj "qh'vj g'eqpetgv'y cu'qdugtxgf "vq"
dg"dgwy ggp"822"cpf"922"r uk'cv'5"f c{ u0Vj g'o gcp'hgzwtn'utgpi vj "kpetgcugf "d{ "72"vq"322"r uk'
dgwy ggp"f c{ u'5"cpf"80C'htg"9"f c{ u'qh'o qkv'ewtkpi . "vj g'hgzwtn'utgpi vj "f gxgnr gf "cv'c'f getgcukpi "
tcv0Hqt"gecj "ecuv."vj g'hgzwtn'utgpi vj "i clp"dgwy ggp"43"vq"4: "f c{ u'y cu'pgi rki kdg0Vj g'hgzwtn'
utgpi vj "i clp"ewtxgu"ctg"dguv'hw"y kj "c"qi ctkj o k"qt"r qy gt"hwpevkp0'Vj g'eqghlekpwu"qh'
f gvto kpcvkp'hqt"vj g'hwgf "qi ctkj o k"cpf "r qy gt'ewtxgu'y gtg"dgwy ggp"209"cpf"20 6."kpf lecvpi "
c"i qqf "vq"xgt{ "i qqf "hw0Uqo g"xctkcdkvw{ "y cu'qdugtxgf "kp"vj g'hgzwtn'utgpi vj u'cv'gctn{ "ci gu."
gur gekm{ "hqt"Ecuv"3"cpf"40Hqt"cm'ecuv."vj ku'xctkcdkvw{ "kp"vj g'hgzwtn'utgpi vj "f getgcugf "chgt"
36"f c{ u0Vj gug"qdugtxcvkpu"ctg"cu"gzr gevfg . "cu'eqpetgv"dgco u'ctg"cpvlekv cvgf "vq"j cxg"c"rti gt"
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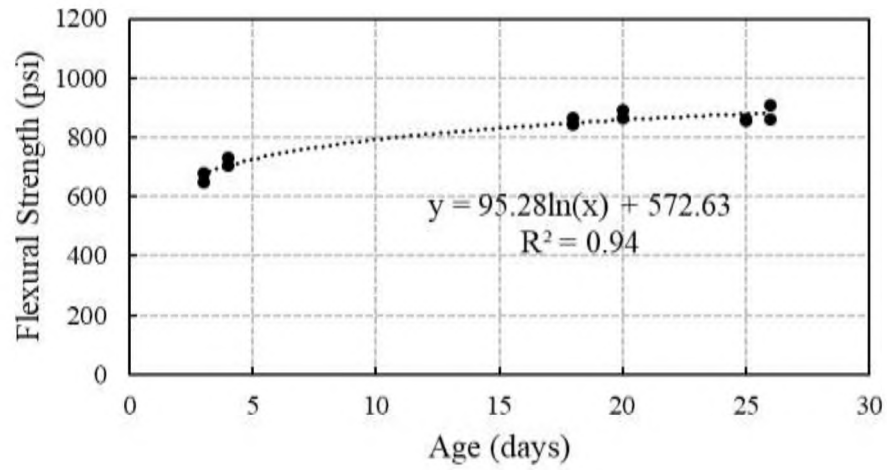


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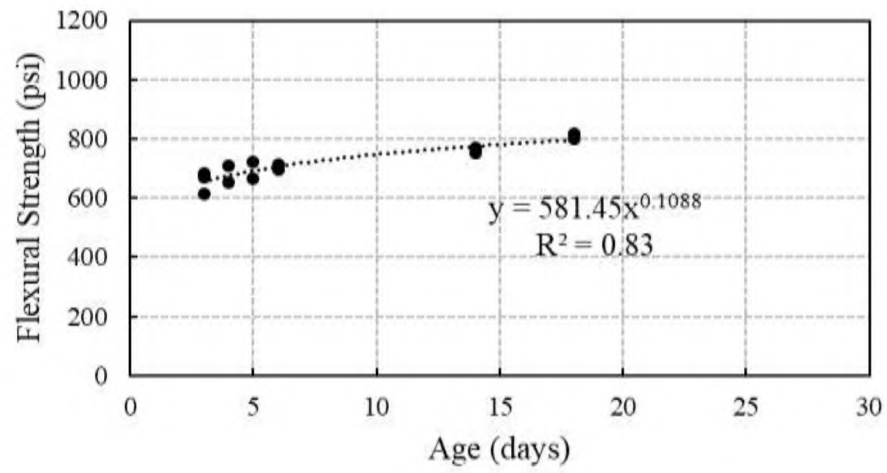


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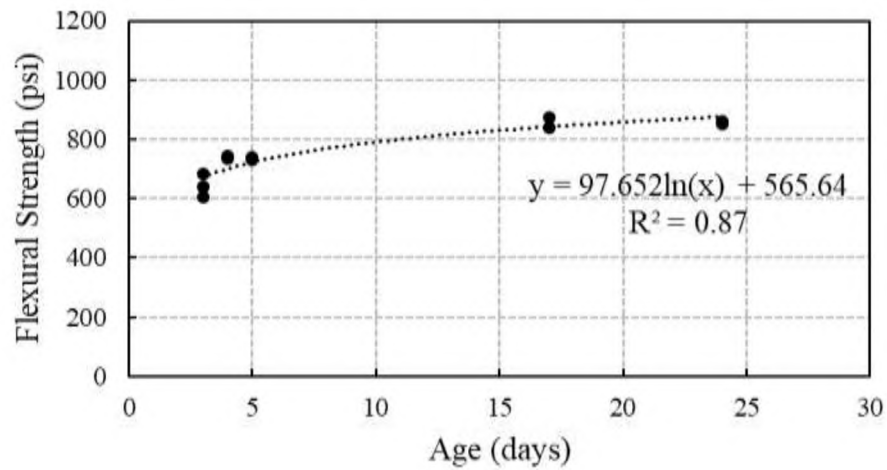
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*c+

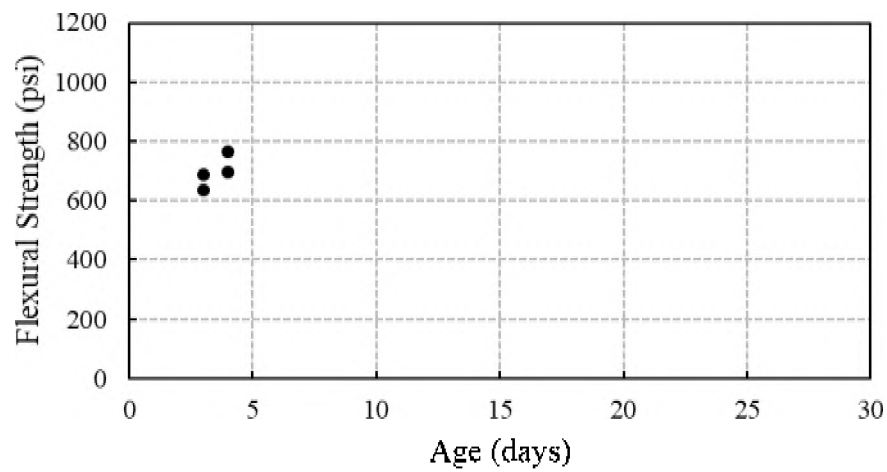


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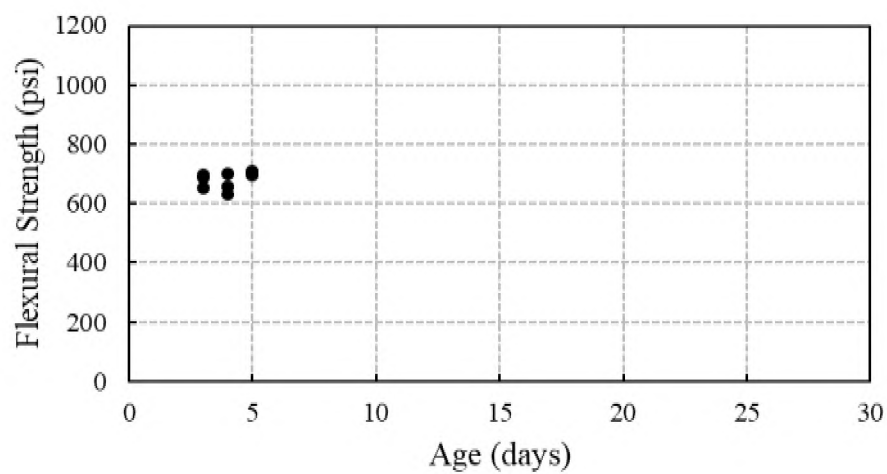


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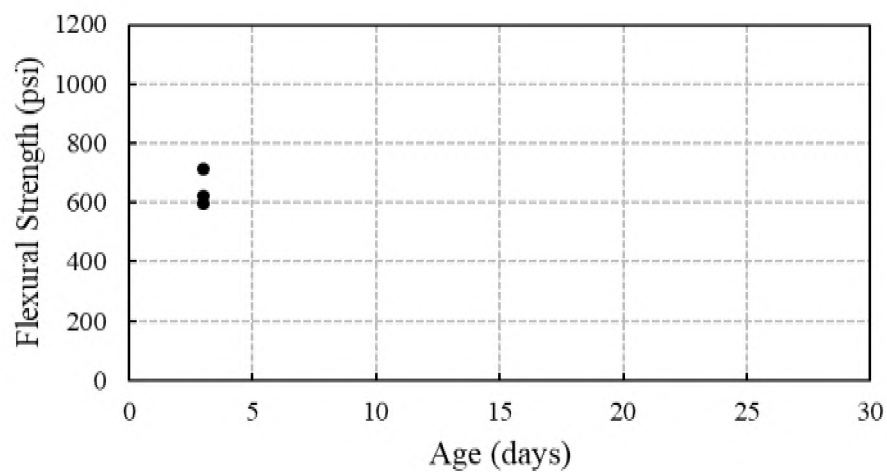
Hki wtg'76<Hgzwtcn'lutgpi vj 'i clp"ewtxgu'hqt '*c+'Ecuv'6'*d+'Ecuv'7"cpf '*e+'Ecuv'80



*c+



*d+



*e+

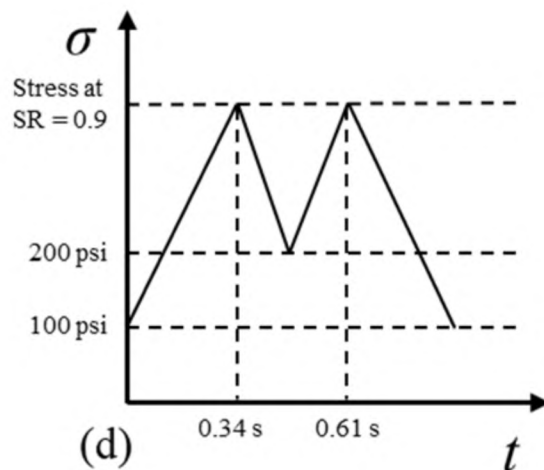
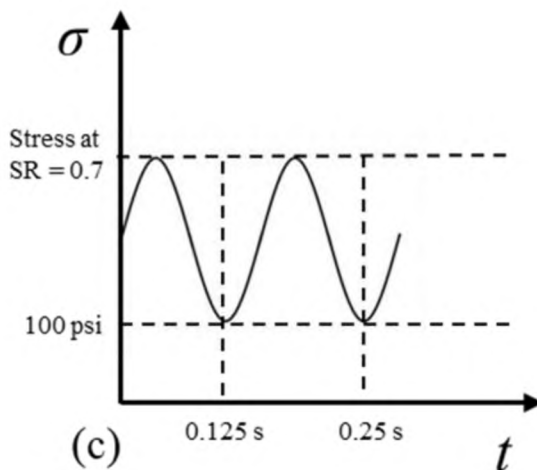
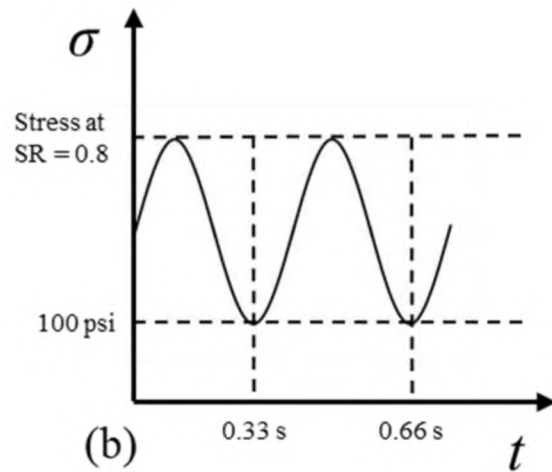
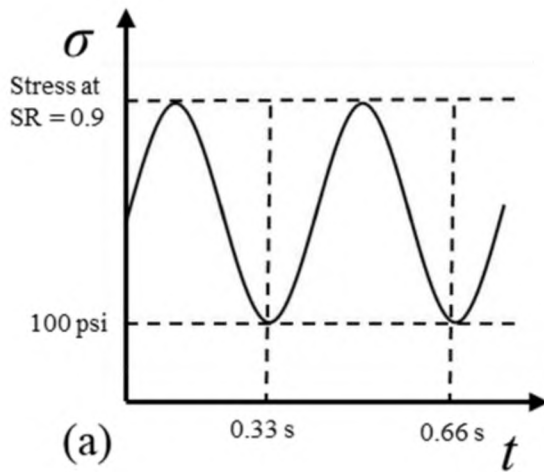
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Vj g'hc'ki wg"rhg"qh"eqpetgv"uxdlgevgf "vq"utguu"rgxgnu"uko krt"kp"o ci pkwf g"vq"vj g'utguu"vj cv' f gxgnr u'lp'c'r cxgo gpv'f wg'vq'uwr gtrqcf u'y cu'gxcnwcvgf 0Vj tgg'utguu'tcvku"*Ugevkqp"340403+y gtg" kpxgunki cvgf "hqt"vy q'f khtgpv'utgpi vj u"*Ugevkqp"340404+0C"vqcn'qh"4: "eqpucpv'co r nkwf g'hc'ki wg" vguu'y gtg"eqpf wevgf "wukpi "ur geko gpu'hqo "Ecuu"3/6."cu'uj qy p"lp"Vcdrg"3: 0Vj g'utguu'r tqhkgu" wugf "lp"vj g'eqpucpv'co r nkwf g'vukpi "ctg'r tqxkf gf "lp"Hli wtg"780

Vcdrg"3: <P wo dgt"qh'eqpucpv'co r nkwf g'vuu'hqt"gcej "ecuu0

Ecuu	Pgy 'Rcxgo gpv' Utgpi vj	Qrf 'Rcxgo gpv' Utgpi vj
3	2	7
4	7	8
5	8	3
6	6	2



Hki wtg'78<Ut guu'r tqhkgu'wugf 'lp'yj g'eqpuv'co r rkwf g'vuglpi '*c+'ulpi ng'czng'cv'c'ut guu'tcvkq'?"
 2Q '*d+'ulpi ng'czng'cv'c'ut guu'tcvkq'qh'2Q '*e+'ulpi ng'czng'cv'ut guu'tcvkq'?"2Q"cpf '*f+'vcpf go 'czng'cv'
 c'ut guu'tcvkq'qh'2Q 0

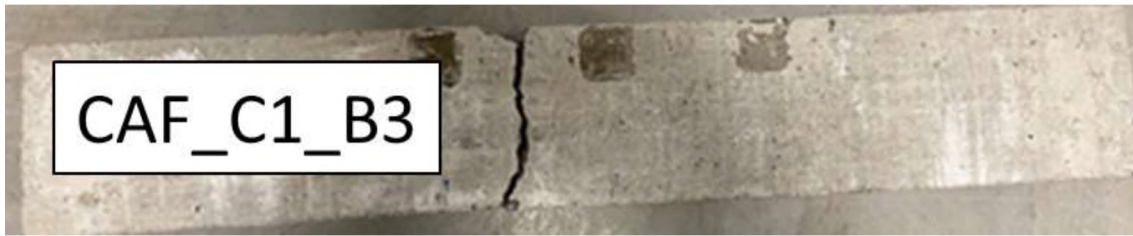
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 y gtg'vugf 'cv'dgy ggp'36"v'4: 'f c{u'chgt'ecv'pi 0Vj g'pwo dgt'qh'vugu'r gthqto gf 'lp'gcej 'vug'egm'
 lp'yj g'g'zr g'ko gpv'nf g'uki p'o cvkz 'hqt'yj g'pgy "r cxgo gpv'utgpi vj 'y cu'kpetgcugf 'ftqo '5"v'6'f wg'vq"
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 cm'eqpetvg"dgco u'ku'lp'Vcunl6'Cr r gpf kz 'D'*Vcdrg'D3+0Vj g'ut wewtcn't gur qpug'f cv'eqmgevgf 'hqt"
 gcej 'hvki wg'vug'ku'cnuq'lp'v'nf gf 'lp'Vcunl6'Cr r gpf kz 'D'*Hki wtgu'D3/D4: +0

3408 "Hicewtg

Vj g"hicewtg"dgj cxlqt "qh"eqpetgvg"dgco u"vgugf "kp"eqpucpv"co r rkwf g"hcvi wg"y cu"uko kct "vq"vj g" hicewtg"dgj cxlqt "qdugt xgf "f wtkpi "hgz wcn'utgpi yj "vgukpi 0Eqpetgvg"dgco u"vgugf "chgt '5"q'9"fc{u" hckrgf "gkj gt"o quw{ "ctqwpf "vj g"ci i tgi cvg"qt "vj tqwi j "cpf "ctqwpf "vj g"ci i tgi cvg0Eqpetgvg"dgco u" vgugf "dgw ggp"36"cpf "4: "fc{u"hckrgf "gkj gt"vj tqwi j "cpf "ctqwpf "vj g"ci i tgi cvg"qt"o quw{ "vj tqwi j " vj g"ci i tgi cvg0

F wtkpi "vj g"hcvi wg"vgukpi . "pq" xkuwn'uki pu"qh"etcentpi "y cu"qdugt xgf "wpvkl" yj g"etcent' f gxgnr gf "cv'hckwtg0Vj g'hckwtg"f gxgnr gf "kp"vj g'tgi kqp"dgw ggp"vj g"vy q"mqcf kpi "hpgu'hqt"gej " vgu'r gthqto gf 0Hki wtg"79"f gr kw"gzco r ngu"qh'v{r kcn'etcentpi "cv'hckwtg0Wf qp"xkuwn'kpur gevqp." 38"qh'vj g"4: "eqpetgvg"dgco u"vgugf "kp"eqpucpv"co r rkwf g"hcvi wg'hckrgf "y kj kp"4"lpej gu"qh'vj g'egpvt" qh'vj g'dgco 0Vj g'tgo cklpi "34"eqpetgvg"dgco u'hckrgf "y kj kp"vj g'vgpukp"l qpg'dw'dg{ qpf "4"lpej gu htqo "vj g'egpvt"qh'vj g'dgco 0Vj g'mecvqp"qh'vj g'hckwtg"etcentku'r ctvkwctn{ "ko r qtcvpv"q"lpvtr tgv vj g'dgpf kpi "utckp"o gcwtgo gpw."cu" f guetkdgf "kp"Ugevqp"3505070





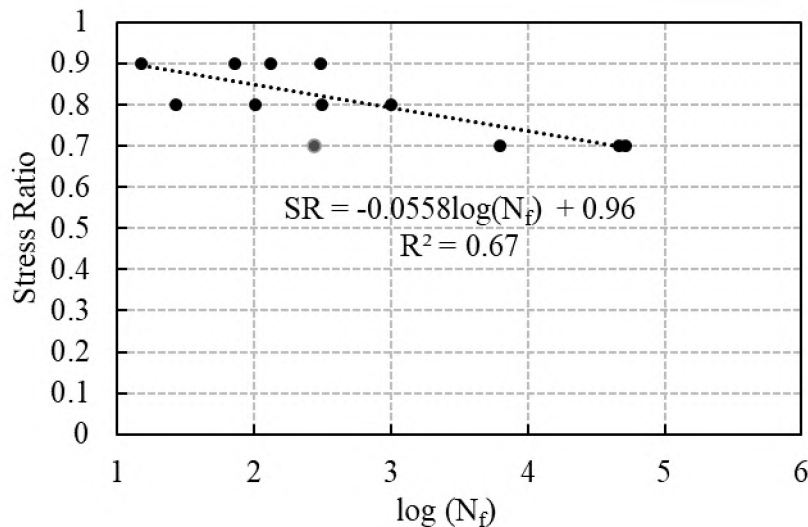
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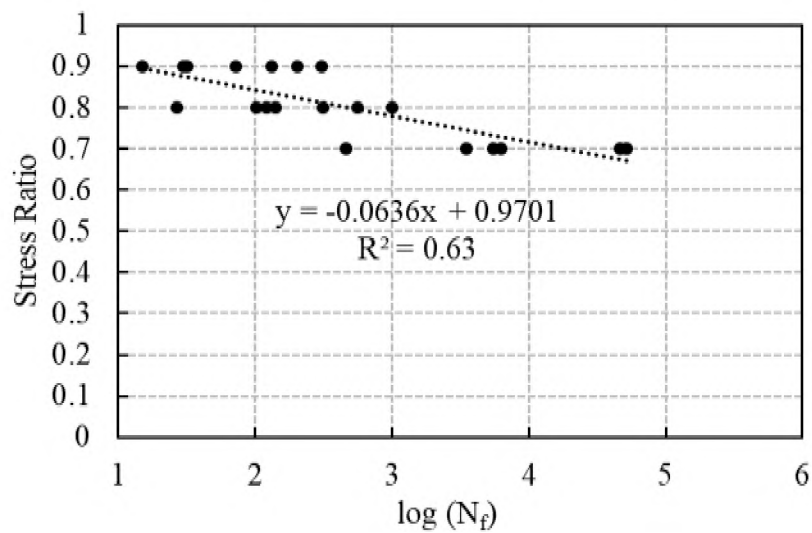
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rtqhggu'tguwnkpi "h'qo "c"ulpi ng"czng"mqf "y gtg"lplkm{ "eqpukf gtgf 0'Vj g"UP"ewtxgu"ht"pgy "
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Hki wtg'Hki wtg'7: c."yj gtg'y cu'cp"qwdgt"gzemf gf "h'qo "yj g'tgmvkpuj k"%EChE4aD5+0Ur geko gp"
EChE4aD5"j cf "c'hcvi wg'nhg"qh'498"e{ engu'cv'c'utguu'tcvkq"qh'200Vj ku'dtgcm'qeewtgf "cv'o qtg"
yj cp'y q'qtf gtu'qh'o ci plwf gu'qh'e{ engu'gctnkt "yj cp'cpv'ekr cvgf "dcugf "qp"yj g'tguwnu'hqt "c'uko krt
uwf { "h'w'pf "lp"yj g'rkgtcwtg"%Ej cvk "gv'cr0'422; +0Wf qp"xkwnk'pur gev'kp."yj g'dgco "h'k'gf "pgct"cp"
gpv'crr gf "ck"xqlf 0'Vj g"eqgh'ekgpv'qh'f gyto kpcv'kp"y cu"lpetgcugf "h'qo "206"vq"2089"y kyj "yj g"
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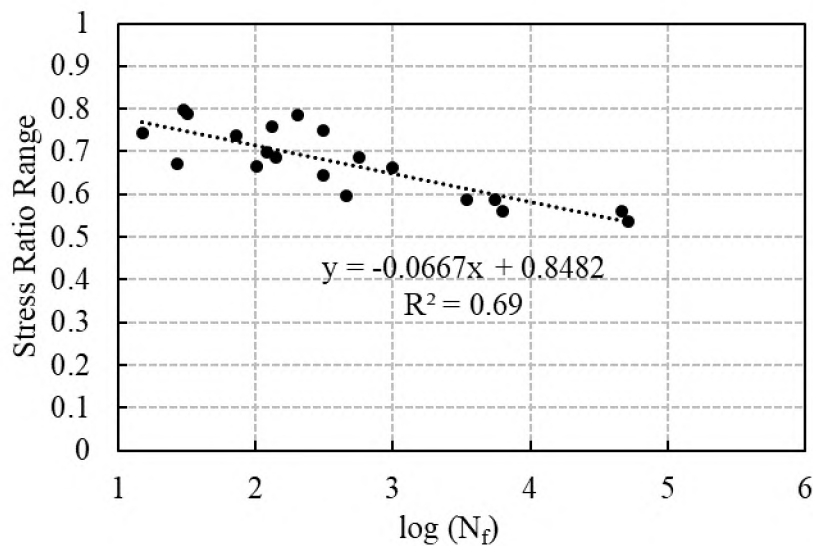


*c+

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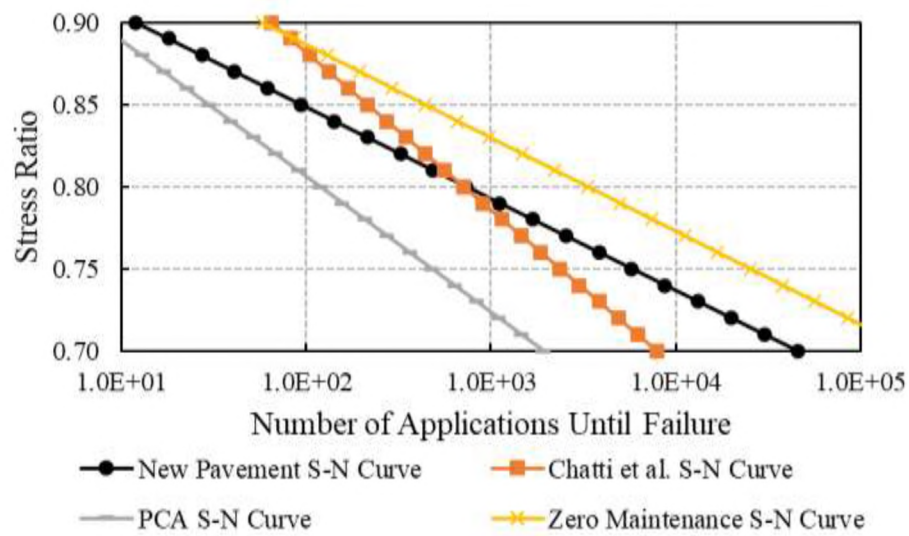
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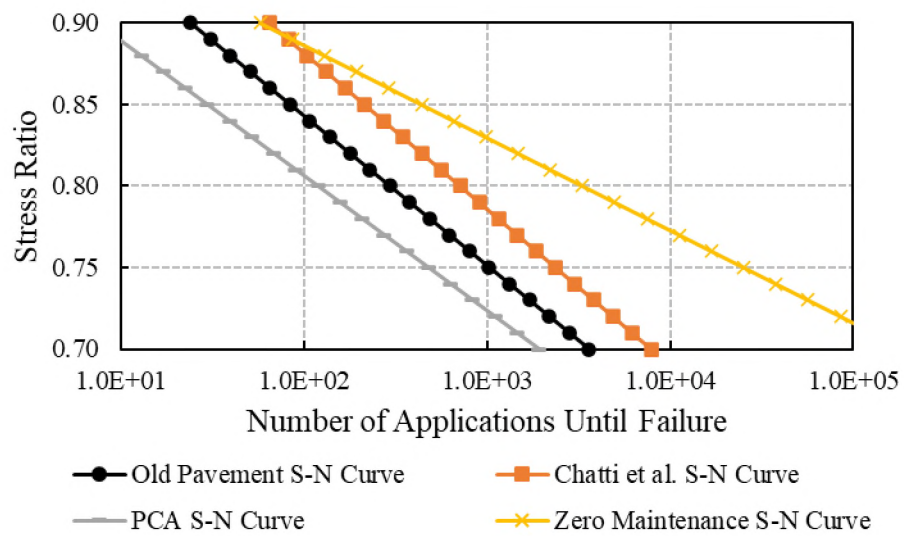
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- " Hgzwtcn'dgco "uk g
- " Nqcf kpi "v{r g
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- " Hgzwtcn'utgpi vj
- " O kpl'o wo "nqcf "dgwy ggp"eqpug'w'xg" h'vki wg"e{ergu

Vj g"eqo dlp'cv'kpu"qh'r ctco gvtu'tgr t gupv'gf "lp"vj g" f'cvc"ugv'wugf "hqt"vj g" f'gxgr o gpv'qh'vj g" \ gtq/O clpvgpcpeg"UP "ewtxg" { krf "c" uko krt "qwr w"v"vj g" pgy "r cxgo gpv"UP "ewtxg."cpf "vj g" eqo dlp'cv'kpu"qh'r ctco gvtu" wugf "lp"vj g" f'cvc"htqo "vj g"REC"UP "ewtxg" { krf "c" uko krt "qwr w"v"vj g" qrf "r cxgo gpv"UP "ewtxg0Cu"uj qy p"lp"vj ku"uwf { ."k'o c{ "dg" d'gpg'h'ekcn"v" ceeqwpv'htqo "utguu"tcpi g" cpf "vj g"uk g"gh'gev'lp"vj g" r tgf k'v'kp"qh'h'vki wg" f'co ci g0

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*c+



(b)

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Czrg'Vf rg

Vj g'f'wki wg'rhg'qh'eqpetgw'dgco u'uwldgevgf "v'ulpi rg'cpf "vcpf go "czrg'utguu'r tqh'ngu'cv'c" utguu'tcvkq"qh'20 "Hli wtg"78c/d+y gtg'eqo r ctgf "v'gzco kpg'yj g'ghgeu"qh'czrg'v(r g0Vj g'tguwu" hqo "yj gug'eqpuwcpv'co r rkwwf g'v'guu'ctg'i kxgp'lp"Vcdrg"430Wr qp'lpkkn'qdugtxcv'kp."yj g'tguwu'ctg" qp'yj g'uco g'qtf gt'qh'o ci pkwf g'hqt"geej "czrg'v(r g0Cu'uj qy p'lp"Vcdrg"44."c'v'guv'y cu'eqpf wevgf " vq'f g'vto kpg'h'yj gtg'y cu'c'ucv'wkecnf k'htgpeg'dgy ggp'yj g'y q'o gcpu0Vj g'ghgev'qh'yj g'o k'lo wo " utguu" dgy ggp"r gcmu" hqt" vcpf go "czrgu"y cu'uj qy p"v"dg"lpuki p'k'ecpv"y kj "c"; 7 "rgxgn'qh" eqphf gpeg'hqt"c'utguu'tcvkq"qh'20 ."cu'lpf k'ecvgf 'lp'yj g'ucv'wkecn'v'guu0

Vcdrg"43<P wo dgt'qh'e{ engu'v'f'ckwtg'hqt'ulpi rg'cpf "vcpf go "czrgu'cv'c'utguu'tcvkq"qh'20 0

Hgzwt cnUt gpi yj	Upi rg'Czrg'cvUT'? '20	Vcpf go 'Czrg'cvUT'? '20
P gy 'Rcxgo gpv	P _H ? '37 P _H ? '95 P _H ? '353 P _H ? '52:	P _H ? "34"*45'r gcmu+" P _H ? "332"*442'r gcmu+" P _H ? "359"*495'r gcmu+
Qrf 'Rcxgo gpv	P _H ? '5 P _H ? '52 P _H ? '54 P _H ? '424	P _H ? '9"*35'r gcmu+" P _H ? "33"*44'r gcmu+" P _H ? "73"*323'r gcmu+

Vcdrg"44<Ucwkuecnluki pkkcepeg"qh"vj g"fhgtgpeg"dgvy ggp"vj g'o gcp"qh'hcvi wg'rhg'hqt"ulpi ng"
czrg"cpf "vcpf go "czrgu'cv'c"utguu'cv'q"qh'20 0

Hgzwt cñUt gpi vj	Pgy 'Rcxgo gpv	Qrf 'Rcxgo gpv
Cxgtci g'Ulpi ng'Czrg'E {ergu'vq'Hckwt g	354	89
Cxgtci g"Vcpf go 'Czrg'E {ergu'vq'Hckwt g	394	67
Ucpf ctf 'F gxlcwqp"qh"Ulpi ng'Czrg'E {ergu'vq'Hckwt g	349	; 3
Ucpf ctf 'F gxlcwqp"qh"Ulpi ng'Czrg'E {ergu'vq'Hckwt g	354	6:
P wñJ { r qj guku	3/ 4? 2	3/ 4? 2
vucwue	2063	/206:
F gi tgg"qh'Hggf qo	7	7
Uki pkkcepeg	2027	2027
r /xcnwg	202	204

3406''Fghgevkqp

Vj g"egpvt"f ghgevkqp"f cvc"o gcwtgf "y kj "vj g"NXF Vu"y cu"wkñ gf "vq" gxcnwvg"vj g"pqprkpgct"
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F ghgevkqp"f fhgtgpeg"ku"fhkpgf "cu'hqmjy u<

*Deflect on 'D ffè"ence *DD^`:" m x /" ^`:" m n* *6; +

y j gtg.

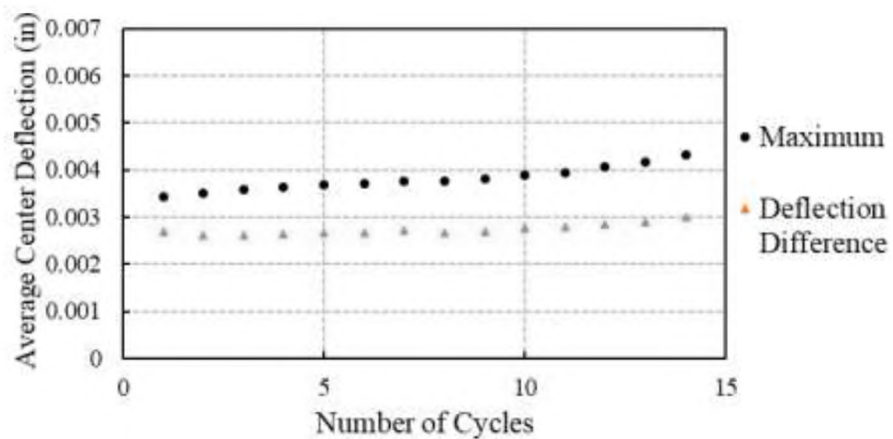
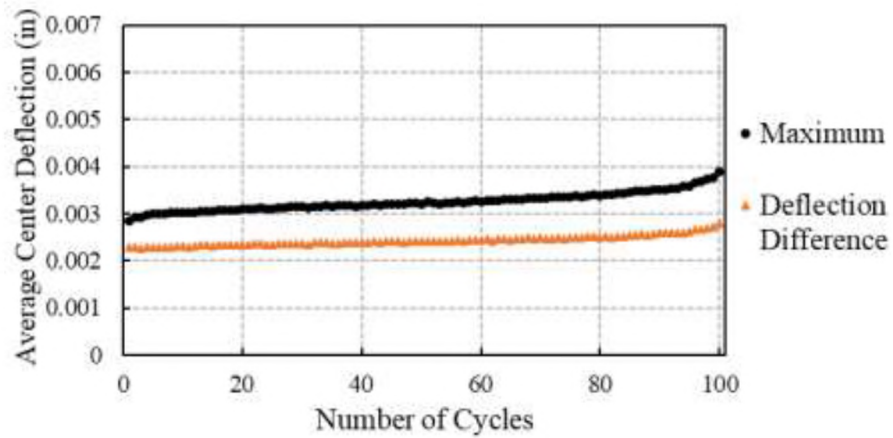
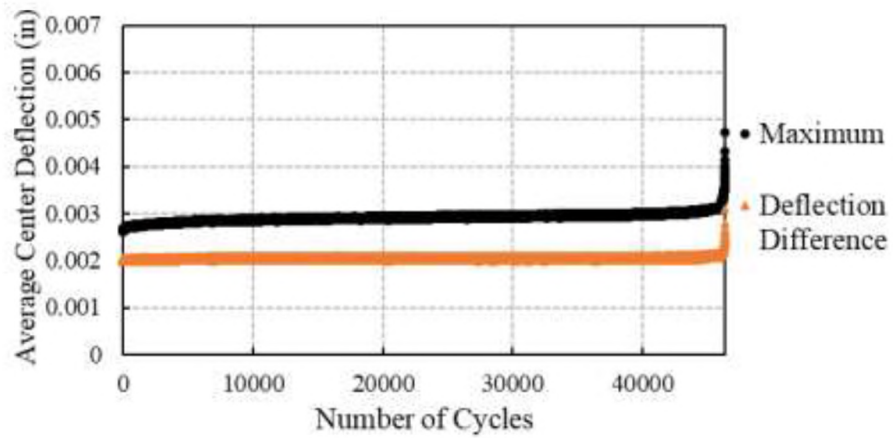
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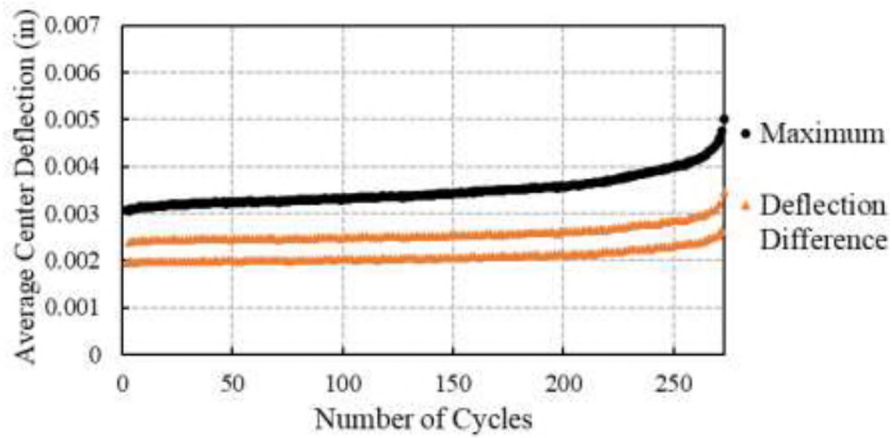
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`\`m"n ? "vj g'o kpo wo "cxgtci g"egpvt"f ghgevkqp"ht"e{erg"ko ku"

Vj g'o czko wo "cxgtci g"egpvt"f ghgevkqp"cpf "f ghgevkqp"f fhgtgpeg"xu0'pwo dgt"qh'e{ergu"
r mvt"ht"gej "eqpuvcpv'co r rkwf g'hcvi wg'vguv"ku'lpnw gf "lp"vj g"Vcum6'Cr r gpf kz'D0Hki wtg'84"uj qy u"
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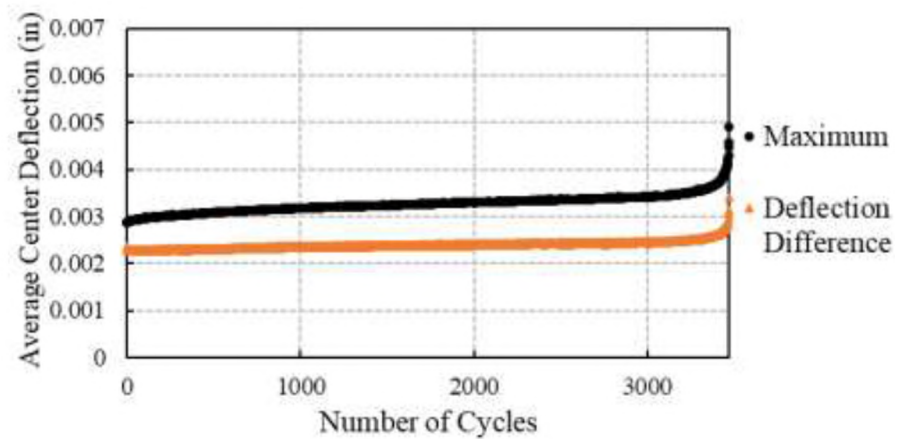




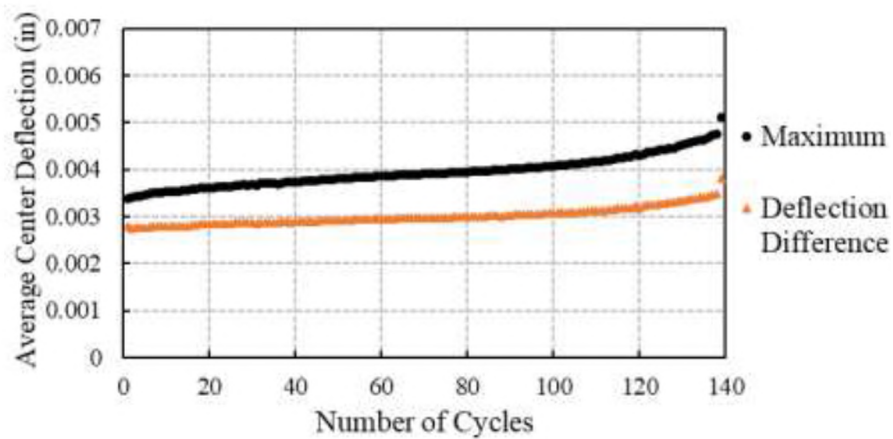
*f +

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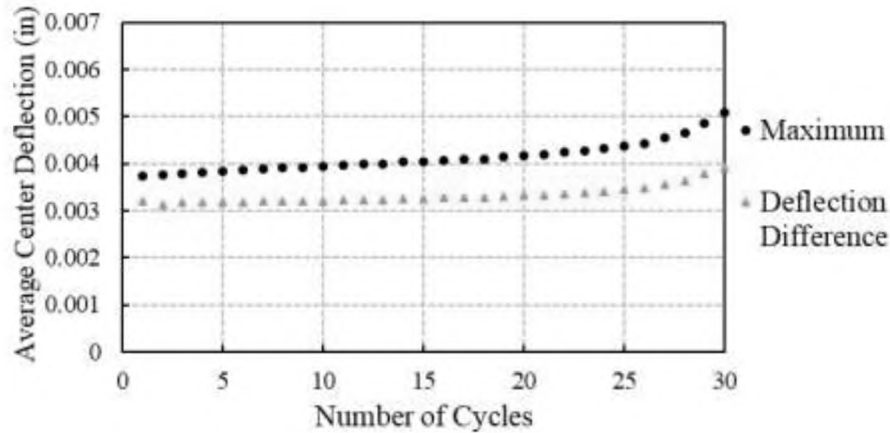
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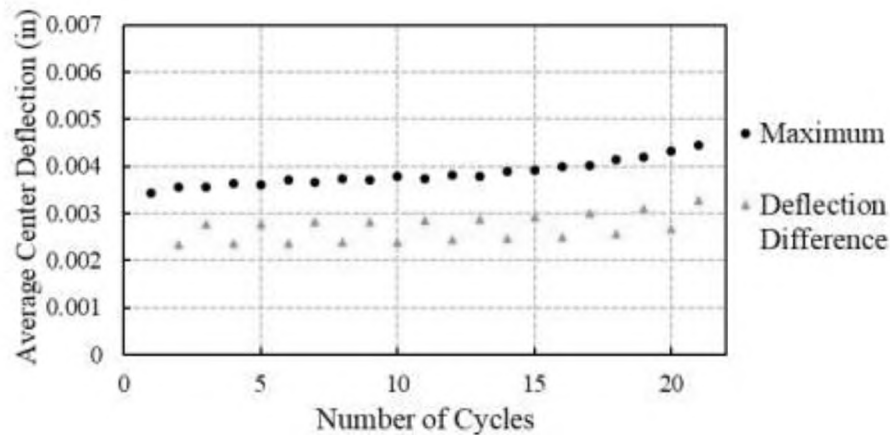
*c +



*d +



*e+



*f+

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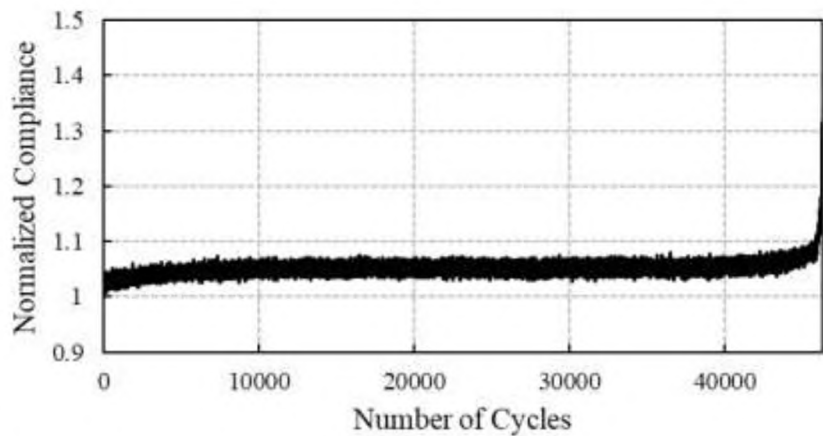
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Vj g"o czko wo "cxgtci g'egpwt"f ghgevkp"cpf"f ghgevkp"f khtgpeg"lpetgcugf"y kj "utguu"
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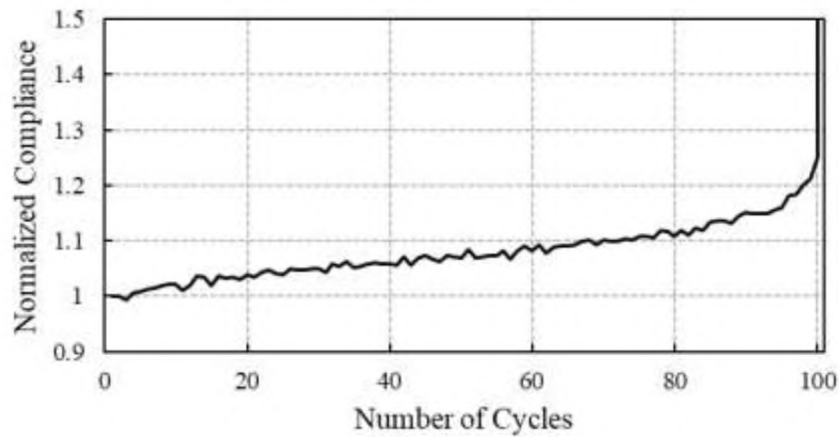
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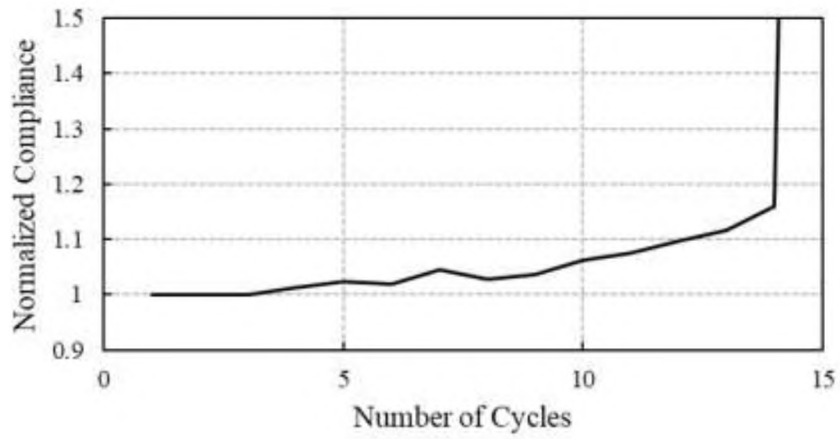
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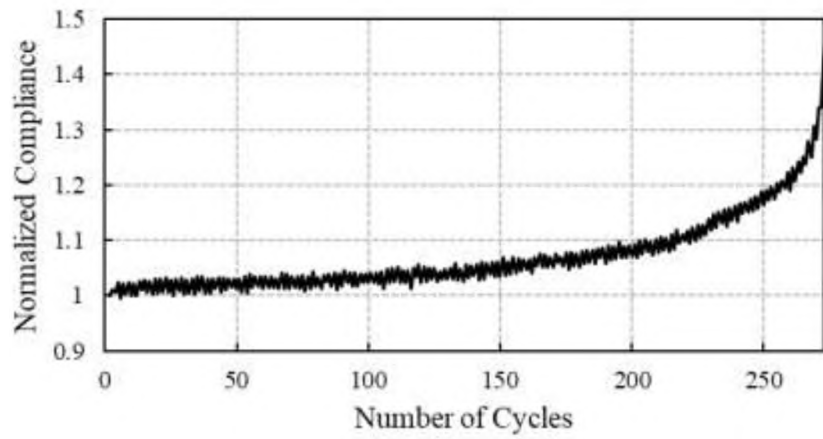
(a)



*d+



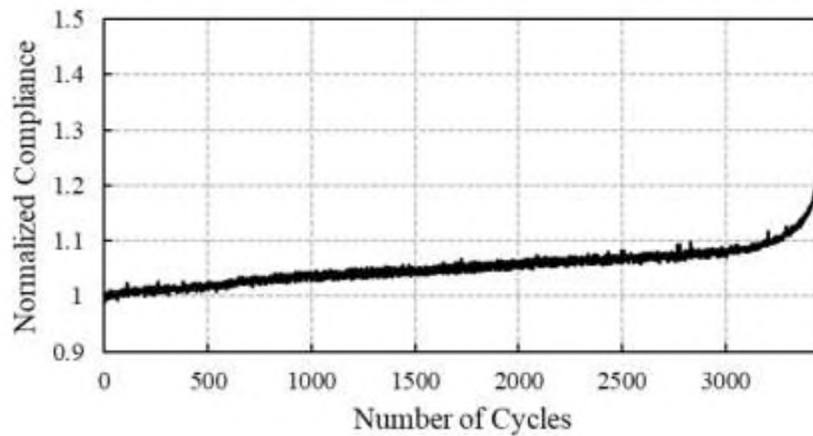
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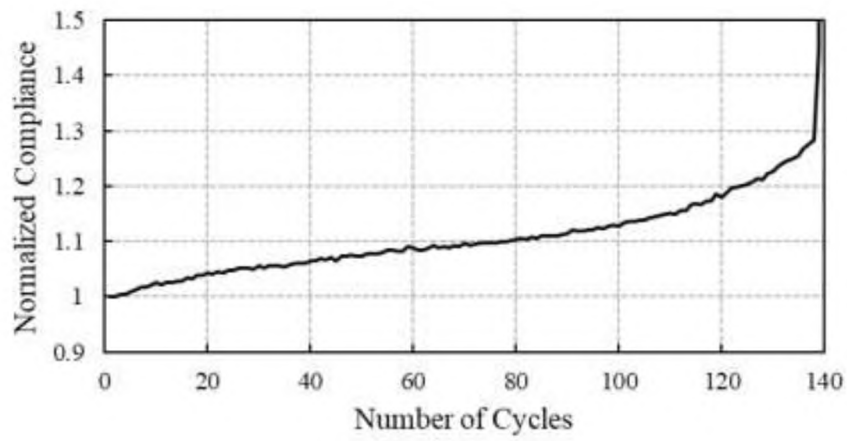
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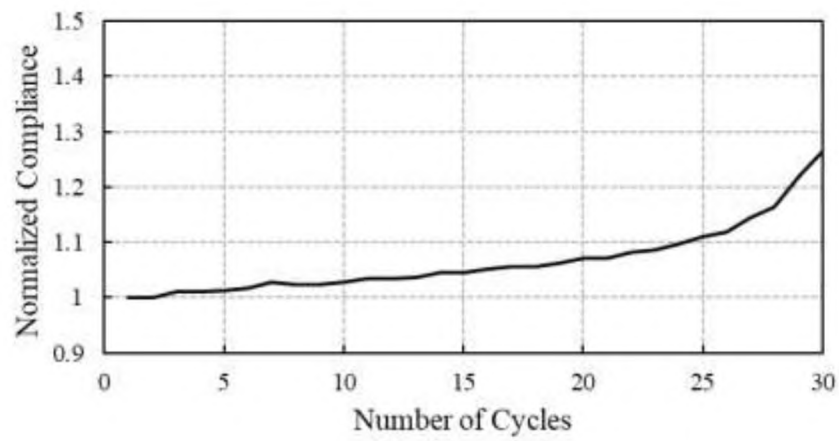
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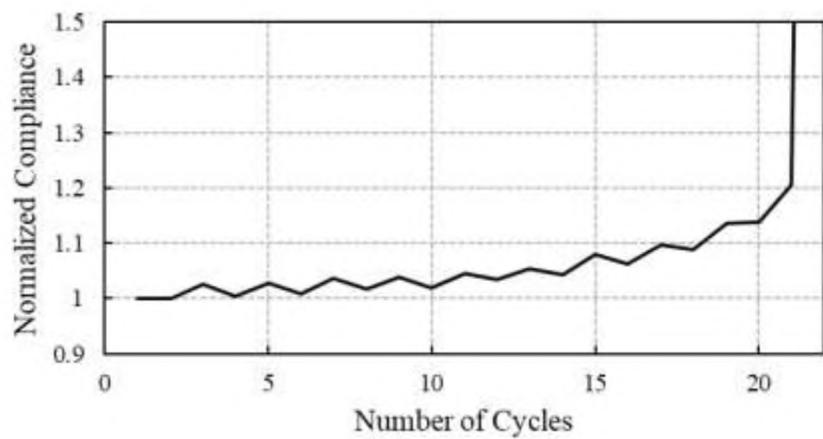
*c+



*d+



*e+



*f+

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Cu'uj qy p"lp"vj gug"lki wtgu."vj g"pqto crk gf "eqo r rlcpeg"y cu"qdugt xgf "vq"lpetgcug"lp"vj tgg" r j cugu0"lp"vj g"lkuw'32"vq'37' "qh"vj g"lcvki wg"rlkg"qh"vj g"eqpetgvg."vj g"pqto crk gf "eqo r rlcpeg" lpetgcugu"cv"cf getgcupl "tcvg0Vj gp."vr "wpvklcdqw'92' "vq": 2' "qh"vj g"lcvki wg"rlkg"qh"vj g"eqpetgvg." vj g"pqto crk gf "eqo r rlcpeg"lpetgcugu"rkgctn(0Ncuw(."lp"vj g"lpcn'r qt vqp"qh"gej "lcvki wg"rlkg."vj g" pqto crk gf "eqo r rlcpeg"lpetgcugu"cv"cf uki plklecpw("lpetgcupl "tcvg0Vj g"o clqtkv("qh"pqto crk gf " eqo r rlcpeg"lpetgcug" *kq0"ukhpguu"mquu"ku" qdugt xgf "vq" qeewt "chgt"92' "qh"vj g"lcvki wg"rlkg"ku" eqpuwo gf 0Vj ku"lpf kcvgu"vj cv'uw r gtmcf "utguugu"ctg"o qt g"f co ci lpi "vq"vj g"eqpetgvg"y j gp"cr r rkgf " lp"vj g"lcvgt"r qt vqp"qh"vj g"lcvki wg"rlkg"cpf "hguu"f co ci lpi "y j gp"cr r rkgf "gctrkg"lp"vj g"lcvki wg"rlkg0

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3400'"Dgpf lpi 'Utlcp

Vj g"dgpf lpi "utclp"o gcuwtgf "y kj "vj g"utclp"i ci gu"y cu"cuq"wnk gf "vq" gxcnvcg"vj g"pqprkgct" r tqi tguukp"qh" f co ci g"lp"vj g"eqpetgvg0' Hqt" gej "dgco "kpwtwo gpvgf"y kj "utclp"i ci gu."vj g" o czko wo "dgpf lpi "utclp"cpf "utclp" f khtgpeg"y gtg"r mwgf "cu"cf hwpvqp"qh"vj g"pwo dgt"qh'e{ engu0' Utlcp" f khtgpeg"ku" f ghkgf "cu"lqmjy u" *Gs wcvqp'72+<

$$St^{\sim} a n^{\sim} D f f \hat{e}^{\sim} e n c e^{\sim} S D^{\sim} \quad \varepsilon_{\hat{m}^{\sim} x} / " \quad \varepsilon_{\hat{m}^{\sim} n} \quad *72+$$

y j gtg.

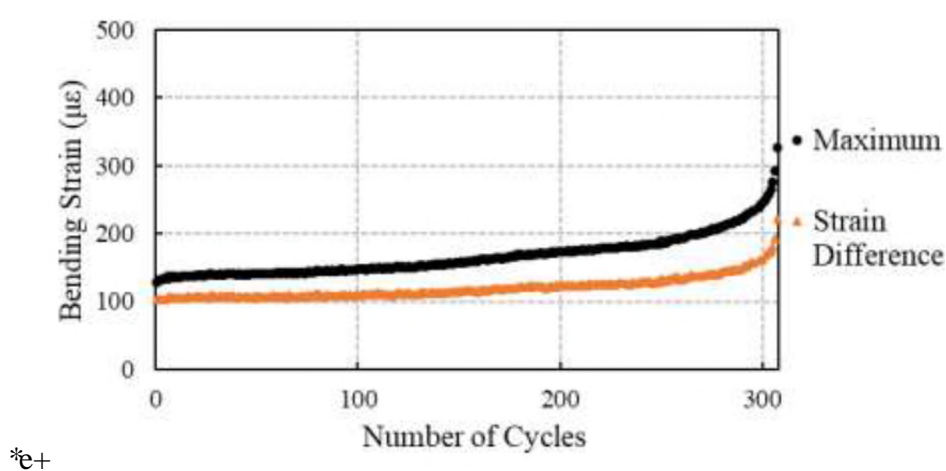
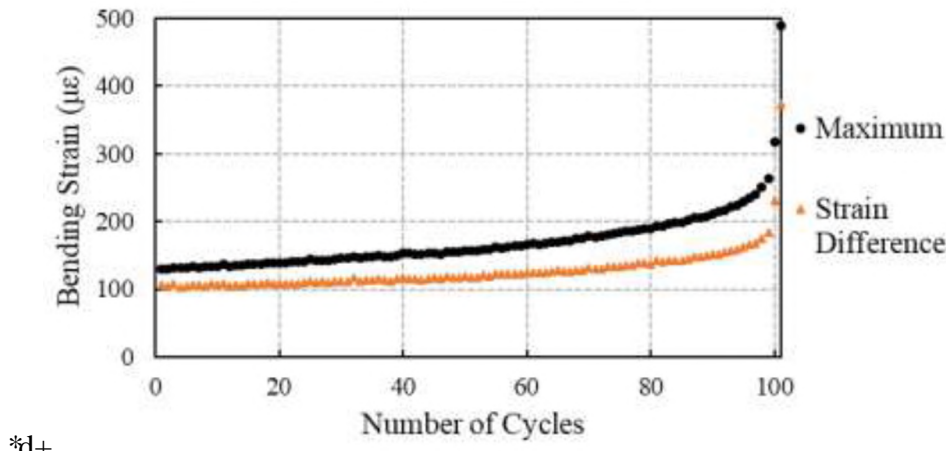
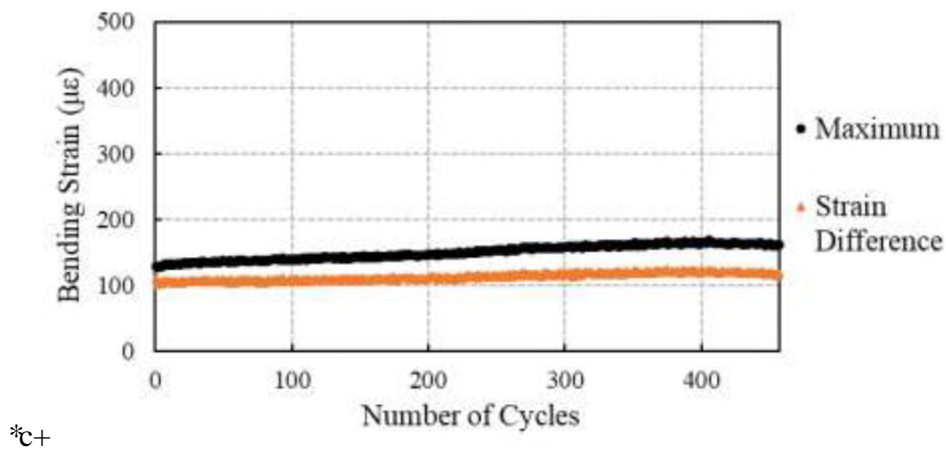
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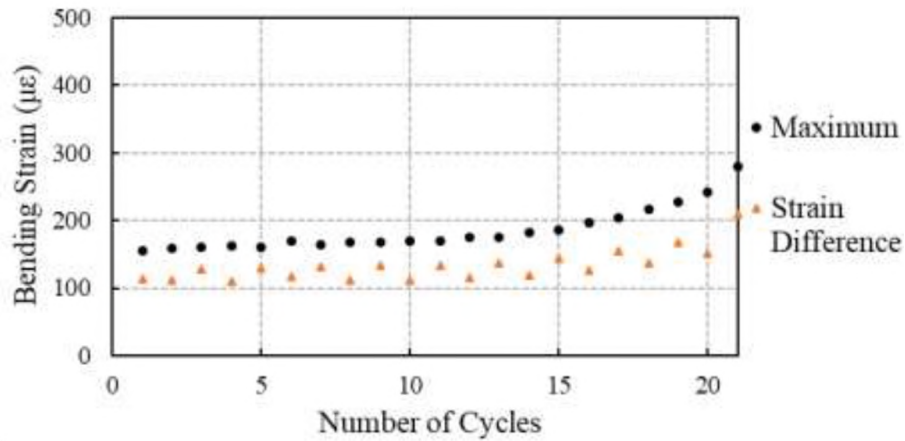
$\varepsilon_{\hat{m}^{\sim} x} " ? " v j g^{\sim} o c z k o w o " d g p f l p i " u t c l p " h q t " e \{ e n g " k "$

$\varepsilon_{\hat{m}^{\sim} n} ? " v j g^{\sim} o k p k o w o " d g p f l p i " u t c l p " h q t " e \{ e n g " k 0$

Vj g"o czko wo "dgpf lpi "utclp"cpf "utclp" f khtgpeg"xu0'pwo dgt"qh'e{ engu"r mv"lqt"gej " kpwtwo gpvgf "dgco "ku"lpenw gf "lp"vj g"Vcun6'Cr r gpflz "D0Ukpeg"vj g"lqecvqp"qh"vj g"lcvktg"etcemu" xctkgf "cmipi "vj g"mcf gf "tgi kqp"qh"vj g"eqpetgvg"dgco ."qpn("uqo g"qh"vj g"utclp"o gcuwtgo gpvu" ecr wtgf "vj g"eqo r rvg"pqprkgct"r tqi tguukp"qh" f co ci g"lp"vj g"eqpetgvg0Vj ku"y cu"cpvlekr cvgf "i kxgp" vj cv'vj g"mcf lpi "ur cp"y cu"ugxgp"lpej gu"y kj "c"hw/ lpej /mipi "i ci g"r rnegf "cv'vj g"egpvt"qh"vj g"dgco 0

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vj g'eqpetgyg0





(d)

P qvg<Gcej "vcpf go "czrg'r gcm'utgu'y cu'eqpukf gtgf "c'e{ erg0

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 ECHaE3aD4"ukpi rg"czrg"cvUT"? "20+"*d+"ECHaE4aD6"ukpi rg"czrg"cvUT"? "20 +"*e+"
 ECHaE6aD3"ukpi rg"czrg"cvUT"? "2Q "+cpf "%f +ECHaE4aD; "%vcpf go "czrg"cvUT"? "2Q +0

Cu"uj qy p"kp"Hki wtg'88."yj g'o czko wo "dgpflpi "utckp"y cu"qdugt xgf "vq"lpetgcug"kp"yj tgg"
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3408"Uwo o ct{ 'cpf 'Eqpenwukpu

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 r tgf levgf "d{ "yj g'U/P "ewtxg"vq"dg"cdqw'32⁵⁰."32⁴⁰."cpf "32³⁰"hqt"utguu'tcvkqu"qh'20."20 ."cpf "2Q ."

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r tqhkg'cv'c'utguu'tcvk'qh'20 'y cu'pqv'qdugt xgf "vq'dg'ucvukecm{ 'uki pkhecp0

Vj g'qrf "r cxgo gpv'U/P "ewtxg'y cu'qdugt xgf "vq'dg'uwgr gt."cpf "vj ku'ku'j { r qvj guk gf "vq'dg'c"
eqpugs wpeg'qh'c'rti gt'utguu'tcpi g0Vj g'vy q/wkrgf "v'vuv'lpf kecvf "vj cv'c'utguu'tcvk'qh'20'ecwugf "
f khtg'gpv'f gi tgg'qh'f co ci g'vq'eqpetgv'y kj "pgy "r cxgo gpv'cpf "qrf "r cxgo gpv'utgpi vj 0'Vj g"
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J qy gxgt."kh'qpg'U/P "ewtxg'y cu'f gxgnr gf "wulpi "vj g'f cw'hqt'cm'y g'vguu."vj g'eqghlekp'qh'
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Vj g'pqrkpgct'r tqi tguukp'qh'hcvi wg'f co ci g'yj cv'f gxgnr gf "lp'y g'eqpetgv'y cu'gzco kpgf "
vj tqwi j "vj g'eqmgevkp'qh'utwewcn'tgur qpug'f cvc0'Vj g'o czko wo "cxgtci g'egpvt'f ghgevkp."
f ghgevkp'f khtgpeg."pqto crk gf "eqo r kcepg."o czko wo "dgpf kpi "utckp."cpf "utckp'f khtgpeg'cm'
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eqo r kcepg'f cvc."o quv'qh'yj g'utkhp'guu'muu'qeewt'gf "cv'cp'kpetgculpi "tcvg'chgt'92" "qh'yj g'hcvi wg"
rkkg'ku'equwo gf 0'Vj ku'qdugt xcvk'p'y cu'hw'vj gt'eqttqdtcvf "y kj "vj g'dgpf kpi "utckpu0Vj gug'tguwu"
uwi i guv'yj cv'cu'yj g'hcvi wg'f co ci g'lp'eqpetgv'kpetgcugu."uwr gtrmcf "utguugu'dgeqo g'kpetgculpi n{ "
o qtg'ko r ce'hw0Vj gtghqtg."vj g'tcf kkp'cn'U/P "ewtxg'cpf "rkpgct'f co ci g'j { r qvj guk'cr r tqcej "hqt"
hcvi wg'f co ci g'r tgf levk'p'lp'eqpetgv'r cxgo gpv'j cu'ko kcvkpu'y j gp'wugf "vq'cuugu'yj g'ghgeu"
qh'yj g'f co ci g'ko r qugf "d{ 'uwr gtrmcf u0

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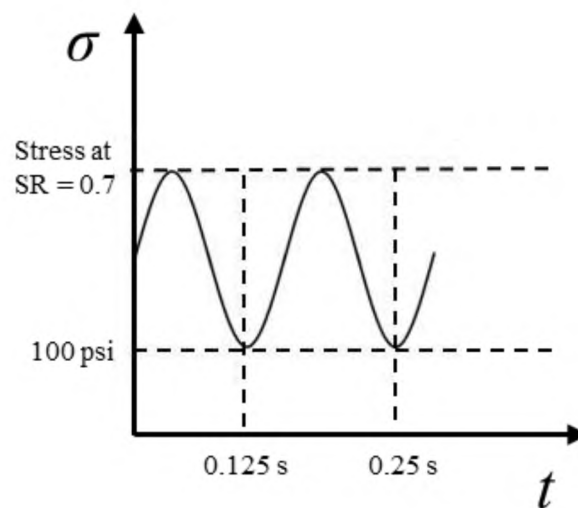
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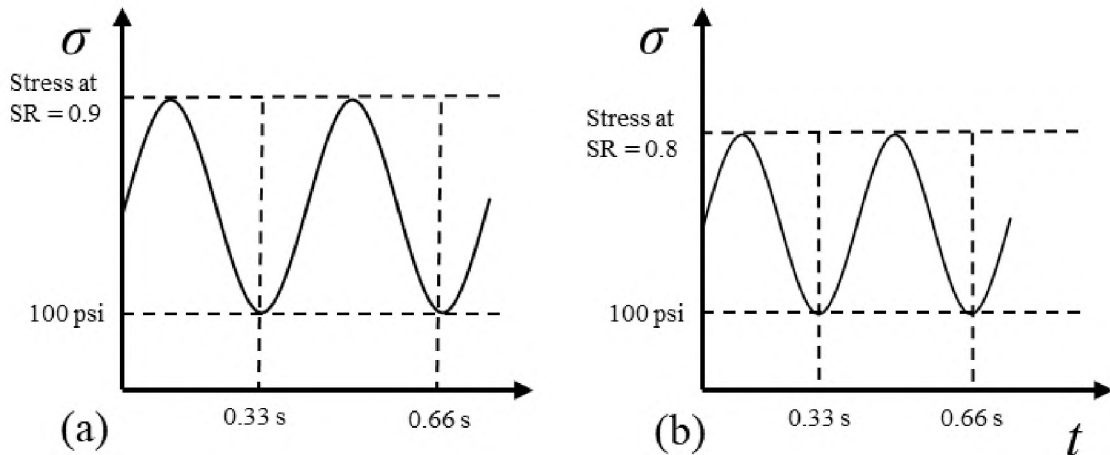
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Vcdrg"45<P wo dgt "qh'eqpuwcpv"co r rkwwf g'v'guu'h'qt "gcej "ecu0

Ecuw	P gy 'Rcxgo gpv' Ut gpi vj	Qrf 'Rcxgo gpv' Ut gpi vj
3	2	2
4	2	2
5	2	5
6	2	8
7	9	5
8	5	8
9	5	2
:	7	2
;	3	2



Hi wtg'89<Ut'guu'r tqh'kg'wugf "q"f co ci g'vj g'eqpetgv'dgh'qtg"cpf "ch'gt"vj g'qxgt'qcf 0



Hki wtg'8: <Utgu'r tqhgu'hqt '*c+'qxgtmcf 'cv'c'utgu'tcvkq'qh'20 '*d+'qxgtmcf 'cv'c'utgu'tcvkq'qh'20 0

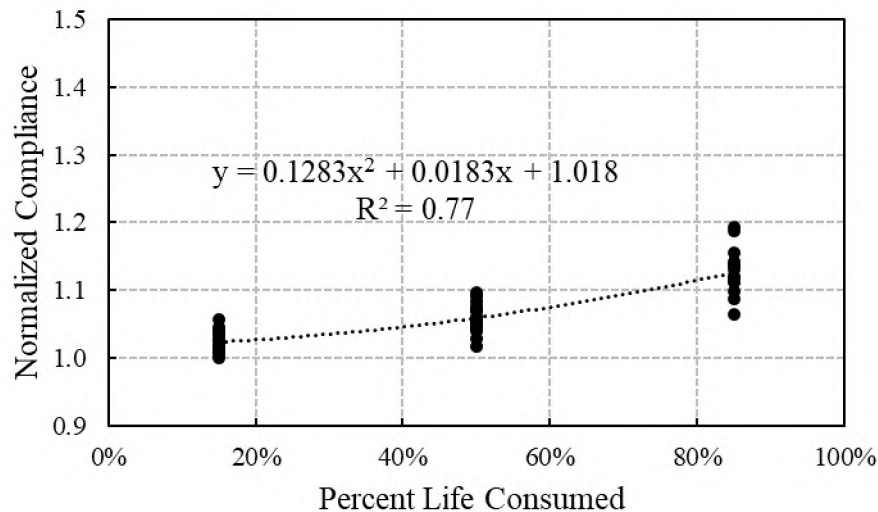
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Cu" o gpv'kqpgf " lp" Uge'kqp" 34045." eqpetgv" dgco u" y gtg" h'vki wgf " vq" vti gv' f co ci g" ucvgu" eqttgur qp'f kpi "vq'37' . "72' . "cpf": 7' "nkig"eqpuwo gf "wukpi "pqto crk gf "eqo r nkpeg0P qto crk gf " eqo r nkpeg"y cu'ej qugp"cu'y g'f co ci g'r ctco gvt "hqt"y g'f co ci gf "eqpetgv"vug'r tqi tco "ukpeg'k" f gr leu"y g"pqprkpgctk { "qh'f co ci g"ceewo wv'kqp"qeewt'kpi "lp"y g"eqpetgv"cpf "hqm'y u'ulo knt" dgj cxlqt "lp"gcej "vug0

Vj g"eqpuwcpv"co r rk'w'f g" vuglpi "tguw'u"y gtg" wugf " vq" f gh'kpg" y g"tgrv'kpuj kr " dgwy ggp" pqto crk gf "eqo r nkpeg"cpf "r gtegpv'nkig"eqpuwo gf 0Hqt"gcej "eqpuwcpv"co r rk'w'f g"vug'kpxq'kpi "c" ukpi ng"czng'utgu'r tqh'kpg."y g"pqto crk gf "eqo r nkpeg"y cu'gxc'w'vgf "cv'37' . "72' . "cpf": 7' "nkig" eqpuwo gf ."cu'uj qy p'lp'Hki wtg'8; 0Vj g'o gcp'cpf "ucpf ctf "f g'x'k'v'kqp"cv'gcej "r gtegpv'nkig"eqpuwo gf " hqt"3; "ur geko gpu'ctg"nkugf "lp"Vcdng"460Vj gtg"y cu"c"pq'v'egcdng"wr y ctf "uj kn'lp"y g"pqto crk gf " eqo r nkpeg"ewt'xgu'hqt"ur geko gpu"EC'HaE4aD32"cpf "EC'HaE6aD4."uq"y gug'y gtg"gzewf gf "h'qo "

vj g'f ghpkkp"qh"vj g'tgrvklpuj kr 0Wf qp'htvj gt'kpur gevklp. "vj gug'ewtxgu'y gtg'uj kngf "wr y ctf " dgecwug"vj g'pkklcn'eqo r nkpeg'ecrewvuf "y cu'pqv'lpf lecvxg"qh"vj g'cewcn'pkklcn'eqo r nkpeg"qh"vj g" dgco 0



Hli wtg'8; <P qto crk gf "eqo r nkpeg"gxcmvuf "cv'37' .72' .cpf ": 7' "hlg"equpuwo gf "qh'3; " equpuv'co r rkwl g'vguu0

Vcdrg'46<O gcp"cpf "ucpf ctf "f gxkvlqp"qh'pqto crk gf "eqo r nkpeg"gxcmvuf "cv'37' .72' .cpf " : 7' "hlg"equpuwo gf "qh'3; "equpuv'co r rkwl g'vguu0

Rgtegv'Nhg" Equpuwo gf	O gcp'P qto crk gf " Eqo r nkpeg	Ucpf ctf 'F gxkvlqp
37'	3046	2037
72'	3082	2043
: 7'	3045	2077

Cu'r tguvuf "lp'Hli wtg'8; .c"ugeqpf "qtf gt'r qn'pqo kn'tgpf nkg'hku"vj g'f cwc'y gm0Vj g'o gcp" pqto crk gf "eqo r nkpegu"cv'37' .72' .cpf ": 7' "hlg"equpuwo gf "y gtg'f vgtu kpgf "vq'dg'3046." 3082."cpf '3045."tgr gev'xgn' 0O qtgxgt."k'y cu'qdugtxgf "vj cv'vj g'pqto crk gf "eqo r nkpeg'hqt" gcej "vgu'equpuv'pvn' "lpetgcugu'd{ "cdqw'2028'hqo "37' "vq'72' "hlg"equpuwo gf "cpf '202'hqo " 37' "vq": 7' "hlg"equpuwo gf 0Dcugf "qp"vj g'tguwu'r tguvuf "lp'Hli wtg'8; "cpf "Vcdrg'46."vcti gv' pqto crk gf "eqo r nkpegu"cpf "vj g'cmuy cdr'g'cp' gu'y gtg'f vgtu kpgf "hqt"vj g'f co ci gf "eqpetvg" vgu'kpi 0Vj gug'ctg'r tguvuf "lp

Vcdrg'470K'cf fklqp"vq'wukpi "vj gug'vcti gv'xcn'gu."vj g'gpvtg'pqto crk gf "eqo r nkpeg'ewtxg'y cu" o qpkqtgf 0Vj ku'gpwtgf "vj cv'vj g'tcv'qh'pqto crk gf "eqo r nkpeg'lpetgcug"cv'gcej "vcti gv'

pqto crk gf "eqo r nkpeg"y cu'tgr tguwpv'xg'qh'vj g'cpv'ekr cvgf "tcv'htq'vj g'tgur gev'xg'r gtegpv'htg" eqpuwo gf 0

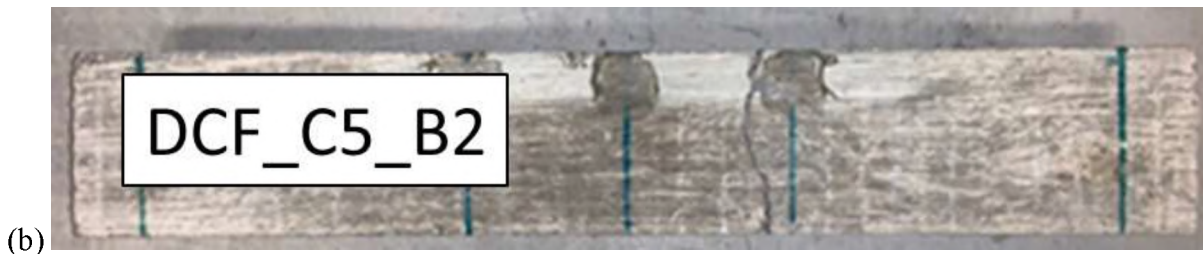
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Rgtegpv'Nhtg" Eqpuwo gf	Vcti gv'P qto crk gf " Eqo r nkpeg	Cmqy cdr'g'Tcpi g
37'	3052	304/306
72'	3082	307/309
: 7'	3052	303/307

340604''Htcewtg

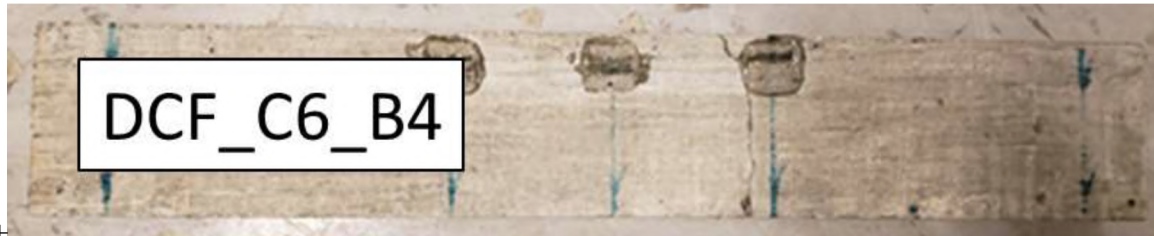
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F wt'kpi "vj g'hcvi wg'vukpi ."pq"xku'cn'uki pu"qh'et'cen'kpi "y cu"qdugt'xgf "wp'v'k'vj g'et'cen' f gx'gnr gf "cv'ht'k'wt'g'0Vj g'ht'k'wt'g'f gx'gnr gf "kp'vj g'tgi k'qp'dgw ggp"vj g'vy q'ncf kpi "ht'p'gu'ht'gcej " vgu'r gth'qto gf 0Hki wt'g'92"fg' r lew'gzco r ngu'qh'v' r lecn'ht'k'wt'gu'0Wr qp"xku'cn'k'pur gev'k'qp."42"qh'vj g' 58"eqpetgv'dgco u'vguvf "kp'f co ci gf "eqpetgv'hcvi wg'ht'k'gf "y kj kp'4"l'pej gu'qh'vj g'egp'vt'qh'vj g' dgco 0Vj g'tgo cl'k'kpi "38"eqpetgv'dgco u'ht'k'gf "y kj kp'vj g'v'puk'qp" qp'g'dw'dg{ qp'f "4"l'pej gu'ht'qo " vj g'egp'vt'qh'vj g'dgco 0Vj g'mec'v'k'p'qh'vj g'ht'k'wt'g'y cu'r ct'v'ew'ct'n{ 'ko r qt'v'p'v'y j gp'kp'v'gr t'g'k'pi "vj g' dgpf kpi "wt'ck'p'o gcu'wt'go gp'v."cu'f guet'k'dgf "kp'U'gev'k'qp"35060





*e+



*f+

Hki wtg'92<Hckwtg'etceml'hqt '*c'+FEHaE: aD3 '*ci g'? '5/f c{ +*d'+FEHaE7aD4 '*ci g'? '6/f c{ +*e'+FEHaE6aD4 '*ci g'? '3; /f c{ +*f'+FEHaE8aD6 '*ci g'? '39/f c{ +0

34065'' Hcwi.wg'Nkg

Vcdrg'48'r tqxkf gu'yj g'hcwi wg'nhg'hqt'gcej "qh'yj g'f co ci gf "eqpetgw'ur geko gpu'vguvf."cpf "Hki wtg" 93'i tcr j kecmf 'uj qy u'yj g'pwo dgt "qh'hcwi wg'e{ ergu'vq'yj g'vcti gv'f co ci g'ucvgu'tgr tguvpi "37' ."

72' . "cpf": 7' "nhg"eqpuwo gf 0Ugxgtcn'qdugtxcv'kpu'y gtg'hqwpf 'lp'yj g'hcwi wg'e{ erg'f cvc<

"" Y j krg'yj gtg'ku'uqo g'qxgtncr."dgco u'y kj 'pgy 'r cxgo gpv'utgpi yj "vgpf gf 'vq'tgs wktg'o qtg" hcwi wg'e{ ergu'vq'tgcej 'yj g'vcti gv'f co ci g'ucvgu'yj cp'dgco u'y kj "qrf 'r cxgo gpv'utgpi yj 0' Vj ku'ku'r qv'pvcnf 'c'tguwn'qh'yj g'utgu'tcpi g'ghgeev

"" Cu'yj g'vcti gv'f co ci g'ucv'g'lpetgcugu."yj g'pwo dgt "qh'e{ ergu'vq'hckwtg'chgt "yj g'qxgtmqcf " f getgcugu

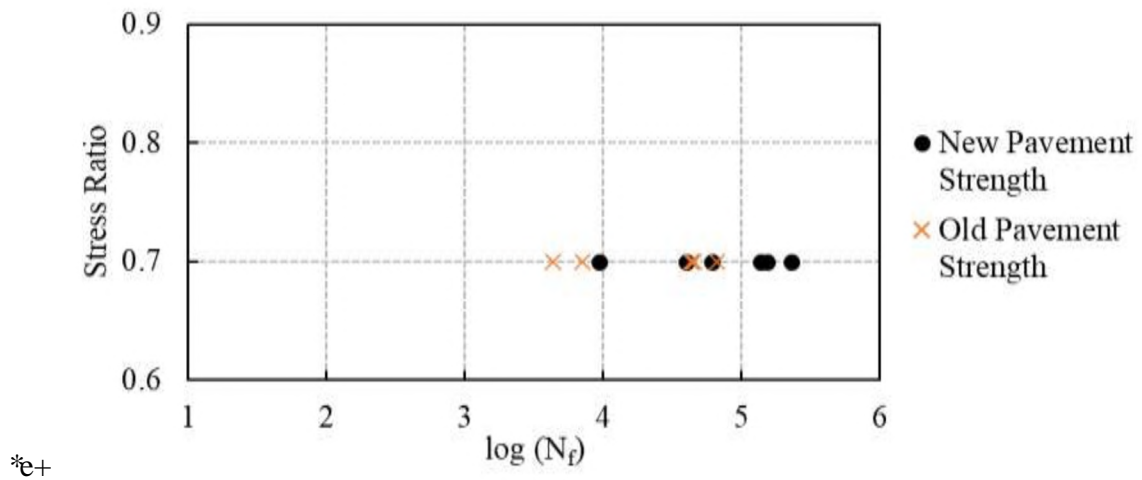
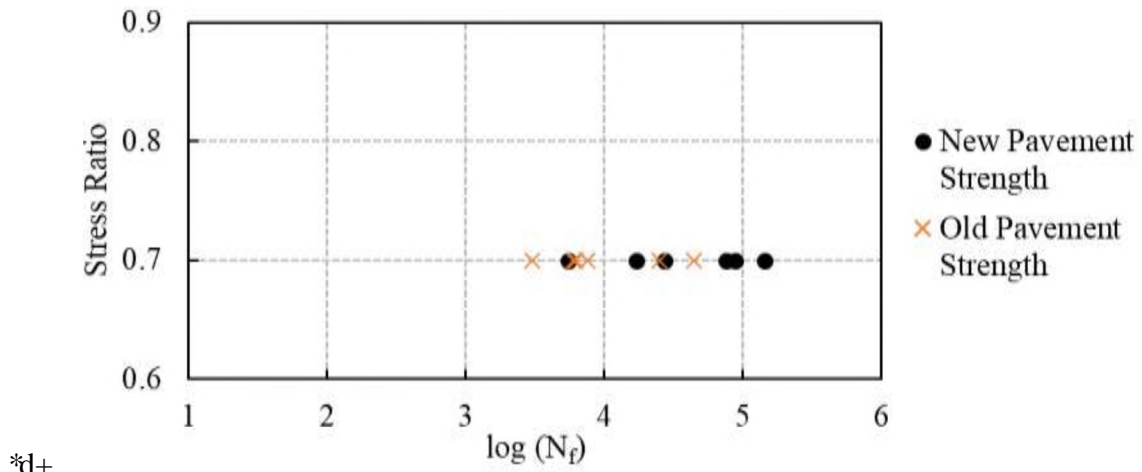
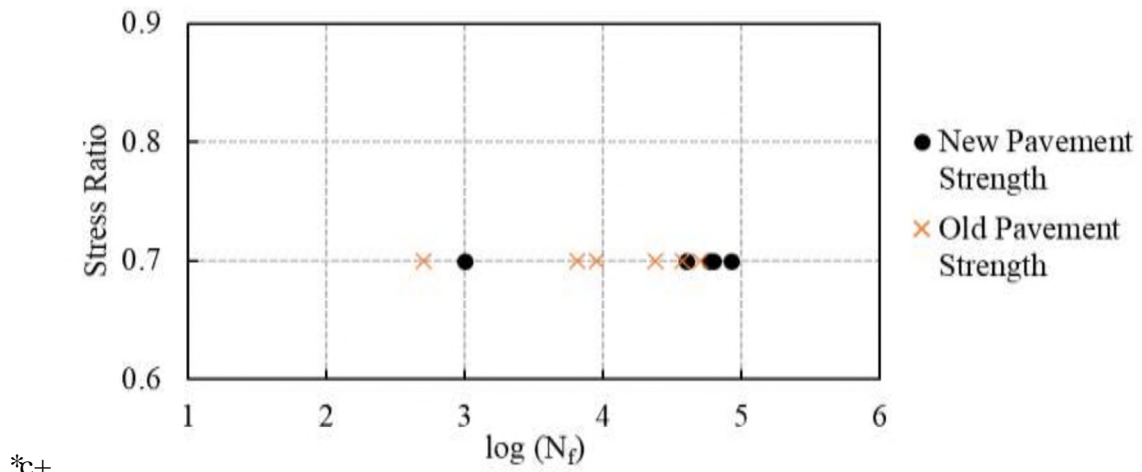
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"" Qxgtmqcf u'cr r nkgf "cv'c'vcti gv'f co ci g'ucv'g'qh': 7' "nhg"eqpuwo gf 'y kj "c'utgu'tcvq'qh'20 " ecwugf 'hckwtg'hqt'ugxgtcn'ur geko gpu'f wtkpi 'ku'cr r ncvkqp

Vcdrg'48<Hcwi wg'nhg'tguwn'qh'f co ci gf "eqpetgw'vgu'pi 0

Ur geko gp'fF	Ci g'cv' Vgu'pi " *f c{ u+	Ut gpi yj " Eqpf kskqp	Vcti gv' Fco ci g" Ucv'g'vq" Crrnf " Qxgtmqcf	Crr nkgf " Qxgtmqcf " Ut gu' Tcvq	Pwo dgt 'qhi' E{ ergu'vq" Vcti gv' Fco ci g" Ucv'g	Pwo dgt 'qhi' E{ ergu'vq" Hckwtg" Chgt " Qxgtmqcf
FEHaE7aD4	6	P gy	37'	20	62.222	4.; 48

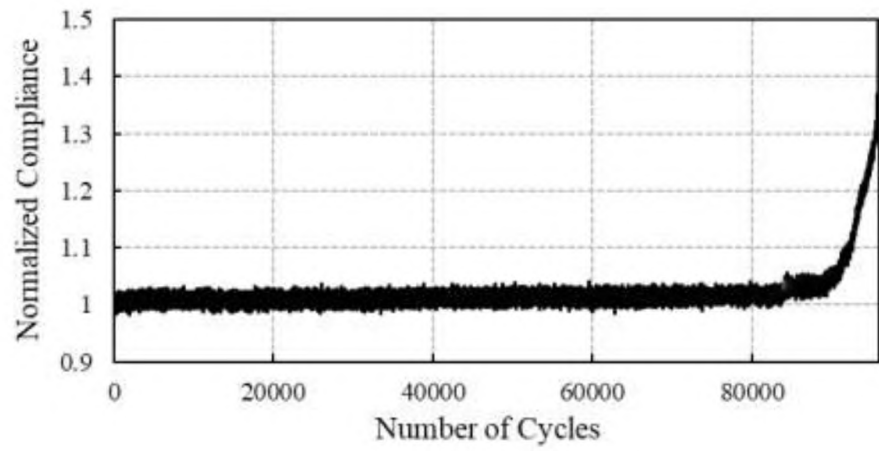
FEH _a E7aD8	8	P gy	37'	20	3.222	8.27;
FEH _a E: aD5	6	P gy	37'	20	82.222	76.; 84
FEH _a E7aD9	8	P gy	72'	20	49.222	6.244
FEH _a E8aD4	7	P gy	72'	20	97.222	4.377
FEH _a E: aD6	7	P gy	72'	20	38.; ; :	4.35:
FEH _a E: aD4	6	P gy	: 7'	20	375.455	39
FEH _a E7aD5	6	P gy	: 7'	20	62.222	629
FEH _a E9aD5	6	P gy	: 7'	20	35: .222	: .562
FEH _a E7aD3	5	P gy	37'	20	7: .222	37.74:
FEH _a E8aD3	6	P gy	37'	20	84.722	4.648
FEH _a E8aD5	7	P gy	37'	20	: 6.222	33.: 2:
FEH _a E7aD7	7	P gy	72'	20	7.722	943
FEH _a E9aD3	5	P gy	72'	20	: 9.222	; 76
FEH _a E: aD3	5	P gy	72'	20	364.79;	6: : .956
FEH _a E7aD6	7	P gy	: 7'	20	83.26;	447
FEH _a E9aD4	5	P gy	: 7'	20	; .622	2
FEH _a E: aD3	5	P gy	: 7'	20	449.528	2
FEH _a E5aD3	43	Qrf	37'	20	8.722	7.; 9;
FEH _a E6aD8	48	Qrf	37'	20	59.222	33.; : :
FEH _a E7aD32	3;	Qrf	37'	20	46.222	63.243
FEH _a E5aD5	47	Qrf	72'	20	5.222	3.222
FEH _a E8aD6	39	Qrf	72'	20	8.222	9.834
FEH _a E8aD;	47	Qrf	72'	20	8.422	3.39;
FEH _a E7aD:	36	Qrf	: 7'	20	67.785	:
FEH _a E8aD7	3:	Qrf	: 7'	20	65.922	9.576
FEH _a E8aD9	46	Qrf	: 7'	20	9.332	3; 3
FEH _a E5aD4	47	Qrf	37'	20	722	7.66;
FEH _a E6aD5	3;	Qrf	37'	20	; .222	32.3; 9
FEH _a E6aD6	42	Qrf	37'	20	72.222	44.742
FEH _a E6aD3	3:	Qrf	72'	20	9.722	4: 2
FEH _a E6aD4	3;	Qrf	72'	20	47.222	3.9: :
FEH _a E8aD8	46	Qrf	72'	20	66.222	; .723
FEH _a E6aD7	43	Qrf	: 7'	20	6.522	2
FEH _a E7aD;	3:	Qrf	: 7'	20	54.: 9:	339
FEH _a E8aD:	47	Qrf	: 7'	20	88.6; 2	2



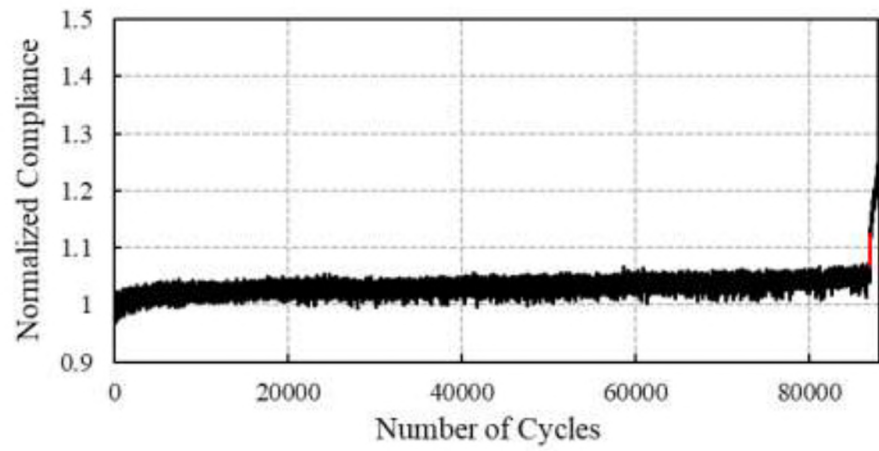
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3460''Pqto crk gf 'Eqo r r kpeg

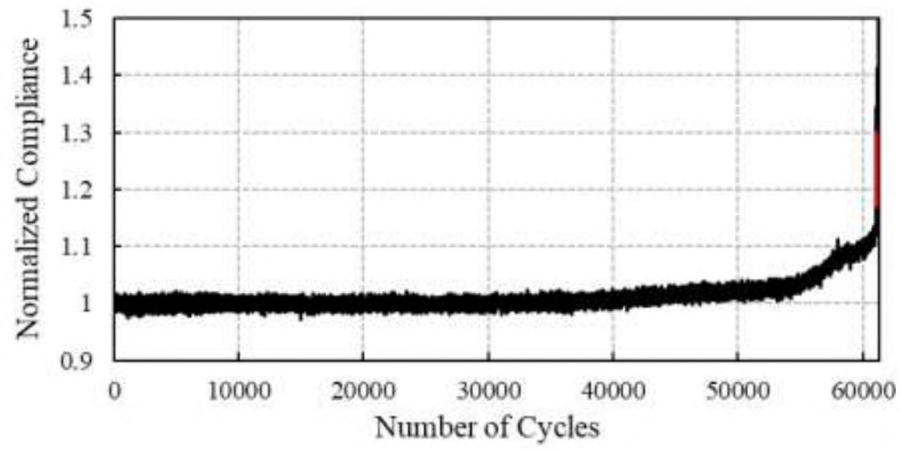
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*c+

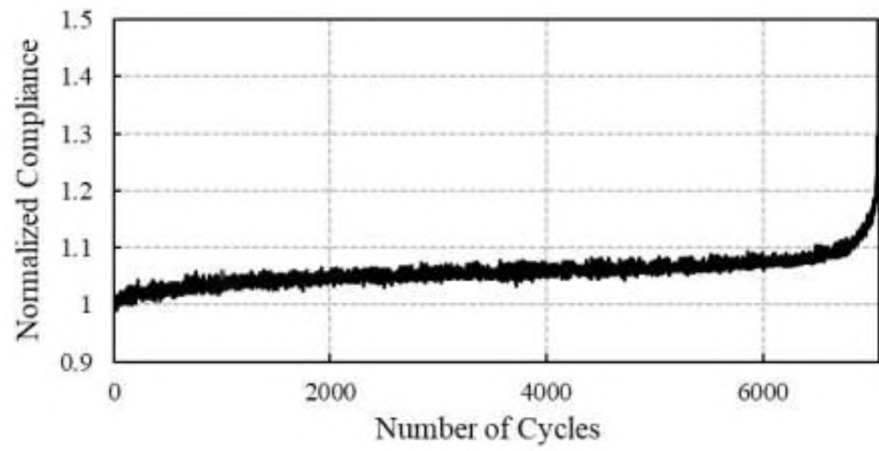


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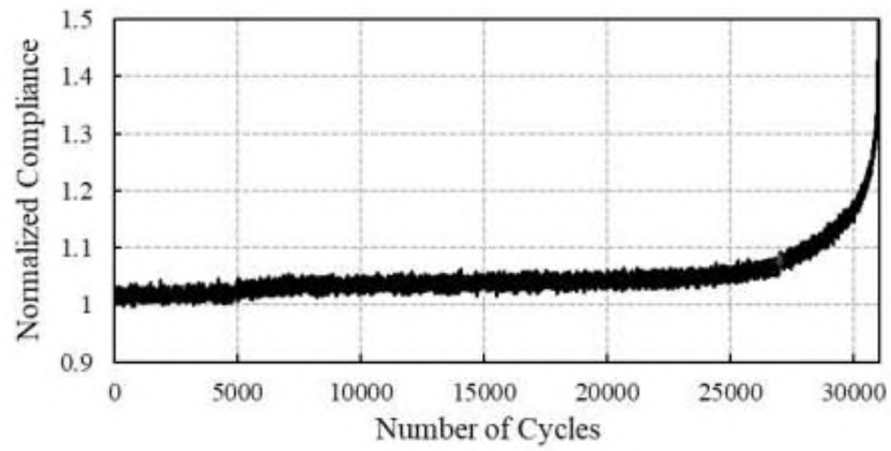


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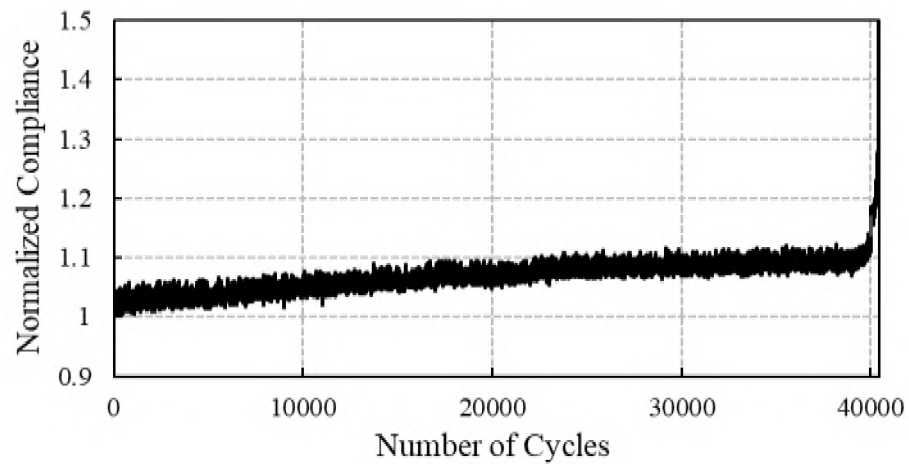
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 ?'2Q "cvF"?'37' +*d+'FEHaE9aD3"*qxgtmqcf"qh'UT"? '2Q "cvF"?'72' +*e+'FEHaE7aD6"
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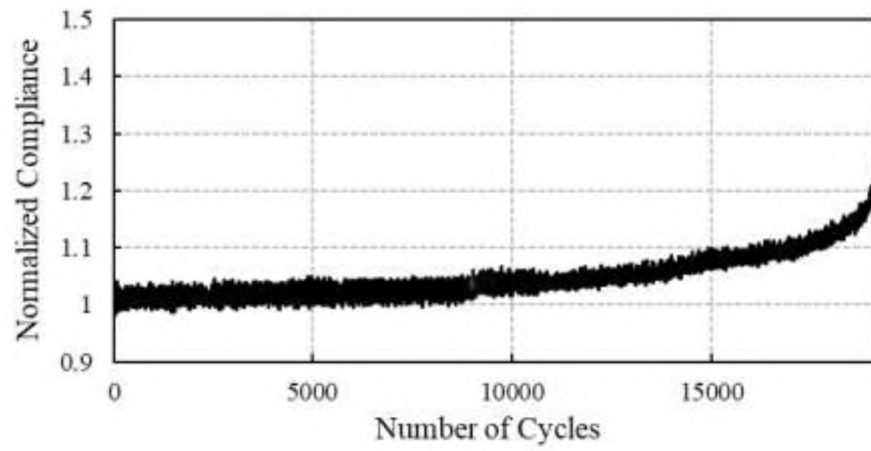


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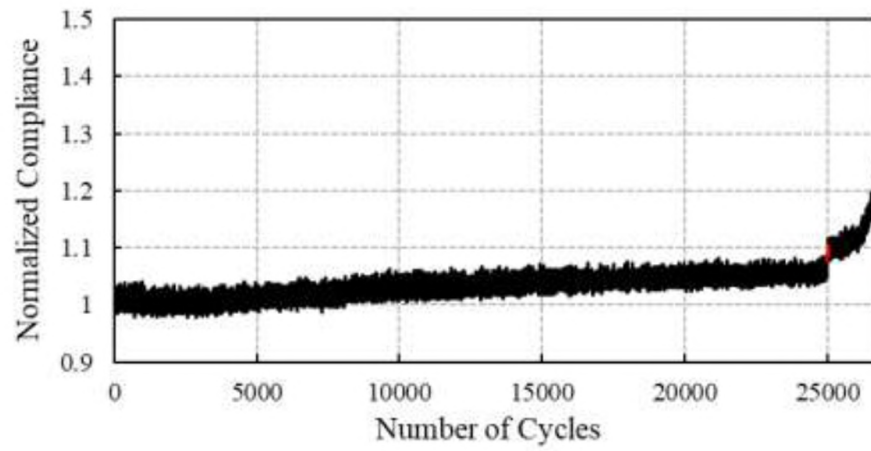


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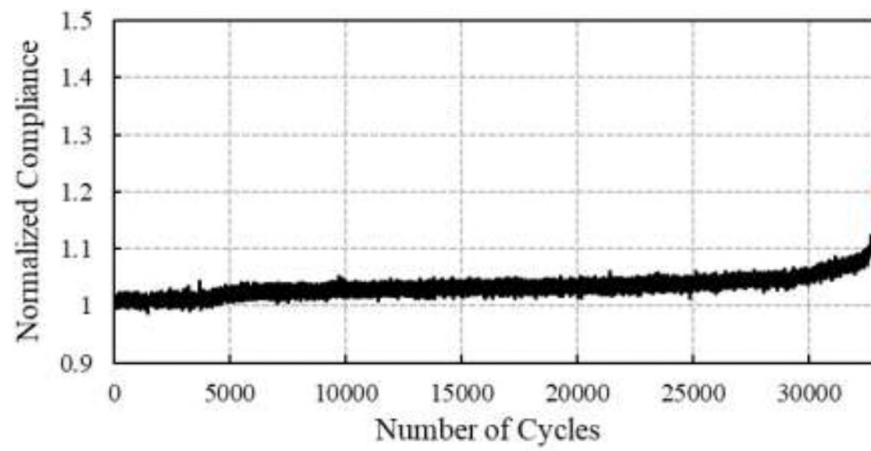
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 ? "20 "cvF "? "37" +*d+FEHaE7aD9"*qxgtmqcf "qh'UT"? "20 "cvF "? "72" +*e+FEHaE7aD5"
 *qxgtmqcf "qh'UT"? "20 "cvF "? ": 7" +0



*c+

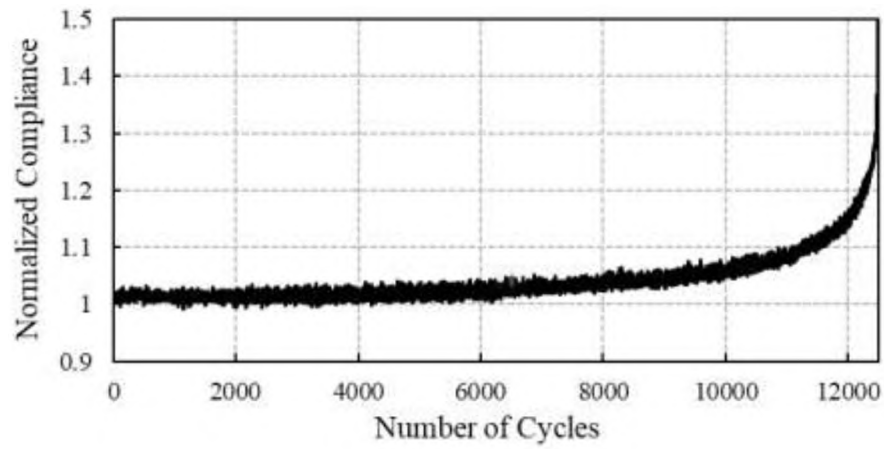


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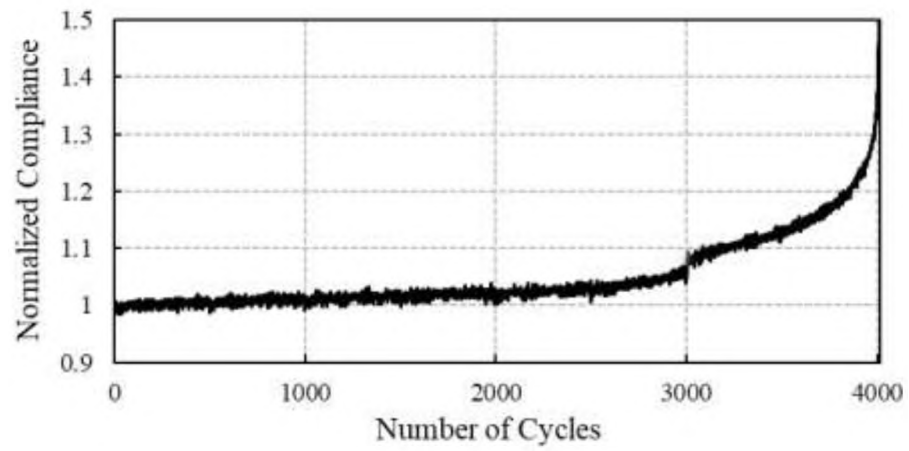


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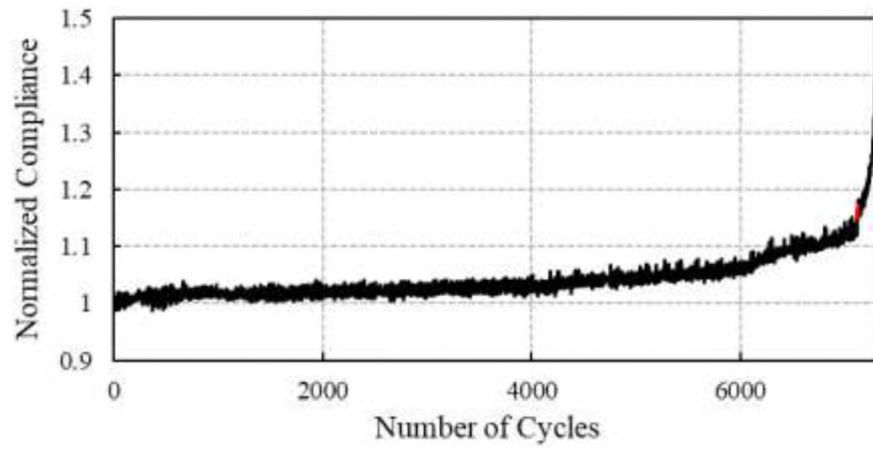
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 ?'2Q "cvF "?'37' +*d+'FEHaE6aD4"*qxgtmqcf "qh'UT"?'2Q "cvF "?'72' +*e+'FEHaE7aD; "
 *qxgtmqcf "qh'UT"?'2Q "cvF "?': 7' +0



*c+



*d+



*e+

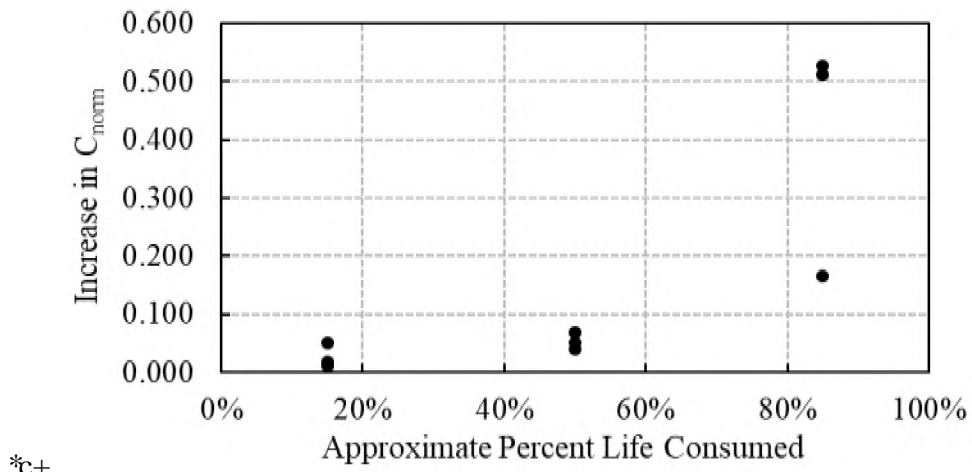
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 ?'20 "cvF"?'37' +*d+'FEHaE5aD5"*qxgtmqcf"qh'UT"? '20 "cvF"?'72' +*e+'FEHaE8aD9"
 *qxgtmqcf"qh'UT"? '20 "cvF"?'": 7' +0

Cu'gxf gpv'lp'Hki wtg'94'yj tqwi j 'Hki wtg'97.'yj g'vcti gv'pqto crk gf "eqo r nkpeg"ku'cej kxgf " y kj lp'yj g'cmqy cdrg'tcpi g'uweeguuhwm' 00 qtqxtg.'yj g'tcv'qh'kpetgcug'lp'pqto crk gf "eqo r nkpeg" cv'gej 'vcti gv'y cu'y kj lp'g'zr ge'v'qpu'dcugf "qp'yj g'tguwu'ftqo 'yj g'eqpu'cv'co r rkwf g'v'gupi 0Cv' c"vcti gv'pqto crk gf "eqo r nkpeg"tgrtgugv'pi "37' "rk'eqpuwo gf."yj g'pqto crk gf "eqo r nkpeg" kpetgcugu'rkpgctn'."uki pcrkpi "yj g'gpf "qh'yj g'fgeg'v'qrp"rj cug'qh'fco ci g'f g'xgm' o gpv'lp"yj g' eqpetgv'0Cv'c"vcti gv'pqto crk gf "eqo r nkpeg"tgrtgugv'pi "72' "rk'eqpuwo gf."yj g'pqto crk gf " eqo r nkpeg"kpetgcugu'rkpgctn' "y kj "c'urki j v' "i tgcvt'urq g'yj cp'cv'37' "rk'eqpuwo gf 0Cv'c"vcti gv' pqto crk gf "eqo r nkpeg"tgrtgugv'pi ": 7' "rk'eqpuwo gf."yj g'pqto crk gf "eqo r nkpeg"ceeg'v'c'v'g' vqy ctf u'rk'wtg0

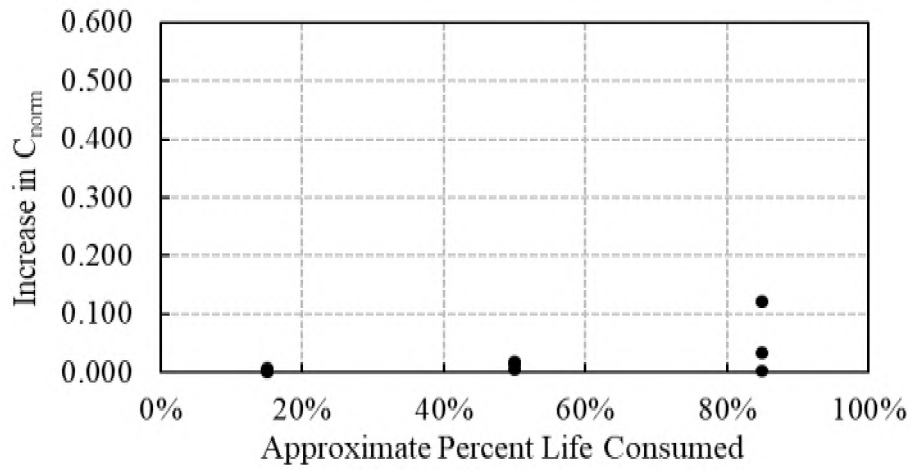
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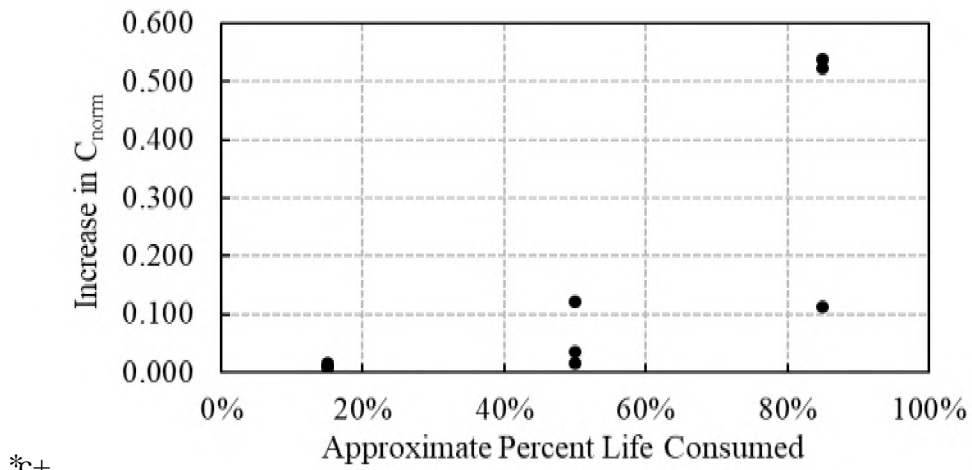


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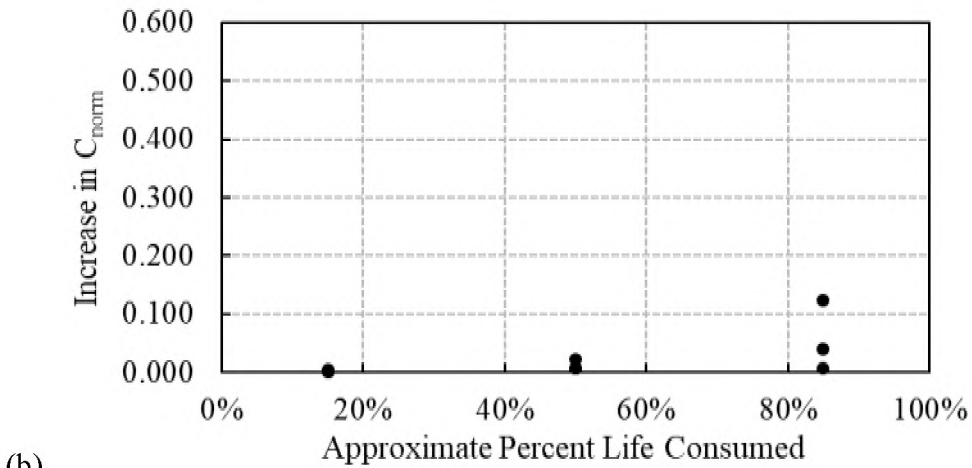


(b)

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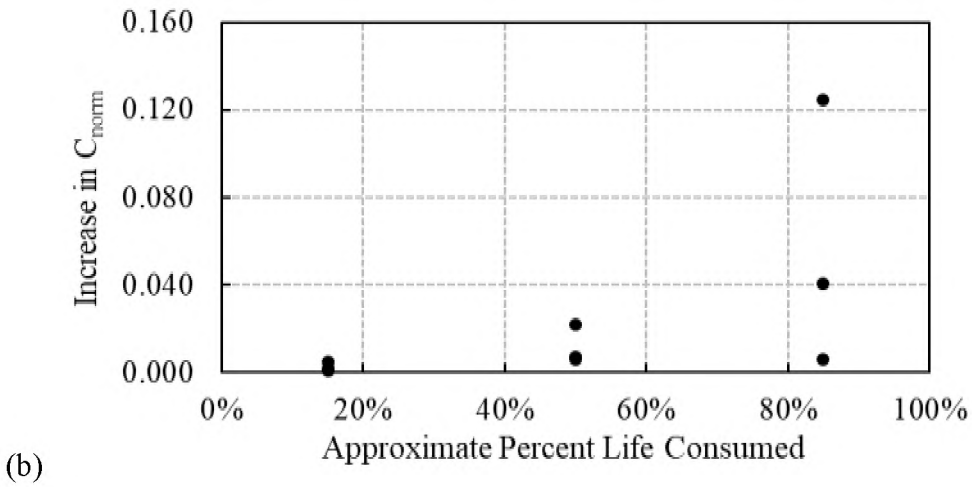
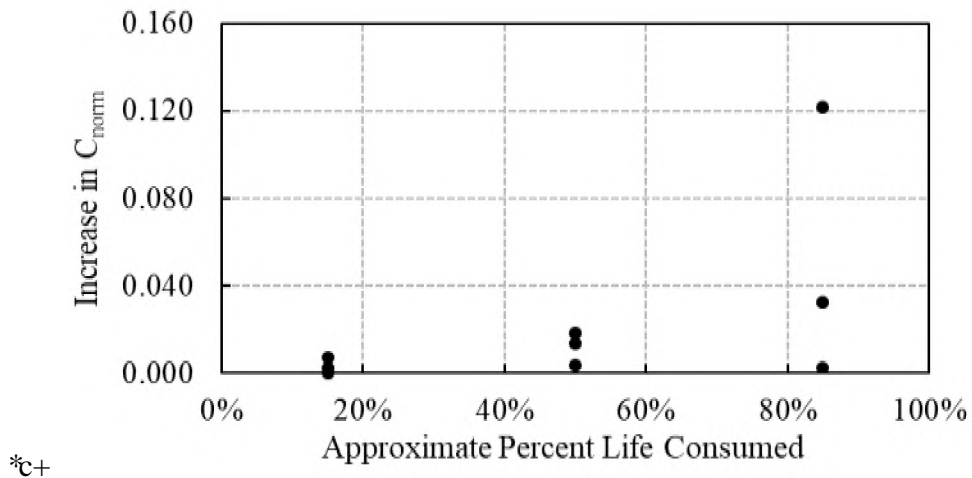


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(b)

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Ɓ"Vcɔɔɔ'4: . "uɔvɔuɔu"ctg"r tɔɔɔɔɔɔ "hɔt"y g"lɔɔɔɔɔɔ"lɔ"pɔto cɔɔ gf "eqo r ɔɔɔɔɔ"ɔvɔ"y g" qɔɔɔɔɔɔ 0"ɔt"ɔɔɔ "eqo dɔɔɔɔɔ"qɔ"uɔɔɔ y "eqɔɔ ɔɔɔ"ɔɔ "uɔɔu"tɔɔɔ. "y g"o ɔɔɔ"ɔɔ "uɔɔɔ ɔɔɔ" f ɔɔɔɔɔɔ"qɔ"y g"lɔɔɔɔɔɔ"lɔ"pɔto cɔɔ gf "eqo r ɔɔɔɔɔ"ctg"qɔɔɔɔɔɔ "y lɔɔɔɔɔɔ"cu"y g"vɔti ɔvɔ ɔo ɔi g" uɔvɔ"lɔ"y g"eqɔɔɔɔ"lɔɔɔɔɔɔ 0"Vj ɔɔɔ"tɔɔuɔu"lɔɔ ɔɔvɔ"y ɔv"y g"lɔ r ɔv"qɔ"ɔɔ"qɔɔɔɔɔɔ "uɔɔu"lɔ"dɔy " i tɔɔvɔt"ɔɔ "o qɔg"ɔtɔɔɔɔ"cu"r ɔɔɔɔɔ"ɔɔɔ"eqɔuɔo ɔf "lɔɔɔɔɔɔ 0"Vj lɔ"ci tɔɔu"y ɔy "y g"eqɔuɔɔɔɔ ɔo r ɔɔɔɔ ɔ"ɔu"tɔɔuɔu. "lɔ"y j ɔɔ "o qɔv"qɔ"y g"pɔto cɔɔ gf "eqo r ɔɔɔɔɔ"lɔɔɔɔɔɔ"lɔɔ 0"uɔɔɔɔɔɔ"lɔu"lɔ" qɔɔɔɔɔɔ "y qɔɔvɔ"ɔɔɔ"92" "qɔ"y g"lɔvɔ ɔv"ɔɔɔ"lɔ"eqɔuɔo ɔf 0

Vcɔɔɔ'4: <"Uɔvɔuɔu"qɔ"y g"lɔɔɔɔɔɔ"lɔ"pɔto cɔɔ gf "eqo r ɔɔɔɔɔ"ɔvɔ"y g"qɔɔɔɔɔɔ 0

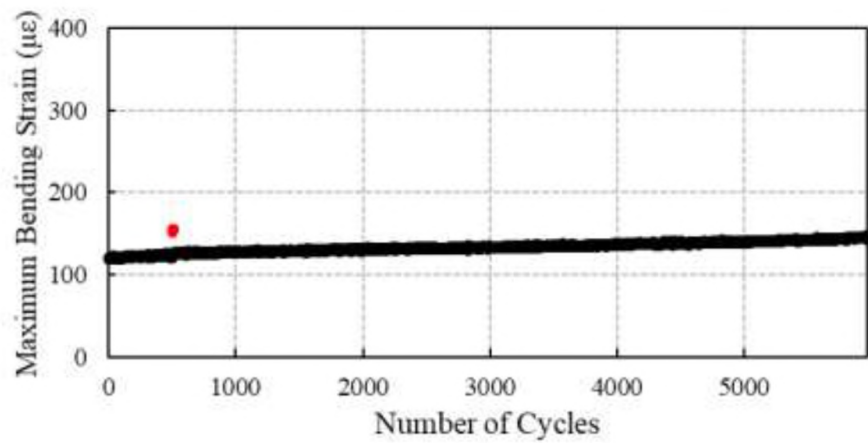
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P ɔy	20	37'	2049	2043
		72'	2075	2036
		: 7'	20624	20426
Qɔɔ	20	37'	2033	2026
		72'	207:	2079
		: 7'	205; 2	20463
P ɔy	20	37'	2025	2026
		72'	2034	2029
		: 7'	2074	2084
Qɔɔ	20	37'	2025	2024
		72'	2034	202;
		: 7'	2079	2083

34068"Dɔɔɔɔɔ "Uɔɔɔ

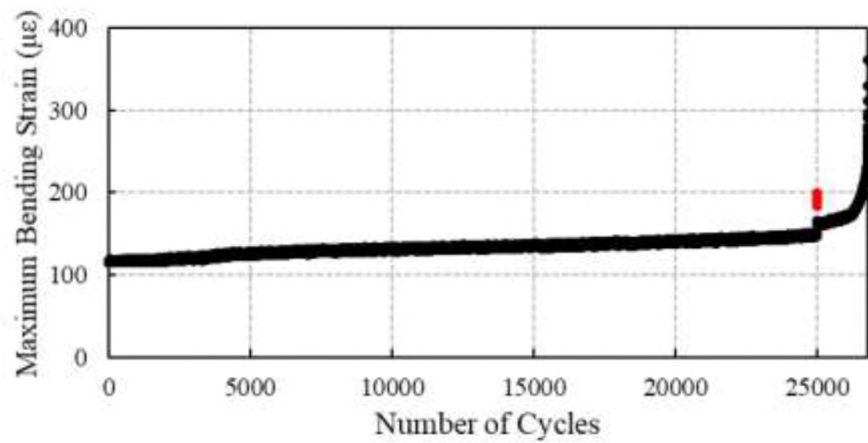
Vj g"dɔɔɔɔɔ "uɔɔɔ"o ɔɔvɔtɔɔ "y ɔy "y g"uɔɔɔ"i ɔi ɔu"y ɔu"uɔɔɔ ɔf "y"eqttqɔtɔvɔ"y g"qɔɔɔɔɔɔɔu" hɔvɔɔ "lɔ"y g"pɔto cɔɔ gf "eqo r ɔɔɔɔɔ"ɔvɔ0"ɔt"ɔɔɔ "f ɔo ɔi ɔf "eqɔɔɔɔ"ɔu"y g"o ɔɔɔo uo "dɔɔɔɔɔ " uɔɔɔ"y ɔu"r ɔvɔɔɔ "ɔu"ɔ"lɔvɔɔɔ"qɔ"y g"pɔo dɔt"qɔ"e{ ɔɔu. "ɔu"y qy p"lɔ"y g"Vɔuɔɔ'Cr r ɔɔɔɔ "E0

Vj g"ɔɔvɔɔ"dɔɔɔɔɔ "uɔɔɔ"tɔuɔuɔɔ "hɔo "ɔ"uɔɔ ɔv"ɔɔɔ"uɔɔu"r vɔvɔ"ɔv"ɔ"uɔɔu"tɔɔɔ"qɔ"20" vɔr ɔɔɔɔ "y ɔu"dɔvɔ ɔɔɔ"322/332"o ɔɔtɔuɔɔɔɔ"hɔt"eqɔɔɔɔ"ɔɔo u"y ɔy "pɔy "r ɔɔɔo ɔv"uɔɔɔ yj "ɔɔɔ " 332/342"o ɔɔtɔuɔɔɔɔ"hɔt"eqɔɔɔɔ"ɔɔo u"y ɔy "qɔɔ"r ɔɔɔo ɔv"uɔɔɔ yj 0"Qɔɔɔɔɔɔ u"ɔv"uɔɔu"tɔɔɔ"qɔ" 20 "ɔɔɔ"20 "y ɔtɔ"qɔɔɔɔɔɔ "y lɔɔɔɔɔɔ"y g"ɔɔvɔɔ"dɔɔɔɔɔ "uɔɔɔ"ɔ{ "ɔdɔv"32"o ɔɔtɔuɔɔɔɔ"ɔɔɔ "42" o ɔɔtɔuɔɔɔɔ. "tɔu ɔvɔɔɔɔ 0"Vj lɔ"ci tɔɔu"y ɔv"y ɔy "y g"dɔɔɔɔɔ "uɔɔɔ"o ɔɔvɔtɔo ɔv"lɔ"y g"eqɔuɔɔɔɔ ɔo r ɔɔɔɔ ɔ"ɔu"lɔɔ 0

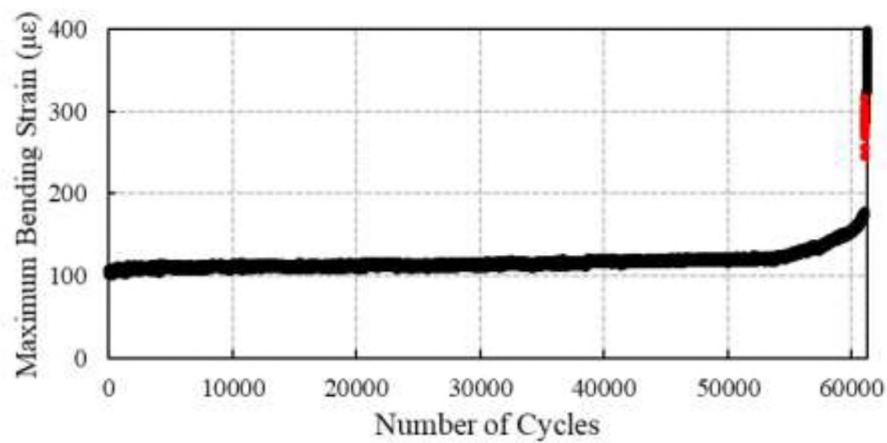
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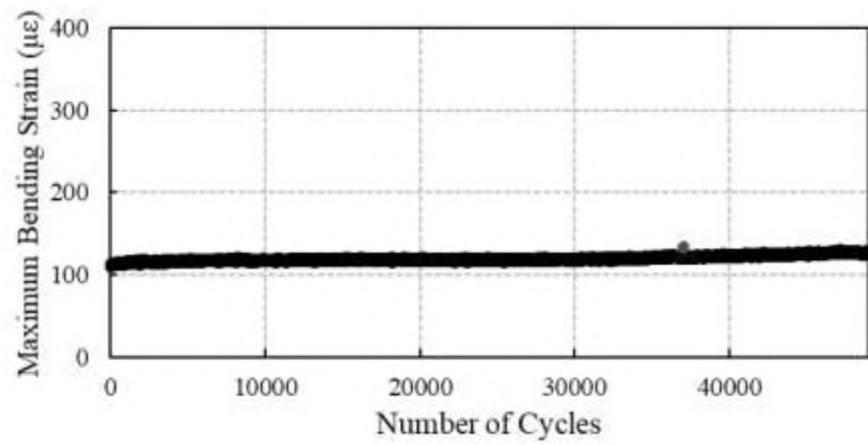


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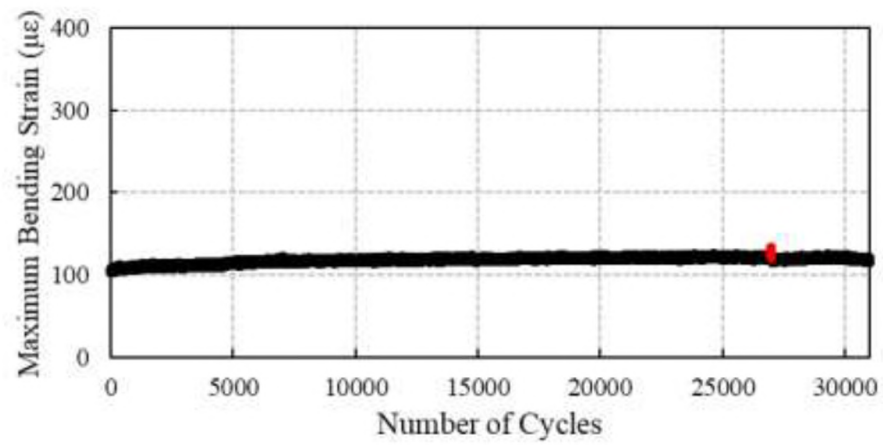


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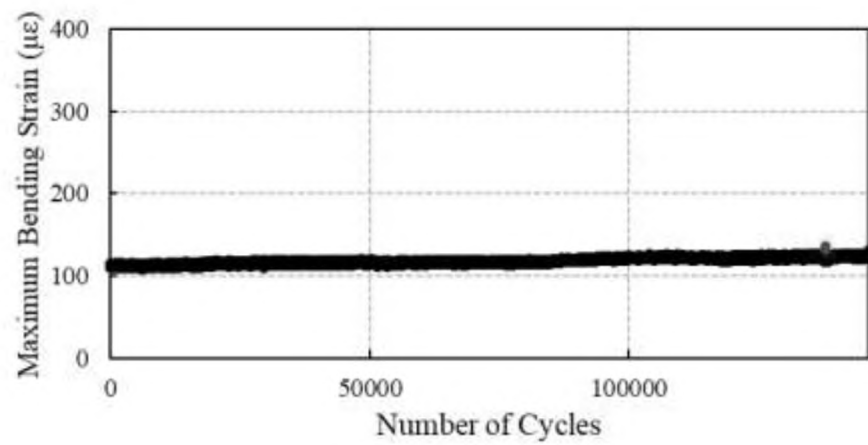
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*d+



*e+

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- " O k'ur cp" f gh'gevkp." dgpf kpi " utckp." cpf " eqo r nkpeg" kpetgcug" pqprikpgctn{ " f wtkpi " eqpuwcpv'co r rkwwf g'v'gukpi
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- " Cu'h'vki wg'f co ci g'kp"eqpetgv'kpetgcugu."uwr gtmcf "utguugu"dgeqo g'o qtg'ko r cev'wn
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Vj g'mqecvkqp"qh'yj g'etkklcn'utckp'y km'xct { "dcugf "qp'yj g'r cxgo gpv'utwewtg"cpf "mqcf lpi "eqpf kskqpu"
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r tgxkqwn{ ." Nc { gtgf " Grcvke" Cpcn{ uku" *NGC+" ku" eqo o qpn{ " wugf " kp" O gej cplvke/Go r kklcn'
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f co ci g0

Vj ku'ugevkqp" f kuewuugu'yj g'f gxgnr o gpv'qh'c'o gj qf "vq" cpcn{ | g'yj g'f co ci g'ecwugf "d{ "UNu"
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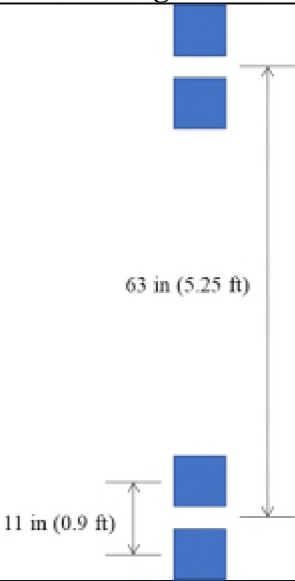
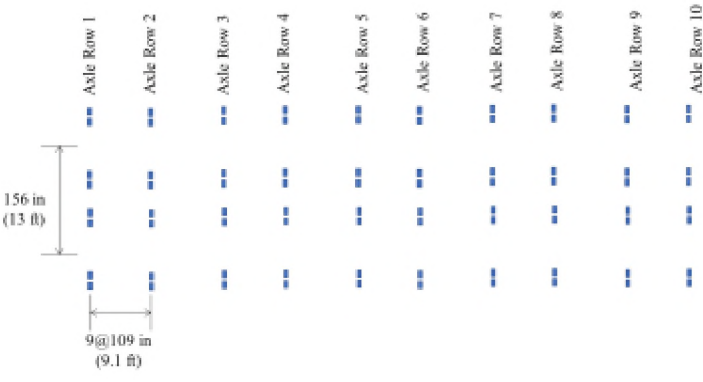
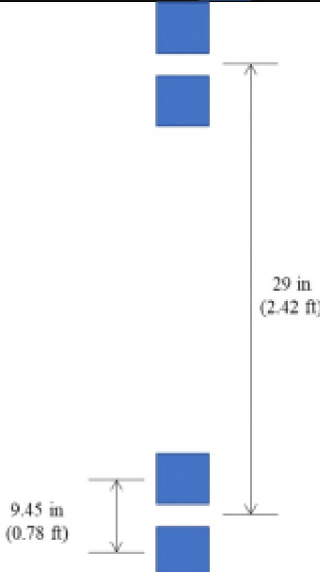
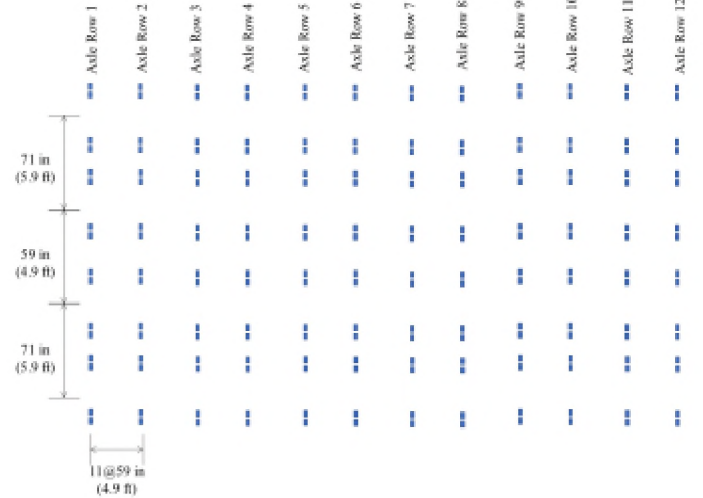
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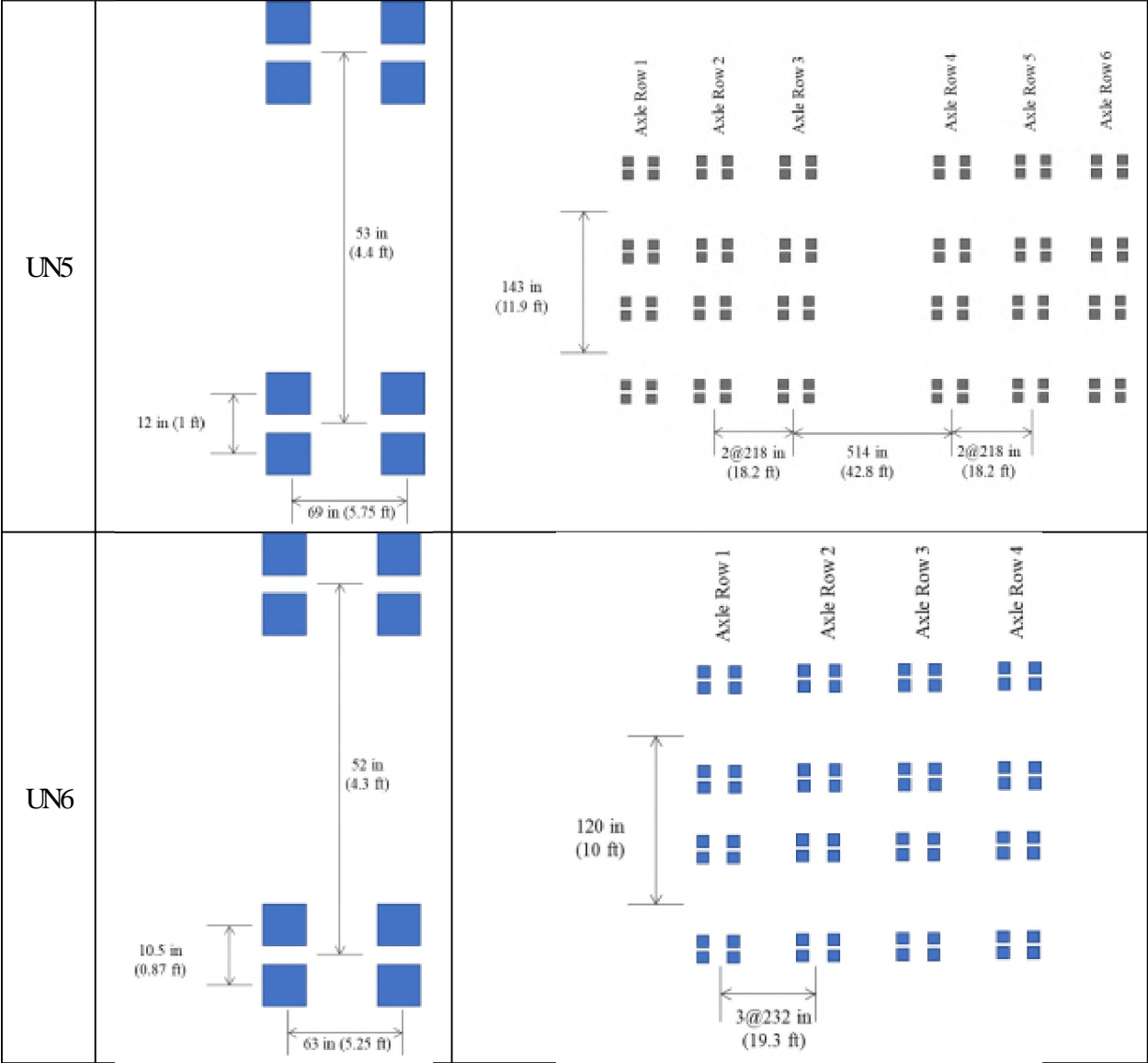
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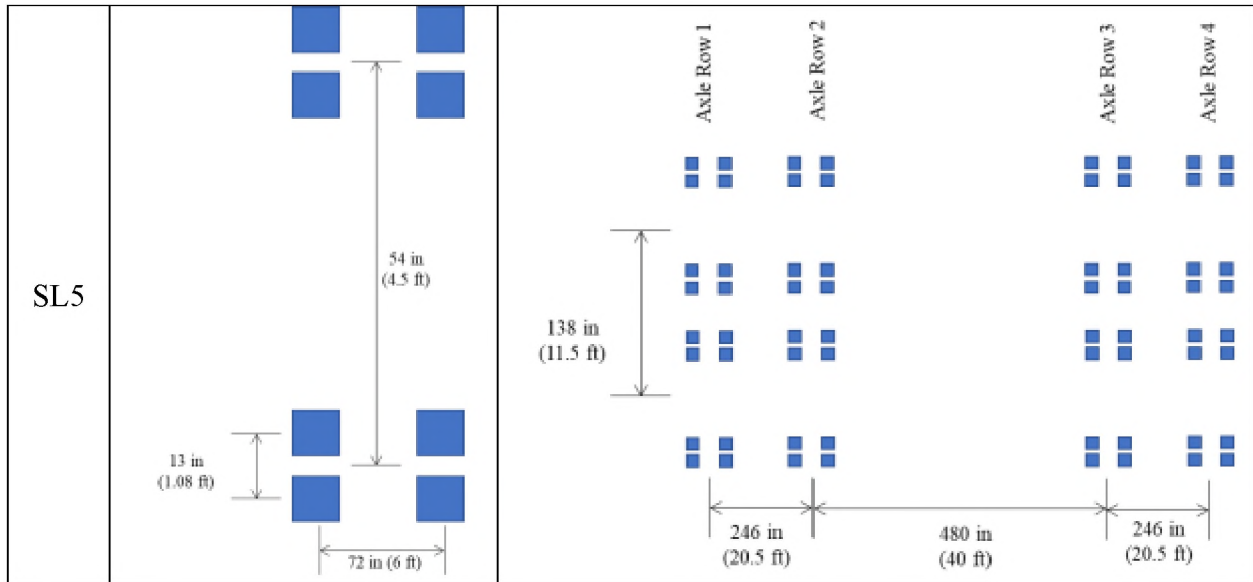
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Pco g	Eqphki wt cvkqp'qh'gcej " czig	Vt chgt 'eqphki wt cvkqp
UN3	 <p>63 in (5.25 ft)</p> <p>11 in (0.9 ft)</p>	 <p>Axle Row 1</p> <p>Axle Row 2</p> <p>Axle Row 3</p> <p>Axle Row 4</p> <p>Axle Row 5</p> <p>Axle Row 6</p> <p>Axle Row 7</p> <p>Axle Row 8</p> <p>Axle Row 9</p> <p>Axle Row 10</p> <p>156 in (13 ft)</p> <p>9 @ 109 in (9.1 ft)</p>
UN4	 <p>29 in (2.42 ft)</p> <p>9.45 in (0.78 ft)</p>	 <p>Axle Row 1</p> <p>Axle Row 2</p> <p>Axle Row 3</p> <p>Axle Row 4</p> <p>Axle Row 5</p> <p>Axle Row 6</p> <p>Axle Row 7</p> <p>Axle Row 8</p> <p>Axle Row 9</p> <p>Axle Row 10</p> <p>Axle Row 11</p> <p>Axle Row 12</p> <p>71 in (5.9 ft)</p> <p>59 in (4.9 ft)</p> <p>71 in (5.9 ft)</p> <p>11 @ 59 in (4.9 ft)</p>





Dcugf "qp"vj g'tqwg'tgr qtvgf "lp"vj g'r gto ku'hqt"vj gug"UNu'cu'y gm'cu'vj g'tgeqo o gpf gf "gruue" o qf wk' qh' CE." dcuglwddcug." cpf " uwdi tcf g" h'qo " RgppF QV" Rwdnecvkqp" 464" *Rgppu{ rkcplc" F gr ctwo gpv'qh'Vtcur qtvcvkqp."423; +."vj tgg'r cxgo gpv'utwewtgu'y gtg'kf gpv'wkgf "dcugf "qp"vj g'rgxgn' qh'tkum'vj g' "y qwf "dg'uwdlgevfg "vq'd{ "c'ukpi ng'r cuu'qh'vj g'UN'twen0Vj gug'ctg'wwo o ctg' gf "lp"Vcdng" 520Vj g"Nqy "tkum'utwewtg"j cu"t'grv'xgn' "vj keni'CE"cpf "dcug"rc{ gt"*vj g"dcug"cpf "uwdcug"ctg" i tqwr gf "lpvq"c'ukpi ng'rc{ gt'hqt'uko r nkek{ +y kj "c'tgrv'xgn' "j ki j "gruue"o qf wwu."cpf "ku'gZR gevfg " vq"uwhtgt"o kpk cni'f co ci g'f wg"vq"c'ukpi ng'r cuu'qh'cp"UN'twen0Qp"vj g"qvj gt"j cpf ".vj g"J ki j "tkum' utwewtg"j cu"t'grv'xgn' "vj lp"rc{ gt'u'y kj "tgrv'xgn' "ny "gruue"o qf wk'cpf "ku'gZR gevfg "vq"uwhtgt" uki phtecpv'f co ci g'0Vj g"O gf kwo "tkum'utwewtg"ku"lp"dgw ggp"vj gug"vy q"gzvgo gu'Ej cpi gu"lp" o qf wwu"ecp"dg"gzr gevfg "vq"qeevt"y kj "ej cpi gu"lp"vj g"vgo r gtcwtg"qh'vj g"CE"qt"ej cpi gu"lp"vj g" o qkwtg"eqpv'qh'vj g"dcug"rc{ gt0

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Nc{ gt	Nqy 't kum	O gf kwo 't kum	J ki j 't kum
CE	Vj kempguu"? "3: "lp O qf wwu"? "40'g8'r uk	Vj kempguu"? "32"lp O qf wwu"? "3g8'r uk	Vj kempguu"? "5"lp O qf wwu"? "5g7'r uk
Dcug'3lpemf lpi " uwdcug+	Vj kempguu"? "46"lp" O qf wwu"? "5; 222'r uk	Vj kempguu"? "38"lp" O qf wwu"? "45222'r uk	Vj kempguu"? "9"lp" O qf wwu"? "32222'r uk
Uwdi tcf g'*UI +	O qf wwu"? ". 222'r uk	O qf wwu"? ". 222'r uk	O qf wwu"? ". 222'r uk

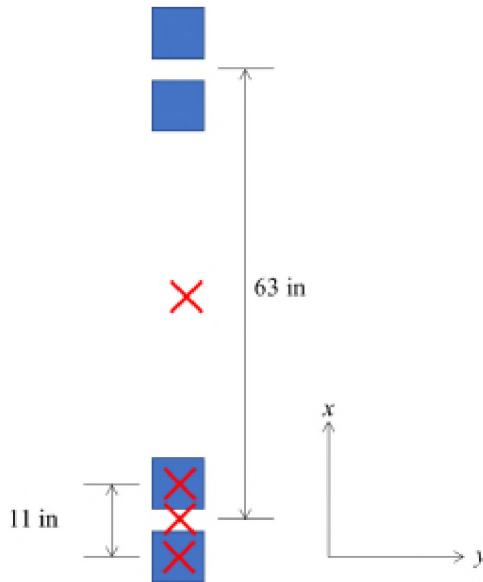
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3508 "Cpc'fuku'gh'UN3

Vj g'eqphki wcvkqp"qh'UN3'y cu'uj qy p'lp"Vcdng"4; 0Gcej "ukpi ng"czng"eqpuku"qh'hqwt "ktgu"ectt { lpi "
 672: "rd"cv'c'r tguuwg"qh'322'r uk'gcej . "y kj "42"ukpi ng"czngu"cttcpi gf "cmppi "32"czng"tqy u0Vj g'htuv"
 ugr "kp"cpn { lpi "y ku'eqphki wcvkqp"ku"vq"kf gpvkh { "y g'pwengwu"qh'y g'UN0Vj g'pwengwu"qh'cp"UN"ku"c"
 tgr gcvpki "wpk'qh'y g'UN'y cv'tgr tguwpv'y g'gpvtg'twem"uwej "y cv'y g'cpn { uku'qh'y g'gpvtg'UN'twem"
 ecp"dg'tgf wegf "vq"cpn { lpi "c"ugtkgu"qh'pwengk"J cll. "gv'cn0"423: +0K gpvkh { lpi "y g'pwengwu"qh'cp"UN"
 ku"cu'o wej "cp"ctv'cu'c'uekgpeg"j qy gxgt. "c'i gpgtcn'twng"qh'y wo d'ku'y cv'ktgu"cpf lqt "czngu"ugr ctevgf "
 d { "c"ur cekpi "dgmny "c'y tguj qrf "qh'82"lp"*7"hw"fq"pqv'i gpgtcm { "kphwpeg" gcej "qy gt"cpf "y gtghqtg"
 y ku'y tguj qrf "hqt0 u'y g'dcuku"qh'kf gpvkh { lpi "y g'pwengwu"qh'cp { "UN0

Kp'y g'UN3"eqphki wcvkqp. "gcej "tqy "qh'czngu"ku'ugr ctevgf "d { "c"ur cekpi "qh"; "hw'3"lp. "y gmlcdqyg"
 y g'y tguj qrf "qh'kphwpeg0'Vj gtghqtg. "gcej "czng"tqy "ecp"dg"cpn { gf "ugr ctevgn { 0Hwtj gto qtg. "
 y kj kp" gcej "czng"tqy . "gcej "czng"ku'ugr ctevgf "d { "c" f kwcpeg"qh'35"hw. "y j kej "ku"ci clkp"y gmlcdqyg"y g"
 y tguj qrf 0Vj gtghqtg. "y g'qp { "ktgu"y cv'tg"dgmy "qt'tgcuqpcdn { "emug"vq"y g'y tguj qrf "ctg"eqpvckpgf "
 y kj kp" gcej "czng"cpf "j gpeg. "y g'pwengwu"qh'UN3"ku" gcej "ukpi ng"czng0K'o c { "dg'pqvgf "y cv'y ku'ukpi ng"
 czng"j cu'c" f hgtgpv'eqphki wcvkqp "kp"vgto u"qh'ktg"ur cekpi + "y cp" c"ucpf ctf "czng0

Pgzv. "gcej "r cxgo gpv'utwewtgu"ku"cpn { gf "ht"mcf lpi "y kj "y g'pwengwu"wkpi "y g'rc { gtgf "
 grucwke"cpn { uku'r tqi tco "OpNc { gt" *Mj c { cpqxlej " ("Y cpi . "4229+ "cuwo lpi "hwm'dqpf "dgwy ggp"y g"
 rc { gtu0Vj g'utckpu"cv'y g'dqwqo "qh'y g'CE" *j qtk qpvcn'cpf "xgtwecn: "dqwqo "qh'y g'dcug" *xgtwecn: "
 cpf "vqr "qh'y g'wudi tcf g" *xgtwecn: "ctg" gxcnwvgf "cv'y g'r qkpw" f gr levgf "d { "c" tgf "öZ ö"lp" Hki wtg": 30"
 Vj g'tguwu"ctg"uj qy p'lp" Hki wtg": 40



Hki wtg': 3<Cpcn{ uku'r qkpui'lp'yj g'pwengwu'qh'UN3

Vj g'o czko wo "j qtk qpvcrlutckp"cv'yj g'dqwqo "qh'yj g'CE'y cu'j ki j guv'er r tqzko cvgn{ "dgrny " yj g'kppgt"wtg'hqt'yj g'J ki j 'tkum'ecug."cpf "lp'dgwy ggp'yj g'wy q'emuguv"wtgu'hqt'yj g'O gf kwo "cpf "Nqy " tkum'ecugu."y kj "yj g'o ci pkwf g"qh'yj g'utckp"eqttgur qpf kpi "y kj "yj g'rgxgn'qh'tkum'j ki j guv'hqt"J ki j " tkum'nyy guv'hqt"Nqy "tkum'0Vj g'o czko wo "xcnwg"qh'yj gug'utckpu"ecp"yj gp"dg'wugf "q"gxcnwcvg"yj g" f co ci g"ecwugf "d{ "qpg'r cuu"qh'yj g'UN'twem"eqpukukpi "qh'32'tgr gvkqpu"qh'yj g'pwengwu0F co ci g" ecp"dg's wcpvkgf "wukpi "y q'o gcuwugw<"hwi wg"hg"eqpuwo gf."cpf "qvcn'twukpi 0

Vj g'pwo dgt"qh'cmny cdng"tgr gvkqpu"qh'yj g'pwengwu"hqt"hwki wj"ecp"dg"gxcnwcvf "wukpi " yj g'o qf gn'hqo "Rcxgo gpv'O G"*P cvkpcn'Eqqr gtcvkg"J ki j y c{ "Tgugctej "Rtqi tco "Tgr qtv'3/59C." 4226+f'kewuugf "r tgxkqwu{ "cpf "tgr tqf wegf "dgrny <

$$N_f \approx 202654 \cdot \frac{\sqrt{\varepsilon_t}}{\sqrt{E}} \cdot \frac{\sqrt{2076}}{\sqrt{E}} \quad *73+$$

$$\sim "32" M \quad *74+$$

$$M \approx 60.6 \cdot \frac{\sqrt{V_b}}{\sqrt{V_b}} \cdot \frac{\sqrt{2076}}{\sqrt{V_b}} \quad *75+$$

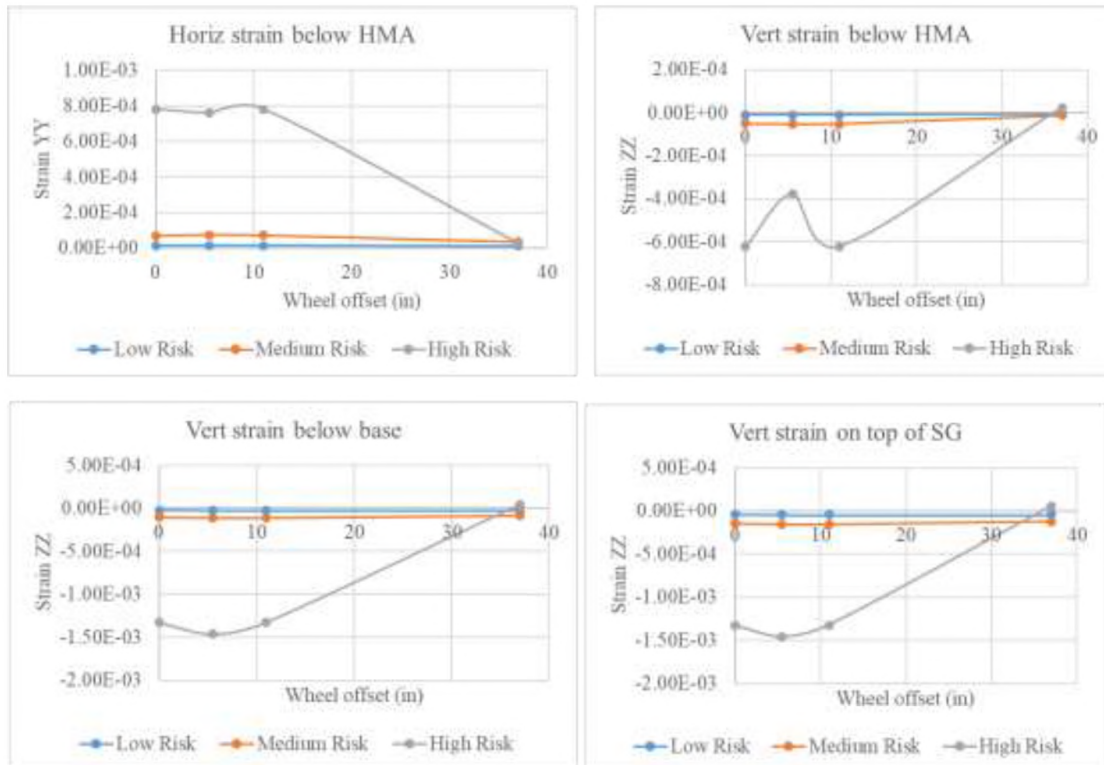
Y j gtg.

V "?" "ck"xqkf u'lp"cur j cn'o kzwtg'd{ "xqmw g."

V_b ? "ghgevkxg"cur j cn'dkpf gt"eqpvgpv'd{ "xqmw g."

ε_t ? "o czko wo "gpubg'utckp'cv'yj g'dqwqo "qh'yj g'CE'rc{ gt.'kp lkp"
 E ? "yj g'o qf wwu'qh'yj g'CE'rc{ gt.'r uk

Kp'yj g'r tguvpv'uwf { .'k'y cu'cuwo gf "yj cv' "? '029' ." V_b ? ", 069' . 'y j kej "ctg'v' r kecn
 xcnwut'geqo o gpf gf "d{ "RgppF QV"*Dtkpm"Y kmg. 'F ctvgt. ("Xqp'S wlpwu."4242+0



Hli wtg': 4<J qtk qpvc'pcf "xgt'ec'utckpu'wpf gt'yj g'pwengwu'qh'UN3

Vj g'r gtegpvc' g'qh'hc'ki wg'rhg"eqpuwo gf "ecp"dg"xcn'wgf "cu<

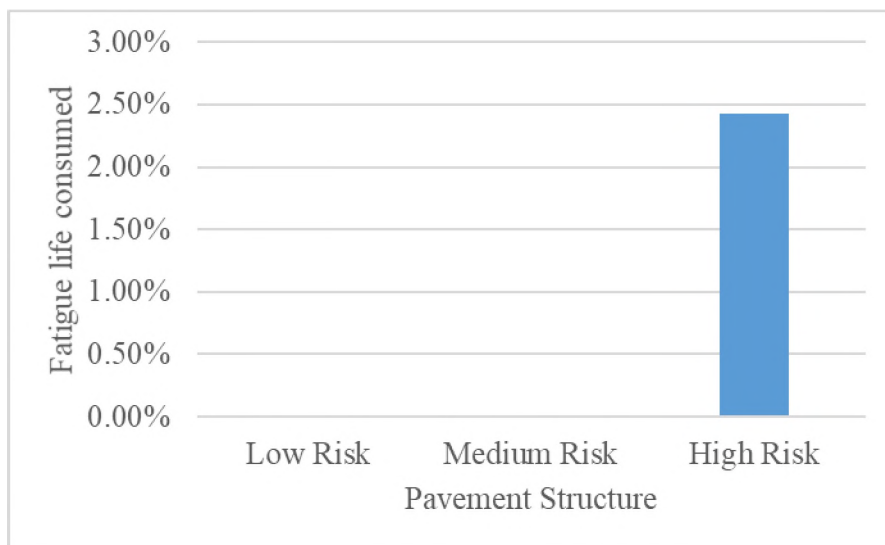
$$D * +? " \frac{n}{N_f} "322 \quad *76+$$

y j gtg.

n ? "yj g'pwo dgt'qh'tgr g'k'k'pu'qh'yj g'pwengwu'qxgt'c'r qkp0

Hqt "UN3."cp{ 'i kxgp'r qkp'v'g'zr gt'g'pegu'v'p'tgr g'k'k'pu'qh'yj g'pwengwu'hqt "qpg'r cuu'qh'yj g"
 UN."cpf "yj gtghqtg."320Vj g'r gtegpvc' g'qh'hc'ki wg'rhg"eqpuwo gf "hqt"gej 'r cxgo gpv'utwewt g"

chgt"qpg'tgr gvkqp"qh'v g'UN'ku'uj qy p'lp'Hki wtg': 50Hqt'v g'Nqy "cpf'O gf kwo 'tkunlwtwewtgu." vj gtg'ku'pgi rki kdr'f co ci g'ltqo "qpg'r cuu'qh'v g'UN0J qy gxgt.'hqt'v g'J ki j 'tkunlwtwewtg."qpg" r cuu'eqpuwo gu'cdqww'406' "qh'v g'hc'ki wg'hkg0



Hki wtg': 5<Rgtegpvc i g'qh'hc'ki wg'hkg'eqpuwo gf "d{ "qpg'r cuu'qh'UN3

Vj g'o czko wo "xgtv'ecnl'utckp'cv'gcej 'r qkp'v'ctg'lp'dgwy ggp'v'j g'vy q'emuguv'ktgu'hqt'v'j g'dcug" cpf "UI ."lpf'k'ecv'pi "v'j g'lpvgtcevkqp"dgy ggp'v'j go ."cpf "wpf gtpgc'v'j g'k'p'p'gt'ktg'hqt'v'j g'CE0Vj g" vqcnltw'kpi 'f gr v'j *TF +y cu'gxcn'w'v'g'f "wulpi "v'j g'Rcxgo gpv'O G'o qf gnu'hqt'CE"cpf "wpdqwpf 'rc {gtu" *P cv'k'q'pcn'E'qqr gtcv'xg"J ki j y c{ "Tgugctej "Rtqi tco "Tgr qtv'3/59C.'4226+."cu'f guet'kdgf "dgm'y <

$$D_{AC} = \frac{CE'_{tw'kpi} < 32^{50877743956205} N^{59} }{AC} \quad *77+$$

y j gtg.

T ? "o kf/f gr v'j "vgo r gtcwtg'qh'v g'CE'rc {gt."

."c ? "v'j g'v'j kempguu'qh'v g'CE'rc {gt.'kp

ε."? "v'j g'tguk'k'p'v'utckp.'lp'lkp

Vj g'tguk'k'p'v'utckp'ku'ecrewn'v'g'f "wulpi "v'j g'hqm'y kpi "gs wcv'k'p<

$$\varepsilon^{-} \text{ " ? " } \frac{3 \pi}{E} \left(\frac{z}{z'} \right)^{\frac{1}{2}} \left(\frac{x}{y} \right)^{\frac{1}{2}} + \quad *78 +$$

y j gtg.

z " ? " xgtvkecn'utguu'cv'o kf/f gr vj "qh'vj g'CE"rc{ gt.'r uk
x ? "j qtk qpvcn'utguugu'cv'o kf/f gr vj "qh'vj g'CE"rc{ gt.'r uk"
y " ? "j qtk qpvcn'utguugu'cv'o kf/f gr vj "qh'vj g'CE"rc{ gt.'r uk"
" ? "Rqluqp'tcvkq"qh'vj g'CE"*cuwo gf "vq'dg'205"cnv c{ u+

Dcug'twwkpi

$$\backslash D_{GB} \text{ ? " }_{GB} \left(\frac{\varepsilon_{\gamma}}{\varepsilon_{\gamma'}} \right)^{\frac{1}{2}} e_v^{\frac{1}{2}} \bar{n}_{\gamma} + \varepsilon_v \quad *79 +$$

UI 'twwkpi

$$\backslash "D_{GB} \text{ ? " }_{SG} \left(\frac{\varepsilon_{\gamma}}{\varepsilon_{\gamma'}} \right)^{\frac{1}{2}} e_v^{\frac{1}{2}} \bar{n}_{\gamma} \varepsilon_v \quad *7: +$$

Y j gtg"vj g"eqpuvcpw"ε." ε . " GB SG "ctg'ur gekkf"d{ 'vj g'o qf gncpf "ku'vj g'xgtvkecn'utckp'cv'
vj g'o kf/f gr vj "qh'vj g"eqttgur qpf kpi "rc{ gt0

Vj g'vqvcntwwkpi 'ku'vj gp"gxcmvvgf "cu<

$$\backslash 'D \text{ ? " } \backslash D_C - \text{ " } D_{GB} - \text{ " } D_{SG} \quad *7; +$$

Vj g'twwkpi "ecp"vj gp"dg'uecnf "vq" "Dp"ç"uugt/ur gekkf"tgnkdkk{ "ugmvevgf "cu": 7' "lp"vj g"
rtgugpv'uwf { +\wukpi "vj g'hqmy kpi "o qf gnc

$$\backslash "D_p \text{ ? " } "D - \text{ " } \frac{4}{\sqrt{}} \left(\sqrt{D_C - "Se^4_{DGB} - "Se^4_{D_{SG}}} \right) p \quad *82 +$$

Y j gtg.

Se." ? "ucpfctf "gttqt"qh'twwkpi ."lp"

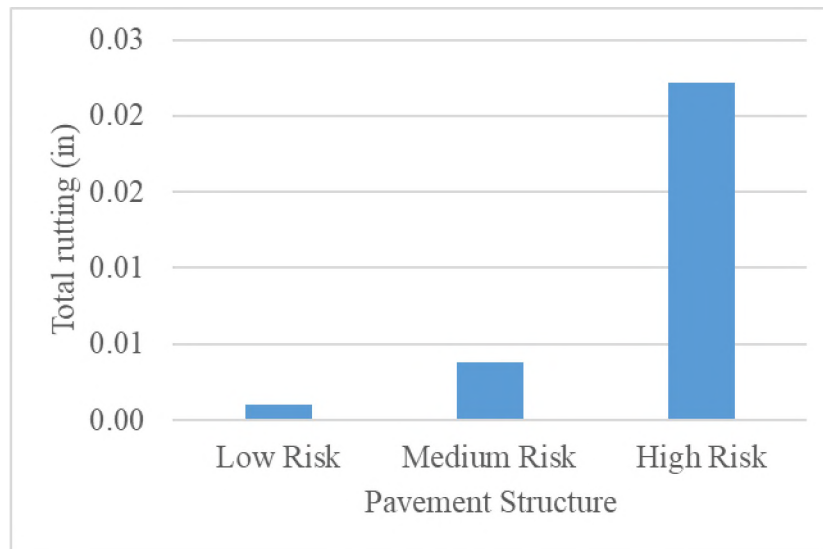
Se\ D_C ? "2037: 9* \ 20579: D_C +

$Se_{DGB} = 2038; * 2075$

$Se_{DSG} = 20946; * 2078$

"p"ucpfctf "pqto cn'xctkcyg

Vj ku'ku'ecrewcygf "hqt"gej "r cxgo gpv'utwewtg"cpf "uj qy p"lp Hki wtg": 60Hqt'yj g"Nqy "cpf " O gf kwo "tkuni'utwewtgu."pgi rki kdrng"twwkpi "ku"r tgf levgf "vq" f gxgnr "y kj "qpg"r cuu"qh'yj g"UN0 J qy gxgt."hqt'yj g"J ki j "tkuni'utwewtg."c'uki pkhecpw{ "j ki j gt'twwkpi "y cu'r tgf levgf 0



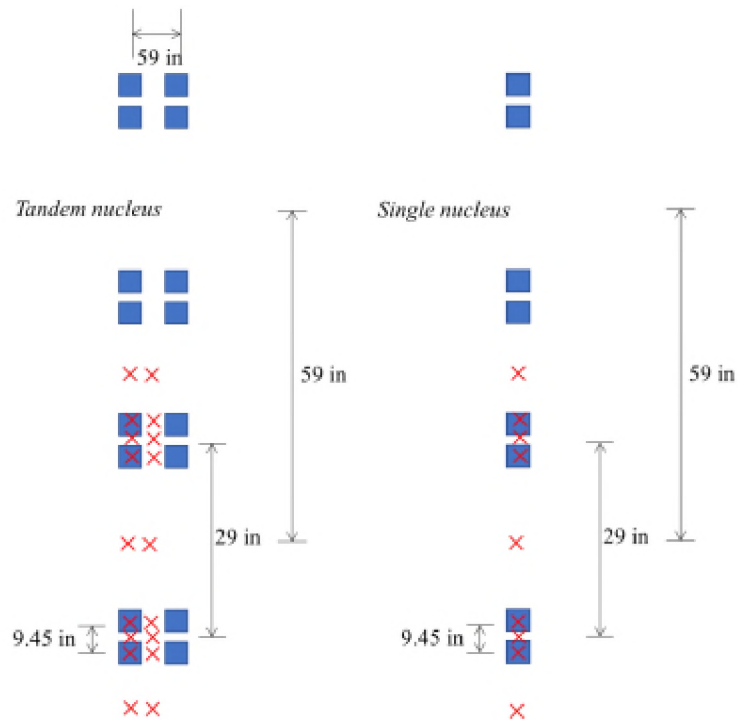
Hki wtg": 6<Rtgf levgf "twwkpi "hqt"qpg'r cuu"qh"UN3

35004" Cpcrfuku'qhUN4

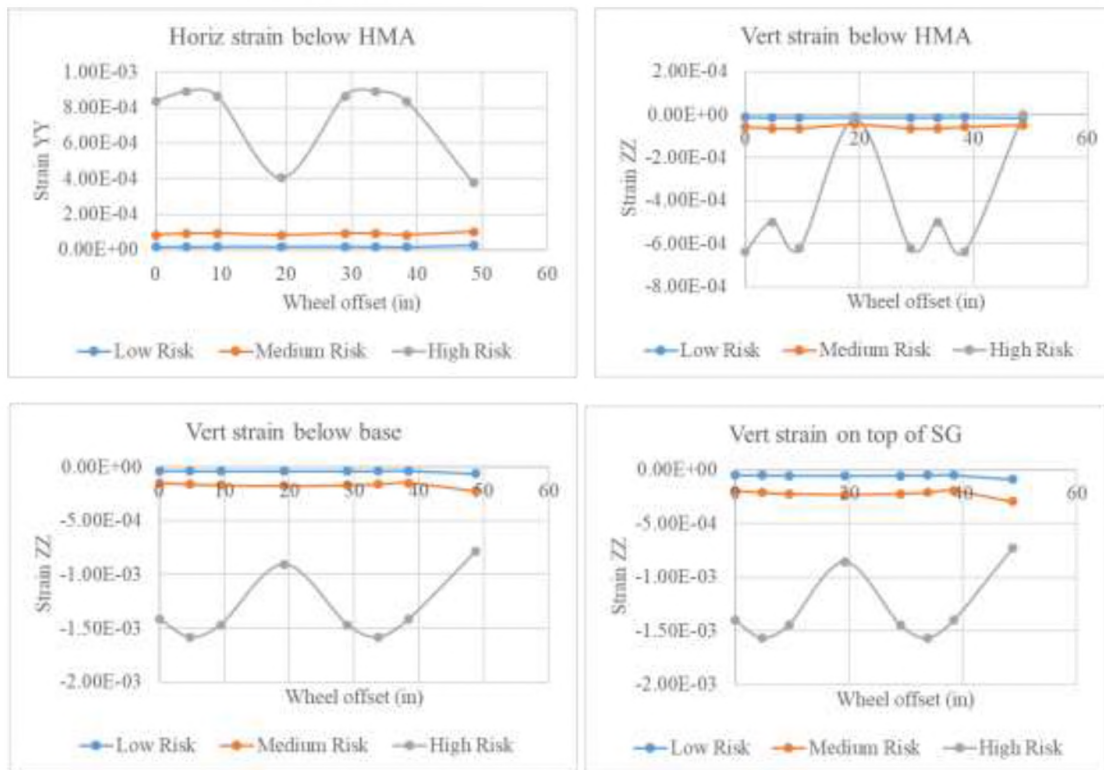
UN4"eqpuku'qh'c"ugtkgu'qh'6: "ukpi ng"czngu"cnpi "y gnxg'tqy u."y kj "gej "vtg"j cxkpi "c"mcf "qh'672: " ndu'cv'c'r tguwtg"qh'322'r uk0Cnpi "y j f kgevkp"qh'tcxgn"gej "tqy "ku'ugr ctcvgf "d{ "c"ur celkpi "qh'60 " hv."y j lej "ku'lww'dgmny "y j g'y tguj qrf "qh'lpvgtcevkp0Vj gtghqtg."gkj gt"cu'pi ng'tqy "qt"y q'tqy u'o c{ " dg'r ctv'qh'yj g"pwengwu'qh'UN40Y kj lp"gej "czng'tqy ."y gtg"ctg"hw'ut'ukpi ng"czngu0Vj g'emuguv'ur celkpi " dgwy ggp"cp{ "y q"cf lcegpv'ukpi ng"czngu'ku'7; "lp."y j lej "ku'cnq'lww'dgmny "y j g'y tguj qrf 0Vj gtghqtg." y q'pweng'ctg'r quukdrng<c"Ukpi ng'pwengwu'eqpuku'pi "qh'y q'ukpi ng"czngu'ur cegf "7; "lp"cr ctv."cpf "c" vcpf go "pwengwu'eqpuku'pi "qh'y q'i tqwr u'qh'ukpi ng"czngu0Vj gug."cnpi "y kj "y j g'r qlpw'cv'y j lej "y j g' utckpu"ctg"gxcmcygf."ctg"uj qy p"lp

Hki wtg": 70

Hqt"vj g"Ukpi ng"pwengwu."vj g"utckpu"gxcmwvfg"ctg"uj qy p"kp"Hki wtg": 80'Vj g"o czko wo " j qtk qpwn'utckp"cv'vj g"dqwqo "qh'vj g'CE"y cu'qdugtxgf"kp"dgy ggp'emugn(ur cegf"ktgu'f wg"vq"vj g" kpgtcevkqp"dgy ggp"vj go 0Qp"vj g"qvj gt"j cpf."vj g"o czko wo "xgtvecn'utckp"cv'vj g"dqwqo "qh'vj g'CE" y cu'fktgevn(dgrny "vj g'ktgu0Cv'vj g"dqwqo "qh'vj g'dcug"cpf"vqr"qh'vj g'uwdi tcf g."vj g'xgtvecn'utckpu" y gtg"kp"dgy ggp'emugn(ur cegf"ktgu."ci ckp"uj qy kpi "vj g'kpgtcevkqp"dgy ggp"vj go 0

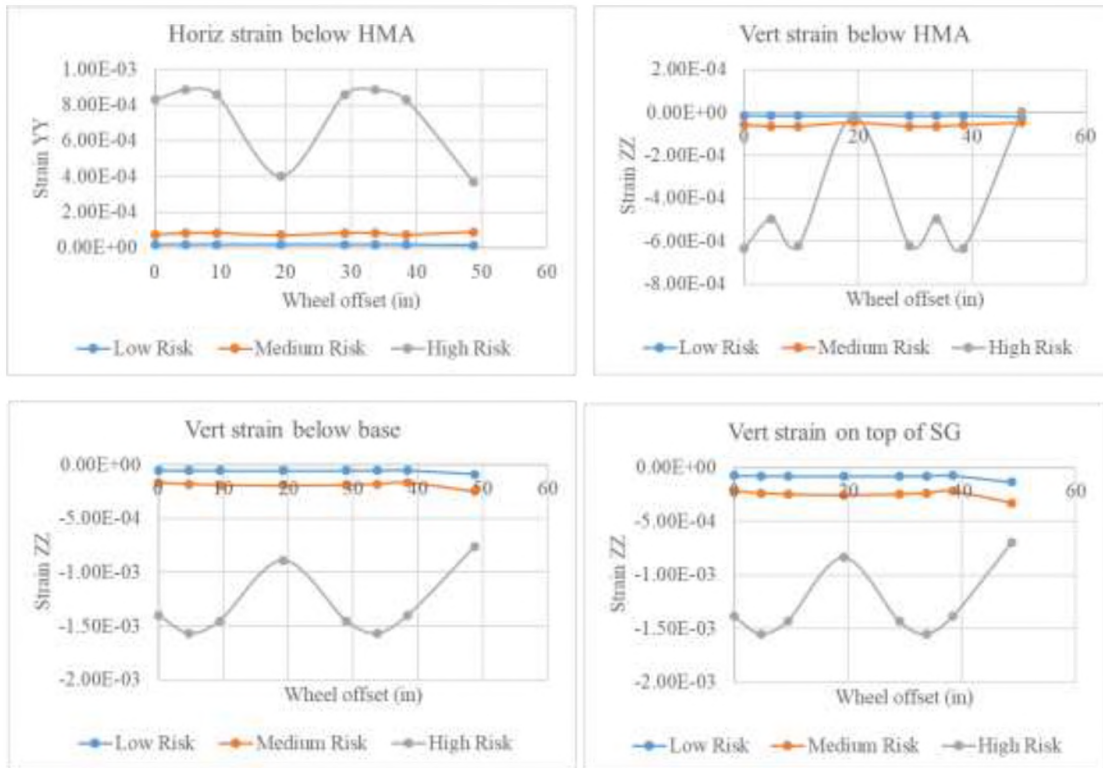


Hki wtg": 7<P weng'qh'UN4"cpf"eqttgur qpf kpi "cpcn(uku'r qkpuf gr levgf"d{ "vj g'tgf"öZö

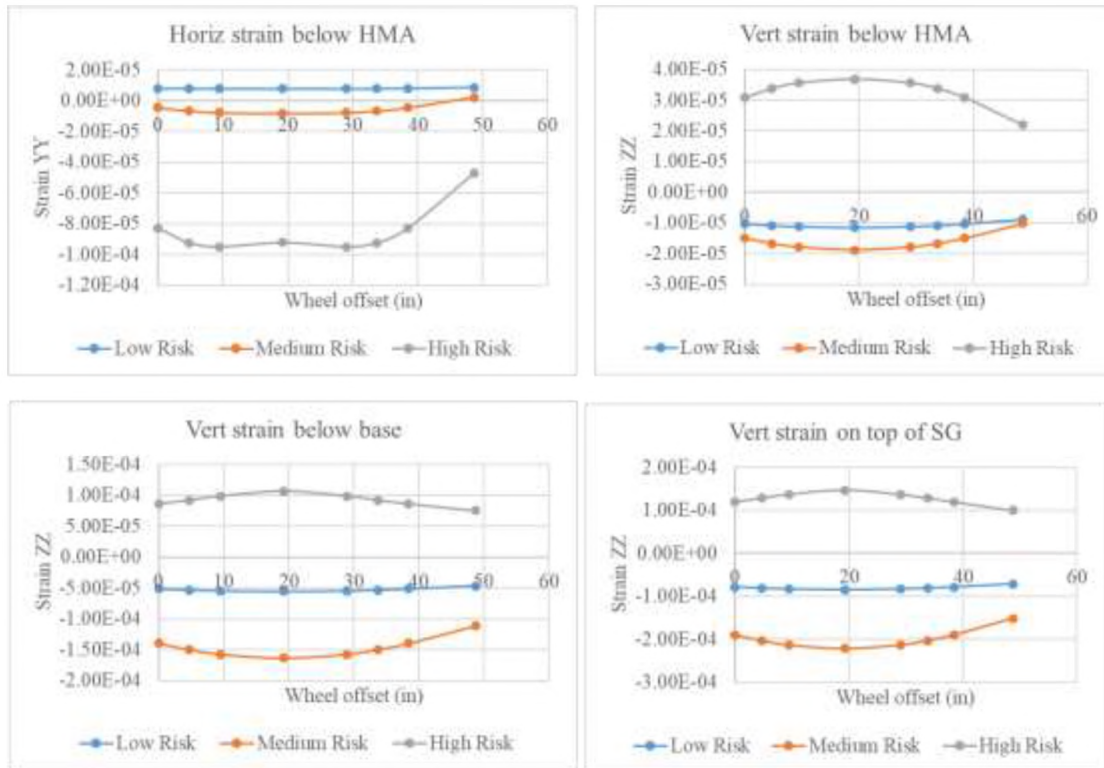


Hki wtg': 8<J qtk qpvcn'cpf 'xgt'ecn'utckpu'wvf gt 'vj g'Ukpi ng'pwengwu'qh'UN4

Hqt "vj g"Vcpf go "pwengwu."vj g"utckpu"gxcn'wv'f "cnqpi "qpg"qh'vj g"czrgu"ku'uj qy p"kp"Hki wtg" : 90Vj g"utckpu'ctg'uko k'ct "q'vj g"Ukpi ng'pwengwu."uj qy kpi "vj cv'vj gtg"ku'rk'wg"kp'vgt'cev'kqp"y kj "vj g" cf l'cegp'v'czrg'tqy 0Vj ku'ecp'dg"eqp'h'ko gf "d{ "nq'qn'kpi "cv'vj g"utckpu"kp'dgw'ggp'vj g"czrg'tqy u."cu" uj qy p"kp"Hki wtg": : 0Vj g"utckpu'ctg'c'h'm'qtf gt "qh'o ci pkwf g'uo cmgt'vj cp'vj g'eqttgur qpf kpi "utckpu" cnqpi "cp"czrg."cpf "o qtgqxgt."uqo g'qh'vj g"utckpu'ctg'tgxgtugf "kp'vj gkt "fkt'ge'v'kqp"cpf "vj wu'f q"pqv" eqp'tkdwg'v'q'hc'vki wg'et'cen'kpi "qt't'w'w'kpi "gp'v'kt'gn'0

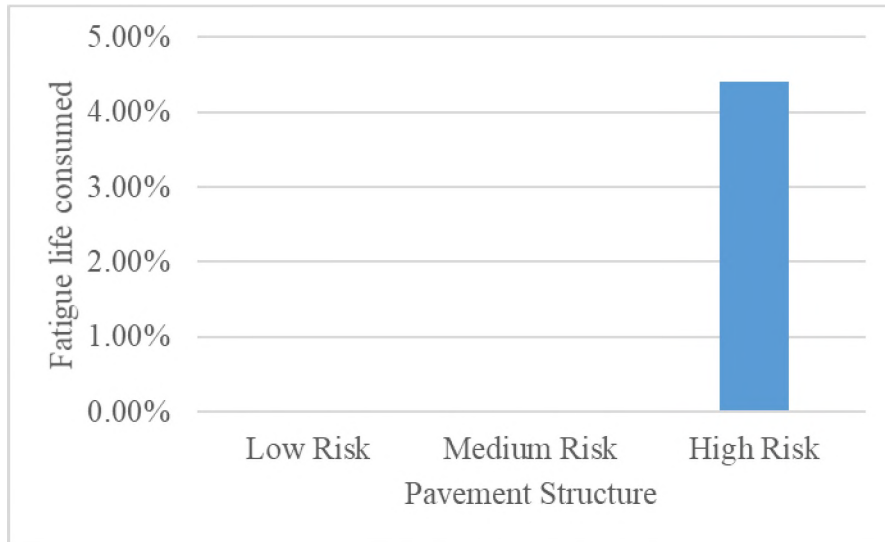


Hki wt g': 9<J qtk qpvcn'cpf "xgt vlcni'utckpu'vpf gt"cp"czrg"qh'yj g"Vcpf go "pwegwu"qh'UN4

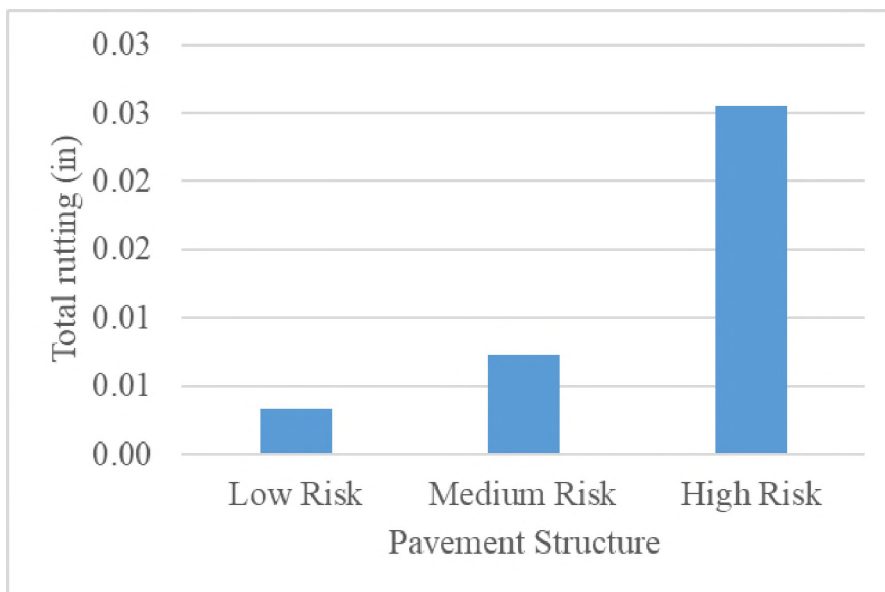


Hki wtg': : <J qtk qpvcn'cpf 'xgtvkcni'utckpu'kp'dgwy ggp'yj g'czrgu'qh'yj g'Vcpf go 'pwergwu'qh'UN4

Dcugf "qp"yj g'cdqxg"tguwmu."k'ecp"dg"eqpenwf gf "yj cv'yj g"Ukpi ng'pwergwu"ku"uwHlekp'v"q" cpcn{ | g'UN4."y kj "cp{ 'r qkp'v'qp'yj g'r cxgo gpv'gxr gtlgpekp' "34'tgr gvkqpu'qh'yj g'pwergwu0Wukpi 'yj g' utckpu'qdvckpgf 'ftqo 'yj g'Ukpi ng'pwergwu'cpf 'yj g'o qf gnu'f guetldgf 'kp'UN3."yj g'r gtegpwi g'qh'lcvi wg" rkhg"eqpuwo gf "d{ 'c'ukpi ng'r cuu'qh'UN4"cu'y gm'cu'yj g'qvcl'twukpi "cv'yj g'vqr "qh'yj g'uwdi tcf g'ctg" uj qy p'kp'Hki wtg': ; "cpf 'Hki wtg', 2'tgur gevkggn{ 0



Hki wtg"; <Rgtegpwi g"qh'ic'ki wg'ikg"eqpuwo gf "d{ "qpg"r cuu'qh"UN4

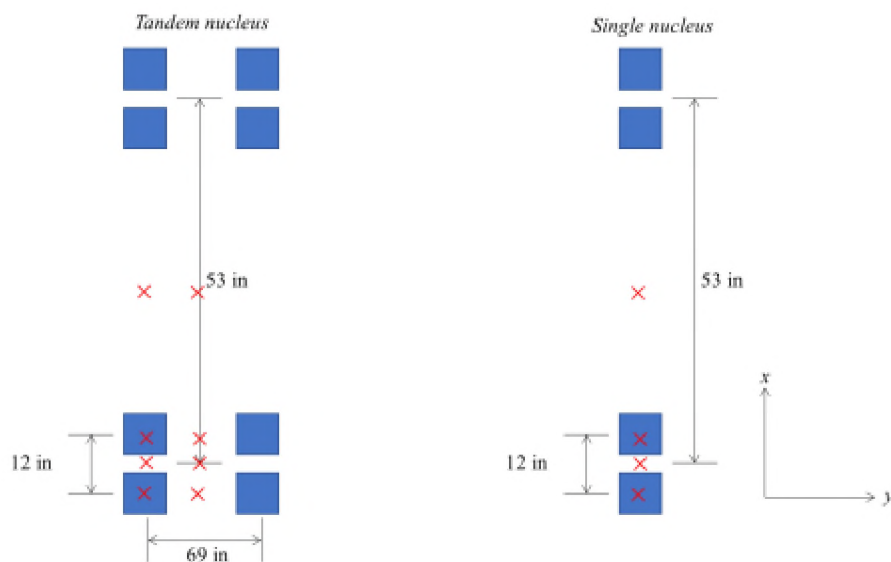


Hki wtg"; 2<Rt gf levgf 'twl'pi 'hqt "qpg"r cuu'qh"UN4

Nkng"UN3."y g"Nqy "cpf "O gf kwo "tkunr cxgo gpw'f kf "pqv'eqpuwo g'uki p'hecpv'r qt'v'qp"qh'y g" h'v'ki wg'ikg"0Vj g"J ki j "tkunr cxgo gpv'j qy gxgt'f kf "eqpuwo g'cdqw'607' "qh'ku'h'v'ki wg'ikg'y kj "qpg" r cuu'qh'y g"UN0Hqt'tw'k'pi ."y g"Nqy "cpf "O gf kwo "tkunr cxgo gpw'f kf "pqv'uj qy "uki p'hecpv'tw'k'pi ." y j kg'y g"J ki j "tkunr cxgo gpv'uj qy gf "c'uo cni'co qwpv0

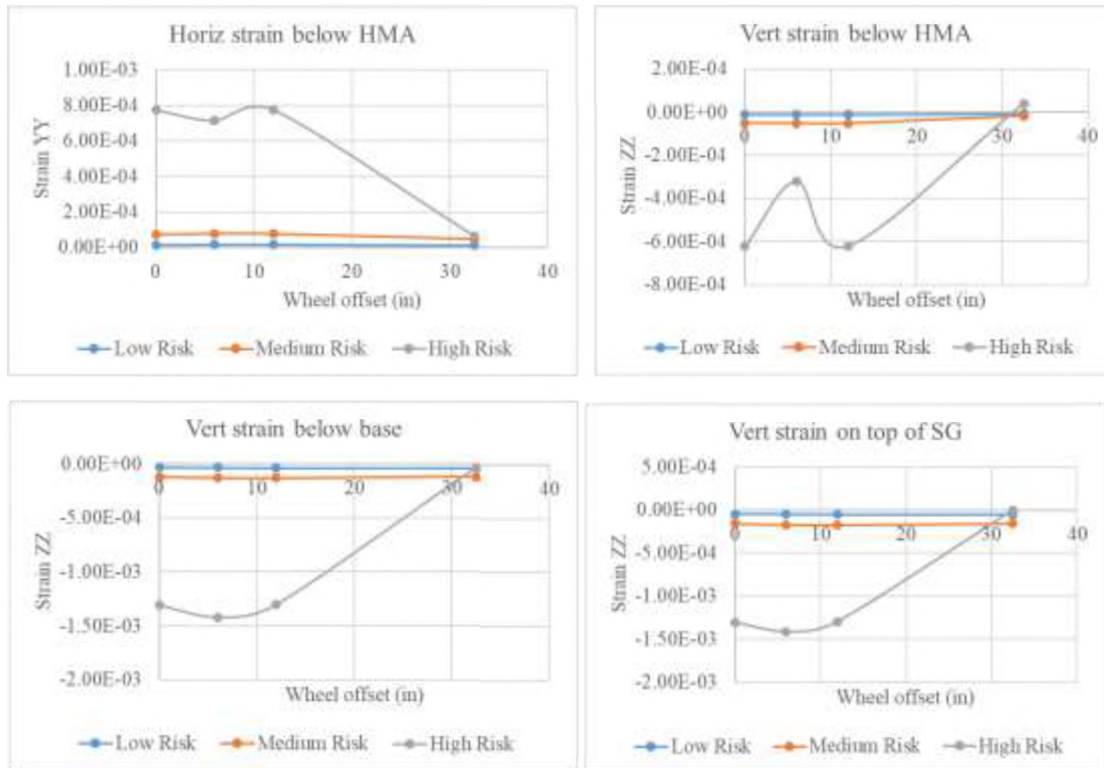
UN5"eqpukru"qh'c"ugtgu"qh'34"vcpf go "czngu"cnppi "ukz'tqy u'y kj "gcej "ktg'j cxkpi "c'mcf "qh'6878"nd"
cv'c'r tguwtg"qh'322"r uk'Gcej "vcpf go "czng"eqpukru"qh'vy q"czngu'Vj g"htuv'uvg "ku'vq'kf gpvkh' "vj g"
pwengwu"qh'vj g'UN'Gcej "czng'tqy 'ku'ugr ctcvxf "d{ '3: 04'hm'/'640 'hm'y gm'cdqxs'vj g'vj tguj qrf ."uq'vj g' "
ecp'dg'cpcn{| gf 'ugr ctcvgn' 0Y kj kp"gcej "czng'tqy ."gcej "vcpf go "czng'ku'ugr ctcvxf "d{ '330 'hm'ci ckp"
cdqxs'vj g'vj tguj qrf 0Vj wu. 'vj g'gpvktg'UN'tgf wegu'vq'vj g'cpcn' uku'qh'c'ukpi ng'vcpf go "czng0

Y kj kp"gecj "vcpf go "czrg."yj g'lpf kklf wcn'czngu'ctg'ugr ctcwgf "d{ "c"ur cekpi "qh707'h0Y j kg"
 yj ku'ku'cdqxg'yj g'yj tguj qrf 'hqt'lpvgtcekwq. 'k'ku'lwu'dctgn' 'uq0J gpeg. 'yj g'pwengwu'eqwrf 'dg'gkj gt" c"
 ukpi ng"czrg"qt" c"vcpf go "czrg0Dqyj 'ctg'gzco kpgf "j gtg. 'y kj "yj g'Ukpi ng'pwengwu"cpf "Vcpf go 'pwengwu"
 uj qy p"lp"Hki wtg"; 3. "cmipi "y kj "yj g'r qkpwu"cv'y j kej "yj g'utckpu'y gtg'gxcnwcvgf "f gr kwgf "d{ "c"tgf "
 ðZ ö0



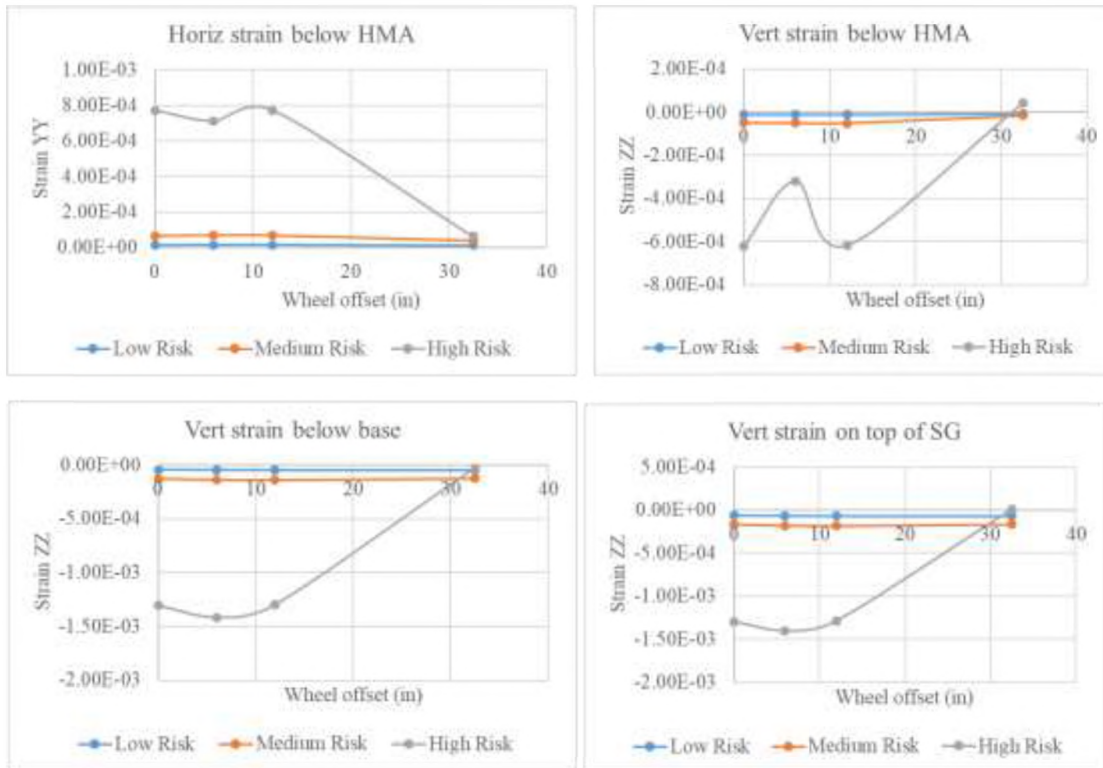
Hki wtg"; 3<Vcpf go "cpf "Ukpi ng"pweng'qh"UN5

Hqt"y j g"Ukpi ng"pwegwu."y j g"utckpu" gxcnævgf "ctg"uj qy p"kp"Hki wtg"; 40'Vj g"o czko wo " j qtk qpvcn'cpf "xgtæcn'utckp"dgm y "y j g"CE"y cu'cr r tqzko cvgn("wpf gtpgc y "y j g"lppgt"ktg."y j krg'y j g" o czko wo "xgtæcn'utckp"dgm y "y j g"dcug"cpf "qp"vqr "ql"y j g"uwdi tcf g"y cu'kp"dgy ggp"y j g"pgctguv" ktgu0

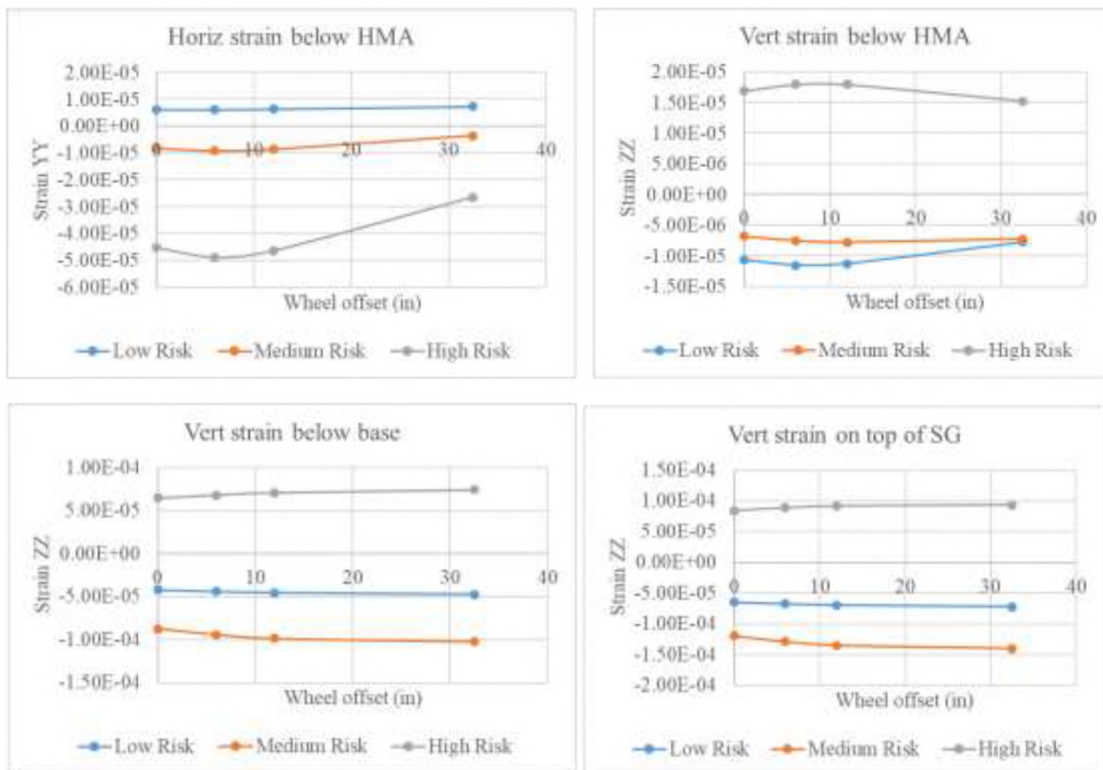


Hli wtg"; 4<J qtk qpvcn'cpf 'xgtvecn'utckpu'w'pf gt'cp'czng'qh'yj g'Ukpi ng'pwengwu'qh'UN5

Hqt'yj g'Vcpf go 'pwengwu.'utckpu'cm'pi 'c'ukpi ng'czng'ctg'lp'Hli wtg"; 50Qpeg'ci clp.'yj gtg'ku" xgt{"rkng'fkhgtgpeg"dgy ggp'yj gug'tguwu'cpf'yj cv'htqo 'yj g'Ukpi ng'pwengwu'Vj ku'uj qy u'rkng' kpygtcevkp'dgy ggp'yj g'vtgu'Vj ku'ecp'dg'eqphkto gf'd{'gzco klpki 'yj g'utckpu'lp'dgy ggp'yj g'czngu' qh'yj g'Vcpf go 'czng'pwengwu.'uj qy p'lp'Hli wtg"; 60

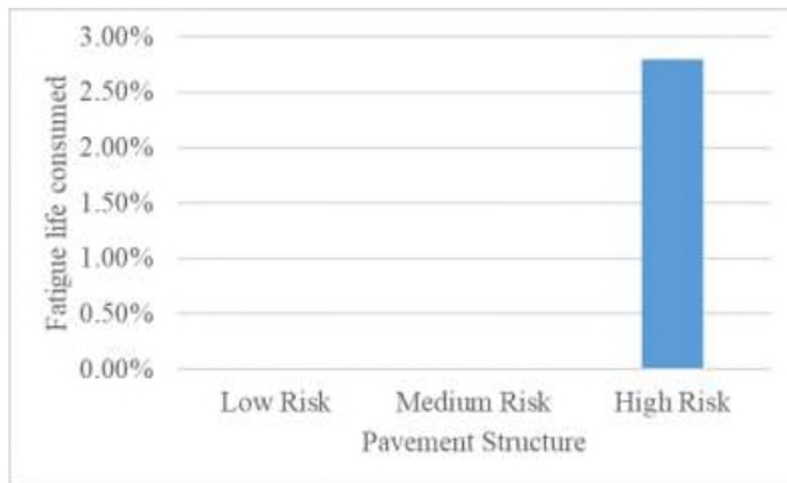


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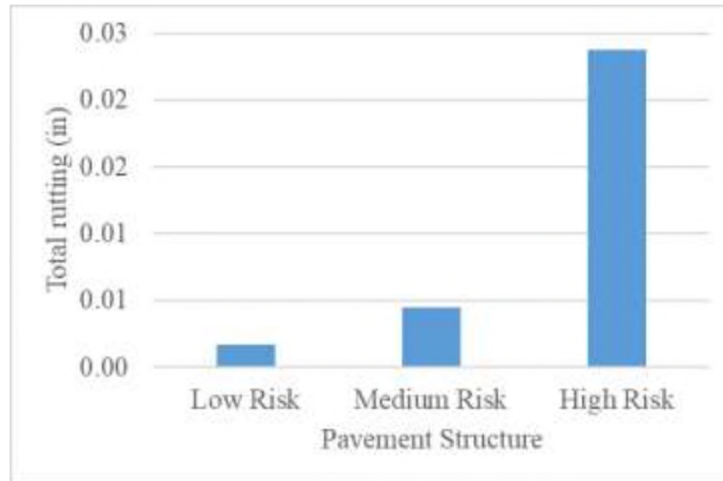


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ƙƙ'Ƴ ƙu'ecug.'Ƴ g'utckpu'ctg'c'hwmi'qtf gt'qh'o ci pkwf g'rguu'Ƴ cp'Ƴ g'eqtgur qpf ƙƙi 'utckpu'cnpi 'Ƴ g'
 czng.'cpf 'ƙƙ'uqo g'ecugu'Ƴ g'uki p'ku'cnq'tgxgtugf "kQ0'gƙukg'utckp'dgeqo gu'eqo r tguukg'cpf 'xleg"
 xgtuc+0'Vj ƙu'ci ckp'tgkphqtegu'Ƴ g'hcev'Ƴ cv'Ƴ gtg'ku'rkwr"ƙƙgtcevkqp'dgy ggp'Ƴ g'czrgu0'htqo "Ƴ g"
 cdqxg'f luewuukqp.'k'ecp'dg'eqpenmf gf "Ƴ cv'Ƴ gtg'ku'pq'eqpukf gtcdrg'ƙƙgtcevkqp'dgy ggp'Ƴ g'y q"
 czrgu'hqt'Ƴ g'vcpf go "czng'eqphki wtcvkqp0'Vj gtghqtg.'Ƴ g'pwengwu'ku'c'ukpi ng'czng.'cpf 'c'r qƙv'qp'Ƴ g"
 r cxgo gpv'gxr gtlgpegu'34'tgr gvkqpu'qh'Ƴ g'pwengwu0'Wukpi 'Ƴ ƙu'phqto cvkqp.'Ƴ g'r gtegpv'hvki wg'hkg"
 eqpuwo gf 'cpf 'qvcn'twukpi 'cv'Ƴ g'qr 'qh'Ƴ g'wudi tcf g'y gtg'f gvgto ƙpgf 'cpf 'ctg'uj qy p'ƙƙ'hki wtg'; 7"
 cpf 'hki wtg'; 8'tgur gevkgnf 0



Hki wtg'; 7<Rgtegpwi g'qh'hvki wg'hkg'eqpuwo gf 'd{ 'qpg'r cuu'qh'UN5



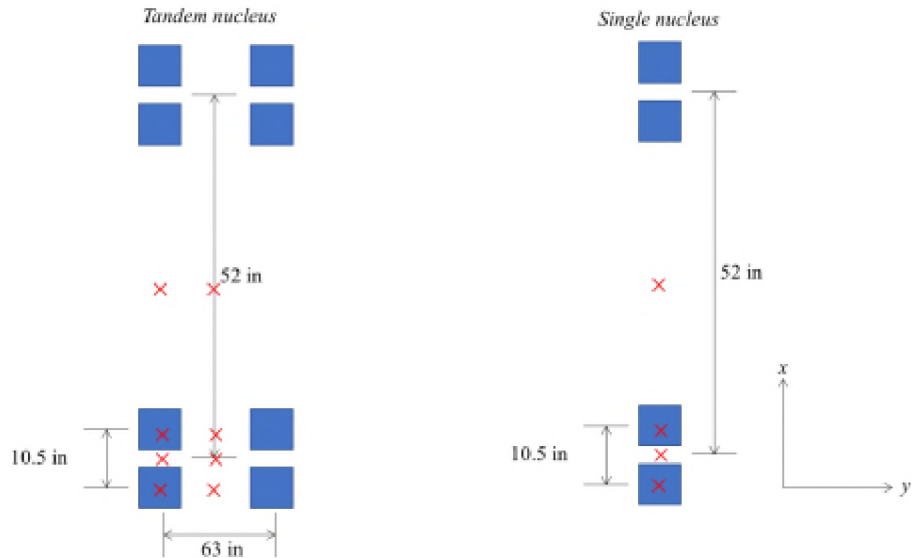
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Nkng'yj g'r t g x k q w u "UNu. "qpn{ 'yj g"J ki j 'tkunlr cxgo gpv'j cf "c"eqpukf g t c d n g "r c t v'q h'ku'hicvki wg" r h g "eqpuwo gf 0Rt gf kev f 'twwkpi 'y cu'p gi r ki k d n g "hqt 'yj g'Nqy "c p f "O g f k w o 'tkunlr cxgo gpw. "c p f "u o c m l' hqt 'yj g"J ki j 'tkunlr cxgo gpv0

35006''Cpcrfuku'qh'UN6

UN6"eqpukwu"qh'c"ugt k u "q h": "c p f g o "c z r g u "c m p i "6"t q y u. "y k j "g c e j "v t g"j c x k p i "c"n q c f "q h"7.9: 4"n d u" c v'c"r t g u u w t g"q h"322"r u k 0"G c e j "c p f g o "c z r g "e q p u k w u"q h'y q "c z r g u 0"G c e j "c z r g"t q y "k u"u g r c t c v g f "d{ " 3; 05"n v"y g m l'c d q x g"y j g'y j t g u j q r f. "u q"y j g{ "e c p"d g"c p c n{ | g f "u g r c t c v g n{ 0"Y k j k p"g c e j "c z r g"t q y. "g c e j " c p f g o "c z r g"k u"u g r c t c v g f "d{ "32"n v"ci c k p"c d q x g"y j g'y j t g u j q r f 0"V j w u. "y j g"g p v k t g"U N"t g f w e g u"v q"y j g" c p c n{ u k u'q h'c"u k p i r g"v c p f g o "c z r g. "l w u v'k n g"UN50

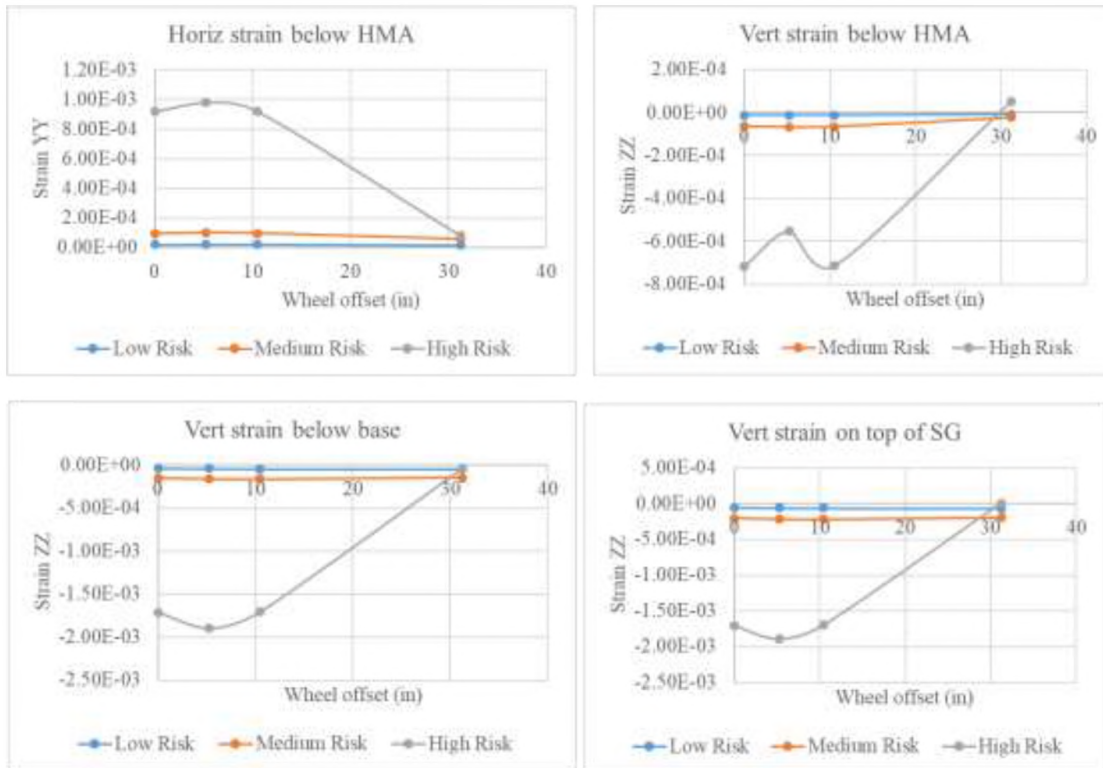
Y k j k p"g c e j "c p f g o "c z r g. "y j g"l p f k x k f w e n'c z r g u"c t g"u g r c t c v g f "d{ "c"l r c e l p i "q h"7047"n v 0"Y j k n g" y j k u'k u"c d q x g"y j g'y j t g u j q r f "h q t"l p v g t c e v k p p. "k'k u'l w u v'd c t g n{ "u q 0"J g p e g. "y j g"p w e r g w u"e q w f "d g"g k j g t "c" u k p i r g"c z r g"q t "c"v c p f g o "c z r g 0"D q y j "c t g"g z c o k p g f "j g t g. "y k j "y j g"U k p i r g"p w e r g w u"c p f "V c p f g o "p w e r g w u" u j q y p"l p"H k i w t g"; 9. "c m p i "y k j "y j g'r q l p w u"v'y j k e j "y j g"u t c k p u'y g t g"g x c n w c v g f "f g r k e v g f "d{ "c"t g f " 0Z 00



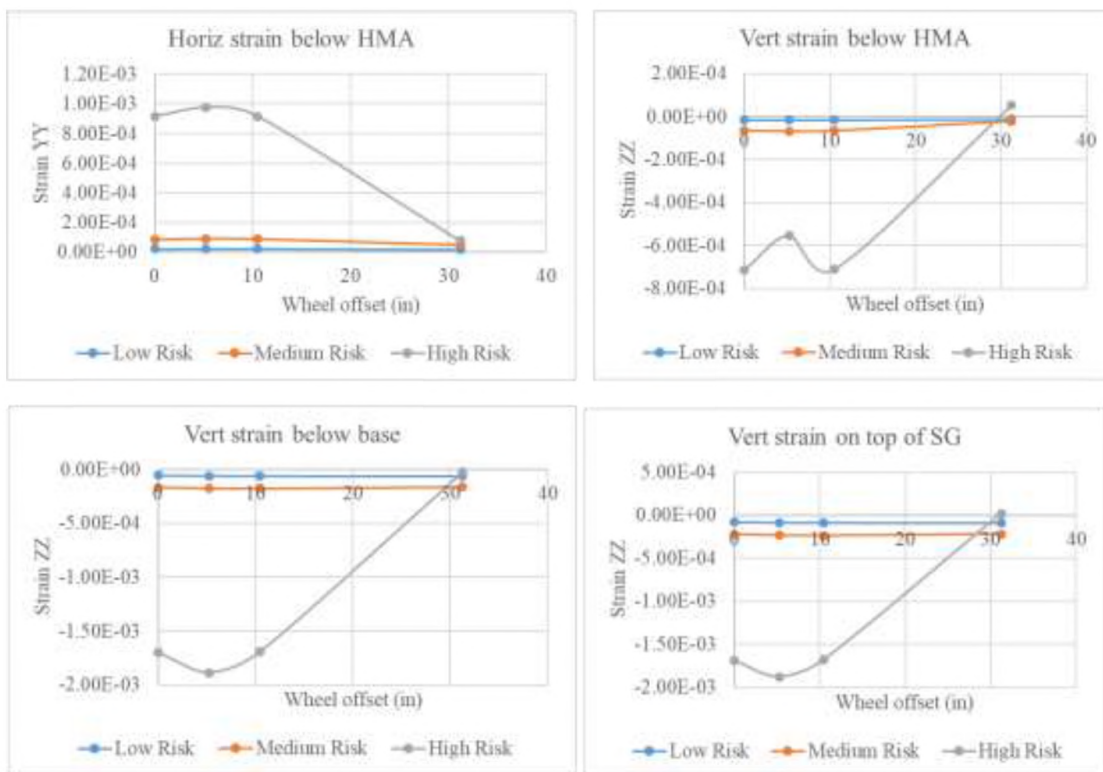
Hki wtg"; 9<Vcpf go "cpf "Ukpi ng'pweng'qh'UN6

Hqt"vj g"Ukpi ng'pwengwu."vj g'utckpu"ctg"uj qy p"lp"Hki wtg"; : . 'y j kg'hqt"vj g"Vcpf go "pwengwu." lp"Hki wtg"; ; 0Qpeg'ci ckp."vj g'wy q"ugwu'qh'utckpu"ctg'pgctn('kf gpvecn'v"gej "qvj gt."lpf lecvkpi "qpn(" o kpgt"lpvgtcevkqp"dgy ggp"vj g"czngu0Vj ku'ecp"dg"eqphko gf "d{ "mqnkp"i "cv'vj g'utckpu"lp"dgy ggp" vj g"czngu'lp"vj g"Vcpf go "pwengwu."cu'uj qy p"lp"Hki wtg"3220

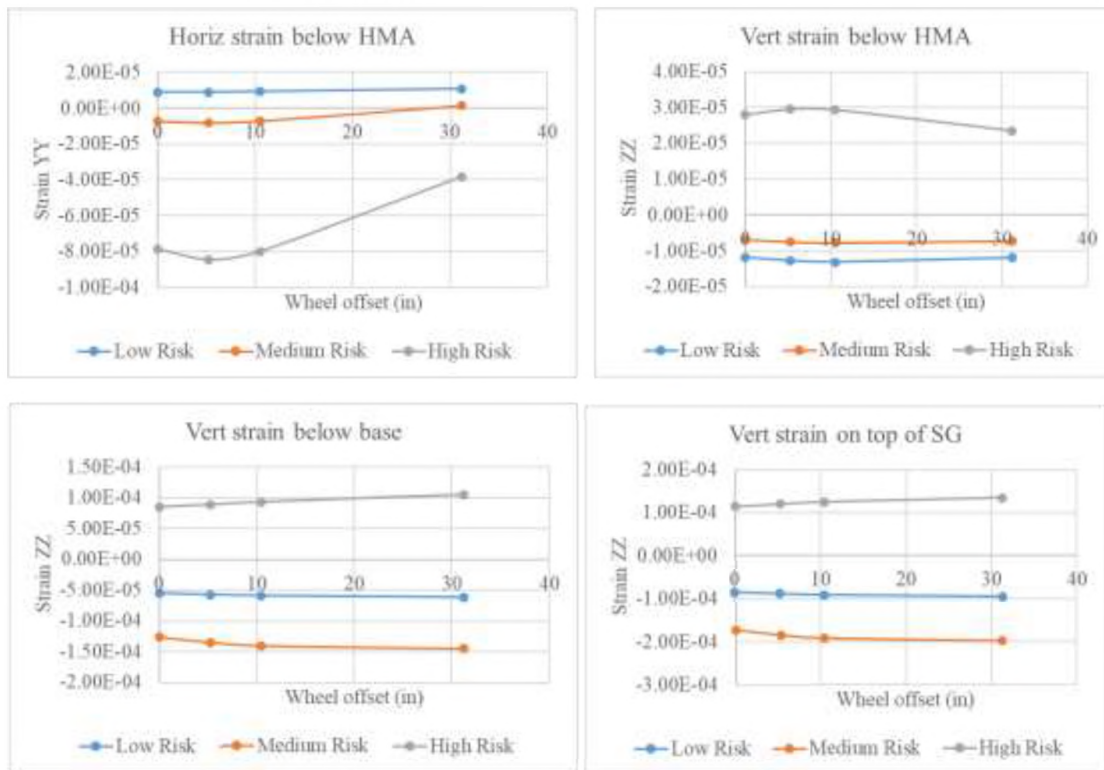
Vj g'utckpu"lp"vj ku'ecug'y gtg"cp"qtf gt"qh'o ci pkwf g"ny gt"vj cp"cmppi "qpg'qh'vj g"ukpi ng"czngu." cpf "lp'uqo g"ecugu"j cf "c"tgxgtugf "f kgevkqp0Vj ku'uj qy u'vj cv'vj g"etkvecn'utckpu"ctg'pqv'lp"dgy ggp" vj g"czngu0K'ecp"vj wu'dg"eqpenwf gf "vj cv'vj g"cpn(uku'qh'c"ukpi ng"czng"cu'vj g'pwengwu"ku'uwHhkekp'v'hqt" vj ku'ecug."cpf "cp{ 'r qlpv'qp"vj g'r cxgo gpv'gxr gtgpegu": 'tgr gvkqp'qh'vj g'pwengwu0



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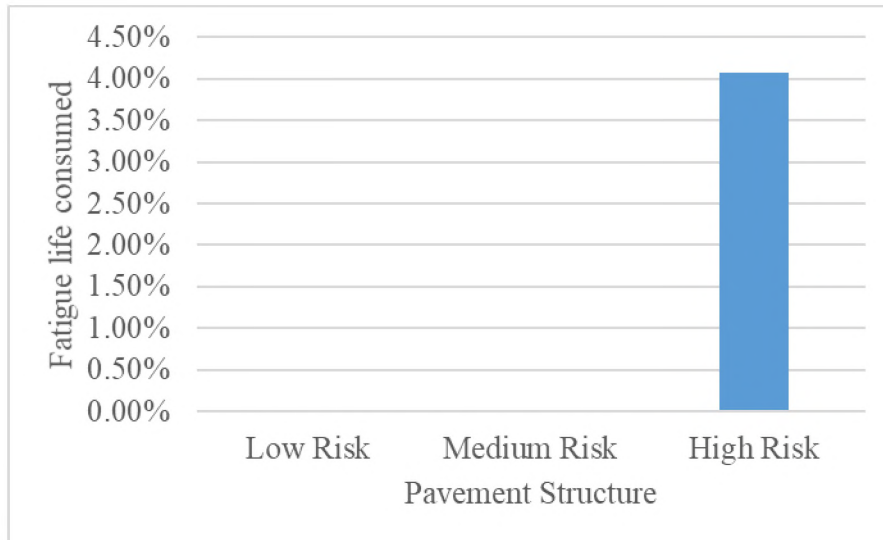


Hli wtg"; : <J qtk qpvcn'cpf "xgt vecn'utckpu'wpf gt"cp"czrg"qh'yj g'Vcpf go 'pwergwu'qh'UN6

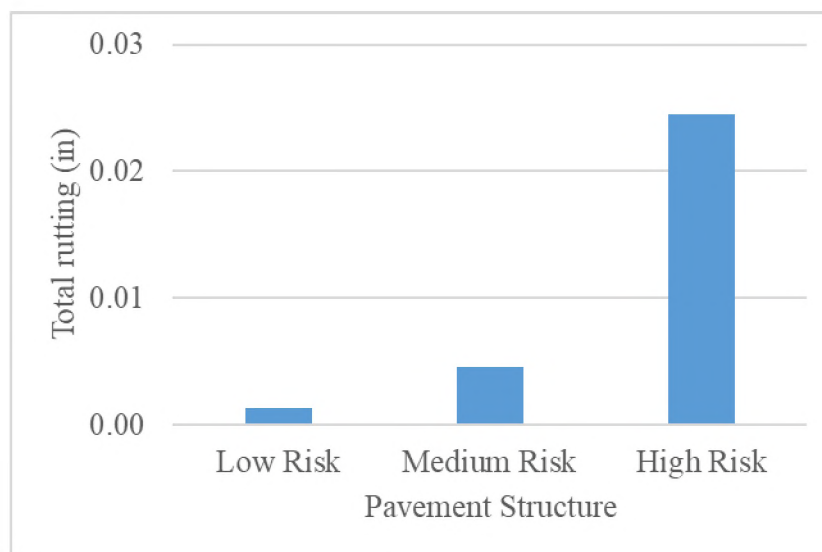


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Hki wtg"323<Rgtegpwi g"qh'hc'ki wg'hkg"eqpuwo gf "d{ "qpg'r cuu'qh'UN6



Hki wtg"324<Vqvcn'twwkpi "chgt"qpg'r cuu'qh'UN6

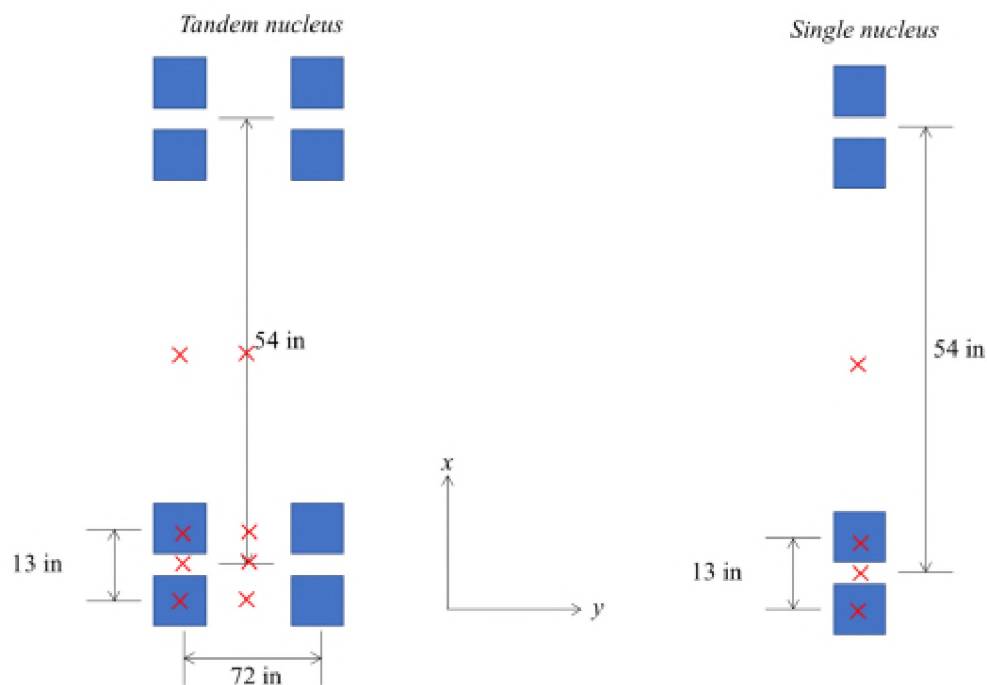
35087''0Cpcrfuku'qh'UN7

UN7"eqpuku'qh'c'ugt'ku'qh': "vcpf go "czrgu'cmppi "6'tqy u."y kj "gcej "vkg'j cxkpi "c'rqcf "qh'7785'nd'cv' c'r tguuwtg'qh'322'r uk0Gcej "vcpf go "czrg"eqpuku'qh'y q"czrgu0Gcej "czrg'tqy "ku'ugr ctcvgf "d{ "4207" hv"/"6202'hv."y gm'cdqxg"y g'y tguj qrf."uq"y g{ "ecp'dg"cpcn{| gf "ugr ctcvgn{ 0Y kj kp"gcej "czrg'tqy ." gcej "vcpf go "czrg"ku'ugr ctcvgf "d{ "3307'hv."y j lej "ku'ci clp"cdqxg"y g'y tguj qrf 0Vj wu."y g'gpvtg'UN" tgf wegu'vq"y g'cpn{ uku'qh'c'ukpi ng"vcpf go "czrg0

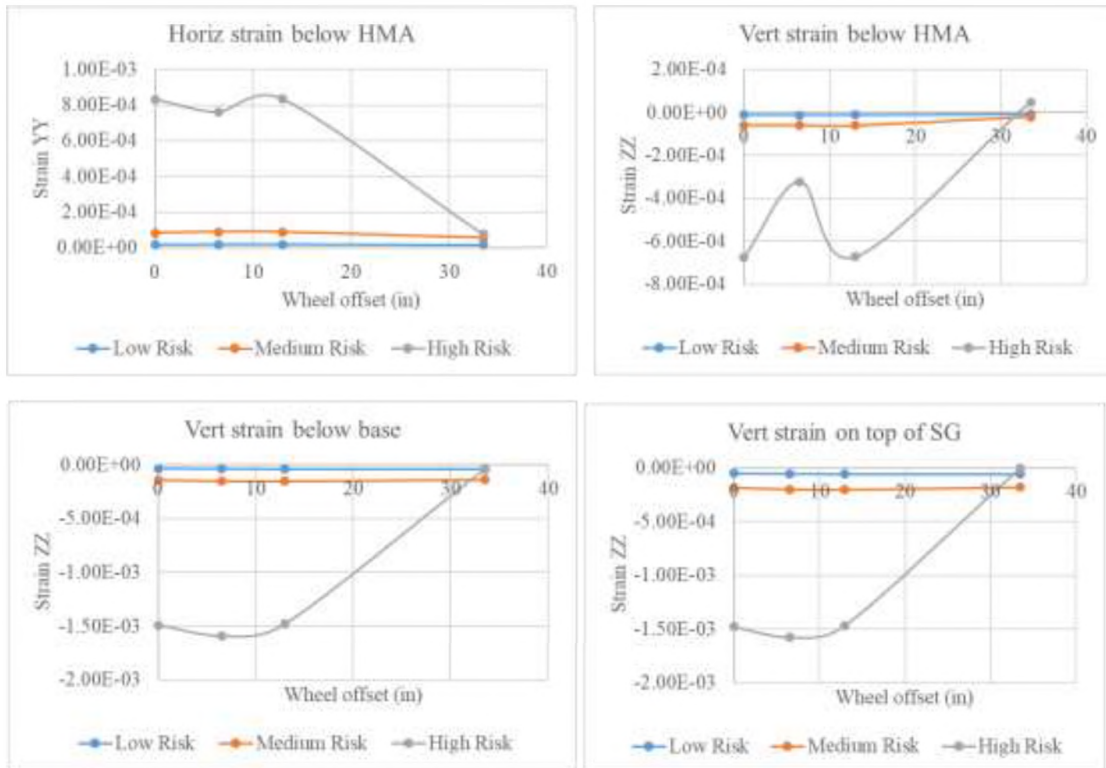
Y kj kp"gcej "vcpf go "czrg."y g'lpf kxf wcn'czrgu'ctg'ugr ctcvgf "d{ "c'ur celpi "qh'8'h0Y j kg"y ku' ku'cdqxg"y g'y tguj qrf "hqt"lpwtcevkqp."k'ku'lwu'cdqxg"d{ "3'h0J gpeg."y g'pwengwu'eqwrf "dg"gkj gt"c"

ulpi rg"czrg"qt"c"vcpf go "czrg0Dqj "ctg"gzco kpgf "j gtg."y kj "yj g"Ukpi rg'pwergwu"cpf "Vcpf go "pwergwu" uj qy p"kp"Hki wtg"325."cmipi "y kj "yj g'r qlpw"cv'y j kej "yj g'utckpu'y gtg"gxcnxcvgf "f gr levgf "d{ "c"tgf " ðZö0

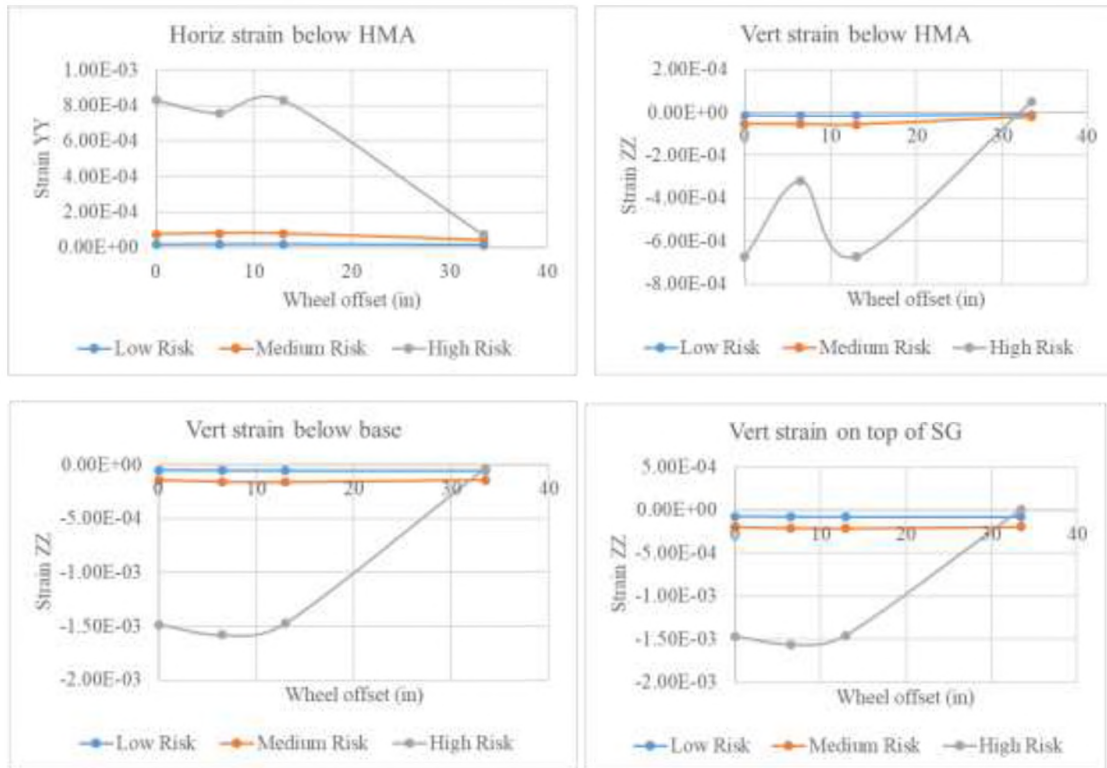
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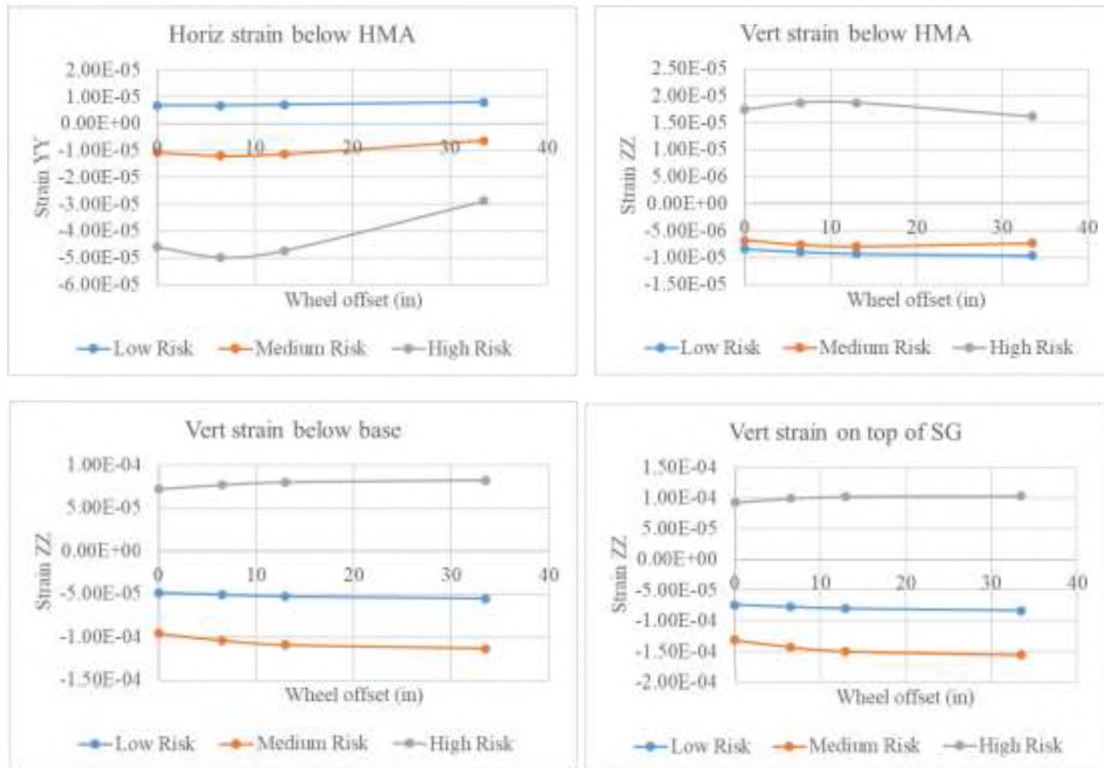
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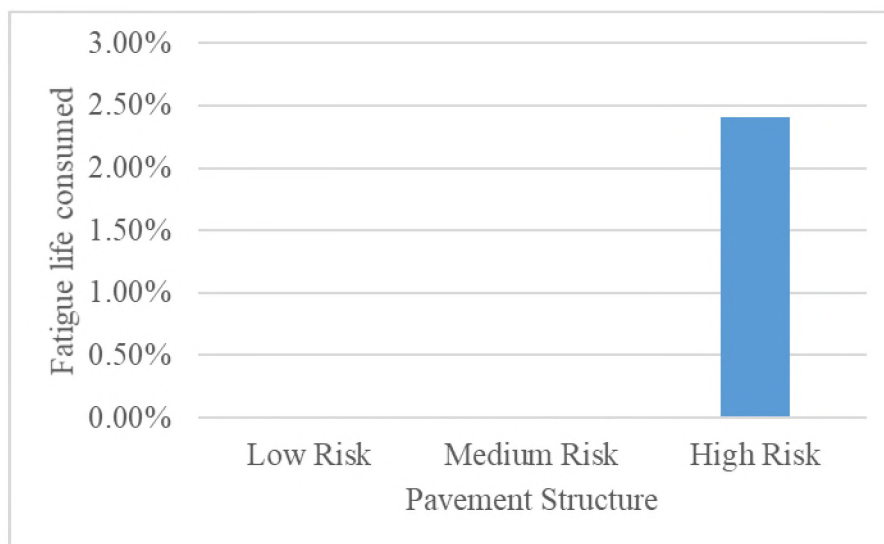


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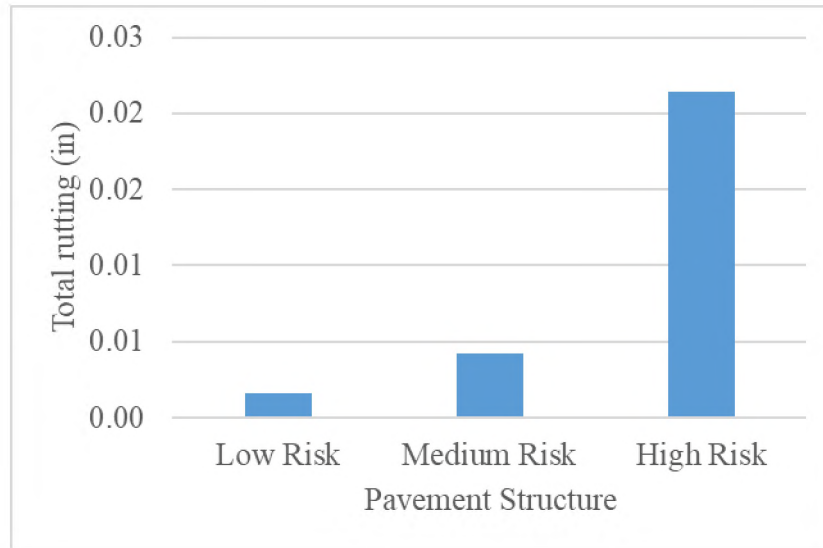


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 kp"Hki wtg"329"cpf "Hki wtg"32: 't'gur ge'v'x'gnf 0



Hki wtg"329<Rgtegpvcn g'qh'h'vki wg'rhg"eqpuwo gf "d{ "qpg'r cuu'qh'UN7



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Qpeg"ci ckp."qpn{ "y g"J ki j "tkum'r cxgo gpv'ecug"uj qy gf "c"eqpukf gtcdrng"eqpuwo r vkpp"qh' hcvki wg"rkg0 Dqyj "y g"Nqy "cpf" O gf kwo "tkum'r cxgo gpw"j cf "c"pgi rki kdrng"co qwpv"qh'twwkpi " r tgf levgf."y j krg'y g"J ki j "tkum'ecug"uj qy gf "c"uo cm'co qwpv0

Hqt"UN3"o"UN7."cp"cf f kkpccn'ccpn{uku'y cu'r gthqto gf "v"ej genly j gyj gt"uj gct'hckwtg"cv'y g" vqr "qh'y g'uwdi tcf g'qeewtu'kp'y g'uwdi tcf g'f wg'vq"r cuu'qh'gcej "UN0Vj g'f gvcnu'qh'y g'o qf gni'ctg" f kuewuugf "kp'y g'hqmgy kpi "ugevkqpu."dw'hqt"cm'ecugu'f kuewuugf "cdqxg."pq'tkum'qh'uj gct'hckwtg'y cu' hqwpf0

3508" Uwo o ct{ 'qhlhpf lpi u

Htqo "y g'cpcn{uku'qh'v{ r kcn'UNu'kp"Rgppu{ rkcplc."y g'hqmgy kpi "eqpenwukqpu"ecp"dg'f tcy p<

30' Vj g'pwengwu'qh'UNu'kp"Rgppu{ rkcplc"ecp"dg'cuuwo gf "v"dg'lwuv'c'ukpi ng'czng."cu'cm'y g'czngu" ctg'ur cegf "uwhkpgv{ "hct"cr ctv'cu'vq"dg'ghgevkgn{ "kpf gr gpf gpv'qh'gcej "qy gt0

40' Hcvki wg'f co ci g'ku'pqv'c'uki pkkcepv'eqpegtp"gzegr v'hqt"r ct vkwrtcn{ "y kp"CE"r cxgo gpw"qt" r cxgo gpw'y kj "y gen'dcug lwwddcug"uwej "cu'f wtkpi "y g'rcvg"ur tkpi +0

50' Uko krt "vq'hcvki wg'f co ci g."twwkpi "ku'pqv'c"eqpegtp"gzegr v'hqt"r ct vkwrtcn{ "r qqt"r cxgo gpv' utwewtgu0

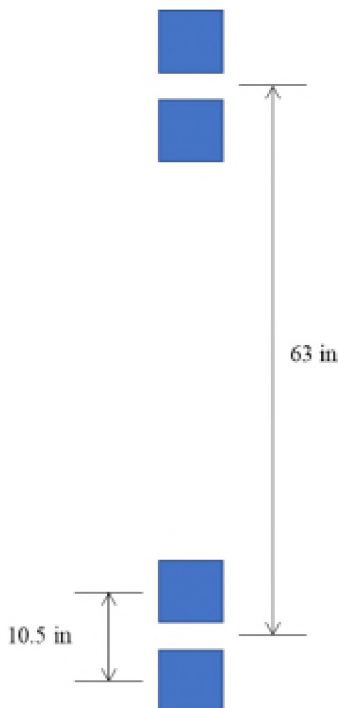
60' Uj gct'hckwtg"cv'y g'vqr "qh'y g'uwdi tcf g'ku'pqv'qh'eqpegtp"ht "y g'v{ r kcn'UNu'kp"Rgppu{ rkcplc

3504 F gxgnr o gpv'qhl'c'Rt gf levk'g'Vqqn

Y j kg"y j g"r tgeg f lpi "cpcn{ uku"y cu"lqt "gz kxkpi "UNu"tgr qtvgf "v"RgppF QV."lqt "cpcn{ lpi "hwwt g" r gto ku."y j gtg"ku" c"pggf "v" f gxgnr "c"eqpxgplgpv"vqqr0Y j kg" c"rc{ gtgf "gruvk" cpcn{ uku"r tqi tco " eqwf "dg" wugf "v" cpcn{ g"cp{ "i gpgtcn'UN."lqt "y j g"v' r lcn'UNu"lp"Rgppu{ rxcplc."c"eqpxgplgpv'Gzegf dcugf "vqqr'y cu" f gxgnr gf "lpugcf 0Vj g" f gxgnr o gpv'qhl'y ku"vqqr'cpf "c" f guetkr vkp"qp"j qy "v" wug"kv" ku" f kweuugf "lp" y j ku"ugevkp0

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Cu" gucdrluj gf "lp" y j g"r tgxkqu" ugevkp."y j g" pwegwu" qh"v' r lcn'UNu"lp"Rgppu{ rxcplc"eqpukuu"qh" c" ukpi ng" czrg0 Vj g" czrg" uj qy p" lp" Hki wtg"32; "y cu" hqwpf "v" dg" tgr tguerpvcxg" lqt "y j g" UNu" lp" Rgppu{ rxcplc."cu" f kweuugf "lp" Vcum'6" qh"y j ku"r tqlgv0Vj g" vqcn'czrg" hqcf "xctkgf "htqo "3: "nkr u"v"cu" j k j "cu"47" nkr u0Vj ku" czrg" eqphki wcvkqp"y cu" wugf "lp" y j g" f gxgnr o gpv'qhl'y g" tgr qpug" r tgf levkp" o qf gn'lqt "CE" r cxgo gpw0



Hki wtg"32; <Tgr tguerpvcxg" ukpi ng" czrg" lqt "UNu"lp"Rgppu{ rxcplc

Vq" f gxgnr "y j g" r tgf levk'g" o qf gn" c" hcevtlcn' cpcn{ uku"y kj "y j g" r cto gvgtu"uj qy p" lp" Vcdng" 53"y cu" twp" wulpi "O pNc{ gt" dcugf "qp" Nc{ gtgf "Gruvk" Cpcn{ uku" *NGC+" y j gqt { 0' Cm" y j g" ecugu" eqttgur qpf "v" y j g" czrg" r rcegf "cnqpi " y j g" qwgt" gf i g" qh" y j g" r cxgo gpv." y j lej "ku" y j g" etklcn' eqphki wcvkqp0

Vcdrg"53<Hcevtken'cpcn' uku'r ctco gygtu'cpf 'xcnngu

Rctco gygt'cpf 'wpku	Xcnngu
Czng'ncf '*rd+	3: .222."44.222."47.222
CE'yj kempguu'*kp+	5."6."7."8." : ."32."34."3:
CE'o qf wwu'*r uk+	4g7."5g7."7g7." : g7."3g8."5g8
Dcug'yj kempguu'*kp+	9."34."3:
Dcug'o qf wwu'*r uk+	3g6."4g6."5g6."6g6."7g6
UI 'o qf wwu'*r uk+	: g5

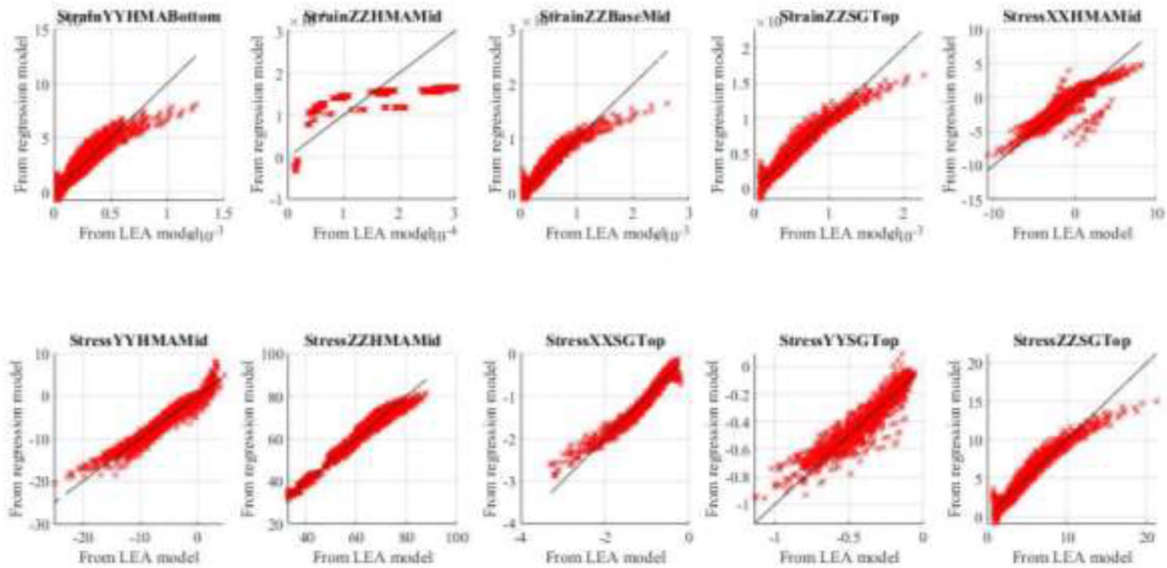
Htqo "NGC."yj g"qwr wu'uj qy p"lp"Vcdrg"54"ctg"qdvkpgf "hqt"gej "ecug"lp"yj g"hcevtken' cpcn' uku'Vj g"qwr wu"wgf "hqt"hcvi wg"cpf "twkpi "wukpi "yj g"Rcxgo gpv'O G'o qf gnu'f kuewuugf " r t g x l q w u n { ' c u ' l p f k e c v g f O C f f k l q p c m { . ' u t g u u g u ' c v ' y j g ' v q r ' q h ' y j g ' u w d i t c f g . ' y j k e j ' c t g ' w u g f ' v q ' e j g e n i ' h q t ' l p u c p c p g q w u ' u j g c t ' h c k n t g . ' c t g ' c n u q ' q d v k p g f ' h t q o ' y j g ' O p N c { g t ' q w r w u o

Vcdrg"54<Qwr wu'htqo "NGC"cpf 'i qqf pguu'qh'hkv

Qwr wu'rctco gygt	Wpku	U'o dqn	T ⁴ cf l	Wugf 'vq' ecnuewvug
J qtk qpvcn'utckp'cv'yj g'dqvqo " qh'CE	P q" wpku	Utkcp[[J O C D q w q o	20 56	Hcvi wg
Xgtvlecn'utckp'cv'o kf/f gr yj "qh' CE	P q" wpku	Utkcp\ \ J O C O kf	206; :	CE"Twkpi
Xgtvlecn'utckp'cv'o kf/f gr yj "qh' dcug	P q" wpku	Utkcp\ \ DcugO kf	20 ; 5	Dcug"Twkpi
Xgtvlecn'utckp'cv'vqr "qh'UI	P q" wpku	Utkcp\ \ UI Vqr	20 47	UI "Twkpi
J qtk qpvcn'utguu'cv'o kf/f gr yj " qh'CE	r uk	UtgauZZJ O C O kf	20 75	CE"Twkpi
J qtk qpvcn'utguu'cv'o kf/f gr yj " qh'CE	r uk	Utgau[[J O C O kf	20 59	CE"Twkpi
Xgtvlecn'utguu'cv'o kf/f gr yj "qh' CE	r uk	Utgau\ \ J O C O kf	20 84	CE"Twkpi
J qtk qpvcn'utguu'cv'vqr "qh'UI	r uk	UtgauZZUI Vqr	20 67	Uj gct'hcknt g
J qtk qpvcn'utguu'cv'vqr "qh'UI	r uk	Utgau[[UI Vqr	20 94	Uj gct'hcknt g
Xgtvlecn'utguu'cv'vqr "qh'UI	r uk	Utgau\ \ UI Vqr	20 53	Uj gct'hcknt g

Dcugf "qp"yj g'hcevtken'cpcn' uku."c'r tgf levxg'o qf gnihqt"gej "qh'yj gug"qwr wu'y cu'f gxgnqr gf " wukpi "uvg y kug"tgi tguukp."kpeqtr qtcvpi "npget."s wcf tcvle."cpf "kpvgtcevkqp"vgto uO'Vj g"r tgf levgf " xcnngu'htqo "yj gug'tgi tguukp"o qf gnu'ctg'eqo r ctgf "vq"yj g'xcnngu'qdvkpgf "htqo "NGC"ctg'uj qy p"lp"

Hki wtg'3320kp'i gpgtcn'vj g'i qqf pguu'qhi'hw*T⁴cf l. 'lpf lecvf 'kp'Vcdng'54+'ctg'xgt{'i qqf . 'gzegr v'htq' 'vj g'utguugu'cpf 'utclpu'gxcnvcgf 'cv'vj g'o kf/f gr vj 'qh'vj g'CE'rc{gt0J qy gxgt. 'vj gug'o kf/f gr vj 'xcnvgt'ctg'wugf 'v'gxcnvcg'twkp'i . 'y j lej 'ku'xgt{'m'y 'lp'vj g'CE'rc{gt'cpf 'vj gtghqtg.'vj g'm'y gt i qqf pguu'qhi'hw'f qgu'pqv'i tgcw{ 'chge'vj g'tguwu0



Hki wtg'332<Rt'gf levgf 'xu'ecnvwcvf 'qwr wu'htq'vj g'CE'r tgf levxg'vqqr'utguugu'tgr qtvgf 'kp'r uk-

35040''Vqqrfguetlrwqp

Vj g'Gzegn'dcugf 'r tgf levxg'vqqr'tgs wktgu'c'ugv'qh'wugt 'lpr wu'uj qy p'lp'Hki wtg'3330Vj g'htuv'ugv'qh' lpr wu'ctg'vj g'uco g'cu'vj g'tgi tguukp'o qf gnu'k0'czng'mcf 'lp'nd+.'CE'cpf 'dcug'rc{gt'vj kempguugu' *lp+.'cpf 'CE'cpf 'dcug'rc{gt'grcu'ke'o qf wrk'*lp'r uk0Dcugf 'qp'vj g'hcevqtken'cpcn{uku.'vj g'czng'mcf ' o wuv'dg'dgy ggp'3: .222'cpf '47.222'nd.'CE'vj kempguu'dgy ggp'5'cpf '3: 'lp.'CE'o qf wwu'dgy ggp' 5g7'cpf '5g8'r uk'dcug'vj kempguu'dgy ggp'9'cpf '3: 'lp.'cpf 'dcug'o qf wwu'dgy ggp'3g6'cpf '7g6'r uk0 K'cp{' 'qh'vj g'lpr wu'ctg'qwukf g'qh'vj ku'tcpi g.'vj gp'c'y ctpkpi 'ku'r tqxkf gf 'v'vj g'wugt.'qy gty kug' õXcnvg'QMö'ku'lpf lecvf 'd{' 'vj g'vqqr0

Inputs		
Superload:		
Axle load	23126 lbs	Value OK
# of axle rows	8	
Pavement Structure:		
AC thickness	8 in	Value OK
AC modulus	3.00E+05 psi	Value OK
Mid-depth AC temperature	100 °F	
Air voids in AC	7.07 %	
Effective binder content	9.47 %	
Base thickness	10 in	Value OK
Base modulus	3.00E+04 psi	Value OK
Subgrade c	20 psi	
Subgrade phi	20 degrees	
Depth of ground water table	10 ft	
Rutting reliability	85 %	

Hki wtg'333<Wugt'kpr wu'lp'yj g'Gzegndcugf'r tgf levkxg'vqqn

Cp"cf fklqpcn'ugv'qh'kpr wu'ku'cnuq'tgs vktgf "vq"gxncwcvg'twwkpi "cpf "hcvki wgo'Vj ku'kpenmf gu" vj g'pwo dgt'qh'czng'tqy u"*pwengk+yj cv'etquu'c'i kxgp'r qlpv'qp'yj g'r cxgo gpv'uwthceg."yj g'o kf/f gr yj " CE"vgo r gtcwtg"*kp" .y j lej "ecp'dg'c'tqwi j "guvko cvg'dcugf'qp'yj g'ugcuq+."ckt'xqlf u'cpf "ghgevkxg" dlpf gt'eqpv'gpv'lp'yj g'CE'o kzwgtg."f guktgf "tgrkcdkiv' "qh'yj g'twwkpi 'r tgf levkqp"*{r kccm{ ': 7' +."cpf " f gr yj "qh'yj g'i tqwpf y cvgt'vcdng"*kp'hv'c'tqwi j "guvko cvg'ku'cf gs wcvg+0

Vj g'vqqnr tqxkf gu'i vkf cpeg'hqt'cf lwwkpi "yj g'o qf wwu'qh'yj g'CE'rc { gt 'kh'hcvki wg'etcentkpi " ku'r tgu'p'v."dcugf "qp'yj g'o qf gr'wugf "lp"Rcxgo gpv'O G0'Vj ku'ecp'dg'hqwpf "lp'yj g'of co ci gf "CE" o qf wwu'ecrewrcvqtö'ugevkqp'qh'yj g'kpr wu."cu'uj qy p'lp'Hki wtg'3340'Vj gug'ctg'lwu'vwi i guvgf 'xcnwgu" ó'yj g'wugt'ku'tgur qpukdng'hqt'r tqxkf kpi 'yj g'f guktgf 'xcnwgu'lp'yj g'cewcn'kpr w'ugevkqp0

Damaged AC modulus calculator	
Undamaged AC modulus	3.00E+05 psi
Damaged AC modulus for Adequate AC pavement (0-8% fatigue (or alligator) c	2.85E+05 psi
Damaged AC modulus for Marginal AC pavement (8-20% fatigue (or alligator)cr	2.63E+05 psi

Hki wtg'334<F co ci gf "CE"o qf wwu'ecrewrcvqt'ugevkqp'qh'yj g'vqqn

Kp"cf fklqpp"vq"hcvi wg"cpf "twwkpi . "rkgtcwtg"uj qy u"yj cv'uj gct'hcnwtg"cv'yj g'vqr "qh'yj g" uwdi tcf g'o c { "cnuq'dg'qh'lpvgtguv'y j gp"UNu'r cuu'qxgt'hgzkdng'r cxgo gpw0'Vj gtghqtg."vq"gxncwcvg" yj ku."c'O qj t/Eqwqo d'uj gct'hcnwtg'etkgtk'y cu'cf qr vgf "dcugf'qp'yj g'hqmqy kpi "gs wcvkpu<

*83+

*84+

y j gtg.

3 "cpf" 5 "ʔ ʲ gʲ r t k p e k r n l u t g u u g u q d v k p g f h t q o ʲ j g j q t k q p w n c p f x g t v e c n l u t g u u g u"

cv'y g'vqr "qh'y g'uwdi tcf g."r uk

c₃ "ʔ" y g'etklecn'ut guu'h qo 'O qj t/Eqwmqo d'y gqt { .r uk

c ? "eqj gukxg"utgpi yj "qh"yj g"uqln"r uk

"? "cpi ng"qh"kpvgtpcn"htkvp"qh"y g"uqkn"f gi tggv

Vj g'vqnr'tgs wktgu'vj g'wugt'vq'r tqxkf g'vj g'z' 'xcnwgu'hqt'vj g'uqk0C'tqwi j 'guxko cvg'qh'vj gug'
xcnwgu'dcugf'qp'vj g'o cvgtkcn'v' r g'ku'cnuq'r tqxkf gf'lp'vj g'vqnr'lp'ecug'vj ku'lp'hqto cvkp'ku'wmpnqy p.'
cu'uj qy p'lp'Hki wtg'3350

Typical c, phi values of subgrade materials		
Material	c (psi)	phi (°)
Rock	1500	30
Sand	0	35
Gravel	0	35
Silt	12	34
Clay	20	20
Loose sand	0	33
Medium sand	0	40
Dense sand	0	40
Gravel with some sand	0	42

Hki wtg'335<V{r kecn'.č "xcnngu"hgq "xctkgwu"uqkn'*cf er vgf "nqo "F cu."4233++

Qpeg"y g" wugt"r tqxkf gu"cm"y g"pgeguuct { "lpr wu."y g"O guuci gu'dqz"r tqxkf gu"y g"pgz v"lgr u." cu"uj qy p"lp"Hi wtg"3360V{r kcm{."y g" wugt"ku" f kgevgf "q"ugg"y g"tguwnu"lp"y g" Tguwnu"cd"qh"y g" ur tgc f uj gg0J qy gxgt."hi"y g"y lenpguu"qh"y g"CE"n { gt"ku"i tgcvgt"y cp"32"lp."y gp"v{r kcm{ "y g" ghhev"qh"qp g"r cuu"qh"cp { "UN"ku"pgi rki kdr g."cpf "y g" wugt"ku" f kgevgf "q"ki pqtg"y g" Tguwnu"cd="pq" hwt y gt"cevkqp"ku"tgs wktgf 0

Messages
See Results tab for calculated distresses

Hki wtg'336<O guuci gu'dqz'kp'yj g'vqqn

kp'yj g'Tguwnu'vcd.'yj g'hqmqy kpi 'ku'f kur rc{ gf.'cu'uj qy p'kp'Hki wtg'337<

30' Vj g'hvki wg'f co ci g'ecwugf 'd{ 'qpg'r cuu'qh'yj g'UN."gzi tguugf "cu'cp'gs wlxcrpvp'pwo dgt'qh' GUCNu'v'q' yj g'pgzv'o wnr ng'qh'hxg0Vj g'tqwpf kpi "qh'h'qh'yj g'GUCNu'y cu'f qpg'v'q'ceeqwpv' hqt'yj g'gttqt 'kp'yj g'r tgf levkp'o qf gncpf "cnuq'dgecwug'GUCNu'ctg'i gpgtcm{ 'tgr qtvgf "cu'c" y j qrg'pwo dgt0

40' Vqvcnr tgf levf 'twv kpi 'chgt'qpg'r cuu'qh'yj g'UN0

50' C"dkpct{ 'y ctpkpi '*{ gu'qt'pq+'cu'v'y j gyj gt'uj gct'hcnwtg'ku'r tgf levf "v'q'qeewt0

Vj g'vqqn'cnuq'eqpvckpu"cp"cf f kqpcn'ugv'qh'vdu"yj cv'r gthqto "yj g'lpvgtto gf levf"ecrewvckpu" j qy gxgt.'yj gug'ctg'j k f gp'v'q'r tngxgpv'wugtu'htqo "ceekf gpvcn{ "o qf kh{ kpi "yj g'r tgf levxg'o qf g0Vj g{ " ecp'dg'wpj k f gp.'kh'pgeguuct{ .'yj qwi j 'k'ku'pqv'tgeqo o gpf gf "v'f q'uq'y ky qw'htuv'eqpvckpi "yj g' tgugetej 'vgo 0

After one pass of the Superload:		
Fatigue damage is approx. equivalent to	30	ESALs
Total rutting =	0.0094	in
Shear failure?	No	

Hki wtg'337<Gzco r ng'tguwnu'f kur rc{ gf 'd{ 'yj g'vqqn

Vj g'r tgf levxg'vqqn'yj wu'u{ pyj guk gu'yj g'npqy ngf i g'i ckpgf 'htqo "yj g'cpcn{ uku'qh'v{ r lecd'UNu' kp'Rgppu{ kcpkc"cpf 'yj g'r tgf levxg'o qf gn'f gxgnr gf 'dcugf "qp'NGC'v'q'gpcdr'g'yj g'wugt'v'q'r gthqto " c's wlen'gunko cvg'qh'yj g'f co ci g'yj cv'eqwf "dg'ecwugf 'd{ "c'hwwt g'UN0F gvckrgf "gzco r ngu'qp'wulpi " yj g'vqqn'htqo "c'pgy "UN'r gto k'ku'f kuewugf 'kp'C'r r gpf kz 'C0

3602'I Wf GNP GUHQ T'EQPUFGTPI 'TH F'RCXGO GPVU<HCVH WGF CO CI G

3603'Kpvt qf wevkqp

Kp"Ugevkqp"32."cp"cpn{uku"qh'hkxg"tgrtgugpvcxg"UNu"cpf"y j gk"ghgev"qp"LERER"ugevkpu"y cu" r tguvpvgf 0Vj g'eqpegr v'qh'c'etklecni'utguu'r wug'y cu'kptqf wegf."y j kej"uj qy u'yj g'utguu'j kuqt{"kp" yj g'LERER"ugevkqp"y j gp'yj g'UN'o qxgu'qxgt'k0Wukpi"y ku'utguu'r wug."y g'r gtegpvc g'qh'ic'ki wg'ikg" eqpuwo gf"y cu"gxcmwgf."cpf"kv'y cu'hqwpf"y cv'wpf gt"egtckp"eqpf kkpqu."uwej"cu"c"r qukxg" vgo r gtcwtg'i tcf kgpv'cpf"wpvgf"uj qwf gtu."y g'ic'ki wg'f co ci g'qp'yj g'LERER"eqwf"dg'uki phtecp0' Kp"y ku'tgr qtv"ci gpgtcn'o qf gnhqt"y g'ghgev'qh'UNu"qp"LERER"ugevkpu"y cu'f gxgnr gf"cpf"eqpxgtvgf" kpq"cp"Gzegndcugf"vqn'yj cv'ecp"dg'wugf"v"guvko cvg'yj g'ic'ki wg'f co ci g'ecwugf"d{"cp{"UNO

3604'O qf griHt co gy qtm

Htqo"y j g'UNu"cpn{| gf"kp"Ugevkqp"32."y tgg"dtqcf"ecvgi qtkgu"qh'UNu"kp"RC"y gtg'kf gpvkhgf 0Qpn{" yj g'vckrgtu'y gtg'cpn{| gf"cu'yj g'ecwug'yj g'xcu'v'o clqtkv{"qh'yj g'f co ci g0Gcej"UN'y cu'ecvgi qtk gf" kpq"qpg"qh'yj g'hqmy kpi"i tqwu<

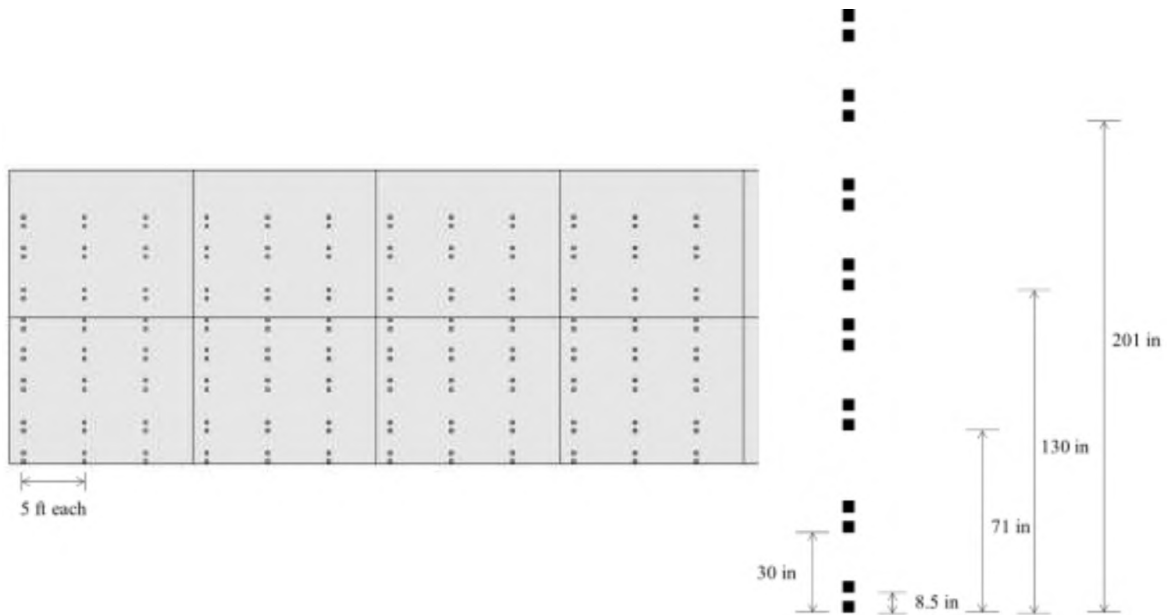
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d+"Ukpi ng<Vj ku'eqpuku"qh'vgr"tqy u'qh'czrgu."gcej"tqy"eqpukupi"qh'vy q"kp'kxf wcn'ukpi ng' czrgu0Gcej"tqy"ku'ugr ctcvgf"d{";"hv."y j krg'yj g'ur celpi"dgw ggp"ukpi ng'czrgu'y kj kp"cp"czrg" tqy"ku'uj qy p'kp'Hki wtg"3390

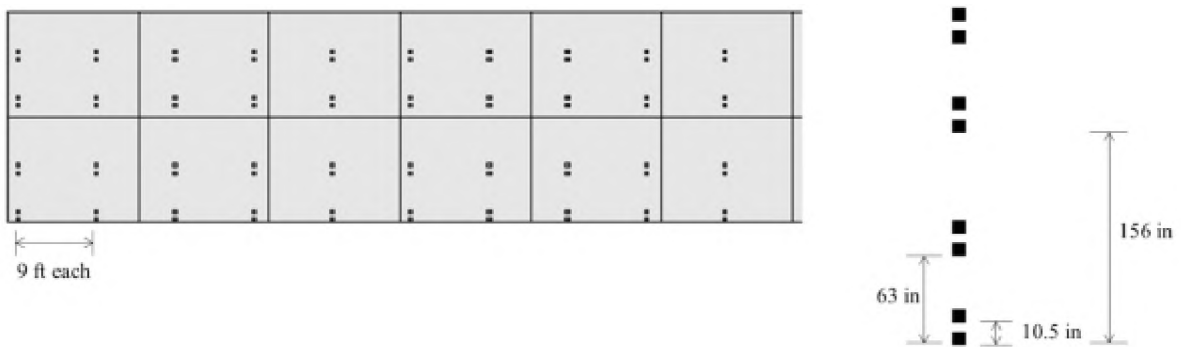
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Uko krt"v"y j g'y qtnif guetkdgf"kp"Ugevkqp"32."y g'utguu'r wug'hqo"c'r cuu'qh'gcej"qh'yj gug"UN" vtenl'ecvgi qtkgu"eqwf"dg"gxcmwgf" wukpi"y j g'hkpg"grgo gpv'cpn{uku"rtqi tco"KUNCD" *Mj c|cpqxlej."gv'cn0"4222-0Kp"qtf gt"v"fgxgnr"co qf gnhq'r tgf kev'ic'ki wg'f co ci g."y j hktu'vgr" y cu"v"guvdrkj"c'hcevtken'cpn{uku"v"gxcmwgf"y j g'etklecni'utguu"qxgt"ctcpi g'qh'ggr gevgf" eqpf kkpqu0Vj g'hcevtken'cpn{uku'cf qr vgf"kp"y j g'rtgugpv'uwf{"ku'uj qy p'kp"Vcdrg"550'K'o c{"dg"

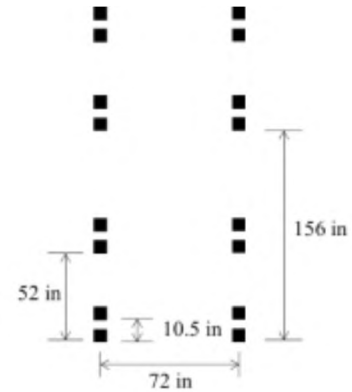
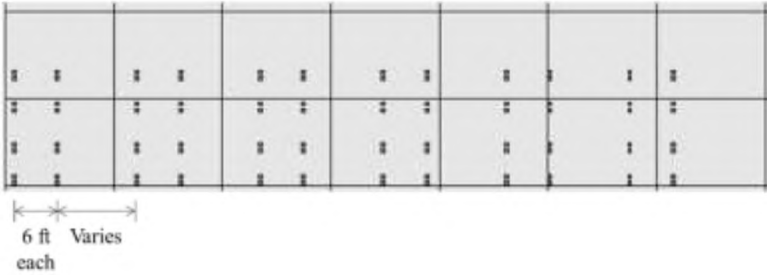
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f kwtldwgf "co qpi "cm'j g'wtgu'qh'j g'czrg0



Hki wtg'338<Eqpvkpwqu'UN'eqphki wtcvkqp."gcej 'urcd'ku'37'iv'z'37'iv



Hki wtg'339<Ukpi rg'UN'eqphki wtcvkqp."gcej 'urcd'ku'37'iv'z'37'iv



Hk wtg'33: <"Vcpf go "UN"eqphki wtcvqp."gcej "urcd"ku'37"lv'z'37"lv

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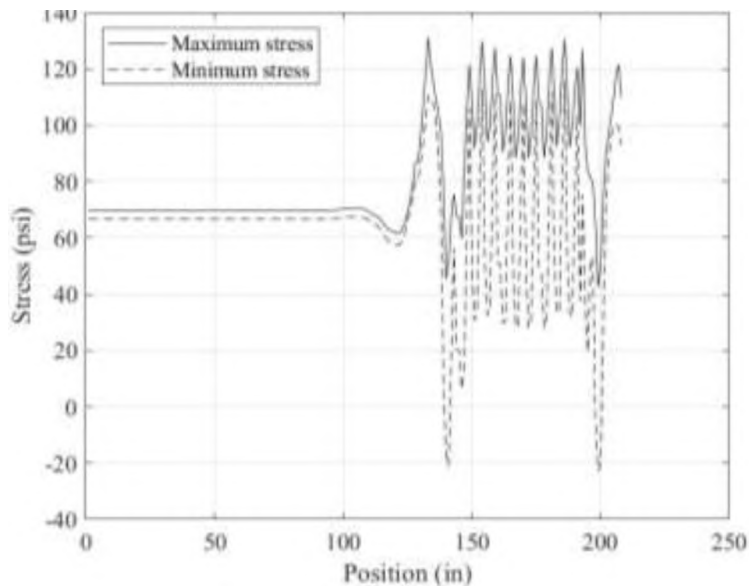
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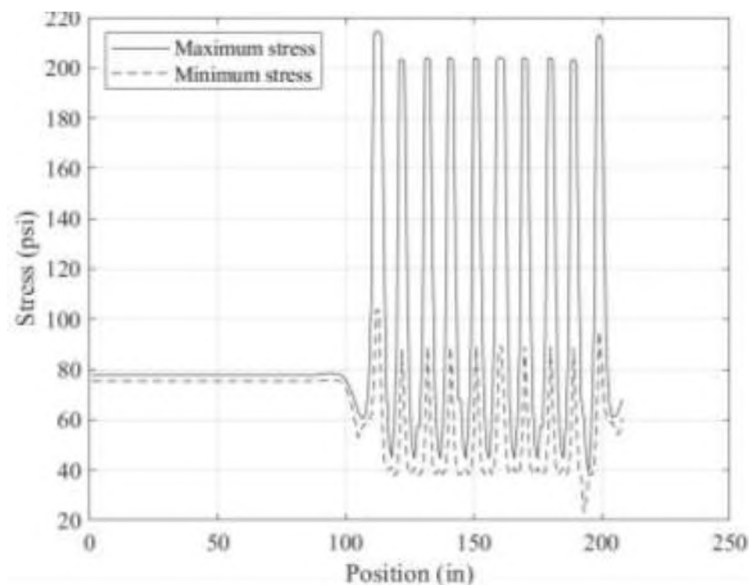
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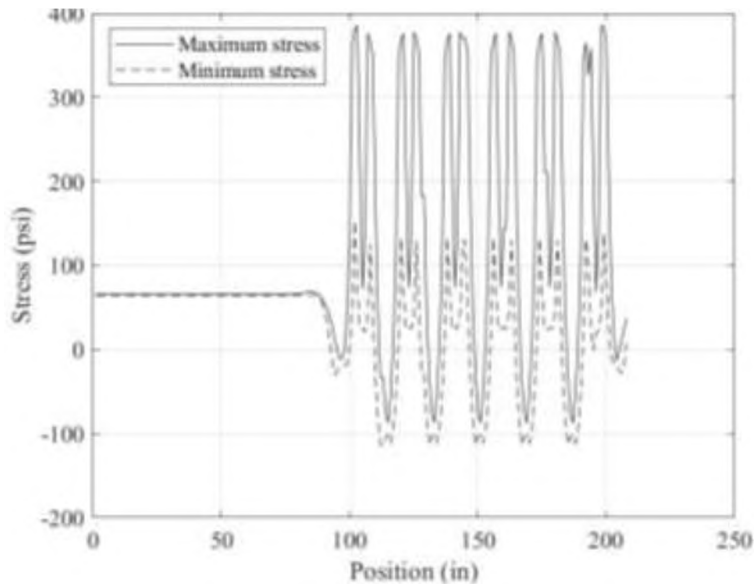
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y ky k p"y ku'tgi kq p"ht"geej "r qukkap"qh'y g"UN"cu'k'vxcgtugu'cnp i "y g"tqcf y c{ 0k p"y ku'o cppgt. "y q"
utguu'r wngu'y gtg" f gxgnr gf "ht"geej "qh'y g"y tgg"UN"v{ r gu"qpg"eqttgur qpf lpi "v"y g"o czko wo "
o kf/urcd"utguu"j kxqt{ . "cpf "y g"qy gt"v"y g"o kpo wo 0Cp"gzco r ng"utguu'r wng"ht"Eqpvkwqu."
Ukpi ng."cpf "Vcpf go "UNu'ku'uj qy p"lp"Hki wtg"33; .Hki wtg"342"cpf "Hki wtg"343. "tgr gevxgn{ 0



Hki wtg"33; <Gzco r ng"utguu'r wng"ht"c"Eqpvkwqu"UN



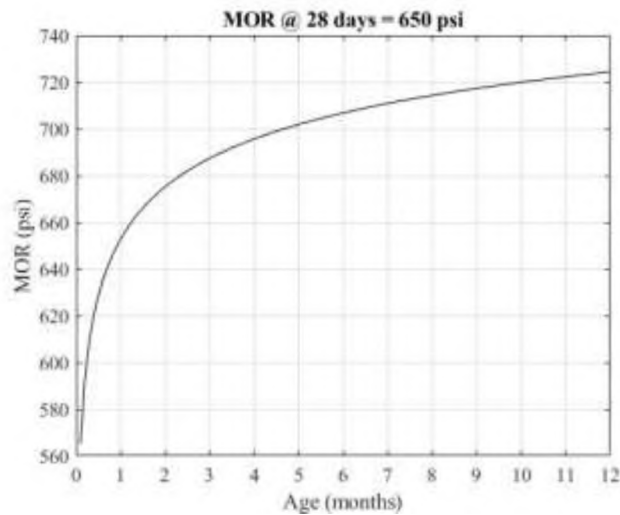
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Hki wtg"343<Gzco r ng'ut guu'r wng'hqt'c"Vcpf go "UN

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K'o c { "dg'tgecmf "yj cv'h'vki wg'f co ci g'ku'pqv'c'h'p'ekqp'qh'qpn' 'ut guu."dw'yj g'tcvk'qh'ut guu" vq'ut gpi yj ."ecmgf "yj g'UT0Ut gpi yj "ku'v'r kcm' 'o gcuwtgf "kp'v'gto u'qh'yj g'O QT0K"RC."yj g'v'r kcn' 4: /f c { "rcxgo gpv'f guki p'O QT"ku'872'r uk0Wukpi "yj ku'cu'c'tghgtgpeg'xcnwg."yj g'ut gpi yj "f gxgnr o gpv' y cu'guvko cvgf "wukpi "yj g'o qf gnlpeqtr qtcvgf "lpvq"Rcxgo gpv'O G"vq'guvko cvg'yj g'gctn' /ci g'ut gpi yj " f gxgnr o gpv'hqt"c"o kzwg'y kyj "c"4: /f c { "eqo r tguuk'g'ut gpi yj "qh'872'r uk"P cvkqpcn'Eqqr gtcv'xg" J ki j y c { "Tgugctej "Rtqi tco "Tgr qtv'3/59C."4226+0'Vj ku'ku'uj qy p"kp"Hki wtg"3440'Vj g'eqpetgvg" tgcej gu'cp"O QT"qh'922'r uk'lp'cdqw'7"o qpvy u."cpf "k'o c { "i gpgtcm' "dg'cuuwo gf "yj cv'UNu'y kn'dg" f tkxgp'qpn' "cetquu"IRER"rcxgo gpw'lp"RC"yj cv'ctg'qrf gt "yj cp"yj cv0'Eqpukf gtpi "xctkcdk'v' { "kp" ut gpi yj ."k'y cu'f gekf gf "vq"wg'cp"O QT"qh'922'r uk'wpl'qto n' "hqt"yj g'tguv'qh'yj g'cpcn' uku'hqt" gxcnv'kpi "yj g'UT'hqt"gej "ut guu'ngxgr0

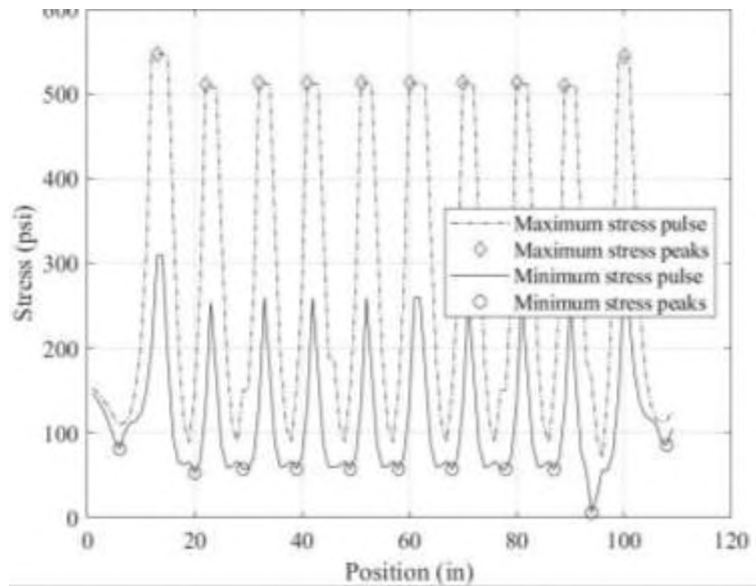


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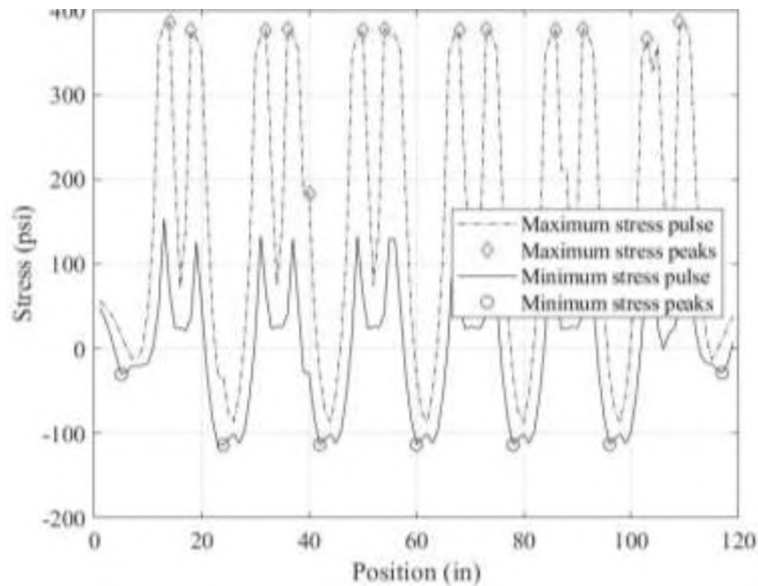
K'y cu'f gvgto kpgf "y cv'y g"UT'hqt'y g'Eqvkwqwu"UNu'y cu'cny c{ u'xgt{ "ny "rguu'y cp"2062-0' Cv'uwej "ny "UTu.'k'ku'i gpgtcm{ "wvf gtuvqf "y cv'hwki wg'f co ci g'ku'pqv'c'eqpegtp"cpf "y cv'cp'kphkpg" pwo dgt"qh'mcf "cr r nccvqpu"ecp"dg"cr r nkgf "cv'y gug"utguu"ngxgu"y kj qw'eqpegtp0'Vj gtghgtg." Eqvkwqwu"UNu'y gtg"tgo qxgf "hqt "hwt y gt"eqpukf gtcvqp0'Hqt "y g"Ukpi ng"cpf "Vcpf go "UNu." j qy gxgt.'k'y cu'hqwpf "y cv'y g"UT'eqwf "dg"j ki j gt"cdqyg"2092+"wvf gt"egtclp"eqpf kkpqu.'hqt'y j lej " c'r tgf kexg'o qf gn'y qwf "j cxg'v"dg'f gxgnr gf 0

Cu'c'rcuv'ugr "dghgtg'f gxgnr kpi "c'r tgf kexg'o qf gn'y g'r gcm'utguugu'i gpgtcvgf "d{ "y g'gpf " cpf "o kf "czrgu'hqt "gcej "utguu'r wng"y cu'gxcnecvgf 0'Ukpeg'y g'hcevqtkn'cpcn{ uku'y cu'xgt{ "rcti g." y ku'kphqto cvqp"y cu'gzvcevgf "wukpi "cp"cwqo cvgf "cni qtkj o "ko r ngo gpvgf "kp"O CVNCD0'Cp" gzco r ng'qh'r gcm'utguugu"kf gpvhwgf "hqt "y g"Ukpi ng"cpf "Vcpf go "UNu"ku'uj qy p"kp"Hki wtg"345"cpf " Hki wtg"346."tgur gevkgu{ 0'Vj g"cni qtkj o "i gpgtcm{ "f qgu'y gm"j qy gxgt"uqo g'o kuf gpvhwgf "r gcmu" ctg'r quukdg."gur gekcm{ "hqt "y g'o kf "czrg'r gcmu0'Vq'hkngt"qww'y gug"qwwkgu."y g'o gf kcp'qh'y g'qh'y g" o kf "czrg'r gcmu'y cu'gxcnecvgf "hqt "gcej "ecug."y j lej "ku'c'o qtg'tqdwv'o gcuwtg'y cp'y g'cxgtci g0'Hqt" y g'gpf "czrg'r gcmu."y g'cxgtci g'y cu'gxcnecvgf "hqt "gcej "ecug0'Vj g'hqewu'qh'y ku'lpvguki cvqp"wugu" y g'o czko wo "utguu'r wngu'f gr levgf "kp'y g'i ter j u'cdqyg"cpf "pqv'y g'o kpo wo "utguu'r wngu0'Vj g" o kpo wo "utguu'r wng"y cu'wugf "v"f gvgto kpg'y g'o kpo wo "utguu'v"dg'eqpukf gtgf "kp"y g'hwki wg" rcdqtcvqt{ "uwf { "cpf "v"gpuwtg'y cv'rcti g'utguu'tgxgtucn'f kf "pqv'qeewt0

Kp"vj ku"y c{."c"fcvdcug"y cu"f gxgmr gf "hqt" gcej "qh"vj g"ecugu"kp"vj g"hcvtken'cpcn{uku."
 eqpvckpki "vj g"rtgflevgf"o kf"cpf"gpfczrg'r gcm'utguugu0Vj ku'fcvdcug"y cu'vj gp"wugf "vq"f gxgmr "c"
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d+" Vcpf go "UN<cp"CPP "vq'r tgf lev'vj g'o czko wo "o kf "czng"ut guu'hqt"c'r qukkxg"cpf "c"ugr ctcvg" CPP "hqt"vj g'pgi cvxg"vgo r gtcwtg'i tcf kgpv'eqpf kkp0

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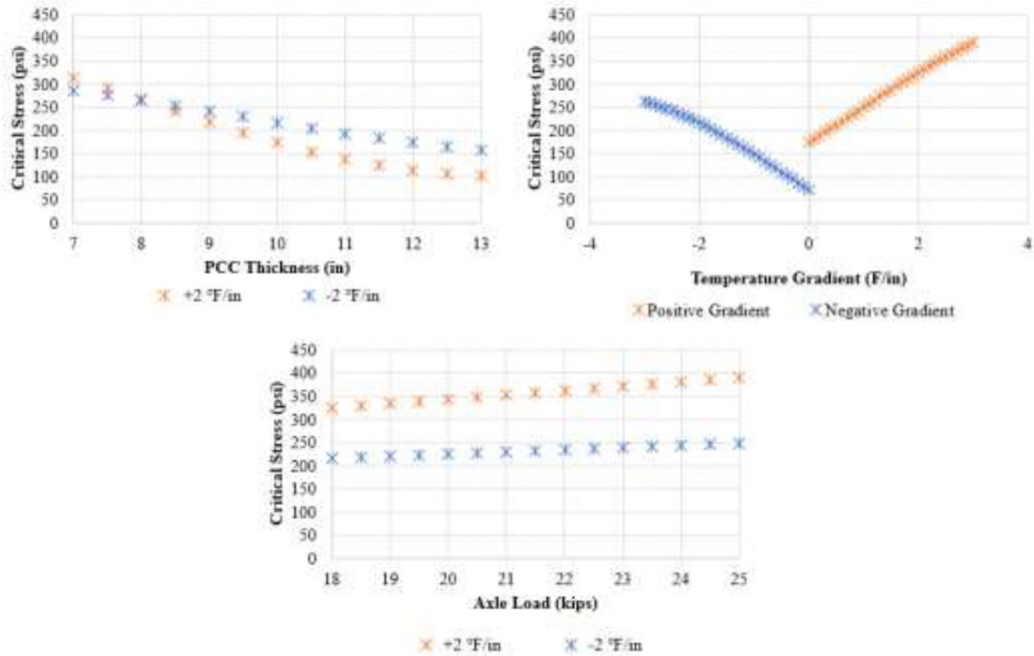
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ku'uwo o ctk gf "kp"Vcdrg"560

Vcdrg"56<I qqf pguu'qh'hk'qh'CP P u'y kj kp"vj g"vtckpkpi "f cvcugv

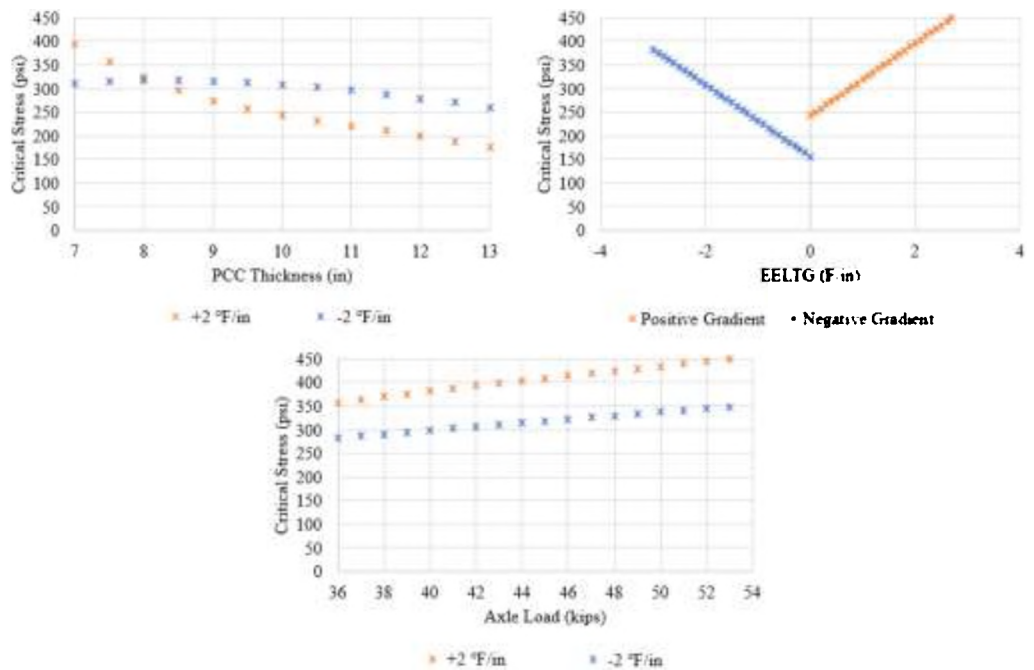
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Ukpi rg	Rqukkxg	20 ;
Ukpi rg	P gi cvkxg	20 ;
Vcpf go	Rqukkxg	20 ;
Vcpf go	P gi cvkxg	20 ;

3606B''O qf gnlXcnf cvkqp

Gcej "qh'vj g'hqwt"CP P u'y gtg'xcnkfcvgf "wukpi "vj g'47' "qh'vj g'f cvcugv'pqv'wugf "kp"vj g"vtckpkpi 0Gcej "
qh'vj g'hqwt"o qf gnu"y gtg"wugf "vq"i gpgtcvg"r tgf kvgf "tguwnu."y j lej "y gtg"vj gp"eqo r ctgf "vq"vj g"
uko wrcvgf "tguwnu"htqo "KUNCDOUkpeg"vj g'ecugu'wugf "ht"xcnkfcvkqp"y gtg'pqv'wugf "vq"vtckp"vj g'o qf gn"
vj ku"cpn{uku"cnq"gxcnvcygu"vj g"cdkxk{ "qh'gcej "o qf gn'vq"r tgf kv'qwuuf g"qh'vj g"vtckpkpi "ugw0Vj g"
tguwnu"ht"vj g"xcnkfcvkqp"ctg"uj qy p"kp"Hki wtg"3470Vj gug"uj qy "vj cv'gcej "o qf gn'ku'r gthqto kpi "
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Hki wtg"348<Gzco r ng"r nqu"htqo "vj g"ugpukxkxk\ "cpcn\ uku"htq"Ukpi ng"UN"htq"%"c+"REE"vj kempguu."%d+"
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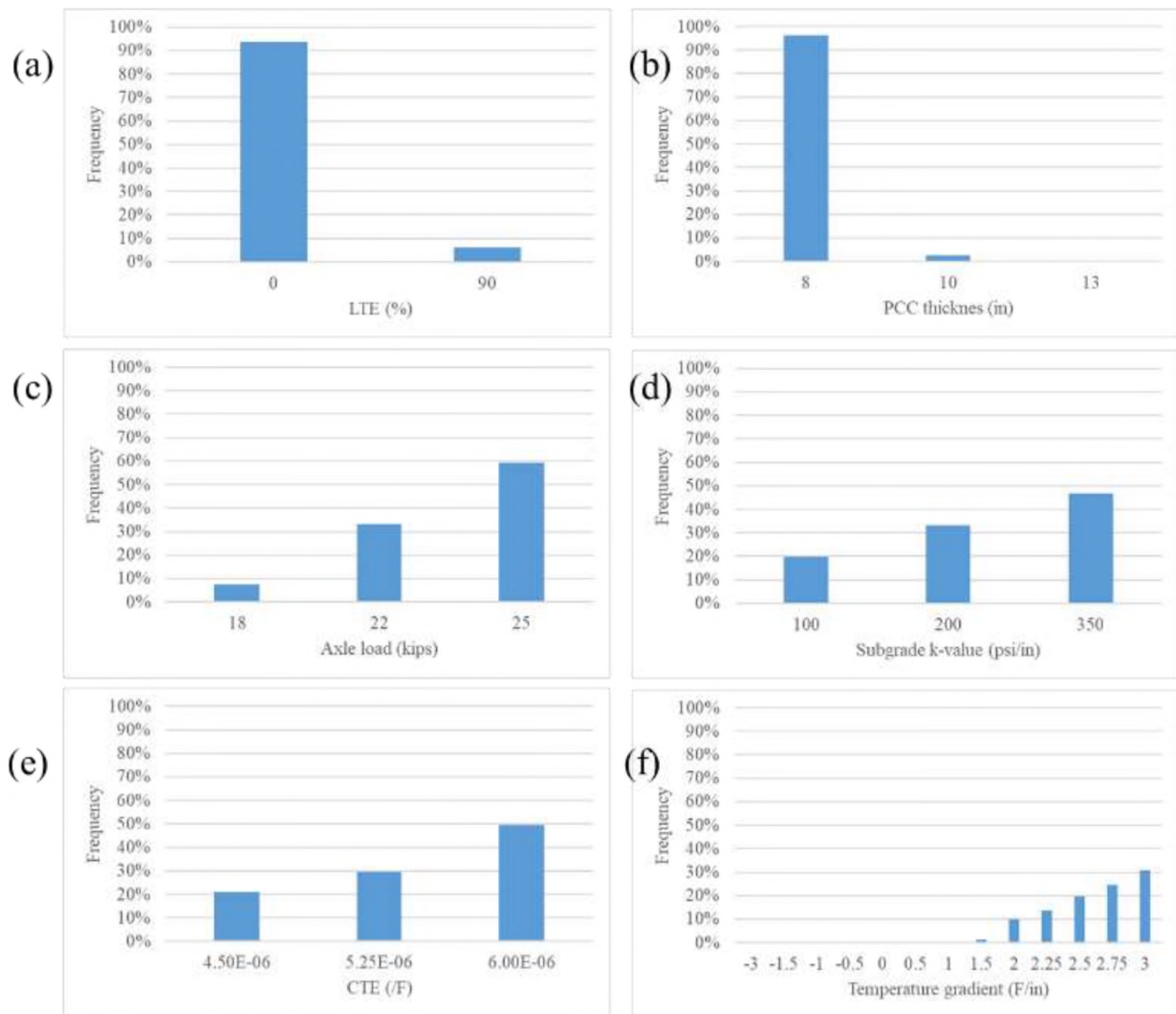
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36065 "Gpf 'czrg'ut guugu

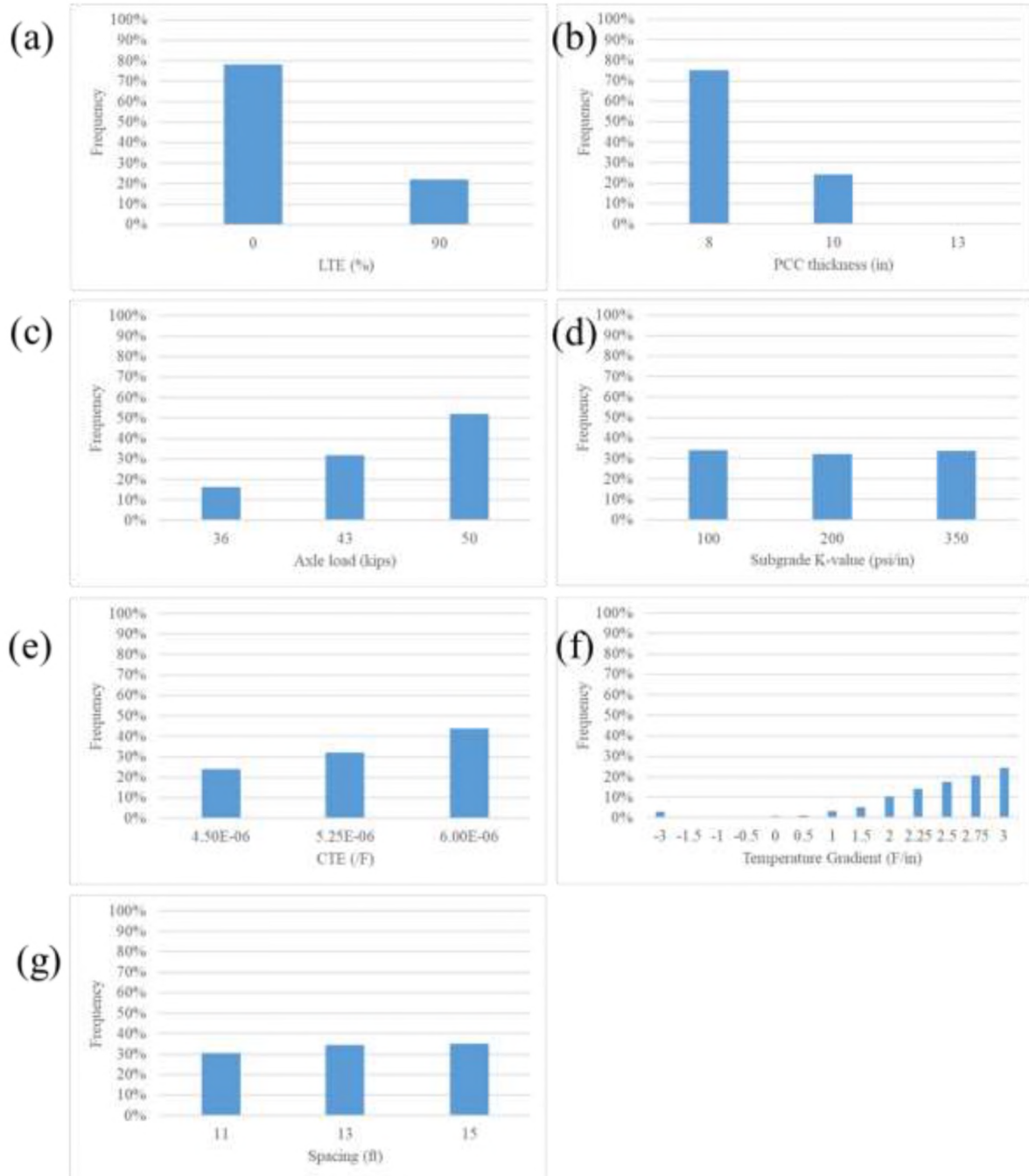
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3607 "I wkf gnpgu"hqt "UNu

Wukpi "y g"CP P u" f kuewugf "cdqyg"cu"y gm"cu"cp "O QT"qh"922"r uk "y g"UT "qh"gcej "qh"y g"ecugu"y cu" gxcnwcvgf 00 quv'qh"y g"UT u"y gtg"rgu"y cp"2062. "kpf lecvpi "y cv"lcvi wg" f co ci g" hqo "c"ukpi rg"r cuu" qh"y g"UN"twemly cu"pqv'qh"eqpegt p0J qy gxgt. "hqt "c"hy "ecugu. "y g"UT "gzeggf gf "202. "y j lej "o ki j v" eqpvtldwg "vq"s wcpvkhcdrg" f co ci g0Hqt "y qug"ecugu. "y g" f kntkdwkp "qh"y g"xcnwg"qh"y g"r tgf levtu" ctg"uj qy p"lp "Hki wtg"34: "cpf "Hki wtg"34; "hqt "Ukpi rg"cpf "Vcpf go "UNu. "tgur gevkgxgn{ 0K"o c{ "dg"pqvgf " y cv"cf f kkpncn'cevtkcnr qkpw" hqt "y g"vgo r gtcwtg"i tcf kpv'y gtg"cf f gf "vq"qdvcp "c" hpgt "f kntkdwkp" wukpi "y g"eqttgur qpf lpi "CP P 0Vj gug"xcnwg"y gtg" xgtkhgf "d{ "tcpf qo n{ "eqo r ctkpi "y go "y kj " xcnwg" hqo "cf f kkpncn'wpu"qh"KUNCD. "cpf "uj qy gf "gzegmgpv"ci tggo gpv"vq"y kj lp"3' "lp" gcej "ecug0



Hki wtg"34: <Htgs wgepe{ "f kwtkdwkqp"qh"r tgf levtu'hqt"ecugu"qh"Ukpi ng"UN"y j gtg"UT"gzeggf gf "202<
c+"NVG'd+"REE"y kempguu'e+"czng'hqcf "f +"uwdi tcf g"mxcnwg"g+"E VG"cpf "h"vgo r gtcwtg"i tcf kgpv



Hk wt g'34; <Hgs wpe { 'f kwt kdwkp'qh'r tgf kevqtu'hqt 'ecugu'qh'Vcpf go 'UN'y j gt g'UT'gzeggf gf " 202<c+'NVG'd+REE'y kempguu'e+'czrg'hqcf 'f '+uwdi tcf g'm'xcnwg'g+'E VG'h+'vgo r gtcwt g'i tcf kgp' cpf 'i '+'czrg'ur celpi

Hkqo 'y gug'tguwnu.'y g'hqmqy kpi 'eqpf kkpqu'y gt g'kf gpwkhgf 'cu'uegpctkqu'y cv'o ki j vj' cxg'c" UT'i tgcvt'y cp"202<

c+" Hqt "Ukpi ng"UN<cur j cn'uj qwf gtu."REE"y kempguu"qh'nguu'y cp"32"lp."czng"mqcf "qh"44"nkr u"qt" i tgevgt."cpf"vgo r gtcwtg'i tcf kgpv'i tgevgt'y cp"40" lp0

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Vcdng"57<O qpj n{ "r tqdcdk{ "qh'vgo r gtcwtg"i tcf kgpv'gzeeggf lpi "40" 1 n "lp"RC"ht"cp": /lp" IRER

O qpj	Rtqdcdrk{ "qh'vgo r gtcwtg" i tcf kgpv'gzeeggf lpi "40" lp" lp"RC
Lcp	2068'
Hgd	208: '
O ct	3082'
Cr t	: 072'
O c{	904: '

Lwp	32083'
Lwn	7073'
Cwi	6087'
Ugr	5094'
Qev	30 3'
Pqx	2055'
Fge	2022'

Hqt"cp{"pgy "UN"r gto kv"vj g"r cxgo gpv'utwewtg."czrg"eqphki wtcvkqp"cpf "mqcf kpi ."cpf "ko g" qh"vj g"{"gct"cpf "fc{"ecp"dg"eqo rctgf "vq"vj g"r tgegf kpi "i vkf grkpgu0Kf"cp{"qh"vj gug"eqpf kkpqu"ctg" y kj kp"vj g"etk'ecp'eqpf kkpqu"y j gp"UT"o c{"gzeggf "202. "hwtvj gt"cpn{uku"wkpi "vj g"vqqn'f kuewugf " kp"vj g"pgzv'ugevkqp"ku'tgeqo o gpf gf 0Kf"pqv."pq"hwvj gt"cevkqp"ku"pgeguuct{ ."cu"qpg"r cuu"qh"vj g"UN" y qwf "pqv'r qug"ct'kum'qh'uki pkk'ecp'f'ic'ki wg"fc co ci g"vq"vj g"IRERO

3608''Hc'ki wg'F co ci g'Rt gf kvkqp'Vqqn

Kp"vj g"r tgegf kpi "ugevkqp."i vkf grkpgu'hqt"y j gp"vj g"UT"o c{"gzeggf "202"fwtkpi "c"ulpi ng"r cuu"qh'c"UN" vtwen"Ukpi ng"qt"Vcpf go +y gtg"r tgugpv'gf 0Kp"vj gug"ecugu."ic'ki wg"fc co ci g"ku'qh'uki pkk'ecp'v'eqpegtp" cpf "pggf u"vq"dg"s wcp'vkf 0Hqt"vj ku."vj g"CP P u"r tgugpv'gf "rtgxk'wun{ "y gtg"r tqi tco o gf "kp'vq"c" uko r ng"Gzegn'vqqn"qpn{ "hqt"vj g"r qukk'xg"vgo r gtcwtg"i tcf k'p'wu."ulpeg"pgi c'v'xg"i tcf k'p'wu"ctg"pgxgt" qh'eqpegtp-0Vj ku"vqqn'o"qpg"gej "hqt"Ukpi ng"cpf "Vcpf go "UNu'o"ecp"dg"wgf "vq"s wcp'vkf "vj g"t'gnc'v'xg" f co ci g"htqo "qpg"r cuu"qh"vj g"UN"vtwen'vq"qpg"r cuu"qh'c"uvcpf ctf "3: /nkr "ulpi ng"czrg0Vj g"vqqn'ku" f guetkdgf "dgrqy 0

3608''Wugt 'Kpr wu

Vj g"wgut "kpr wu"ht"Ukpi ng"cpf "Vcpf go "UNu"kp"vj g"vqqn'ctg"uj qy p"kp"Hki wtg"352"cpf "Hki wtg"353." tgur ge'v'xgn{ ."cpf "ecp"dg"hw'pf "kp"vj g"Wugt "Kpr wu"vcd"qh"vj g"tgur ge'v'xg"ur tgc'f'uj gg0Vj gug"lpr wu" ctg"vj g"uco g"cu"vj g"r tgf kvqtu"kp"Vcdrg"55."y kj "vj g"Vcpf go "UN"j cxkpi "qpg"cf f kkp'pcn'r tgf kvqt" *czrg"ur celpi +cu"eqo rctgf "vq"vj g"Ukpi ng"UN0Cf f kkp'pcn{ ."vj g"wgut "cnuq"pggf u"vq"ur gekh{ "vj g" pwo dgt"qh'czrg"tqy u."y j kej "ecp"dg"qdv'kpgf "htqo "vj g"ftcy kpi u'wdo kwgf "cu'r ctv'qh"vj g"r gto kvkpi " r tgegu0

Inputs		
Superload:		
Axle load	22.931 kips	Value OK
Number of rows of single axles in SL	10	Value OK
Pavement Structure:		
PCC thickness	7 in	Value OK
Concrete thermal coef of expansion	5.50E-06 /F	Value OK
Temperature gradient in slab	2.5 F/in	Value OK
Transverse joint LTE	90 %	Value OK
Subgrade k-value	200 psi/in	Value OK

Hki wtg'352<Wugt'kpr wu'cpf 'v{ r lecn'xcnwgu'hqt'r tgf levxg'vqqnlhqt'Ukpi ng'UNu

Inputs		
Superload:		
Axle load	46.252 kips	Value OK
Number of rows of tandem axles in SL	4	Value OK
Spacing between tandem axles	14.08333 ft	Value OK
Pavement Structure:		
PCC thickness	7 in	Value OK
Concrete thermal coef of expansion	5.5E-06 /F	Value OK
Temperature gradient	2.5 F/in	Value OK
Transverse joint LTE	90 %	Value OK
Subgrade k-value	200 psi/in	Value OK

Hki wtg'353<Wugt'kpr wu'cpf 'v{ r lecn'xcnwgu'hqt'r tgf levxg'vqqnlhqt'Vcpf go 'UNu

Vj g'Wugt'kpr wu'vcd'cnq'eqpvclp'eqo o gpwu'cpf 'xcnwg'ej gemu'vq'gpuwtg'vj cv'vj g'kpr wu'ctg"
y kj kp'vj g'hqmqy kpi 'tcpi g.'qxtg'y j lej 'vj g'CP P u'j cxg'dggp'tclkgf 'cpf 'vguvf <

- c+" NVG'dgy ggp'2"cpf '322'
- d+" REE'vj lempguu'dgy ggp'9"cpf '36'kp
- e+" Vgo r gtcwtg'i tcf kgpv'i tgcvtg'vj cp'2" lkp
- f+" m'xcnwg'dgy ggp'322'cpf '572'r uklkp
- g+" Czrg'mqcf 'dgy ggp'58'cpf '72'nr u'hqt'Vcpf go 'UNu'cpf '3: 'cpf '47'nr u'hqt'Ukpi ng'UNu
- h+" EVG'dgy ggp'60'cpf '80" 1
- i+" Hqt'Vcpf go 'UNu.'czrg'ur celkpi 'dgy ggp'33'cpf '37'lv
- j+" Vj g'pwo dgt'qh'czrg'tqy u'o wuv'dg'cv'lgcu'5

Wulpi "y gug" wugt "lpr wu. "y g"vqql'gxcnævgu"y g"r tgf lævgf "o kf "cpf "gpf "czng" utguugu" wulpi " y g'eqttgur qpf lpi "CPP 0Wulpi "c'hkzgf "O QT"qh'922"r uk"UT"ku'y gp"eqo r wgf "cpf "eqpxgtvgf "lpvq" cp" cmqy cdng" pwo dgt" qh" mcf " tgr gvkqpu.N_f" wulpi " y g" Rcxgo gpv" O G" o qf gn" uj qy p" dgmqy " *P cvkqpcn' Eqqr gtcvæg" J ki j y c{ " Tgugctej " Rtqi tco " Tgr qtv" 3/59C." 4226±" y j kej " y cu" cnq" f kiewuugf "r tgxkqwun{ "lp"y g'rkgtcwtg"tgxkgy <

$$m_i N_f 42^{+304}_{-5} - 206593" \quad *85+$$

Vj ku'ku'y gp"eqpxgtvgf "lpvq" c'hæki wg"f co ci g'FUDqmjy u<

$$FD \approx \sum_{m \in \text{d} \setminus \text{xles}} \frac{n_{m, d_i}}{N_f} - \sum_{end \in \text{xles}} \frac{n_{end}}{N_f} \quad *86+$$

y j gtg.

n ? "y g'pwo dgt"qh'o kf "qt" gpf "czngu"cu'lpf lævgf "d{ "y g'uwduetkr x0

Hæki wg"f co ci g'hqo "c"ulpi ng"r cuu'qh'c"UN."ku'o qtg's wcrkævæg"y cp's wcpkævæg0Vj gtghqtg." vq"r tqxkf g" c'tghgtgpeg. "y g"HF "hqt" c"ulpi ng"r cuu'qh'c"ucpf ctf "3: /nkr "czng"qp" c" | gtq/i tcf kgpv'urcd" y cu'gxcnævgf "cu'y gn0Vj g"utguu'f gxgnr gf "cu" c'tguwn'qh'y g"ucpf ctf "czng"y cu'gxcnævgf "wulpi " y g'REC"f guki p"o gj qf "Rcenttf."3; ; 7±.cpf "y g"UT"y cu'y gp"ecrewævgf "wulpi "c"utgpi y "qh'922" r uk"cu"dghqtg0Hkpcn{ ."y g"HF "y cu'gxcnævgf "wulpi "y g"uco g"gs wcvkqpu' hqt"cpfDcu"dghqtg."dw" y kj "y g"pwo dgt"qh'r cuugu"dgkpi h2"3" *ukpeg" y gtg"y cu"lwu"qpg"czng." y gtg"ku"pq" f kvkpevkqp" dgwy ggp"o kf "cpf "gpf "czngu0

Vj g'tcvq'qh'y g'hæki wg"f co ci g'ecwugf "d{ "y g'UN"vq'y cv'i gpgtcvgf "d{ "qpg'r cuu'qh'c"ucpf ctf " czng"r tqxkf gu"cp" guko cvg"qh'y g'pwo dgt"qh'GUCNu'y cv'y qwf "i gpgtcvg"y g'uco g"f co ci g"cu"qpg" r cuu'qh'y g'UN'xgj kerg0Vj g"qwr wu'ctg'tgr qtvgf "lp"y g"Tuwnu'vcd."cp"gzco r ng"qh'y j kej "ku'uj qy p" lp'Hki wtg'3540Vy q"qwr wu'ctg'tgr qtvgf <y g'cmqy cdng"pwo dgt"qh'czng'tgr gvkqpu'hqt"y g'UN'tweni' dghqtg'hkwtg" *f ghkpgf "cu'72' "hæki wg"etcentkpi ±.cpf "y g'pwo dgt"qh'3: /nkr "ulpi ng"czng"mcf u'y cv" y qwf "gs wcvg"vq"y g'uco g"f co ci g"cu'y cv'lpf wegf "d{ "qpg'r cuu'qh'y g'UN'twen0

For one pass of the superload truck:		
Allowable axle repetitions, Nf =	4.42E+03	
Fatigue damage is approx. equivalent to:	5.3E+04	ESALS

Hki wtg'354<Gzco r rg'tguwmu'kp'yj g'Tguwmu'cd'qh'yj g'vqqn

Vj wu.'wulpi 'yj ku'vqqn'c's wcpvkvxg'o gcuwtg'qh'f co ci g'ecp'dg'qdvckpgf.'cpf'cp'cr r tqr tkcyg" r gto wulpi 'equv'cr r rkgf'hqt'yj g'UN'twemu'hqt'yj g'etkdecn'eqpf klqpu'f ghkpgf "cdqyg0

360"E qpenwulqp

kp'yj ku'tgr qtv."yj tgg'dtqcf "ecvgi qtlgu"qh'UNu'hqt'yj j lej "r gto ku'y gtg'r wmgf "kp"Rgppu{ xcpk"ó" Eqpvkwqwu."Ukpi rg."cpf "Vcpf go "ó'y gtg'gxcnvcvgf "y kj kp"c'rti g'hcvqtken'cpcn{ uku'wulpi 'yj g'hkpg" grgo gp'cpcn{ uku'r tqi tco ."KUNCDO'K'y cu'hqwpf "yj cv'yj g"Eqpvkwqwu"UNu'ctg"i gpgtcm{ "pqv"c" eqpegtp'y kj 'tgur gev'q'hvki wg'f co ci g."dw'wpgf gt'egtckp'eqpf klqpu."yj g'Ukpi rg'cpf "Vcpf go "UNu" o c{ "dg'qh'eqpegtp0Vj gug'o ki j v'dg'qh'eqpegtp'hqt'yj kp"rgu'yj cp"32'kp+REE'urcdu."j ki j "czrg'mcf u" cu'eqo r ctgf "q'wcpf ctf "czrgu."cpf "vgo r gtcwtg"i tcf lgpw'yj cv'gzeggf "40/" lkp0I tcf lgpw'qh'yj ku" o ci pkwf g'ecp'f gxgnr "kp'yj g'chgtppqp'f wtupi "yj g'ur tkpi "cpf "uwo o gt'o qpyj u0

Hqt"yj gug"ecugu"qh'eqpegtp."CPP u'y gtg'f gxgnr gf "q"r tgf kv'yj g'utguugu'ecwugf "d{ "qpg" r cuu'qh'c"UN'twen0Vj ku"o qf gn'y cu"ko r ngo gpvgf "kpq"cp"Gzegndcugf "vqqn"y j lej "tgr qtv"yj g" cmqy cdrg"pwo dgt'qh'r cuugu'qh'yj g'UN'twen'cpf "yj g'pwo dgt'qh'GUCNu'tgs wktgf "q'ecwug'yj g'uco g" co qwpv'qh'f co ci g'cu'qpg'r cuu'qh'yj g'UN'twen0Vj ku'vqqn'ó"qpg'gcej 'hqt'Ukpi rg'cpf "Vcpf go "UNu'ó" ecp'dg'wugf "q's wcpvkh{ 'hvkí wg'f co ci g'ecwugf "d{ "yj gug"UNu0

3702'I Wf GNp GUHQ T'EQPETGVG'RCXGO GPVUEQPUEGTPI 'F CO CI G'CV' F QY GNGF 'LQIPVU

3703'Tpvt qf wevkqp

Tgr gcvgf "cr r necvkpu"qh"j gcx{ "xgj leng"mqcf u"qp"tki kf "r cxgo gpw"y kj "f qy grgf "lqpw"j cxg"y g" r qvgpvcn"vq" f co ci g"y g"eqpetgv"uwtqwpf lpi "y g" f qy gr'dct0Vj ku'ecwugu"t'gf wevkqp"lp"y g"u'kthpguu" qh"y g" f qy grgf "lqpw0F wg"vq"y g"j ki j "mqcf u"cpf "wpls wg"czng"eqphki wtevkpu."uwr gtmqcf u"UNu+"j cxg" y g"r qvgpvcn"vq"lpf weg"uki pkhecpv" f co ci g"y kj "c'tgrvkg"n{ "uo cm'pwo dgt"qh"xgj leng"r cuugu0Dgnqy " cp"gxcmvckp"qh"v{ r lccn"UN"xgj lengu"lqwpf "lp"Rgppu{ nccpkc"y cu"r gthqto gf "hqt"y g"r wtr qug"qh" f gxgnqr lpi "i wkf grkpgu"qp"y g"etkhecn"eqpf kkpqu"wpf gt"y j lej "uki pkhecpv" f qy gr' f co ci g"o c{ "dg" lpf wegf 0

Vj gtg"ctg"wy q"o clp"eqo r qpgrpw"y kj lp"y ku"ugevkp0 Vj g"htuv"r qtvkqp"ku"lqewugf "qp" guvdrkuj lpi "y g"utguugu"i gpgtcvgf "ltqo "c"ulpi ng"cr r necvkp"qh" c"UN"xgj leng"vulpi "c"lwm'hcevqlcn" hpkkg"grgo gpv'cpcn{ uku0Vj g"ugeqpf "ej ctcevgtk gu"y g"lo r necvkpu"qh"y gug"utguugu"qp"y g"r qvgpvcn" f co ci g"y cv'eqwf "eqpvtkdwg"vq"y g" f gxgnqr o gpv'qh'hcnwlp"i "wpf gt'tgr gcvgf "mqcf lpi 0

3704'Cpcn{ ulu'qh'Ulp" ng'Nqcf 'Cr r necvkp

Vj g"eqpetgv" uwtqwpf lpi "y g" f qy gr' dct" ecp" dgeqo g" f co ci gf "y j gp" xgj leng" mqcf u" lpf weg" uki pkhecpv'dgctlpi "utguu." be... "ng0Vj gug'dgctlpi "utguugu"cnq" f gr gpf "qp"y g"mqcf "tcpuhtgtgf cetquu"y g"uj qwf gtu"kh"cp{ "+"cpf "y tqwi j "ci i tgi cvg"kpvtmcm'cetquu"y g"tcpuhtgtg"lqpw0Vq" gxcnvcg"y g"r qvgpvcn"lqt" f co ci g"vq"qeewt" f wg"vq" c"ulpi ng"cr r necvkp"qh" c"UN"xgj leng."y g"etkhecn" dgctlpi "utguugu"i gpgtcvgf "d{ "UN"xgj lengu"qp" c"LRER"y gtg"gxcmvckp"cpf "eqo r ctgf "vq" c"lckmwtg" etkgtk" guvdrkuj gf "lp"y g"nkgtcwtg"cu"y gmi"cu"etkgtk" guvdrkuj gf "dcugf "qp"y g"tguwmu"qh" c" rcdqtcvqt{ "uwf { 0Hktuv" c"lwm'hcevqlcn" cpcn{ uku"y cu" f guki pgf . "y j lej "eqpukf gtu"lo r qtwcpv' r cxgo gpv' f guki p"hgcvwtgu"cpf "UN"eqphki wtevkpu0C"ugtgu"qh" hpkkg"grgo gpv'cpcn{ ugu"y gtg"r gthqto gf "vq" r qr wrcv" c" f cvdcug"qh"etkhecn"dgctlpi "utguugu"dcugf "qp"y ku"lwm'hcevqlcn" f guki p0Ncuw{ . "y gug" etkhecn"utguugu"y gtg"eqo r ctgf "vq" lckmwtg"etkgtk"vq" f gpvkh{ "etkhecn"eqpf kkpqu"y j gp" f co ci g"lp" y j xlekp{ "qh"y g" f qy gr'lo ki j v'qeewt0

3704B'Dgctlpi 'Utguu'Ecrcwvckp

C"pwo dgt"qh"lo r qtwcpv" f guki p"lcevqtu"y gtg"eqpukf gtgf "hqt"r qr wrcvpi "y g" f cvdcug"qh" f qy gr' dgctlpi "utguu0Vj gug'kpenmf gf "r cxgo gpv'y kempguu."uj qwf gt"v{ r g"vkgf "qt"wpvkgf "+" f qy gr' f lco gvgt."

r t g u g p e g " q t " c d u g p e g " q h ' c i i t g i c v g " l p v g t m e m " o q f w w u " q h ' u w d i t c f g " t g c e v k p p " * m / x c m w g + " o q f w w u " q h ' f q y g n l u w r r q t v * + " e q p e t g v g " g r c u k e " o q f w w u . " c z r g " v { r g . " c z r g " m q c f . " c p f " g s w k x c r g p v l p g g c t " v g o r g t c w t g " i t c f l g p v 0 V j g " x c m w g " e q p u k f g t g f " h q t " g c e j " h c e v q t " k u ' r t g u g p v g f " l p " V c d r g " 580

V c d r g " 58 < T c p i g " q h ' r c t c o g v g t u l p e q t r q t c v g f " l p " v j g " h k p k g " g r g o g p v c p c n { u k u 0

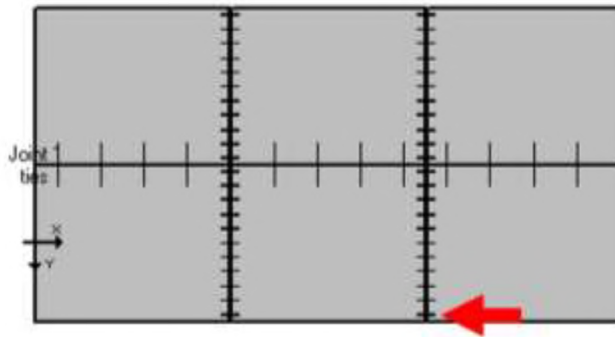
R c t c o g v g t	X c m w g u
V t w e m V { r g	U c p f c t f " 3 : / n k r " u k p i r g " c z r g . " U w r g t m q c f
C z r g " V { r g	U k p i r g . " V c p f g o
C z r g " N q c f " * n k r +	3 : . " 44 . " 47 * U k p i r g +
RE E " V j l e m p g u u " * k p +	58 . " 65 . " 72 * V c p f g o +
F q y g n l F k c o g v g t " * k p +	8 . " . " 32 . " 35
O q f w w u " q h ' F q y g n l T g c e v k p p . " * m u k l p +	3 . " 30 4 7 . " 30 7
V g o r " l t c f l g p v " * H l k p +	722 . " 3722 . " 4222
m / x c m w g " * r u k l p +	/ 5 . " / 30 7 . " 2 . " 30 7 . " 5
E q p e t g v g " O q f w w u " * z 32 8 " r u k +	322 . " 422 . " 572
U j q w r f g t " N q c f " V t c p u l g t " G h h e k p e { " * N V G + " * +	6 . " 7 . " 8
N V G " d { " c i i t g i c v g " l p v g t m e m " c e t q u u " t c p u x g t u g " l q k p v " * +	2 " * w p v g f + ; " 2 " * v g f +
	2 " * p q l p v g t m e m + ; " 2 " * l p v g t m e m +

C " h k p k g " g r g o g p v c p c n { u k u ' y c u ' r g t h q t o g f " v q " e c r e w r c v g " v j g " e t k k e c n ' d g c t k p i " u t g u u " h q t " g c e j " e q o d l p c v k p p " q h ' v j g " h c e v q t u ' r t g u g p v g f " l p " V c d r g " 580 V j g " e q p e t g v g " r c x g o g p v u r g e k h e " h k p k g " g r g o g p v " u q l h y c t g " G x g t H G " * F c x k f u . " 4225 + " y c u " w u g f " v q " r g t h q t o " v j g " c p c n { u k u 0 G x g t H G " y c u " w u g f " u g r g e v g f " d g e c w u g " v j g " u q l h y c t g " c m q y u " w u g t u " v q " f g u k i p " w p k s w g " c z r g " e q p h k i w t c v k p u " h q t " u c v k e " c p c n { u g u 0 C f f k l q p c m { . " f q y g n u " c t g " g z r d e k n { " o q f g r g f " c u " u g r c t c v g " g r g o g p v u l p v g t c e v k p i " y k j " v j g " e q p e t g v g " u r c d " v j t q w i j " c " u r t k p i " l p v g t c e v k p p " y k j " c " u k h h p g u u " . " c p f " c u " c " t g u w n " v j g " d g c t k p i " u t g u u g u " e c p " d g " f k t g e v n { " g x c m w c v g f " * F c x k f u . " 4225 + 0 H k i w t g " 355 " f g r l e w " j q y " v j g " f q y g n l p v g t c e v k p p " k u " o q f g r g f " w u k p i " G x g t H G . " l p e n m f l p i " u r t k p i u " y k j " u k h h p g u u " " d g w y g g p " v j g " f q y g n l c p f " u w t t q w p f l p i " e q p e t g v g 0

H q t " g c e j " e c u g " e q p u k f g t g f . " c " u k z / u r c d " h k p k g " g r g o g p v o q f g n l y c u " c p c n { | g f " c u " r c t v " q h ' c " I R E R . " c u " u j q y p l p " H k i w t g " 3560 G c e j " u r c d " u k g " y c u " 34 " z " 37 " h " c p f " v j g { " c t g " f k u e t g v k g f " l p v q " 8 " z " 8 " l p " g r g o g p w u " l p " v j g " j " q t k q p w c n l f k t g e v k p p " c p f " y k j " w y q " g r g o g p w u " v j t q w i j " v j g " f g r v j " l p " v j g " x g t v k e c n l f k t g e v k p p 0 V j g " u r c d u " y g t g " c u u w o g f " v q " d g " r m e g f " f k t g e v n { " q p " c " u r t k p i " h q w p f c v k p p . " y k j " v j g " u k h h p g u u " d g l p i " u r g e k h k g f " w u k p i " c " o q f w w u " q h ' u w d i t c f g " t g c e v k p p . " q t " m / x c m w g 0 H k i w t g " 355 " f g r l e w " j q y " G x g t H G " o q f g n u " v j g " u w d i t c f g " c u " c " d g f " q h ' u r t k p i u " * Y l p m g t " h q w p f c v k p p + " y k j " c " u k h h p g u u " g s w c n l v q " m / x c m w g 0 V q l p e q t r q t c v g "

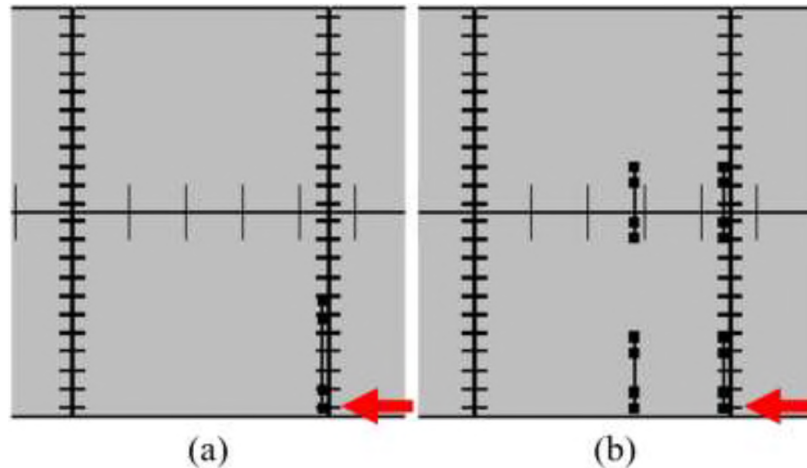
A diagram of a wall cross-section. The wall is represented by a grey rectangle. A green horizontal bar is attached to the right side of the wall. Wavy lines represent insulation. A red arrow points to the wavy lines on the right side of the wall, labeled κ . Another red arrow points to the wavy lines at the bottom of the wall, labeled k-value.

Vj g"qwgto quv'f qy gr'kp"vj g"f tkkpi "ncpg"ku"eqqukf gtgf "vj g"etkkecn'f qy gr'Hi wtg"356"
kpf kcvgu'vj g"etkkecn'f qy gr'wukpi "c'tgf"cttqy 0



Xgj keng"mqcf u'y gtg'o qf grgf "d{ 'r nœkpi "y g'y j ggm"qh'y g"czngu'cf lcegpv'vq'y g"vcpuxgtug" lqkp.v'y kj "y g"qwgto quv'y j ggn'dgkpi "r qukkqpgf "f ktgewf "cdqxcg'y g"etkkœcn'f qy gn'vq'uko wœv'g'y g" r qukkqp'y j gp'y g"dgctkpi "utguugu'y qwrf "dg'y g'j k j guv'hqt'y cv'f qy gr0C"r tgrko kœct{ "cpcnf uku" kœf kœv'g'f "y cv'czng"mqcf u'r œœgf "i tgcœt'y cp'62"kp'cy c{ 'htqo "y g"etkkœcn'f qy gn'f q'pqv'œpvtkdwg" vq'y g"dgctkpi "utguu0Vj g"mpk kwf kœcn'œr œœkpi "dgwy ggp'y g'UN'ukpi ng"czngu'ku"; 'hv*32: 'kp+: "cpf "uq" qpnl "qpg"czng"pggf gf "vq'dg'o qf grgf "cv'y g'lqkp0Vtœpuxgtug"czng'y kf y "cpf "v'g'f ko gpukqu'y gtg"

f gvgto kpgf 'wulpi 'y g'UN'r gto ku'uwdo kwgf 'v' RgppF QV0Hki wtg'357'uj qy u'cp'gzco r ng'qh'c'ukpi ng' cpf 'vcpf go 'czng'UN.'y kj 'y g'etk'ecnf' qy gn'kf gp'v'kgf 'kp'gcej 'ecug0P qv'g'y cv'y g'czng'ku'r n'egf " cf.lcegpv'v'g'y g'qwtg'gf i g'qh'y g'r cxgo gpv'y j lej 'ku'y g'etk'ecnf'eqpf k'kp0



Hki wtg'357'Nc{ qww'qh'c'+ukpi ng'czng'cpf '*d+'cpf go 'czng'UNu.'y kj 'y g'etk'ecnf' qy gn'kf gp'v'kgf " y kj 'tgf'cttqy u0

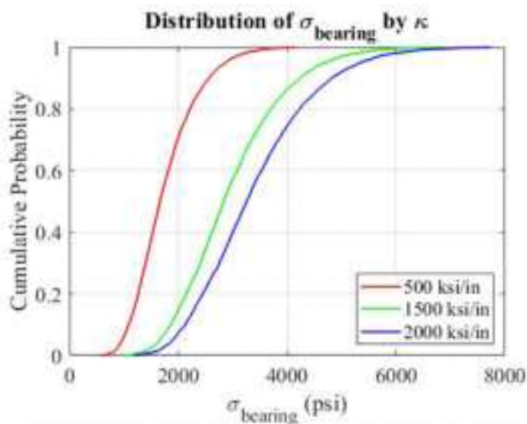
Wulpi 'y g'cdq'xg'f'cevt'k'nf' guki p'cpf 'czng'eqphki w'c'v'k'pu.'y g'etk'ecnf'dgct'kpi 'ut'guugu'y gtg" gxcn'w'v'g'f'ht'gcej 'ecug0J qy gxgt.'uqo g'ecugu'y cv'tgr tgugpv'g'f'wpt'g'c'k'w'le'f' guki pu'o'uwej 'cu'8'kp" ur'cdu'y kj '307'kp'f'qy gnu.'qt'35'kp'ur'cdu'y kj '3'kp'f'qy gnu'o'y gtg'gzen'w'f'gf'ht'qo 'y g'h'k'p'c'nf'cv'c'dcug" cpf 'y g'h'q'm'y kpi 'c'p'c'nf'uku0Eq'p'ugs w'g'p'v'f'.'y g'h'k'p'c'nf'ugv'q'h'ecugu'gxcn'w'v'g'f'j cf'c'j ki j gt'ht'ce'v'k'p'q'h' ur'cdu'y cv'y gtg': 'kp'qt'32'kp'yj lem'cpf'3047'kp'f'kco g'v'g't'f'qy gnu0

370404''Tguwmu

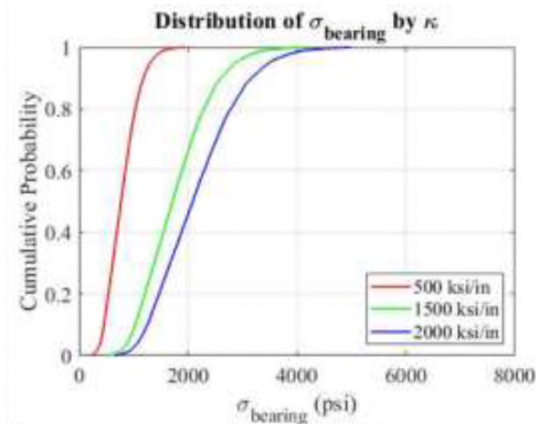
Vj g'f'cv'c'dcug'i gp'gt'c'v'g'f'y t'qwi j 'y g'h'k'p'kg'g'ngo gpv'c'p'c'nf'uku'y cu'wugf 'v'g'gxcn'w'v'g'f'y g'gh'g'ev'gcej " r'ctco g'v'g't'uj qy p'kp'V'cdng'58'j cu'qp'y g'o ci pk'w'f'g'q'h'dgct'kpi 'ut'guu'd'gwy ggp'y g'f'qy gn'c'p'f'y g' uwt'q'w'p'f'kpi 'eq'pet'g'v'g'0C'ewo w'c'v'k'x'g'r' t'q'd'c'd'k'k'v'f'f'gpuk'v'f'w'p'ek'p'p'*EF H'r'q'v'y cu'i gp'gt'c'v'g'f'ht'y g' t'guw'w'k'p'pi 'ut'guugu'ugr'c't'c'v'g'f'd{ 'h'g'x'g'n'q'h'gcej 'f'cevt'k'0

Hki wtg'358'uj qy u'y g'dgct'kpi 'ut'guu'f'k'w't'k'd'w'k'p'cu'c'h'w'p'ek'p'p'q'h'y g' 'wugf'kp'y g'h'k'p'kg' g'ngo gpv'c'p'c'nf'uku0K'ecp'dg'uggp'y cv' 'gh'g'ev'u'y g'etk'ecnf'dgct'kpi 'ut'guu.'y kj 'cxg't'ci g'dgct'kpi " ut'guugu'ht'gcej " 'uj qy p'kp'V'cdng'590'kp'i gp'gt'c'n'dgct'kpi 'ut'guu'k'pet'g'cugu'y kj " 'cpf'ku'cry c{ u" j ki j gt'y j gp'y g'eq'p'v'k'd'w'k'p'q'h'ci i t'gi cv'g'kp'v'g't'q'et'k'lu'p'q'v'eq'p'uk'f'gt'gf'0J qy gxgt." 'ku'p'q'v'c'y gm" gu'v'c'd'r'kuj gf "r'ctco g'v'g't.'cpf'c'eqo o q'p'nf'wugf'x'c'w'g'q'h'3.722'muk'kp'y cu'ugr'g'ev'g'f'dcugf'qp'y g'

rkgtcwtg*Hkdgti .3; 5: +%O ctewu'J 0.'3; 73+0Vj gtghqgtg.'y g'tgo clpf gt'qh'yj g'cpcn{ uku'qh'yj g'tguwmu
y knihqewu"qp"utguugu'hqt "c" "gs wcn'vq"3.722"muklp0



(a)



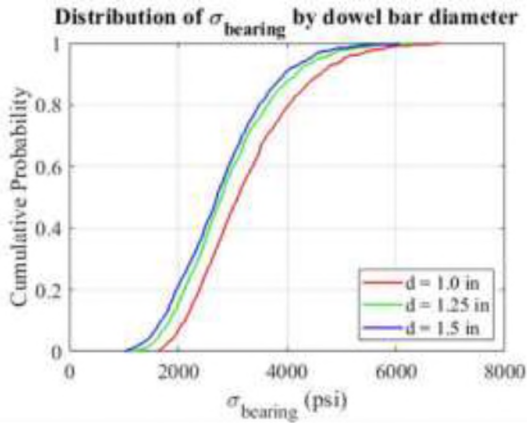
(b)

Hki wtg'358<Ewo wrv'xg'f kwtkdwkqp"qh'dgctkpi 'utguu'cu'c'h'pexkqp"qh'" "y kj "%c+pq'ci i tgi cvg"
lpvgtmqen'cpf "%d+'ci i tgi cvg'lpvgtmqen0

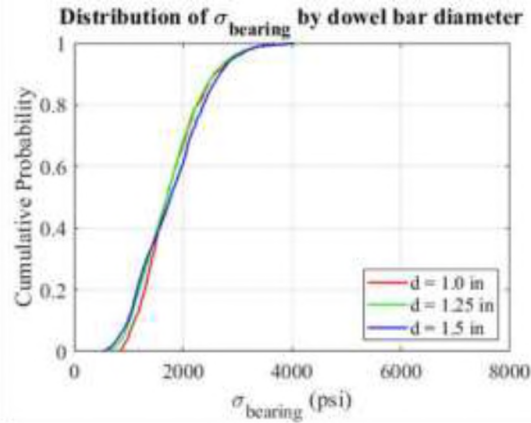
Vcdrg'59<Cxgtci g'dgctkpi 'utguu'hqt'gcej " "eqpukf gtgf 'kp'yj g'h'p'kg"grgo gpv'cpcn{ uku0

.'muklp	Cxgtci g'dgctkpi 'utguu'r'uk	
	Pq'ci i tgi cvg'lpvgtmqem	Ci i tgi cvg'lpvgtmqem' *NVG?; 2' +
722	4.292	; 82
3722	5.6: 5	3.; 32
4222	5.; 24	4.2: 2

Vj g'ghge'v'qh'f qy gn'f lco gvt'y cu'eqpukf gtgf 'hqt"qpn{ 'ecugu'y kj " "ku'gs wcn'vq"3.722"muklp."
cu"uj qy p"kp"Hki wtg"3590'Kpetgcugu"kp"f qy gn'f lco gvt"ecwug"f getgcugu"kp"dgctkpi "utguu'0'Hqt"
gzco r'ng."32" "qh'ecugu'y kj "c"fqy gn'f lco gvt"gs wcn'vq"302"kp"j cxg"dgctkpi "utguugu'i tgcvgt"y cp"
7.222'r uk'y kj qw'ci i tgi cvg'lpvgtmqem'yj g'uco g'ku'twg'hqt'rguu'yj cp'6" "qh'ecugu'y j gp'yj g'f qy gn'
f lco gvt'ku'3047"kp"cpf "rguu'yj cp'5" "qh'yj g'ecugu'y j gp'yj g'f qy gn'f lco gvt'ku'307"kp0J qy gxgt."
y j gp'yj g'lqpw'ctg'mqengf"cpf "yj g'mqcf "ku'tcpulgttgf "y tqwi j "ci i tgi cvg'lpvgtmqem'yj cp"y j g'ghge'v'
qh'f qy gn'f lco gvt'ku'f ko kp'kuj gf 0



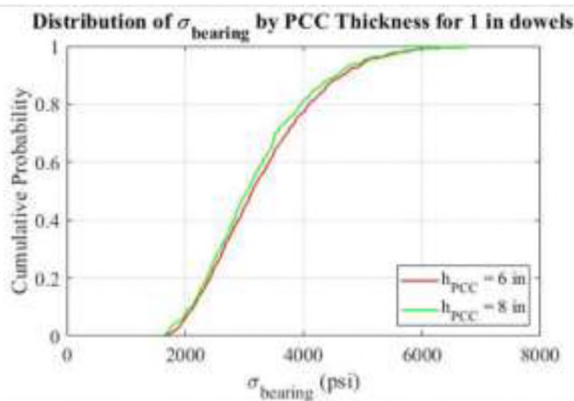
(a)



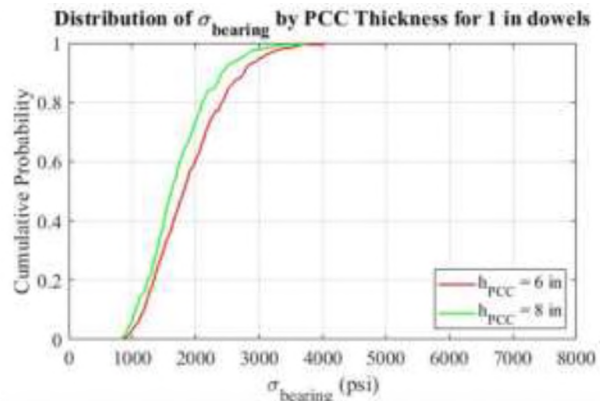
(b)

Hki wtg"359<Ewo wrvdxg"fkutldwkqp"qh'dgctkpi "utguu"cu"chwpvdkp"qh"fy grif lco gvgt dy kj "%c+"
pq"ci i tgi cvg"lpvgtmqem"cpf "d+"ci i tgi cvg"lpvgtmqem"NVG?; 2' +0

Vq" gzco kpg" yj g" ghgev" qh" r cxgo gpv" yj kempguu"pcc"qp" dgctkpi " utguu" hqt" gcej " f qy gn'
f lco gvgt."Hki wtg"35: "yj tqwi j "Hki wtg"362"fg r lev"yj g"EF H'r nqu"ht"dgctkpi "utguu"cu"chwpvdkp"qh"
urcd"yj kempguu"ht"3."3047."cpf "307"lp"fy gnu."tgur gevdxgn 0'Y j kg"yj kppgt"r cxgo gpv"utwewtgu"
crr gct"q"tguwn"lp"ny gt"dgctkpi "utguu"ht"8"cpf ": "lp"r cxgo gpv"y kj "3"cpf "3047/lp"fy lco gvgt"
fy gnu."yj gtg"crr gctu"q"dg"pq"uki p hkecpv"ghgev"qh"r cxgo gpv"yj kempguu"qp"dgctkpi "utguu"ht"yj g"
yj lengt"r cxgo gpv"0'kpetgculpi "yj g"co qwpv"qh"mqf "tcpulgttgf"yj tqwi j "ci i tgi cvg"lpvgtmqem"cuq"
tgfwegu"dgctkpi "utguu"cu"y qwf "dg"cuwo gf 0

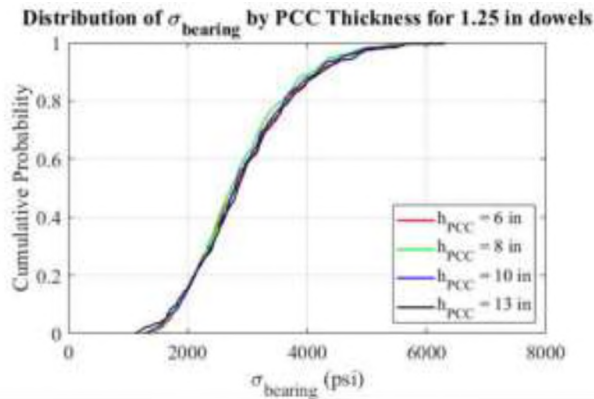


(a)

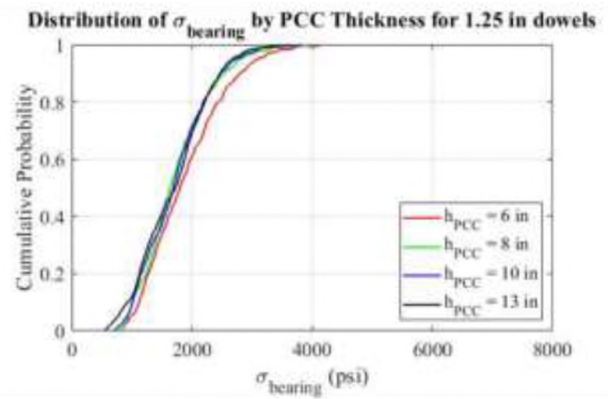


(b)

Hki wtg"35: <Ewo wrvdxg"fkutldwkqp"qh'dgctkpi "utguu"ht"3"lp"fy lco gvgt"fy gn'cu"chwpvdkp"qh"
r cxgo gpv"yj kempguu"y kj "%c+"pq"ci i tgi cvg"lpvgtmqem"cpf "d+"ci i tgi cvg"lpvgtmqem"NVG?; 2' +0

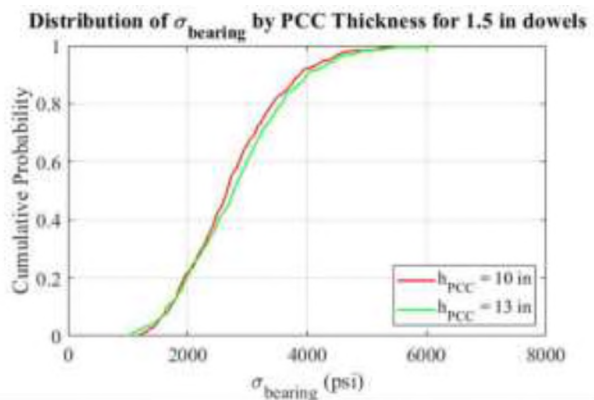


(a)

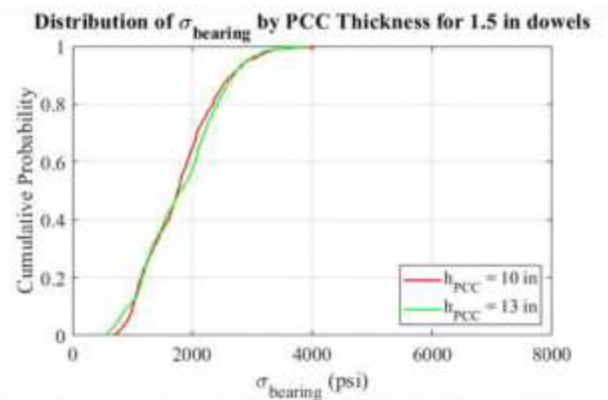


(b)

Hki wtg'35; <Ewo wrvxxg'f kwtkdwlqp"qh'dgctkpi "utguu'hqt'c"3047"lp'f lco gvg't'f qy gr'cu'c'hwpvklp" qh'r cxgo gpv'y kempguu'y kj "c+'pq'ci i tgi cvg'lpvgtmqem'cpf "d+'ci i tgi cvg'lpvgtmqem"NVG?; 2' +0



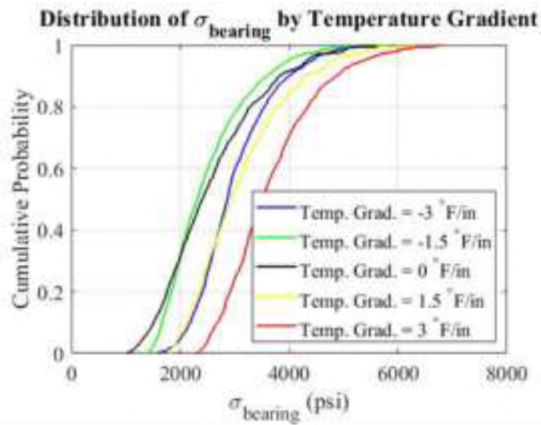
(a)



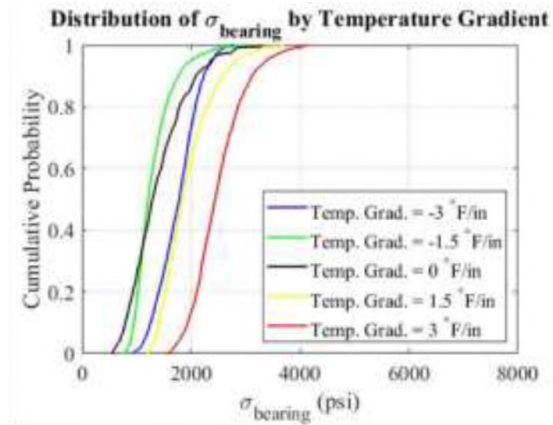
(b)

Hki wtg'362<Ewo wrvxxg'f kwtkdwlqp"qh'dgctkpi "utguu'hqt'c"3"lp'f lco gvg't'f qy gr'cu'c'hwpvklp"qh' r cxgo gpv'y kempguu'y kj "c+'pq'ci i tgi cvg'lpvgtmqem'cpf "d+'ci i tgi cvg'lpvgtmqem"NVG?; 2' +0

Vj g"EF H'r mqv'qh'dgctkpi "utguu'ugr ctcvgf "d{ "gs wlxcrpvn'lpvgct"vgo r gtcwtg"i tcf kgpw"ku" uj qy p"lp"Hki wtg"3630J ki j "r qukkxg"vgo r gtcwtg"i tcf kgpw"ctg"uj qy p"vq"tguwn'lp"j ki j gt"qxgtcm" dgctkpi "utguugu0Vj ku'qeewtu'dgecwug"c'r qukkxg"vgo r gtcwtg"i tcf kgpv'ecwugu'yj g"vqr "uwtlceg"qh'yj g" urcd"vq"gzrcpf."tguwnkpi "lp"c"f qy py ctf "urcd"ewtxcwtg0Vj ku'ewtxcwtg"ecwugu'yj g"vqr "qh'yj g"f qy gr' vq"dg'r tguugf "lpvq"yj g'uwtqwpf lpi "eqpetgvg."tguwnkpi "lp"c"j ki j gt"dgctkpi "utguu'y j gp"uwdlgevgf "vq" xgj keng"mqcf u0



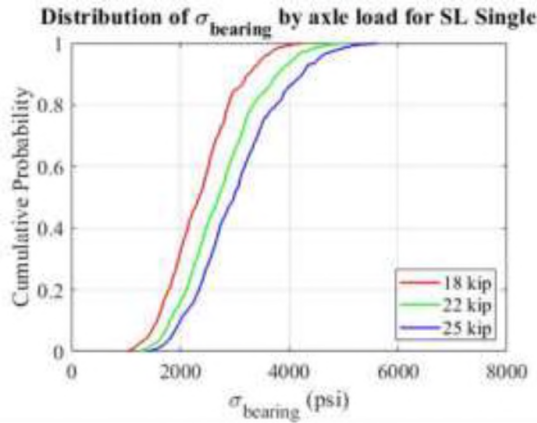
(a)



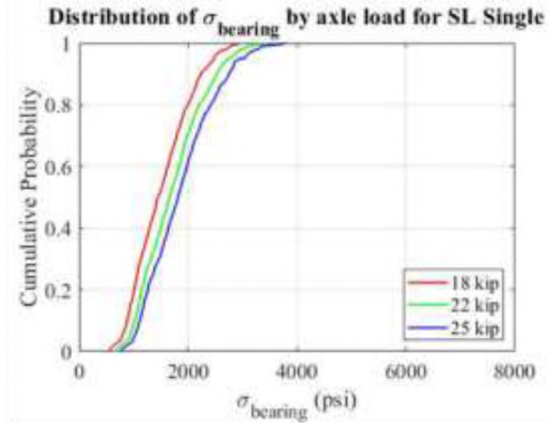
(b)

Hki wtg"363<Ewo wrcvkg'f kurtkdwkqp"qh'dgctkpi "utguu'cu'c'hwpvklp"qh'vgo r gtcwtg'i tcf kgpv"
 *Vgo r 0I tcf 0'y kj "c+'pq"ci i tgi cvg'lpvgtmqem'cpf "d+'ci i tgi cvg'lpvgtmqem"NVG?; 2' -0

Hki wtg"364"cpf "Hki wtg"365"uj qy "y g'EF H'r mqu'hqt"dgctkpi "utguu'hqt"y j g'ukpi ng"czng"cpf "
 vcpf go "czng"UN."tgur gevkgxgn{."hqt"ctcpi g"qh'czng"mqcf u'y kj "cpf "y kj qw'mqcf "tcpuhtg"y tqwi j "
 ci i tgi cvg'lpvgtmqem0Cu"gzr gevfg."y j g'ecugu'y kj "j ki j gt"czng"mqcf u"j cxg"j ki j gt"dgctkpi "utguugu0'
 Cffkklqpcmf."ecugu'y kj "vcpf go "czngu"j cxg"j ki j gt"dgctkpi "utguugu'qxgtcm'eqo r ctgf "vq'ecugu'y kj "
 ukpi ng"czngu."y j kej "ecp"dg"uggp"d{"eqo r ctcp "72y "r gtegpvkg"dgctkpi "utguugu'hqt"y j g"j ki j guv"
 o ci pkwf g"qh'mqcf kpi "hqt"gecj "ecug'htqo "Hki wtg"364"cpf "Hki wtg"3650Hqt"y j g'47/nkr "ukpi ng"czng"UN."
 y j ku'ku'er r tqzko cvgn{ "5.722"r uk'y j gtgcu'hqt"y j g"UN"vcpf go "czng"y kj "72"nkr u.'k'ku'er r tqzko cvgn{ "
 6.722"r uk"dqvj "y kj qw'ci i tgi cvg'lpvgtmqem'mqcf "tcpuhtg0Y j gp"ci i tgi cvg'lpvgtmqem'mqcf "tcpuhtg"
 ku'eqpukf gtgf."y j g'dgctkpi "utguugu'ctg'vukm'j ki j gt'hqt"j ki j gt'mqcf u."dw'y j g'o ci pkwf g'ku'uo cmgt0

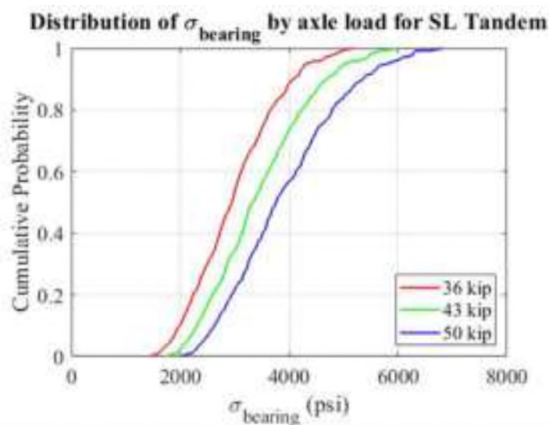


(a)

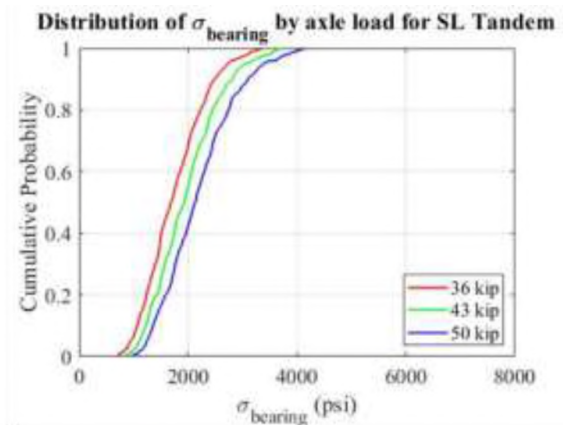


(b)

Hki wtg'364<Ewo wrvkg'f kntkdwlkp"qh'UN'ulpi ng'czng'dgctkpi 'utguu'cu'c'hwpevkp"qh'czng'hqcf " y kj "c+'pq"ci i tgi cvg'kpgtmem'cpf "d+'ci i tgi cvg'kpgtmem"NVG?; 2' +0



(a)



(b)

Hki wtg'365<Ewo wrvkg'f kntkdwlkp"qh'UN'vcpf go 'czng'dgctkpi 'utguu'cu'c'hwpevkp"qh'czng'hqcf " y kj "c+'pq"ci i tgi cvg'kpgtmem'cpf "d+'ci i tgi cvg'kpgtmem"NVG?; 2' +0

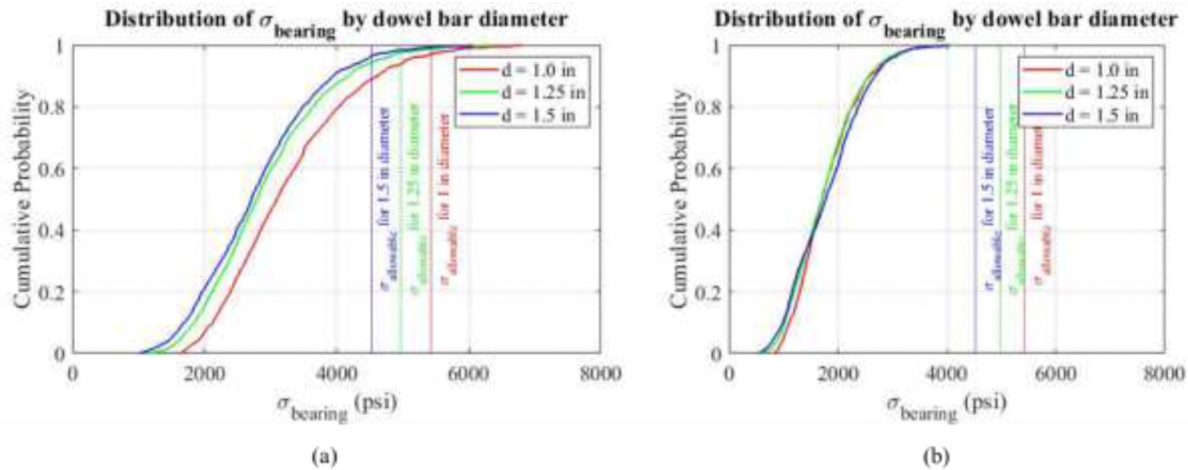
37045'Hchwtg'Et hgtlc

Vj g'etkklcn'dgctkpi "utguu'f gygo kpgf "vj tqwi j "vj g'hkpkv"grgo gpv'cpcn'uku'y gtg'gxcnwv'gf "vq" cuuguu'vj g'r qvqpkcn'hqt'f co ci g'vq'vj g'eqpetgv'uwttqwpf kpi "vj g'f qy gr0Hqt"gcj 'f qy grf'kco gygt." vj g'cmqy cdng'dgctkpi "utguu'y cu'ecrwnv'gf "wulpi "Gs wcvkp"84."y j lej "y cu'f gxgrqr gf "d{ "CEK *Uwdeqo kvgg'KK'3; 78+0

$$uow ? \frac{6+d}{5} f_c$$

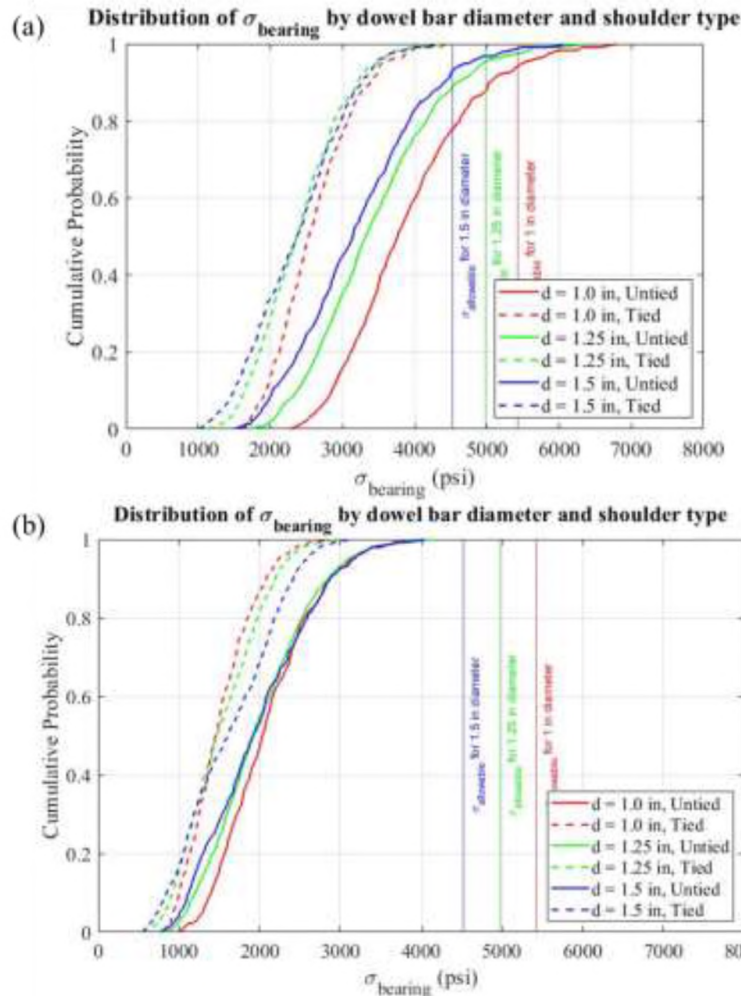
*87+

y j gtg.



Hki wtg'366<E wo wv vxg'f kvtkdwkqp"qh'dgctkpi "utguu'cu'c'hwpevkqp"qh'f qy grnf lco gvgt.d'y kj " llow" bl qh'gcej "f qy grnf lco gvgt'f gpvklgf "ly kj "vj g'xgtvecn'hpgu'y kj "c+pq'ci i tgi cvg lpvgtmjen'cpf "d+ci i tgi cvg'lpvgtmjen"NVG?; 2' +0

Hwtvj gto qtg."vj g'ghge'v'qh'v'kf "cpf "wpv'kf "uj qwf gtu'ecp'cnuq'dg'gzco kpgf "y kj "t'gur gev'vq" vj g'h'kwtg'etkgtkc0Hki wtg'367"uj qy u'vj g'f kvtkdwkqp"qh'dgctkpi "utguugu'd{ "f qy grnf lco gvgt"cpf " uj qwf gt"v{r g0K'ecp'dg'uggp"vj cv'pqpg"qh'vj g'v'kf "uj qwf gt"ecugu'gxgt'gzeggf "vj g'eqt'tgur qpf kpi " vj tguj qrf 0K'ecp"vj wu'dg'guvcdnkuj gf "vj cv'vj g'etk'ecn'ecug'hqt"j ki j "dgctkpi "utguugu'ku'y j gp"vj gtg" ctg'wpv'kf "uj qwf gtu'ecp'pq'mqcf "t'cpulgt"qeewtu'vj tqwi j "ci i tgi cvg'lpvgtmjen0



Hki wtg"367<Ewo wrvkg"f kntkdwkqp"qh'dgctkpi "utguu"cu'c'hwpvkwqp"qh'f qy gn'f lco gvgf.d"cpf " uj qwf gt"v'r g'y kj " llow" ble qh'gcej "f qy gn'f lco gvgf"kf gpvkhf "ky kj "y g'xgtvkcni'kpgu'y kj "c+ pq'ci i tgi cvg'lpvgtmqem"cpf "d+ci i tgi cvg'lpvgtmqem"NVG?; 2' +0

Vj gtg" ctg" c" nko kgf" pwo dgt" qh' ecugu" yj cv' gzeggf" llow"ble" j qy gxgt." kv' ku" pqv" y gmi' guxcdrkuj gf" j qy "dgctkpi "utguu"o ci pkwf gu" yj cv' gzeggf" yj g'low"ble"chge'v'f qy gn'r gthqto cpeg0' Vj g'ndqtcvqt{ "uwf { .f guetkdgf "dgmny .y cu'r gthqto gf "v'kf gpvkhf "j qy "tgr gcvgf "mqcf "cr r rdecvkwpu" ecwug"cp"lpetgcug"lp"yj g'mqugpguu"qh'vj g'f qy gn'y j kej "ecp"yj gp"dg'tgrcvgf "v'r gthqto cpeg0

3705"Cpcrf ulu'qh'Tgr gcvgf 'Nqcf 'Cr r rdecvkwpu

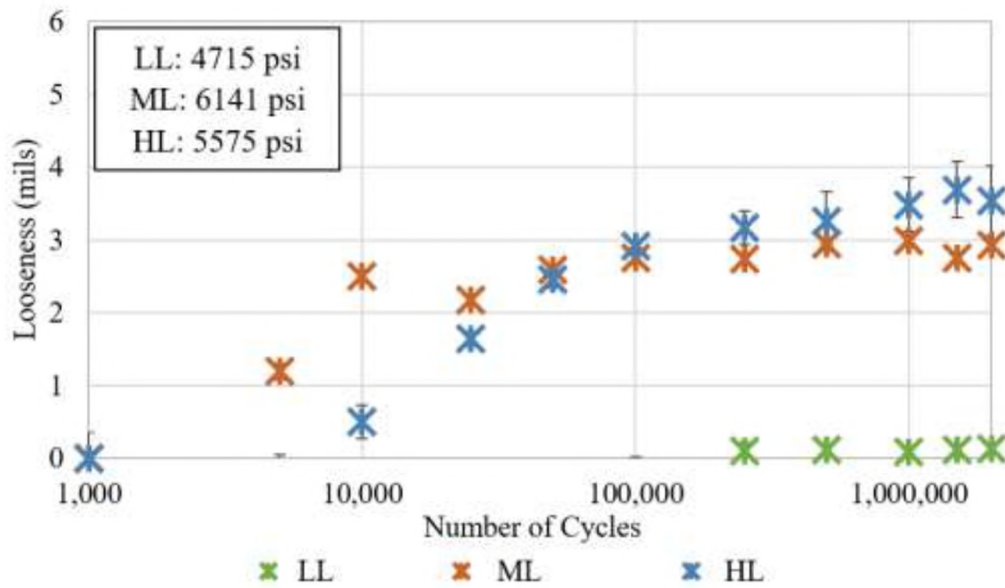
Vj g'ceegrtcvgf "mqcf "uwf { "hqt'tgr gcvgf "cr r rdecvkwpu"qh'c"UN"cpf "cp'3: /nkr "ulpi ng'czrg'y cu" r tgxkqwun{ "f kuewugf "kp"Ugevwqp"; 0Dgco "ur geko gpu'y gtg'uwdlgev'f "v'c"j ki j "pwo dgt"qh'tgr gcvgf " mqcf "e{ engu."cpf "mqugpguu'y cu'o gcuwtf "cv'htgs wgpv'lpvgtxcnu"v'q's wcpvkhf "yj g'ghge'v'ng{ "hce'qtu"

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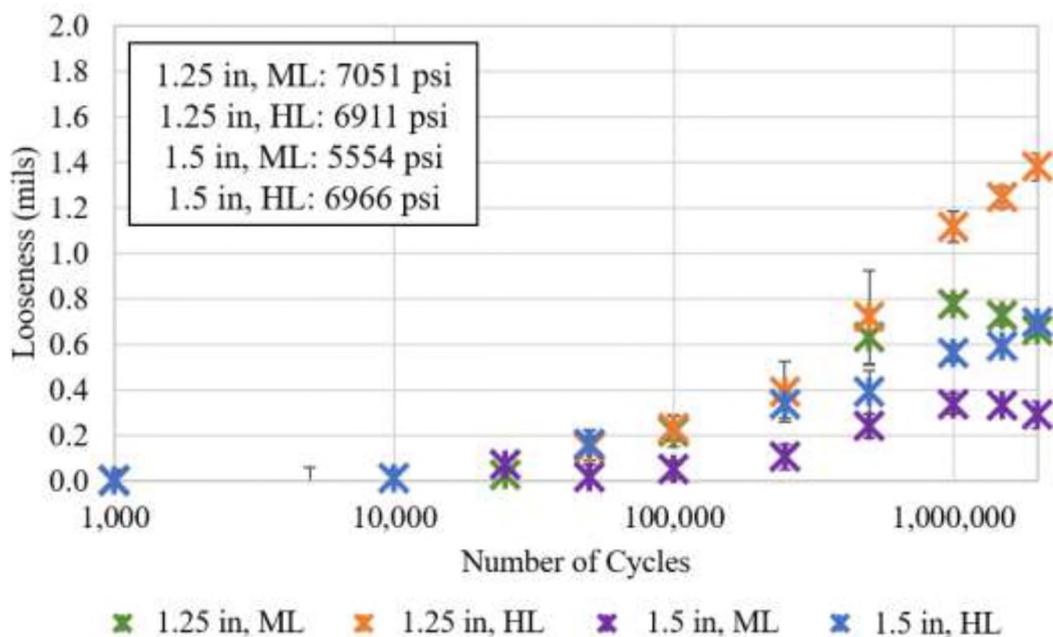
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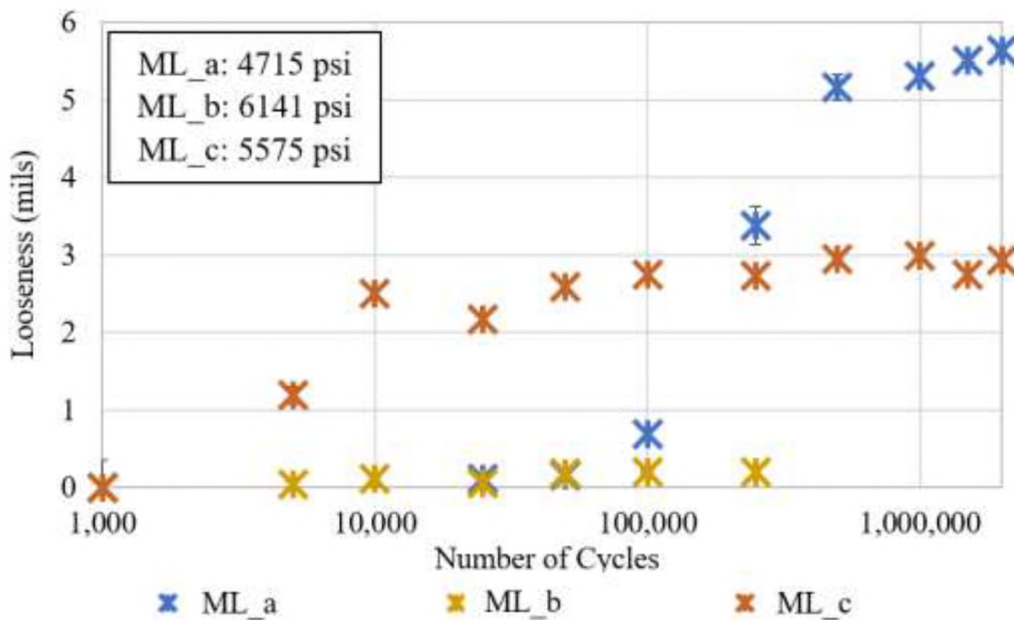
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y cu'ercuukhgf "cu'hqy . 'o gf kwo . 'qt'j ki j 'dcugf "qp'v'j g'etkgtlc'uj qy p'lp'Vcdrg'5; 0Cu'uj qy p'lp'Hki wtg"
 36: .': /lp'dgco u'y gtg'vugvf "y kj "3047"/lp"f qy gni'cpf "c'O N."cpf "v'j g"qpn' "r ctco gvg't'y j lej "xctkgf "
 y cu'v'j g'utgpi v'j "qh'v'j g"eqpetgvg'0Vj g"ghge'v'qh'v'j g"eqpetgvg'utgpi v'j "y cu'uki pklh'ecpv' "cu'v'j g"qy "
 utgpi v'j "ur geko gp" f gxgrqr gf "pgctn' "vy keg"cu'o wej "nqugpguu'cu'v'j g'o gf kwo "utgpi v'j "ur geko gp"
 chgt"472.222"nqcf "cr r n'ecv'kpu'0Vj g"j ki j "utgpi v'j "ur geko gp"i gpgtcvgf "pgi rki kdr'g"nqugpguu'chgt"
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Vcdrg'5; <Tcpi g'qh'eqpetgvg'utgpi v'j u'gxcn'ecvgf "lp'rdqtcvqt { 'uwwf { 0

Ut gpi v'j 'lgxgn	Eqpet gvg'eqo r t gulk'g" ut gpi v'j '*' +t cpi g' r uk
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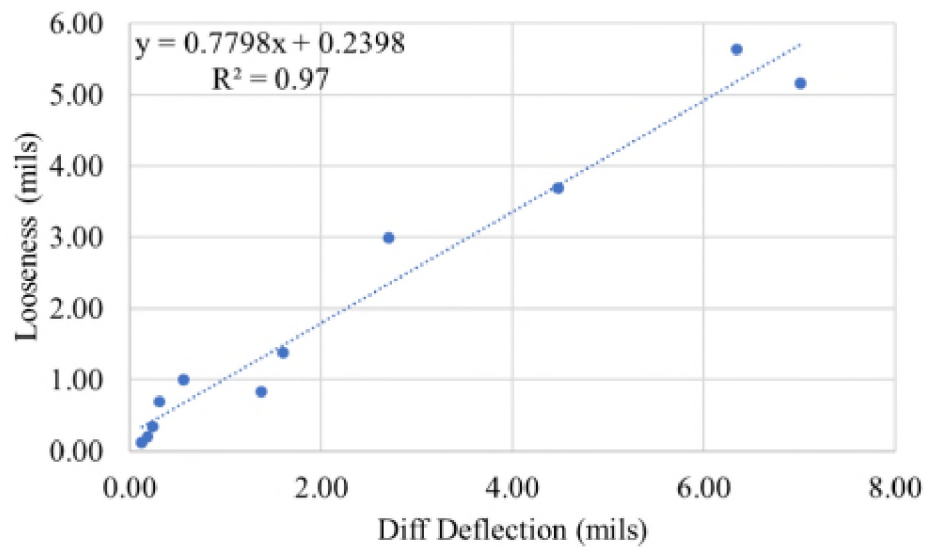


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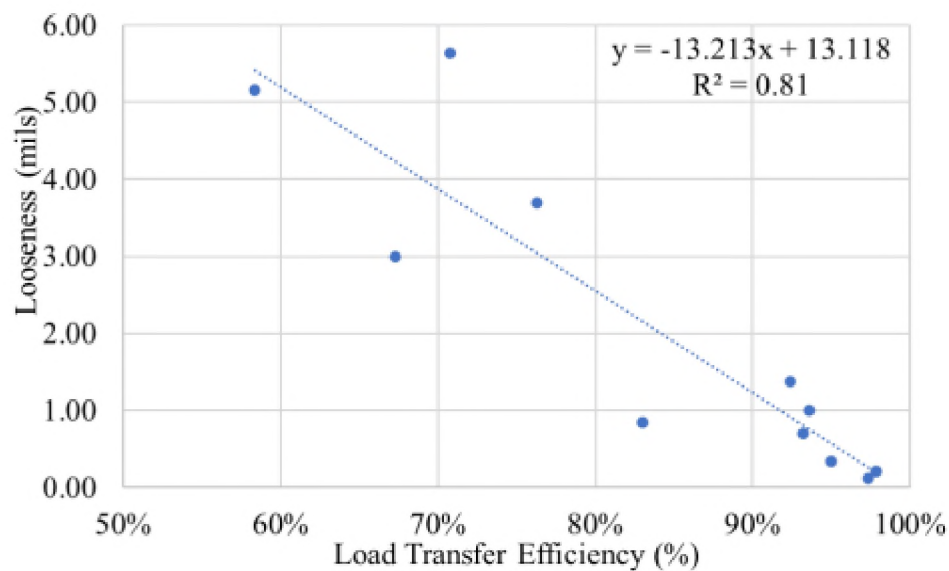
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 lp'nqcf 0Vj g'tgr'v'kpuj kr u'dgy ggp'o czko wo "nqugpguu'cpf "v'j g'eqo o qpn' "o gcuwtgf "FF"cpf "NVG"
 ctg'uj qy p'lp'Hki wtg'36; "cpf "Hki wtg'3720"Nqugpguu'ku'utqpi n' "eqttgr'v'gf "vq"FF. "lpf k'ecv'pi "v'j cv'
 FF "eqwrf "dg" wugf "vq" guko cv'g'v'j g'rgxgn'qh'f co ci g'qh'v'j g"eqpetgvg'ctqwpf "v'j g'f qy gni'cv'c"i kxgp"

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qh'tgr gcvf "mqf u<

c+" Nqcf "o ci plwf g<"ny "mqf u"*tgr tgugpvcxg"qh'cp"3: /nr "ukpi rg"czrg+"y gtg'uj qy p"vq"
i gpgtcvg'o loko cn'mqugpguu'qxgt"4.222.222"mqf "e{ engu0J ki j "mqf u"*tgr tgugpvcxg"qh'
c'etk'ecn'vcpf go "UN+i gpgtcvgf "o gcuwcdn{ "j ki j gt'mqugpguu'eqo r ctgf "vq'dqvj "ny "cpf "
o gf kwo "mqf u"*tgr tgugpvcxg"qh'c'ucpf ctf "vcpf go "czrg+0Vj gtghqtg."UNu'y kj "c"j ki j gt"
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cr r rkgf "gctn{ "lp"vj g'r cxgo gpv'rkz+"ctg"o qtg"uwegr vdrg"vq"i tgcvtg'f co ci g"wpf gt"
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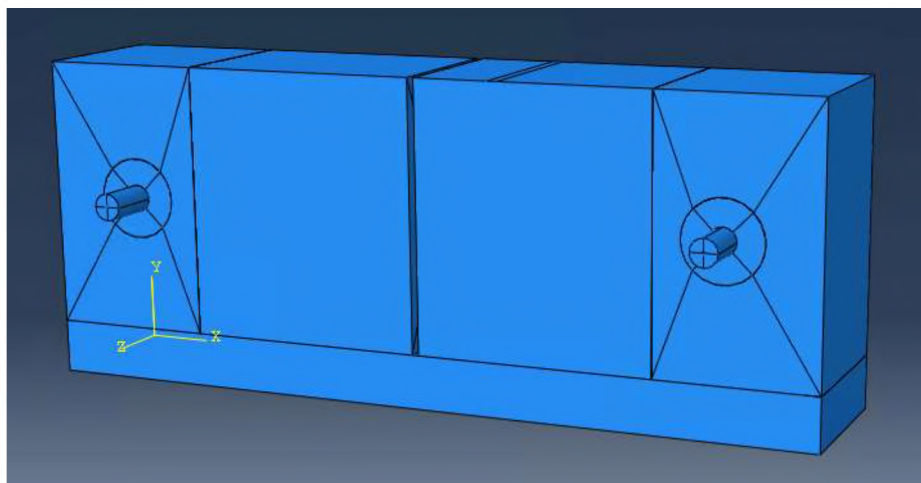
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Y j gtgcu'NVG'ecp"dg'wugf "cu"c"r tgf kvqt'hqt'mqugpguu'y j gp'NVG'ku'j ki j "v{r lecm{ 'hqt'tgrcvkgn{ "
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wugf "lp"vj cv'ecug0

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ugv'hqt"vj g'lp'vgtcevkq"dgvy ggp"vj g'f qy gr'vcpf "utwtqwpf lpi "eqpetgv0

Vj g"CDCS WU^{VO} "o qf gnl'rtgxkqwn{ "wugf "vq"lphqto "vj g"rdqtcvqt { "ugwr "y cu"ko r ngo gpvgf "lp"vj ku" cpcn{ uku' C" o guj "eqpxgti gpeg" y cu" r gthqto gf "vq" gpuwtg" vj g" o guj "y cu" uwhhkegpvn{ "hkg" hqt" gxcnwcipi "f hhtgtpvknf ghgevkpu"dgvy ggp"vj g"mqcf gf "cpf "vpmqcf gf "hcegu"qh"vj g"lqkp"vcpf "dgctkpi " utguugu"cmipi "vj g"ngpi vj "qh"vj g"f qy gn0Cp"gzco r ng"o qf gnl'ku"uj qy p"lp"Hki wtg"3730



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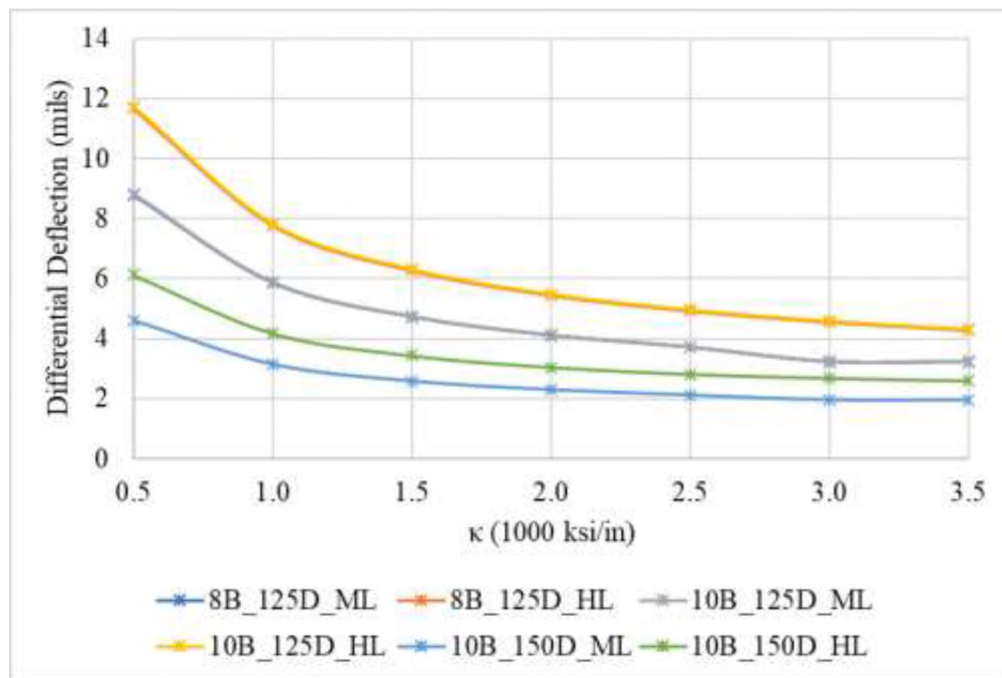
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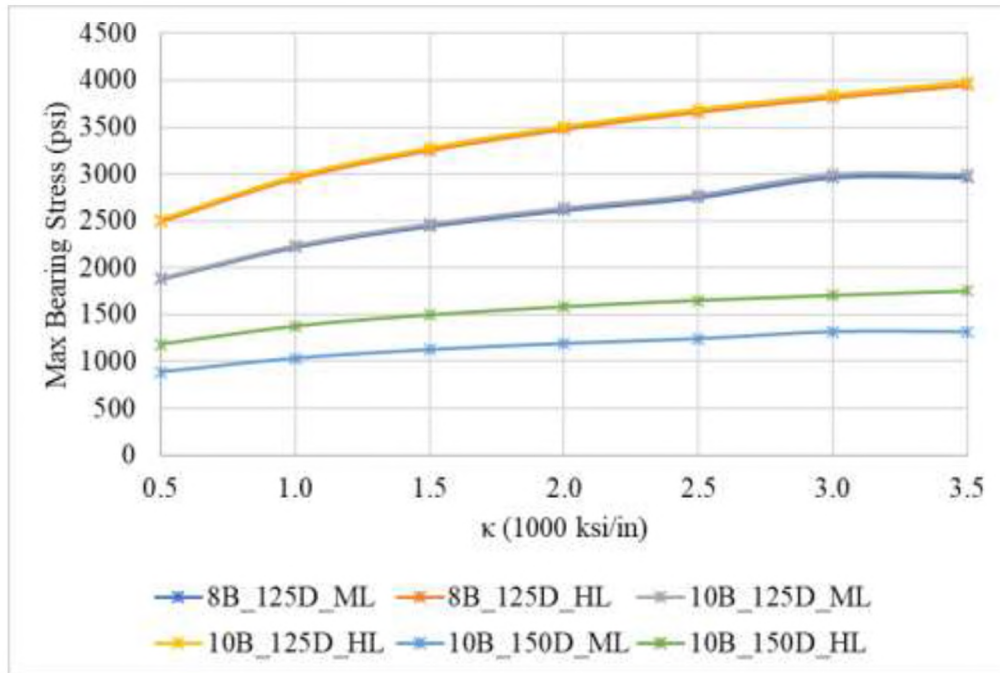
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Vj g"ur t lpi "lpvgtcevkp" * +y cu"ur gekhgf "dgvy ggp"vj g"f qy gnl'cpf "vj g" uwtqwpf lpi "eqpetgvg0K"vj g" rdqtcvqt { ." "ku"pqvf l tgevn{ "mpqy p."uq" gcej "hkg" gngo gpv'o qf gnl'y cu" gxcnwcvgf "y kj "xctkqwu" " xcnwgu"tcpi lpi "htqo "722"muklp"vq"5.722"muklp0Vj g"f hhtgtpvknf ghgevkpu"cpf "dgctkpi "utguugu"

y gtg'vj gp'kf gpv'w'kf 'hqt'gcej 'hpkkg'grgo gpv'cpcn' uku'0 Hki wtg'374'cpf 'Hki wtg'375'uj qy 'vj g' f khtgtgpv'cn'f gh'gevkqp'cpf "o czko wo 'dgctkpi u'utguugu'cu'h'pevkqp'qh' ".t'gur ge'v'x'gn'0



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: Da347F aJ N	5474
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32Da372F aO N	3348
32Da372F aJ N	36; 9

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c+" J ki j "r qukkxg"vgo r gtcwtg"i tcf kpvu=
d+" Uo cmgt"fkco gygt"fy gnu"cpf
e+" J ki j "xgj keng"mqcf kpi 0

Wf qp"cpcn{ uku"qh"y j gug"tguwmu."k'y cu'qdugt xgf "y j cv'y j g'o clqtkv{ "qh"y j gug"ecugu"y j gtg"dgmy " cp"cmqy cdng"dgctkpi "utguu"y j tguj qrf 0Vj g"rdqtcvqt { "uwf { "y cu'r gthqto gf "vq"s wcpvh{ "y j g"kpetgcug" kp"mqugpguu"y j cv'f gxgnr u"y kj "tgr gcvgf "mqcf "cr r rdecvkpu0Vj g"rdqtcvqt { "tguwmu"kp'kcvgf "y j cv' y j g"hmmy kpi "eqpf kkpku"tguwn"gf "kp"y j g"fxgnr o gpv'kp"i tgcvgf "co qwpv"qh"mqugpguu<

c+" J ki j "mqcf "o ci pkwf g=
d+" Nqy "eqpetgv"utgpi y j =cpf
e+" Nqy "fy gnu"fkco gygt0

Cmj qwi j "ugxgtcn"ur geko gpu"fkf "gzj kdk'uki phekcpv"kpetgcugu"kp"mqugpguu"fy wg"vq"tgr gcvgf " mqcf "cr r rdecvkpu."kp"pq"ecug"fy kf "c"ukpi ng"cr r rdecvkpu"qh"c"mqcf "tguwn"kp"i c"o gcuwcdng"kp'kcvgf "kp"

mqugpguu0k"qtf gt"q"qdugt xg"cp{ "petgcug"p"mqugpguu."cvhgcu'3.222'tgr gvkqpu'qh'j g'UN'y qwf "
pggf "q'dg"cr r ngf "q'j g'r cxgo gpvutwewt g'y j gp"e'etkknltcpi g'qh'eqpf kqpu'ct g'r tgugp0

DĐDNKQI TCRJ [

CCUJ VQ0*3; ; 5+0CCUJ VQ'I wlf'g'fqt 'F guki p'qñRcxgo gpv'Ut wewt gu.'3; ; 50Y cuj kpi vqp.'F E<
CCUJ VQ0

CCUJ VQ0*422: +0O gei cpluke/Go r kkecn'Rcxgo gpv'F guki p'I wlf'g.'Kpvgtko 'Gf kkkp<'C'O cpwcn'
qñRtcevkgoY cuj kpi vqp.'F E0<CCUJ VQ0

Ccu/Lcmqdugp.'M0*3; 92+0Hcwi wg'qñeqpet gvg'dgco u'cpf'eqno pu0F kkkkqp'qñEqpet gvg"
Ut wewt gu.'P qty gi kcp'Kpukwng'qñVgej pqmji {.'Wpkxgtuk{ 'qñVtqpf j glo 0

CDCS WU0*4233+0CDCS WU'Vj gqt { 'O cpwcn'803+0

CEK0*422: +0I wlf'g'fqt 'y g'F guki p'cpf'Eqpuat wewkqp'qñEqpet gvg'Rctnki 'Nqu0Hcto kpi vqp"
J km.'O K'Co gtkecp'Eqpet gvg'Kpukwng'Ego o kwgg'5520

CEKEgo o kwgg'547.'U0K0*3; 78+0Ut wewtcn'F guki p'Eqpukf gtcvkqp'uñt'Rcxgo gpv'Eqkpu0Lqwt pcn'
qñVj g'Co gtkecp'Eqpet gvg'Kpukwng.'75.'3/4: 0

Cf co u.'V0'Rgtt {.'G0'Uej y ctv {.'C0'I qnpkm'D0'Mcpi .'O 0'Dkwpgt.'I0'('Y ci pgt.'U0*4235+0'
Cki plpi 'Qxgt uk'glQxgt y gli j v'Hgguy kj 'Ci gpe{ 'Equu<'Et kkecn'Kuwgu0O cf kuqp.'Y K'
Y kueqpuk'F qv0

Crk'J 0C0'('Vc{cdlk'U0F 0*4222+0Wulpi 'vtcpuxgtug'r tqhkg'f cv'v'eqo r wg'r muke'f ghqto cvkqp"
r ctco gvgtu'ñt'cur j cn'eqpet gvg'r cxgo gpv0Vt cpur qt cvkqp'Tgugctej 'Tgeqtf.'3938*3+."
: ; /; 90

Cmpf.'M0*423: +0Cpcñf /kpi 'Hcnki 'Y gli j v'F ghgewgo gvg'F cv'qp'Ewtngf'cpf'Y ctrgf"
Eqpet gvg'Urcdu0Rkxudwi j .'RC<Wpkxgtuk{ 'qñRkxudwi j 0

Cmp.'F 0'('F ggp.'T0*3; ; 8+0C'eqo r wgtk gf'cpcñf uku'qñtwwkpi 'dgi cxkqt'qñhngzkdng'r cxgo gpv0'
Vt cpur qt cvkqp'Tgugctej 'Tgeqtf.'32; 7.'3"/'320

Cnlej g.'C0*4226+0F co ci g'b qf gññt'hcwi wg'ñcf kpi 'qñeqpet gvg0KpvgtpcvkqpñLqwt pcn'qñ'
Hcwi wg.'48*, +"; 37/; 430

Cr r ñgf'Tgugctej 'Cuqekcvgu'*CTC+.'K0*4226+0I wlf'g'fqt 'O gei cplukeóGo r kkecn'F guki p'qñPgy "
cpf'Tgi cdkkcvgf'Rcxgo gpv'Ut wewt gu0Y cuj kpi vqp.'F E0<Vt cpur qt cvkqp'Tgugctej "
Dqctf 'qñv'j g'P cvkqpñCecf go kgu0

Cur j cn'Kpukwng0*3; ; 4+0Tgugctej 'cpf'F gxgnro gpv'qñv'j g'Cur j cn'Kpukwng'u'Vj kempgu'F guki p"
Ocpwcn0Ngzkpi vqp.'Ml <Cur j cn'Kpukwng0

Dck'l 0'Uej tqem'U0F 0'O wkpcl | k'V0G0'J qw'Y 0'Nkw'E0'('Hto cp.'W0*4232+0Ginko cvkpi "
j ki j y cf'rcxgo gpv'f'co ci g'equu'cwt kdwgf'iq'it weniñt cñhe0Nkpeqrp.'P G<O kf /Co gtlec"
Vt cpur qt cvkqp'Egpgt0

Dcnf k'I 0*3; ; ; +0Hcwi wg'ñkg'cpf'r gto cpgpv'f ghqto cvkqp'ej ctcevgtkuñu'qñ'cur j cn'eqpet gvg"
o kzgu0Vt cpur qt cvkqp'Tgugctej 'Tgeqtf.'3449.'97/; 80

Dcmkpi gt.'E0C0*3; 93+0Ewo wrvkg'icwi wg'fco ci g'ej ctcevgtku'qhi'r nkp"eqpetgvg0J k j y c{"
Tgugctej 'Tgeqtf'. '592.'6: /820

Dcvkqlc/Crktcg| . 'F0F0'Mc| go k'U0H0'J cll.'G0| 0'Ukf f j ctvj cp.'T0X0(' 'J cpf.'C0L0*423: +0'
Rtqdcclkkk'0'gej cpkk/Dcugf 'Rcxgo gpv'F co ci g'Equu'hqt'O wkktr 'Qxgty gli j v'
Xgj kergu0Lqwtpcn'qhl'Vt cpur qt wvkp'Gpi kpggt kpi . 'Rctv'D<'Rcxgo gpw.'366*4+0

Dqppcwgt.'H0'I tdxqku.'C0(' 'Wf tqp.'L0*3; : 2+0C'pgy "o gj qf 'hqt'r tgf kvkpi 'y g'icwi wg'hkg'qh"
dkwo kpwu'o kzu0Cuuqekcvkq'qhl'Cur j cn'Rcxkpi 'Vgej pqri kuu'Rt qeggf kpi u.'*r 06; ; /
74; +0

Dtkpm'Y 0'Y kng.'R0'F ctvgt.'O 0(' 'Xqp'S wkwu.'J 0N0*4242+0RgppF QV'Rcxgo gpv'O G'F guki p"
Wugt 'Kprw'I wkf g0J cttkdwti . 'RC<'Rgppu{ ncpkc'F gr ctwo gpv'qhl'Vt cpur qt wvkp0

Dwej . 'P 0(' '\ qmkpi gt.'F 0*3; ; 8+0F gxxnr o gpv'qhl'f qy gnlqqugpguu'r tgf kvkpi'o qf gnlhqt 'lqkvgf "
eqpetgvg'r cxgo gpw0Vt cpur qt wvkp'Tgugctej 'Tgeqtf'. '3747.'43/490

Dwto kvgt.'F 0O 0*3; 67+0Vj g'i gpgtcn'vj ggt { 'qhl'ut guugu'cpf 'f kur nrego gpw'kp'nc { gt gf 'u' ugo u0K'
Lqwtpcn'qhl'crrk'f' 'rj { uku.'38*4+': ; /; 60

E3; 4E3; 4O /43.'C0*423; +0Ucpcf'ctf 'Rtceveg'fqt 'Ocmkpi 'cpf 'Ewt kpi 'Eqpetgvg'Vgu'Ur geko gpu'
kp'vj g'Ncdqtcvgt { 0Y guv'Eqpuj qj qengp.'RC<'CUVO 'Kvgtpcvkpcr0

E5; IE5; O /43.'C0*4243+0Ucpcf'ctf 'Vgu'0'gy qf 'fqt 'Eqo rt gukxg'Ut gpi vj 'qhl'E { rkpft'kecn'
Eqpetgvg'Ur geko gpu0Y guv'Eqpuj qj qengp.'RC<'CUVO 'Kvgtpcvkpcr0

E68; IE68; O /36.'C0*4236+0Ucpcf'ctf 'Vgu'0'gy qf 'fqt 'Ucve'0'qf wwu'qhl'Grukek { 'cpf "
Rqkuqp'u'Tcvk'qhl'Eqpetgvg'kp'Eqo rt gukqp0Y guv'Eqpuj qj qengp.'RC<'CUVO "
Kvgtpcvkpcr0

E839 IE839O /37.'C0*4237+0Ucpcf'ctf 'Rtceveg'fqt 'Ecrr kpi 'E { rkpft'kecn'eqpetgvg'Ur geko gpu0
Y guv'Eqpuj qj qengp.'RC<'CUVO 'Kvgtpcvkpcr0

Eco rdgm'U0'Uy gctkpi gp.'M0E0'J qpgkpi gt.'L0I 0'Mngt.'V0'Tc { . 'F 0'J wo r j tg { . 'F 0'000'
Xctpgt.'U0*422; +0K r ceu'qhl'Rgto kwg'f'Vt wnkpi 'qp'Qj kq'Vt cpur qt wvkp'U' ugo 'cpf "
Geppqo { 0

Ej cwk'M0'O cplm'C0'Ucrco c.'J 0'Dtcng.'P 0'J ckl gt.'U0Y 0'O qj vct.'E0G0(' 'Ngg.'J 0U0*422; +0'
Ghgev'qhl'O lej ki cp'O wnk/czrg'Vt wnu'qp'Rcxgo gpv'F knt guu'*Xqno g'KK0Gcu'Ncpukpi . "
O lej ki cp<O lej ki cp'F gr ctwo gpv'qhl'Vt cpur qt wvkp0

Ej gp.'F 0J 0'Hgtcpf q.'G0(' 'O wtr j { . 'O 0*3; ; 8+0Crr rdecvkp'qhl'icmki 'y gli j v'f ghgevqo gvgt "
f cve'hqt'cpcn { uku'qhl'uwr gtj gcx { 'mqf u0Vt cpur qt wvkp't gugctej 't geqtf'. '3762.'. 5/; 20

Ej gp.'Z0'Nco dgtv.'L0T0'Vuck'E0(' '\ j cpi . '\ 0*4235+0Gxcnckp'qhl'Uwr gt'J gcx { 'Nqcf "
O qxgo gpv'qp'Hgzkdng'Rcxgo gpw0Kvgtpcvkpcr0Lqwtpcn'qhl'Rcxgo gpv'Gpi kpggt kpi . '6626"
66: 0

Ekmmq.'C0'P wuadcwo . 'R0(' 'Eqmg { . 'D0*3; 9; +0Nqcf'Vt cpufgt 'qhl'F qy gnl'Detu'cpf'Uct 'Nwi u0'
Unqng.'Kkpkku<Eqputwvkp'Vgej pqri { 'Ncdqtcvgtkgu0

Encguugp."C0K0"Gf y ctf u."L0O 0"Uqo o gt."R0"("Wi g."R0*3; 99+0Cur j cn'Rcxgo gpv'F guki p//Vj g"
Uj gniO gj qf 0Rtqeggf kpi u'qhl6vj "KpvgtpcvkpcnEqplgt gpeg"qp"Ut wewt cn'F guki p"qhl'
Cur j cn'Rcxgo gpw'*Xqmw g'K+0Cpp"Ctdqt."O lej ki cp0

Eqtpgnkuugp."J 0C0*3; : 6+0Hcvi wg'hcnwtg"qhl'eqpetgv'kp"vgpukp0/J GTQP."4; *6+3/8: 0

Eqttgk."L0R0"("Dtcpeq."H0C0*4228+0P gy "o gj qf qm { <Rgto k'ej genkpi "qhl'xgj kewrt"
qxgtmqcf u0Lqwtpcn'qhl'Dt kf i g'Gpi kpggt kpi ."33*5+."496/4: 30

Fctvgt."O 0K0*3; 99+0F guki p"qhl'c" gtq/o ckvpgcpeg'Rncp"Lqkpvf"Eqpetgv'Rcxgo gpw.'Xqmw g"
Qpg/F gxgrqro gpv'qhl'F guki p'Rtqegf wt gu0Y cuj kpi vqp."F 0E0'Hgf gtcn'J ki j y c{"
Cf o kpkntcvkqp0

Fcu."D0O 0*4233+0I gqvgej pkecn'Gpi kpggt kpi "J cpf dqqn0H'Ncwf gtf crg."HN<L'Tquu'Rwdrkuj kpi ."
Kpe0

Fcxkf u."Y 0*4225+0GxgtHG"Vj ggt {"O cpwcn'Xgtukp"40460

Fg'Lqpi ."F 0N0'Rgwj ."O 0I 0"("Mqtuy ci gp."C0T0*3; 9; +0Eqo.rwgt'r tqi tco 'DKUCT.'w{gtgf"
uf ugo u'wpf gt'pqt o cn'cpf"xcpi gpv'cn'lwtf'eg'hqcf u0Gzvgtpcn'Tgr 0P q0C0 UT."80

Fqo gplej kpk"N0"("O ctej kappc."C0*3; : 3+0Kp'wvpeg"qhl'wt guu'tcpi g"qp'r nc'p"eqpetgv'r cxgo gpv"
hcvki wg'f guki p0Rtqeggf kpi u'qhl'vj g"4pf "KpvgtpcvkpcnEqphgt gpeg"qp"Eqpetgv'Rcxgo gpv"
F guki p0*r 077/87+0Y guv'Ncl'c{ gwg."Kpf kpc<Rwtf wg'Wpkxgtuk{ 0

HJ Y C0*4222+0Cff'gpf wo "w'yj g'3; ; 9'fg'gtcn'j ki j y c{"Eqw'cmqecv'kp"uwf{"Kpcn't gr qt v0"
Y cuj kpi vqp0F 0E0

HJ Y C."("F QV0*4238+0Rcxgo gpv'Eqo.rctcvkxg'Cpcn'uku'Vgej pkecn'Tgr qt v0

HJ Y C."("F QV0*423: +0WU'Eqf g'qhl'Hgf gtcn'Tgi wrcv'kpu."Vkrq"45."Rctv'87: 090Hgf gtcn"
Tgi kngt0

HJ Y C="F QV0*3; ; : +0Hkpcn'Tgr qt v'qp'yj g'Hgf gtcn'J ki j y c{"Eqw'cmqecv'kp"Uwf{"0Hgf gtcn"
J ki j y c{"Eqw'cmqecv'kp"Uwf{".'3; ; 90Y cuj kpi vqp0F 0E0

Hkpp."H0"Uctch'E0'Mwmtpk'T0'P ckt."M0"Uo kj ."Y 0"("Cdf wncj ."C0*3; 99+0Vj g'wug"qhl'f kwt guu"
r tgf lev'kpu'uwdu{ ugo u'hqt'yj g'f guki p'qhl'r cxgo gpv'wt wewt gu0Rtqeggf kpi u'qhl'6vj "
KpvgtpcvkpcnEqplgt gpeg"qp"Ut wewt cn'F guki p'qhl'Cur j cn'Rcxgo gpw'*Xqmw g'K+0Cpp"
Ctdqt."O K0

Hkqtkmq."I 0"("I j qup."O 0*4236+0Rtqegf wt g'hqt"Ucwk'wkecn'Ecvgi qtk'cvkqp"qhl'Qxgty gli j v"
Xgj kengu'lp"e"Y K0 'F cxcducg0Lqwtpcn'qhl'Vt cpur qt wcvkqp'Gpi kpggt kpi 0

Hkldgti ."D0*3; 5: +0F guki p'qhl'F qy gni'lp"Vt cpuxgtug'Lqkpw'qhl'Eqpetgv'Rcxgo gpw086*; +0

I cgf leng."E0'Tqgungt."L0"("Uj cj ."U0*422; +0Hcvi wg'etcenli tqy yj "r tgf lev'kpu'kp"eqpetgv'uwdu0"
Kpvgtpcvkpcn'Lqwtpcn'qhl'Hcvi wg.'53*:/; +352;/35390

I j qup.'O 0'Hkqtkmq.'I 0'I c{qx{{.'X0'I gwq.'V0'Cj o gf.'U0'('Rctngt.'P 0*4237+0'Ghgewu'qhl'
Qxgty gli j v'Xgj kengu'qp'P gy 'l qt mlUcv'g'F QV'kpl'cwt wewt g0

J cll.'G0l' 0'Ukf f j ctvj cp.'T0X0'P cdk cf gj.'J 0'Ghcuu.'U0'P ko gk'O 0'Mc| go k'H0U0'000'
Rktvj ggr cp.'O 0*423: +0'Cpcn'uku'Rtqegf'wt gu'lt'Gxcnw'kpi 'Uwr gtj gcx{'Nqcf' 'O qxgo gpv'
qp'Hngzkdng'Rcxgo gpw.'Xqmw g'K'Hkpcn'Tgr qt v0T gpq.'P X<Wp'kxgtuk{'qhl'P gxcfc0

J ctkej cpf tcp.'T0U0'l gj.'O 0U0'('Dcnfk'I 0l' 0*3; ; 2+00 KJ /RCXG<'C'pqp'kpgct'hkpg'
grgo gpv'r tqi tco 'lt'cpcn'uku'qhl'ngzkdng'r cxgo gpw0Vt'cpur qt w'kqp'Tgugctej 'Tgeqtf.'
34: 8.'345/3530

J c{j qg.'I 0H0*4224+0'NGCH<'C'pgy 'rc{gtgf'gru'ke'eqo'rw'w'kqpcn'r tqi tco 'lt'HCC'r cxgo gpv'
f'guki p'cpf'gxcnw'kqp'r tqegf'wt gu'Y cuj kpi vqp.'F 0'0'Hgf gtcn'Cxk'w'kqp'Cf o kpknt'w'kqp0

J kngt.'L0G0'('Tqgurgt.'L0T0*4227+0F gvgto kpc'w'kqp'qhl'et'klecn'eqpet'g'g'r cxgo gpv'lw'ki wg'f co ci g'
mqec'w'kpu'wukpi 'kphw'gpeg'kpgu0Lqwt'pcn'qhl'Vt'cpur qt w'kqp'Gpi kpggt kpi.'353*.'+'7; ; /8290

J knf qth'J 0M0'('Mgurgt.'E0G0*3; 88+0H'w'ki wg'wtgpi j 'qhl'eqpet'g'w'p'f gt'xct{kpi 'hngzwtcn'
wtgu'gu0CEKLqwt'pcn'85*32+'327; /32970

J qm gp.'L0Q0*3; ; 4+0H'w'ki wg'qhl'eqpet'g'w'd{'eqpu'w'p'v'cpf'xct'kdng'co r'k'w'f g'w'cf kpi 0CEK'
Lqwt'pcn'UR97.'93/3320

J uw.'V0V0*3; ; 3+0H'w'ki wg'qhl'r'w'k'p'eqpet'g'w'0CEKLqwt'pcn'Rtqeggf kpi u.'9: *6+'4; 4/5270

J wpi.'l' 0J 0*4226+0Rcxgo gpv'cpcn'uku'cpf'f'guki p0

kpe.'C0*4235+0'CDCS WU'Uqhy ct g'Xgtukap'805<Wugt'u'O'cpwcn'0Rtqxkf gpeg.'T10

Mj c| cpqxlej.'N0*423: +0'S wcp'w'k'kpi 'vj g'Ghgewu'qhl'K0'rwgo gpw'qhl'J wud'cp'f't{'qp'Rcxgo gpw0'
Y cuj kpi vqp.'F 0'0'P'w'kqpcn'Eqr gtc'w'x'g'J ki j y c{'Tgugctej 'Dqctf0

Mj c| cpqxlej.'N0'('Y cpi.'S 0*4229+00 pNc{gt<'j ki j /r gthqto cpeg'rc{gtgf'gru'ke'cpcn'uku'
r tqi tco 0Vt'cpur qt w'kqp'Tgugctej 'Tgeqtf.'4259.'85/970

Mj c| cpqxlej.'N0'l w.'J 0V0'Tcq.'U0'I crcuqxc.'M0'Uj cw.'G0'('Lqpgu.'T0*4222+0'KNCD'4222<
h'k'p'k'g'grgo gpv'cpcn'uku'r tqi tco 'lt't'ki k'f'cpf'eqo'rw'q'k'g'r cxgo gpw<wugt'au'i w'f'g0'
Wdpc.'KN<GTGU'Eqpu'w'w'p'v0

Mqmw'w.'U0X0'Q'P gl'n'G0H0'Rqr qxleu.'L0U0'('Uj cj.'U0R0*4222+0Et'cenlr tq'ci w'kqp'k'p'hngzwtcn'
lw'ki wg'qhl'eqpet'g'w'0Lqwt'pcn'qhl'Gpi kpggt kpi 'O'gej c'p'keu.'348*.'+'; ; 3/: ; ; 0

Nctuqp.'I 0'('F go r ug{'.'D0*4225+0'Gpj cpegf'k'p'vgi t'cv'gf'Erko c'w'ke'O'qf'gn'Xgtukap'50' *GKE O'0'
Wdpc.'KN<Wp'kxgtuk{'qhl'Kk'p'q'ku0

Nctuqp.'I 0'('F go r ug{'.'D0L0*3; ; 9+0'Gpj cpegf'k'p'vgi t'cv'gf'enko c'w'ke'o'qf'gn'Xgtukap'400'Wdpc.'
KN<Wp'kxgtuk{'qhl'Kk'p'q'ku'cv'Wdpc/Ej co r cki p0

Ngcj {'.'T0*3; ; ; +0R'gto c'p'gpv'F'gh'qto w'kqp'Ej ct'cevgt'k'w'kqp'qhl'Cur'j cn'O'k'w'wt gu0Eqmgi g'Rctm'
O F<Wp'kxgtuk{'qhl'O ct{k'p'f0

N{ wqp. 'T0N0*3; ; 5+0F gxrqro gpv'cpf "xcrkf'cvkqp'qhr'gt'fqt o cpeg'rt gf'kevqp'o qf'gnu'cpf"
ur ge'k'kevqp'u'fqt "curj cn'dkpf'gtu'cpf"r'cxkpi "o k'gu'0Y cuj kpi vqp. 'F 00'U'cvgi le"
J ki j y c{ 'Tgugtej 'Rtqi tco 0

O ctewu. 'J 0*3; 73+0Nqcf 'Ectt{ kpi 'Ecr'cek{ "qh'F qy gnu'cv'Vt'cpuxgtug'Rcxgo gpv'Lqkpu06: 0

O k'c. 'V0L0('Ej cp. 'V0J 0*4224+0Dtkf i g'Nkxg'Nqcf 'O qf'gnu'htqo "Y KO 'F cxc0Gpi kpggtkpi "
Utnewtgu "46* . + "3293632: 60

O k'p'gt. 'O 0C0*3; 67+0Ewo w'v'xg'f co ci g'lp'hc'ki wg0Lqwt'pcn'qhr'Cr'rk'gf "O'gej c'p'keu. "34. "36; 6"
3860

O k'p'p'gu'q'v'F gr'ctwo gpv'qh'Vt'cpur qt'v'kqp0*4234. 'Lwn{ +0O pRCXG'W'ugt'au'I w'kf g0

O qj co o cf'k'L0('Uj cj . 'P 0*3; ; 4+0U'c'v'k'ec'cn'G'x'c'w'v'k'qp'qh'Vt'wem'Q'x'gt'm'cf u0Lqwt'pcn'qhr'
Vt'cpur qt'v'kqp'Gpi kpggtkpi . '33: *7+ "87368870

O w'f'qem'L0Y 0('M'gurt. 'E0G0*3; 7: +0G'h'ge'v'qh't'cpi g'qh'ut'guu'qp'hc'ki wg'ut'gpi vj "qh'r'nc'kp"
eqpet'gv'dgco u0CEKLqwt'pcn'Rt'q'eg'gf kpi u. "77* . + "443/4530

P cu'k'k'U0('X'c'p'f'g'p'd'quej g. 'L0O 0*4234+0G'uc'd'rkuj kpi "d'w'k'v'k'p'v'go r'g't'c'w't'g'i t'cf'k'g'p'v'f'qt"
l'q'k'p'v'g'f'r'nc'kp'eqpet'gv'r'cxgo gpw'lp'R'g'p'pu{ k'c'p'k'c0K'v'g't'p'c'v'k'p'c'n'Lqwt'pcn'qhr'Rcxgo gpv"
Tgugtej 'cpf "V'gej p'q'qi { . "7*6+ "4670

P c'v'k'p'c'n'E'q'q'r'g't'c'v'x'g'J ki j y c{ 'Tgugtej 'Rtqi tco 'Tgr'qt'v'3/59C0*4226+0I w'kf'g'f'qt "O'gej c'p'k'w'ke/"
Go r'k'k'ec'n'F'g'uk'i p'q'hr'P'gy 'c'p'f "T'g'j c'd'k'k'c'v'g'f "Rcxgo gpv'Utnewtgu'0Y cuj kpi vqp. 'F'E<
Vt'cpur qt'v'kqp'Tgugtej 'Dqctf 0

QDtk'p. 'G0L0'G'p't'ki j v. 'D0('I g'v'cej gy . 'C0*4232+0K r'q't'v'c'p'eg'qh'v'j g'V'ck'k'p'Vt'wem'Y g'ki j v"
O qf'g'k'p'i 'f'qt'Dtkf i g'Cu'gu'uo gpv0Lqwt'pcn'qhr'Dt'f'f i g'Gpi kpggtkpi . "37*4+ "43264350

Qj . 'D0J 0*3; ; 8+0H'c'ki wg'c'p'c'n'f'uk'i'qh'r'nc'kp'eqpet'gv'lp'h'g'z'w't'g0Lqwt'pcn'qhr'Utnewt'cn'
Gpi kpggtkpi . "334*4+ "495/4: : 0

Qj . 'D0J 0*3; ; 3c+0Ewo w'v'xg'f co ci g'v'j g'qt { "qh'eqpet'gv'w'p'f'gt'x'c't'k'd'ng/co r'k'w'f'g'hc'ki wg"
m'cf'k'p'i u0CEKO'c'v'g't'k'c'u'Lqwt'pcn": : *3+ "63/6: 0

Rcen't'f. 'T0I 0*3; ; 7+0Vj k'ep'ngui'f'g'uk'i p'f'qt "eqpet'gv'j ki j y c{ "c'p'f"l'ut'gg'v'r'cxgo gpw0U'q'p'nd'g. 'K'N<
R'q't'v'c'p'f'Ego gpv'Cu'q'ek'c'v'k'qp0

Rcen't'f. 'T0I 0('Vc{ c'd'k'k'U0F 0*3; ; 7+0P gy "REC"v'j k'ep'ngui'f'g'uk'i p'r't'q'eg'f'w't'g'f'qt "eqpet'gv"
j ki j y c{ "c'p'f"l'ut'gg'v'r'cxgo gpw0Vj k'f "K'v'g't'p'c'v'k'p'c'n'E'q'p'f'g't'g'p'eg'q'p'E'q'p'et'gv'Rcxgo gpv"
F'g'uk'i p'c'p'f "T'g'j c'd'k'k'c'v'k'qp0Y guv'N'c'h{ g'w'g. 'K'P <R'w'f'w'g'W'p'k'x'g't'uk{ 0

Rcr ci k'ep'p'c'n'k. 'C0V0*4237+0PEJ TR'U'p'v'j g'uk'i'698<Rt'c'v'k'eg'u'f'qt "R'g't'o k'k'p'i "U'w'r'g't'j g'c'x{ "N'q'c'f"
O'q'x'go gpw'q'p'J ki j y c{ "Rcxgo gpw'0Y cuj kpi vqp. 'F 00'P c'v'k'p'c'n'E'q'q'r'g't'c'v'x'g'J ki j y c{ "
Tgugtej 'Rtqi tco 0

Rg'p'p'u{ k'c'p'k'c'F gr'ctwo gpv'qh'Vt'cpur qt'v'kqp0*423; +0R'w'd'r'k'ec'v'k'qp'464<Rcxgo gpv'R'q'r'ke{ "O'c'p'w'c'n0"
J c'tt'k'ud'w'i . 'RC<R'g'p'p'u{ k'c'p'k'c'F gr'ctwo gpv'qh'Vt'cpur qt'v'kqp0

Vgmgt.'N0Y 0'('Ecuj gm'J 0F 0*3; 7; +0Rgtlqto cpeg'qhf qy grgf 'Lqpw'Wpf gt'Tgr gvkxg"
Nqcf kpi 0J ki j y c{'Tgugctej 'Dqctf'Dwngvp.'*439+': 66; 0

Vgr hgtu.'T0*3; 9; +0Vgpukg'hvki wg'utgpi yj "qhr nkp"eqpetgv0CEKLqwtpcn'98*.'+"; 3; /; 560

Vkwu/I rpxgt.'N0'Qy wuw/Cpy k'G0D0'('O 0K'c0F 0*3; ; ; +0F guki p'cpf'Eqpwt wevkp'qhf'REE"
Rcxgo gpw'Xqmo g'KK'K'rtqxf'REE'Rgtlqto cpeg0Y cuj kpi vqp.'F 0E0'Hgf gtcn'
J ki j y c{'Cf o kpkutcvkp0

Vugpi.'M0J 0'('N{ vqp.'T0N0*3; ; ; +0Rtgf levkp'qhr gto cpgpv'f ghqto cvkp'kp'hgzkdng'r cxgo gpv"
o cvgtkn0Kp'K'rtkecvkp'qhfci i t gi cvgu'kp'vj g'f guki p.'eqpw wevkp.'cpf'r gtlqto cpeg'qhf'
hgzkdng'r cxgo gpw0CUVO 'Kpvtpcvkpcr0

Wj cp.'L0*3; ; 6+0Cf xcpgef "dcenecrewcvkp'vgej pls wgu0Kp'Pqpf gut wevkg'Vgukpi "qhfRcxgo gpw"
cpf'Dcenecrewcvkp'qhfO qf'wk'Ugeqpf'Xqmo g0CUVO 'Kpvtpcvkpcr0

Xcp'Ecwy grgtv.'H0L0'Crzcpf gt.'F0T0'Y j kg.'V0F 0'('Dctngt.'Y 0T0*3; ; ; +0O wnkrc { gt"
grwke'r tqi tco 'hgt'dcenecrewcvkp'rc { gt'o qf wklp'r cxgo gpv'gxcnecvkv0Kp"
Pqpf gut wevkg'vukpi "qhr cxgo gpw'cpf'dcenecrewcvkp'qhf'o qf'wk0CUVO 'Kpvtpcvkpcr0

Xgi c.'K0O 0'Dj cvk'O 0C0'('P kzqp.'Y 0C0*3; ; 7+0C'P qp/npgct'Hvki wg'F co ci g'O qf grlht"
Eqpetgv'kp'Vgpukp0Kpvtpcvkpcr0Lqwtpcn'qhfF co ci g'O gej cpkeu.'6*6+.'584/59; 0

Y w'E0N0'O cem'L0Y 0'Qnco qvq.'R0C0'('Rcenctf.'T0I 0*3; ; 5+0Rtgf levkp'qhfHcvnkpi "qh"
Lqpw'kp'Eqpetgv'Rcxgo gpw0Rt qeggf lpi u'qhfij g'Hhij "Kpvtpcvkpcr0Eqpigt ppeg"qp"
Eqpetgv'Rcxgo gpv'F guki p'cpf'Tgj cdkkcvkp0Y guv'Nclc { gwg.'K'<Rwtf wg'Wpkxgtukv{ 0

[w.'J 0V0'Mj c| cpqxlej .'N0'Tcq.'U0R0'F ctvgt.'O 0K0'('Xqp'S wkpww.'J 0*3; ; ; +0I wlf'grkpgu'fqt"
Udwmt'feg'Ftckpci g'Dcuqf"qp'Rgtlqto cpeg.'Crr gpf keg0P cvkpcr0Eqqr gtcvkg"
J ki j y c{'Tgugctej 'Rtqi tco 0

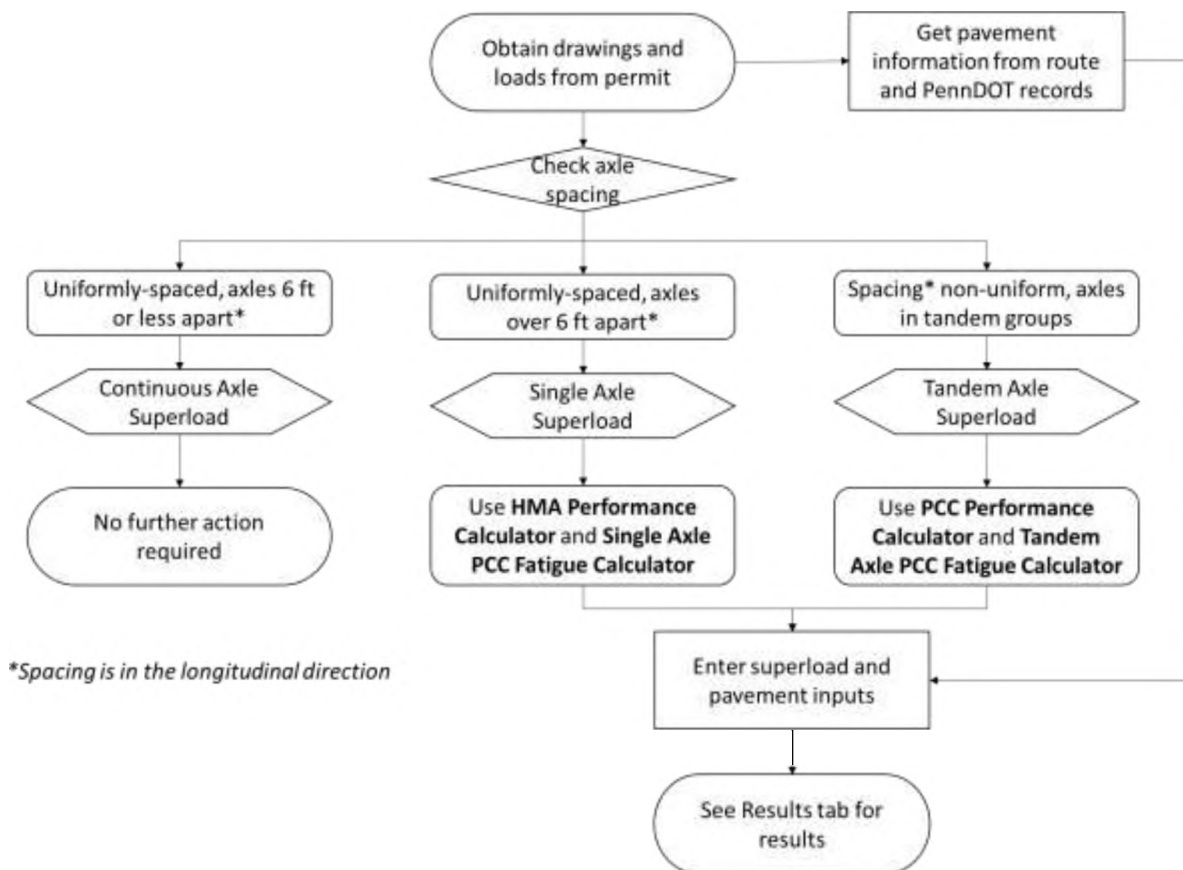
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Rcxgo gpw'Xqmo g'KK'K'rtqxkpi 'Eqpetgv'Rcxgo gpv'Rgtlqto cpeg0Hkpcn'Tgr qtv."
Eqpwtcev'F VHJ 83;/ 3/E/2227500 eNgcp.'XC<'Hgf gtcn'J ki j y c{'Cf o kpkutcvkp0

\ j cpi.'D0'Rj knk u.'F 0X0'('Y w.'M0*3; ; 8+0Ghgew'qhf'ncf kpi 'hgs wge { "cpf'utguu'tgxgtucn'qp"
hvki wg'hkg'qhr nkp"eqpetgv0O ci c/kpg'qhf'eqpetgv'tgugctej.'6.'*399+.'583/5970

CRRGP F KZ 'C<GZ CO R NGU'QH'CUUGUUP I 'VJ G'GHHGEVU'QH'UWRGTNQC F UQP RCXGO GP VU

CØ'Qxgt xlgv

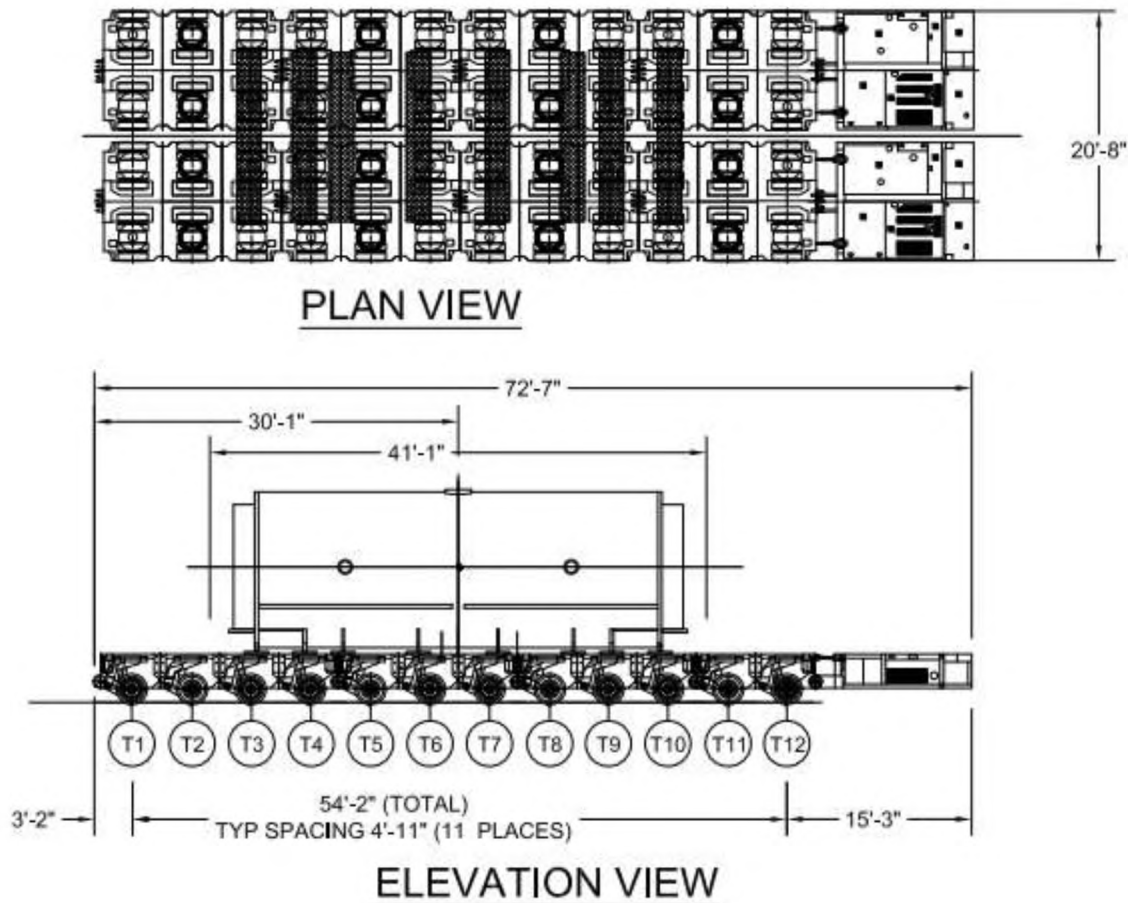
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Hki wtg"376<Hqy ej ctv'htq"cpn' | kpi "c'UN'y kj "vj g'r tqxkf gf "vqqu

CØ'Gzco r rg'3

Vj g'hqmy kpi 'r gto k'cr r ñecvkp'y cu'tgegkxgf 'd{ 'RgppF QV"r gto k'%J 729459538+.'cu'uj qy p'kp Hki wtg'3770



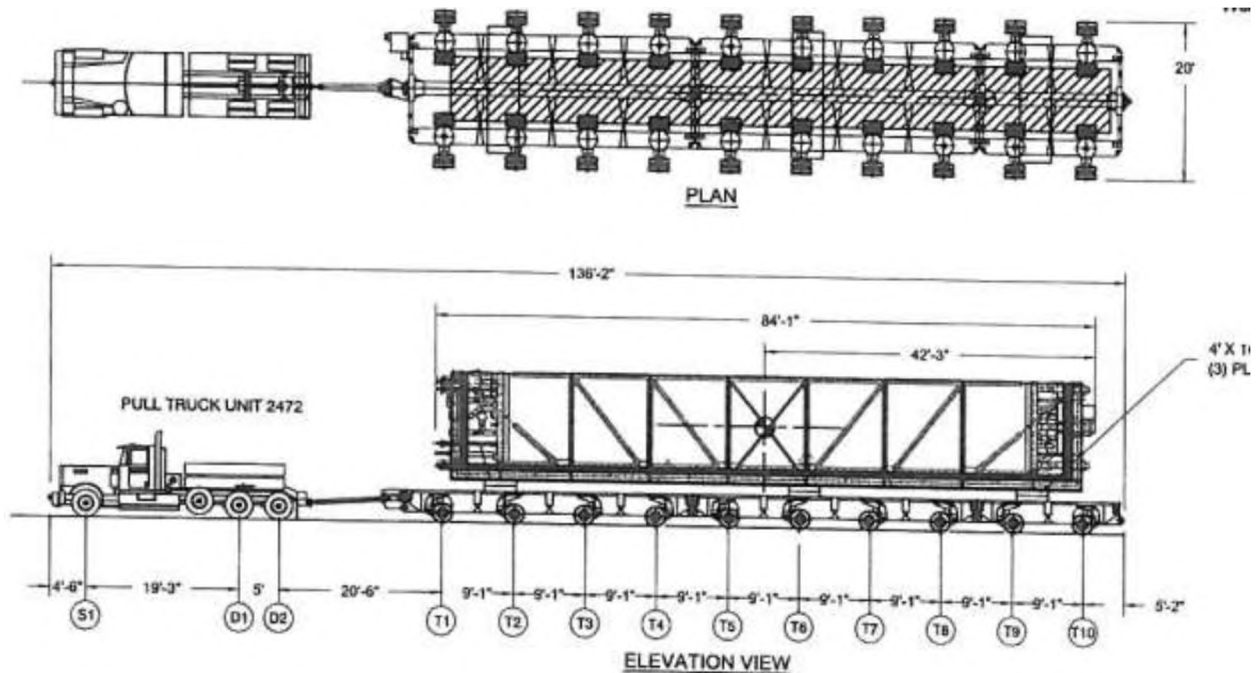
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Hqt "y ku'v{ r g'qh'uwr gtrqcf . 'k'y cu'uj qy p"*ugg'HkpcnTgr qtv+yj cv'y gtg'ku'pq"uki pñkecpv'f co ci g'y cv' tguwu"htqo "qpg"r cuu'qh'y g"vwen'qxtg"t ki k' r cxgo gpv0Vj gtghqtg."pq"vqn'ht"y ku'ecug"y cu' f gxgnr gf "cpf "pq'htwjt g'uwr u'pggf "vq'dg"cnrgp0Hqt "hgzldrg'r cxgo gpw."htqo "y g'r gto k."gej "vkg" j cu'c"mqcf "qh'6.672'nd0Gcej "ukpi rg"czrg"qh'6'y j ggn'j cu'c"mqcf "qh'wvf gt'3: .222'ndu."y j kej "ku'rguu" yj cp'c"ucpf ctf "czrg0Vj gtghqtg."pq'ur gekn'cpn{ uku'ku'tgs wktgf "kp'y ku'ecug0

C04'Gzco r ng'4

Vj g'liqmy kpi 'r gto k'y cu'tgeglxgf 'd{ 'RgppF QV'*r gto k'%J 72947; ; 99+."cu'uj qy p'kp'Hki wt g" 3780



Hki wt g"378<Rmp"cpf "grgxcvqp"xkgy 'hqt'Gzco r ng"4

Kp'y ku'ecug."y g"vckrgt"czngu"ctg"wpkhtqto n{ "ur cegf "cv'c'y kf g'f kucpeg"cr ctv."uq"y cv'y ku'ecp"dg" ecvgi qtk gf "cu'c"Ukpi ng"Uwr gtmqcf "v{ r gOP qvg'y cv'y g"tcevat"ku'f kut gi ctf gf "hqt"y g"cpn{ uku'cu'k' j cu'c'o wej "uo cmgt"ghgevlp"vgo u'qh'f co ci g'v"y g'r cxgo gpv'y cp'y g'vckrgt0

Ukpeg"y ku'ku'c"Ukpi ng"uwr gtmqcf "v{ r g."y g"J O C "Rgthqto cpeg"Ecnewvqt"vqn'uj qwr "dg"wguf "vq" cuugu'y g'ko r cev'v"y g'r cxgo gpv0Vj g'vqn'tgs vkt gu'ur gekh{ kpi "egtckp"lpr wu."cu'uj qy p'kp'Hki wt g" 3790Hqt"y g"Ukpi ng"Uwr gtmqcf."gcej "czng'tqy "eqpukuu'qh'y q'ukpi ng"czngu'gcej 0Htqo "y g'f tcy kpi u" r tqxkf gf "kp'y g'r gto k'er r necvqp."y g'i tquu'mqcf "qh'gcej "czng'tqy "ku'67.: 84"rd."uq"gcej "ukpi ng"czng" j cu'c'mqcf "qh'44.; 53"rd0Vj ku'lpr w'ku'gpvgtgf "lpv"y g'vqn0Vj gtg'ctg"cuq"32'tqy u'qh'czngu."uq"32" czngu'y km'tcxgtug"cuqpi "y g'gf i g'qh'y g'r cxgo gpv0Vj gtghqtg"y g'lpr w'hqt"y g'pwo dgt"qh'czngu" tqy u'ku'320Vj gug'ctg"y g'qpn{ "lpr wu'tgs vkt gf "htqo "y g'f tcy kpi u0

Vj g"qy gt"ugv'qh"lpr wu"ctg"tgrvuf "vq"y g'r cxgo gpv0Vj ku'kphqto cvqp"ecp"dg" qdvckpgf "htqo " RgppF QV'tgeqtf u'qi gj gt'y kj "y g'r tqr qugf "tqwg"qh'y g'uwr gtmqcf 0Vj g'dcuke"lpr wu'pggf gf "ctg" CE"y kempguu"cpf "grcuke"o qf wwu0Vj g'guko cvgf "grcuke"o qf wwu"ecp"dg"cf lwugf "t gf wegf +vq" ceeqwpv'htq"cp{ 'h'ki wg'etcenkpi 'r tugupv'lp"y g'r cxgo gpv'ugg"y g'f co ci gf "o qf wwu'ecnewvqt"kp" y g'vqn:"cpf "dcug"y kempguu"cpf "o qf wwu" *c"eqo r qukg"y kempguu"cpf "o qf wwu"htq"dcug"cpf " uwdcug"rc{ gtu'o c{ "dg"wguf "h'c"uwddcug"ku'r tugupv+0Cf f kklqpcmf."y g'vgo r gtcwtg"cv'y g'o kf /f gr y " qh'y g'CE"rc{ gt"ku'tgs vkt gf."y j kej "o c{ "dg"lphgttgf "htqo "y g'ugcuqp0Ck"xqkf u'cpf "ghgevlxg"dkpf gt" eqpvpgv."y j kej "ecp"dg"qdvckpgf "htqo "eqputwvqp"tgeqtf u'qt"v{ r lecn'xcnngu."ctg"cuq"pggf gf "cu" lpr wu0Hkpcmf."y tgg"r tqr gt vku'tgrvuf "vq"y g'uwdi tcf g"ctg"tgs vkt gf <f gr y "qh'y g'y cvgt"vcdng"*c"

i gpgten'xcnwg"qh"32"l'u'cf gs wcv'lp"RC"l'h'y ku'ku'pqv'npqy p+."cpf "y g"eqj gukqp."cpf "cpi rg"qh" kpgtprn'ltkvpq." .qh'y g'uwdi tcf g."y j lej "ecp'dg'qdvckpgf "ltqo "y g"v'r lecn'xcnwgu'vcdng'r tqxkf gf " kp'y g"vqr0Vj g'wugt'ecp'cnq'ur gekh' "y g'tgrkcdkx' "cv'y j lej "twwkpi 'ku'ecrwwv'gf ."cmj qwi j "c'f'ghcwm' xcnw"qh": 7' "ku'tgeqo o gpf gf 0Tgcupcdng'xcnwgu'ltq'cm'y gug'kpr wu'ctg'uj qy p'lp'Hki wtg"3790

Inputs		
Superload:		
Axle load	22931 lbs	Value OK
# of axle rows	10	
Pavement Structure:		
AC thickness	8 in	Value OK
AC modulus	3.00E+05 psi	Value OK
Mid-depth AC temperature	100 °F	
Air voids in AC	7.07 %	
Effective binder content	9.47 %	
Base thickness	10 in	Value OK
Base modulus	3.00E+04 psi	Value OK
Subgrade c	20 psi	
Subgrade phi	20 degrees	
Depth of ground water table	10 ft	
Rutting reliability	85 %	

Hki wtg"379<"J O C"r tgf levkqp"vqrn'kpr wu'ltq'Gzco r rg"4

Qpeg'y g"lpr wu'ctg'r tqxkf gf ."y g'tguwu'ctg'uj qy p'lp'y g'Tguwu'vcd"cpf "tgr tqf wegf "lp'Hki wtg" 37: 0Vj ku'ur gtqcf "i gpgtcvu'c"f co ci g'gs wxcrnpv'v'57'GUCNu'cpf "cf f u'cdqw"2023"lp'qh'twwkpi 0' kp'y ku'ecug."uj gct'lcmtg'lp'y g'uwdi tcf g'ku'pqv'gzr gev'f 0

After one pass of the Superload:		
Fatigue damage is approx. equivalent to	35	ESALs
Total rutting =	0.0103	in
Shear failure?	No	

Hki wtg"37: <"J O C"r tgf levkqp"vqrn'tguwu'ltq'Gzco r rg"4

Vq"cuugu'y g'r qvgpvcn'lcw' w'f co ci g"v'c'REE'r cxgo gpv'y g'Ukpi rg'Czrg'REE"lcw' w'vqrn'ecp" dg"wugf 0Vj g"vqrn'ku'qpn' "pggf gf "lp'y j gp'y g'ur gtqcf "ku'cr r n'gf "f wtkpi "rcv'ur tkpi "qt"uwo o gt." y j gp'y g"vgo r gtcwtg'i tcf kpv'o ki j v'dg"j ki j 0Vj g'tgs wktgf "lpr wu'ctg'uj qy p'lp'Hki wtg"37; 0Vj g" czng"rqcf "cpf "pwo dgt"qh'tgr gvkqpu"ku'y g"uco g"cu'ltq'y g"J O C"vqrn'0Vj g'uj qwf gt"NVG."REE" y lenpguu."uwdi tcf g'm'xcnwg."cpf "REE"E VG"ecp'dg'qdvckpgf "ltqo "tgeqtf u'dcugf "qp'y g'r tqr qugf " tqwg'qh'y g'ur gtqcf "tven0

Vj g'qpn' "cf f kkpvcn'kpr w'pggf gf "ku'y g"vgo r gtcwtg'i tcf kpv'0C"xcnw"qh"40' lkp"o c' "dg"wugf "l'h' y g'ur gtqcf "ku'gzr gev'f "v'v'cxgn'lp"rcv'ur tkpi "qt"uwo o gt" f wtkpi "o kf "chgtppqp"y j gp" c"rti g" r qukkxg'i tcf kpv'eqwf "dg'r tgugpv'xcnwgu'dgm'y "y ku'i gpgtcm' "f q'pqv'r qug" c'uki p'k'ecpv't'kum'v' y g"

rcxgo gpv0Qpeg"cm'ij g'lpr wu'ctg'r tqxkf gf . 'vj g'Tguwnu'cd'uj qy u'ij g'tguwnu.'cu'ij qy p'lp'Hki wtg"
 3820'kp"ij ku'ecug."qpg'r cuu'qh'ij g'uwr gtrqcf "tckrgt"ku'gs wxcrgpv"vq"40" "327"GUCNu."cpf "cdqw"
 4.792'tgr gvkqpu'ctg'cmijy gf "dghqtg'hckwtg0

Inputs		
Superload:		
Axle load	22.931 kips	Value OK
Number of rows of single axles in SL	10	Value OK
Pavement Structure:		
PCC thickness	7 in	Value OK
Concrete thermal coef of expansion	5.50E-06 /F	Value OK
Temperature gradient in slab	2.5 F/in	Value OK
Transverse joint LTE	90 %	Value OK
Subgrade k-value	200 psi/in	Value OK

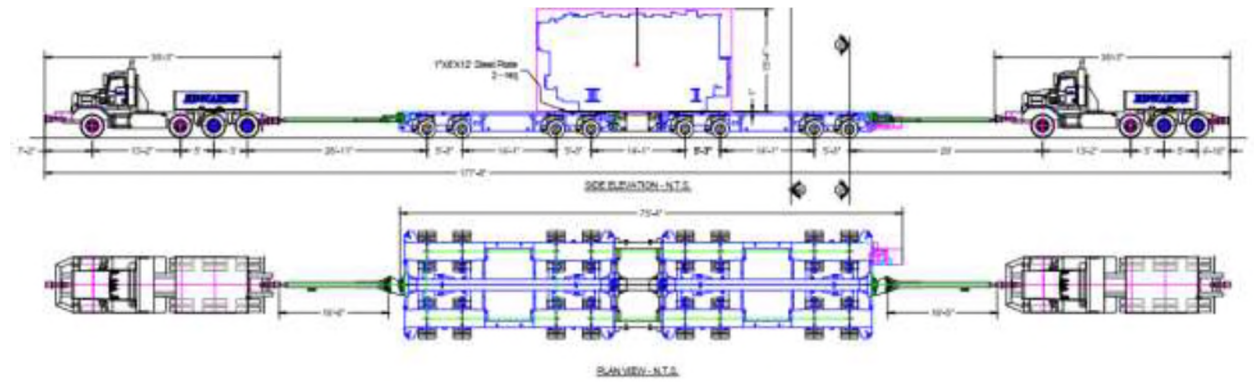
Hki wtg"37; <REE'r tgf levqp"vqqr'kpr wu'hqt'Gzco r ng"4

For one pass of the superload truck:		
Allowable axle repetitions, Nf =	2.57E+03	
Fatigue damage is approx. equivalent to:	2.7E+05	ESALs

Hki wtg"382<REE'r tgf levqp"vqqr'tguwnu'hqt'Gzco r ng"4

C05'Gzco rrg'5

Vj g'liqmy kpi 'r gto k'y cu'tgeglxgf 'd{ 'RgppF QV'*r gto k'w/28729925+. 'cu'uj qy p'lp'Hki wtg'3830



Hki wtg'383<Rncp"cpf "grgxcvklp'xlgy 'hqt'Gzco r rg'5

Kp'y ku'ecug. 'k'ku'cr r ctgpp'yj cv'yj g'czrg'tqy u'ecp'dg'f kxkf gf 'kpq'i tqwr u'qh'liqwt'vcpf go 'czrgu'Vj g' ur celkpi 'dgwy ggp'gcej 'vcpf go 'czrg'ku'36'hv'3'lp. 'y j krg'yj g'y q'czrgu'o cnkpi 'wr 'gcej 'vcpf go 'czrg' j cxg'c'ur celkpi 'qh'7'hv'5'lp0J gtg'ci ckp. 'yj g'tcevt 'ku'f kutgi ctf gf 'cpf 'qpn' 'yj g'tckrgt'ku'eqpukf gtgf 0

Y j gp'yj g'uwrgtrqcf "i qgu'qxgt "c"hgzkdr'g'cxgo gpv. 'k'y cu'uj qy p'yj cv'yj g'utguu'dwdu'tguwnkpi " hqo "gcej "czrg'y kj kp'yj g'vcpf go "f q"pqv'qxgtrr 0' Vj gtghqtg. "yj g'uco g"J O C"Rgthqto cpeg" Ecrcwrcvt'vqqr'wugf 'vq'cuugu'yj g'ukpi rg'czrgu'hqt'yj g'uwrgtrqcf 'kp'Gzco r rg'4'ecp'dg'wugf 'ci ckp'vq" cpcn| g'yj g'i tqwr u'qh'vcpf go 'czrgu'lp'yj ku'uwrgtrqcf 0'Nkrg'lp'Gzco r rg'4. 'uqo g'qh'yj g'kpr wu'ecp" dg'qdvckpgf 'hqo "yj g'f tcy kpi u'uwdo kwgf "y kj "yj g'r gto k'cr r rdecvklp. 'cu'uj qy p'lp'Hki wtg'3840' Ur gekhlecml. "yj g'czrg'mqcf "y cu'tgr qtvgf "cu'45.348"nd"lp'yj g'r gto k'cr r rdecvklp. "y kj "c"vqcn'qh": " czrgu'lp'i tqwr u'qh'6'vcpf go 'czrgu'yj cv'y kml'tcxgtug'cnkpi 'yj g'qwtg'gf i g'qh'yj g'r cxgo gpv'0Qy gt" kpr wu'tgrvqf "vq'yj g'r cxgo gpv'ecp'dg'qdvckpgf 'hqo "RgppF QV'tgeqtf u'hqt'yj g'tqwg'ur gekhgf "kp" yj g'r gto k'cr r rdecvklp. 'cu'y cu'f qpg'lp'Gzco r rg'40'Vj g'eqtgur qpf kpi 'tguwnu'ctg'uj qy p'lp'Hki wtg' 3850'Kp'yj ku'ecug. 'yj g'uwrgtrqcf "ku'r tgf levgf "vq'ecwug'yj g'uco g'f co ci g'gs wxcrgpv'vq'52"GUCNu0' Cnq. '20; 6'lp'qh'twklpi 'ku'r tgf levgf "vq'f gxgnr 'dw'c'uj gct 'hckwtg'ku'pqvr tgf levgf "vq'qewt'lp'yj g' uwdi tcf g0

Inputs		
Superload:		
Axle load	23126 lbs	Value OK
# of axle rows	8	
Pavement Structure:		
AC thickness	8 in	Value OK
AC modulus	3.00E+05 psi	Value OK
Mid-depth AC temperature	100 °F	
Air voids in AC	7.07 %	
Effective binder content	9.47 %	
Base thickness	10 in	Value OK
Base modulus	3.00E+04 psi	Value OK
Subgrade c	20 psi	
Subgrade phi	20 degrees	
Depth of ground water table	10 ft	
Rutting reliability	85 %	

Hki wtg"384<J O C'r tgf levkqp"vqqnlpr wu'hqt 'Gzco r ng"5

After one pass of the Superload:		
Fatigue damage is approx. equivalent to	30	ESALs
Total rutting =	0.0094	in
Shear failure?	No	

Hki wtg"385<J O C'r tgf levkqp"vqqnlpr wu'hqt 'Gzco r ng"5

Y j gp"vj g"uwr gtmcf "i qgu"qxtg"t"ki kf "r cxgo gpv"vj g"Vcpf go "Czrg"REE"Hvki wg"vqqnlpggf u"vq"dg" wugf "hqt"vj ku"cpn(uku0Vj ku"j cu"uko kct"lpr wu"cu"lp"Gzco r ng"4."dw"vj g"czrg"mqf "lpr w'pggf u"vq" tgrtgugpv"vj g"eqo dlpkf "mqf "hqt"dqj "vj g"czrgu"vj cv'o cng"wr "vj g"vcpf go ."y j lej "y qwf "dg"cdqw"68" nkr u"lp"vj ku"uwr gtmcf 0'Hwtj gto qtg."vj g"ur celpi "dgwy ggp"vj g"vcpf go "czrgu"cuq"pggf u"vq"dg" ur gekhgf ."y j lej "ku"36"lv"3"lp"*36Q: 5"lv+hqt"vj ku"uwr gtmcf 0'Hkpcmf ."vj g"pwo dgt"qh"tqy u"qh"vcpf go " czrgu"*pqv"lpf kxf wcn"czrgu"rkng"vj g"CE"ecug+"pggf u"vq"dg"ur gekhgf ."y j lej "ku"60Vj gug"lpr wu"ctg" gpvgtgf "lpv"vj g"vqqn"cu"uj qy p"lp"Hki wtg"3860Qvj gt"lpr wu"y gtg"vj g"uco g"cu"lp"Gzco r ng"40

Inputs			
Superload:			
Axle load	46.252	kips	Value OK
Number of rows of tandem axles in SL	4		Value OK
Spacing between tandem axles	14.08333	ft	Value OK
Pavement Structure:			
PCC thickness	7	in	Value OK
Concrete thermal coef of expansion	5.5E-06	/F	Value OK
Temperature gradient	2.5	F/in	Value OK
Transverse joint LTE	90	%	Value OK
Subgrade k-value	200	psi/in	Value OK

Hki wtg"386<" REE"r tgf levkqp"vqqn'kpr wu'hqt 'Gzco r rg"5

Vj g'tguwnu'hqt"vj ku'ecug"ctg"uj qy p"lp"vj g'Tguwnu"cd"cpf"lp"Hki wtg"3870"Kp"vj ku'ecug."qpg"r cuu"qh"vj g'uwrgtncf"tvenly cu'gs wxcrgpv"vq"75.222"GUCNu."cpf"co czko wo "qh'cdqw"6.622"tgr gvkqpu"ctg"cmqy gf"dghqtg'hckwtg0

For one pass of the superload truck:		
Allowable axle repetitions, Nf =	4.42E+03	
Fatigue damage is approx. equivalent to:	5.3E+04	ESALs

Hki wtg"387<" REE"r tgf levkqp"vqqn'tguwnu'hqt 'Gzco r rg"5