

February 23, 2016

Via Federal Express

Melanie A. Bachman, Esq.
Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Docket No. 469 – Application of Cellco Partnership d/b/a Verizon Wireless for a Certificate of Environmental Compatibility and Public Need for the Construction, Maintenance and Operation of a Wireless Telecommunications Facility Located at 520 Bailey Hill Road, Killingly, Connecticut**

Development and Management Plan Submission

Dear Ms. Bachman:

Enclosed please find fifteen (15) copies of the following:

1. Final Development and Management (“D&M”) Plans prepared by Hudson Design Group LLC for the approved telecommunications facility at 520 Bailey Hill Road in Killingly, Connecticut incorporating the Council’s conditions of approval. Also enclosed are four (4) full size (24” x 36”) sets of D&M plans.
2. Tower and Foundation Design drawings from Engineered Endeavors.
3. Geotechnical Evaluation of Subsurface Conditions prepared by Hudson Design Group LLC, dated December 22, 2016.

Together, this information constitutes the final D&M Plan submission for the approved telecommunications facility at 520 Bailey Hill Road in Killingly.

16184546-v1

Robinson+Cole

Melanie A. Bachman, Esq.
February 23, 2017
Page 2

We respectfully request that this information be reviewed and this matter be placed on the next available Siting Council agenda for approval. Please feel free to contact me if you have any questions or require additional information. Thank you.

Sincerely,



Kenneth C. Baldwin

KCB/kmd

Enclosures

Copy to:

Sean Hendricks, Town Manager
Elizabeth Jamieson, Verizon Wireless

CELLCO PARTNERSHIP

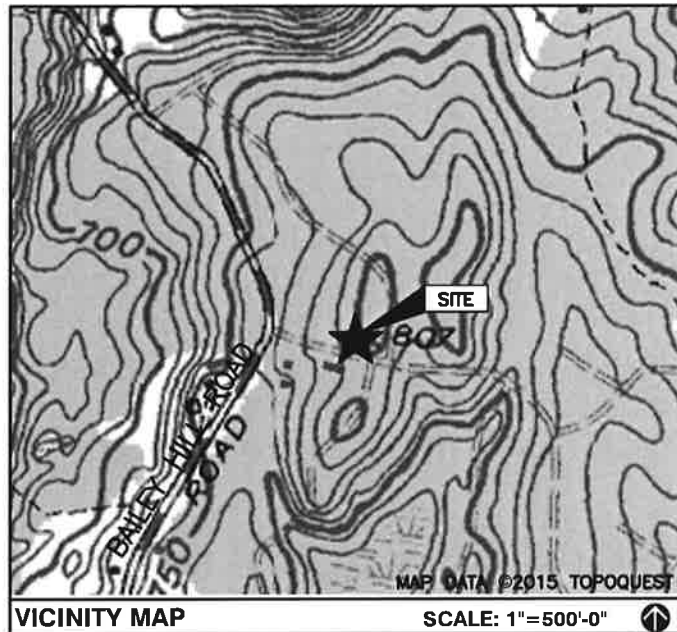
d.b.a. **verizon**✓

WIRELESS COMMUNICATIONS FACILITY

DAYVILLE CT

DEVELOPMENT & MANAGEMENT PLAN - DOCKET NO. 469

**520 BAILEY HILL ROAD
KILLINGLY, CT 06241**



DIRECTIONS TO SITE:
 99 E RIVER DR, EAST HARTFORD, CT 06108
 HEAD NORTHEAST ON E RIVER DR
 TURN LEFT ONTO THE CT-2 E RAMP TO NORWICH
 FOLLOW I-84 E TO CT-74 E IN TOLLAND.
 MERGE ONTO I-84 E
 TAKE EXIT 69 FOR CONNECTICUT 74 TOWARD U.S. 44/WILLINGTON/PUTNAM
 TURN RIGHT ONTO CT-74 E
 TURN LEFT ONTO US-44 E
 CONTINUE STRAIGHT ONTO CT-101 E
 TURN RIGHT ONTO BAILEY HILL RD
 SLIGHT LEFT TO STAY ON BAILEY HILL RD
 TURN LEFT, 520 BAILEY HILL RD, DAYVILLE, CT 06241

CONSULTANT TEAM	
PROJECT ENGINEER	
HUDSON DESIGN GROUP, LLC 1600 OSGOOD STREET BUILDING 20 NORTH, SUITE 3090 NORTH ANDOVER, MA 01845 TEL: 1-(978)-557-5553 FAX: 1-(978)-336-5586	
MEP ENGINEER	
HUDSON DESIGN GROUP, LLC 1600 OSGOOD STREET BUILDING 20 NORTH, SUITE 3090 NORTH ANDOVER, MA 01845 TEL: 1-(978)-557-5553 FAX: 1-(978)-336-5586	

PROJECT SUMMARY	
SITE NAME:	DAYVILLE CT
SITE ADDRESS:	520 BAILEY HILL ROAD KILLINGLY, CT 06241
PROPERTY OWNER:	TRI LAKES, LLC P.O. BOX 28 WATERTOWN, CT 06795
APPLICANT:	CELLCO PARTNERSHIP d/b/a VERIZON 99 EAST RIVER DRIVE EAST HARTFORD, CT 06108
SITE ACQUISITION CONTACT:	HOLLIS REDDING STRUCTURE CONSULTING GROUP 99 EAST RIVER DRIVE, 9TH FL EAST HARTFORD, CT 06108
LEGAL/REGULATORY COUNSEL:	KENNETH C. BALDWIN ESQ. ROBINSON + COLE LLP (860)275-8345
LATITUDE:	N41° 49' 56.76"
LONGITUDE:	W71° 48' 33.23"

SHEET INDEX	
SHT. NO.	DESCRIPTION
T-1	TITLE SHEET
C-1	ABUTTERS PLAN
C-2	SITE PLAN
A-1	COMPOUND PLAN
A-2	ELEVATION
A-3	CANOPY FRAME & EQUIPMENT FRAME DETAILS
A-4	CANOPY FRAME & EQUIPMENT FRAME ELEVATION
A-5	CONCRETE PIER DETAILS & NOTES
A-6	SITE DETAILS
A-7	SITE SURFACE & EROSION CONTROL DETAILS

SCOPE OF WORK INFO.	
VERIZON WIRELESS IS PROPOSING TO INSTALL THE FOLLOWING IMPROVEMENTS ON PROPOSED TELECOMMUNICATION SITE:	
<ul style="list-style-type: none"> NEW 100'x100' FENCED/LEASE AREA ON EXISTING PARCEL OF LAND. NEW PANEL ANTENNAS: (3) ANTENNA PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (9) ANTENNAS. NEW RRHs: (3) RRHs PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (9) RRHs NEW JUNCTION BOXES: (2) JUNCTION BOX TOTAL. ITEMS LISTED ABOVE TO BE MOUNTED ON PROPOSED VERIZON MONOPOLE.	
<ul style="list-style-type: none"> NEW EQUIPMENT CABINETS: (2) CABINETS WITH GENERATOR ON PROPOSED 12'x26' EQUIPMENT STEEL PLATFORM. ITEMS LISTED ABOVE TO BE INSTALLED WITHIN THE PROPOSED 100'x100' FENCED COMPOUND.	
<ul style="list-style-type: none"> NEW POWER AND TELCO SERVICES WILL BE ROUTED OVERHEAD FROM EXISTING UTILITY POLE TO PROPOSED UTILITY POLE, THEN ROUTED UNDERGROUND TO PROPOSED ELECTRICAL METER AND HOFFMAN BOX ON PROPOSED H-FRAME. FINAL UTILITY ROUTING TO BE DETERMINED/VERIFIED BY UTILITY COMPANIES. 	



CHECKED BY: DJR

APPROVED BY: DPH

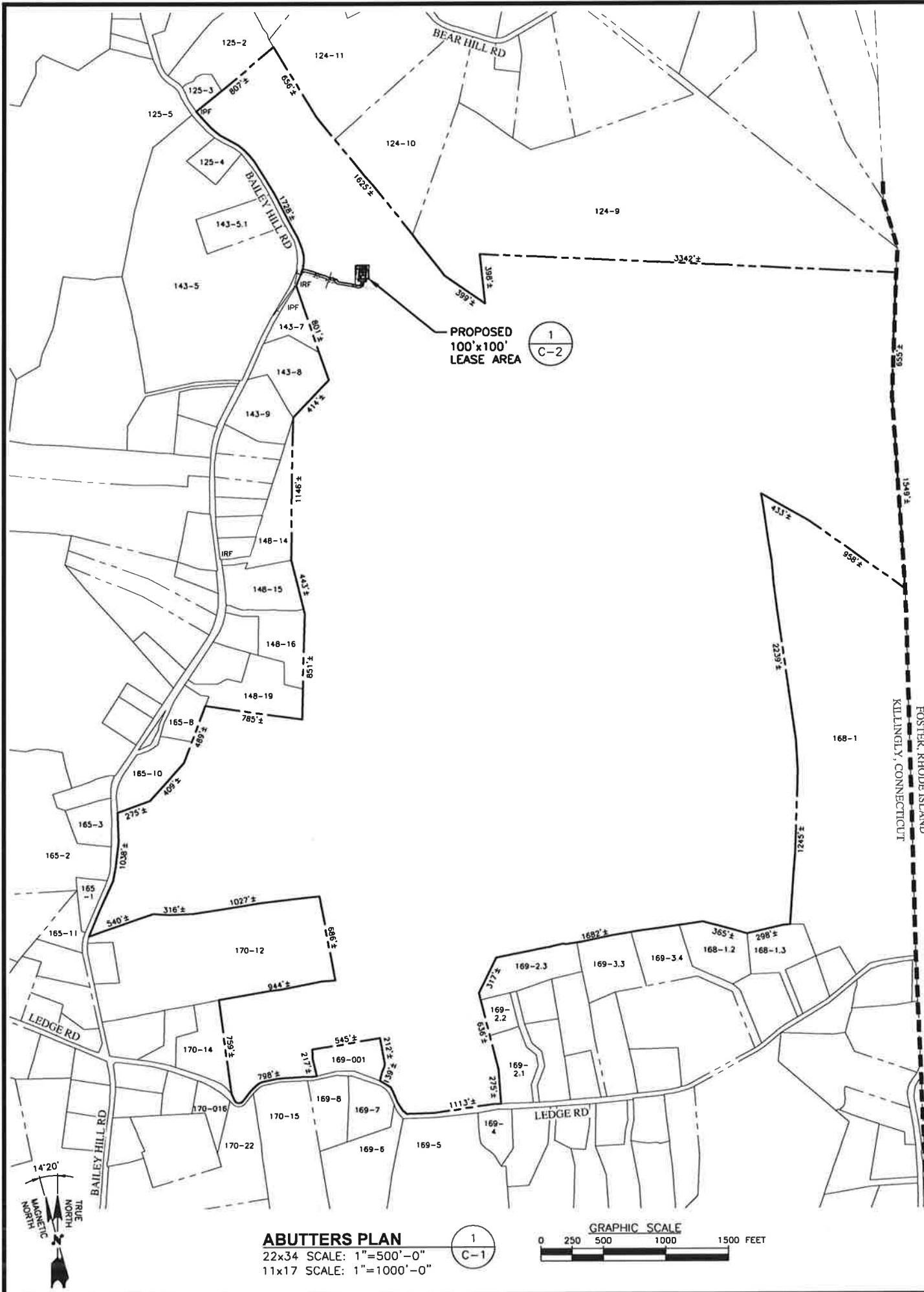
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1	01/09/16	REVISED PER COMMENTS	SLY
0	01/06/17	ISSUED FOR REVIEW	CC

SITE NAME:
DAYVILLE CT

SITE ADDRESS:
520 BAILEY HILL ROAD
KILLINGLY, CT 06241

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1



ABUTTERS LIST

124-009
239 Bear Hill Rd
Frances E. & Robert Pechie
225 Bear Hill Rd
Dayville, CT 06241

124-010
199 Bear Hill Rd
Julie A. Jussoime
P.O. Box 339
Dayville, CT 06241-0339

124-011
189 Bear Hill Rd
Frances Pechie
225 Bear Hill Rd
Dayville, CT 06241

125-002
810 Bailey Hill Rd
Roland D. Jacques
810 Bailey Hill Rd
Dayville, CT 06241

125-003
806 Bailey Hill Rd
Theresa R. Bernier
806 Bailey Hill Rd
Dayville, CT 06241

125-004
779 Bailey Hill Rd
Robert, Virginia &
Susan Griswold
P.O. Box 273
East Killingly, CT
06243-0273

125-005
817 Bailey Hill Rd
Theresa R. Bernier
806 Bailey Hill Rd
Dayville, CT 06241

143-005
721 Bailey Hill Rd
Walter P. Hall, III
721 Bailey Hill Rd
Dayville, CT 06241

143-5.001
755 Bailey Hill Rd
Walter P. & June R. Hall
P.O. Box 48
East Killingly, CT 06243

143-007
724 Bailey Hill Rd
Walter P. Hall, III
721 Bailey Hill Rd
Dayville, CT 06241

143-008
710 Bailey Hill Rd
Larry V. & Judith Lawrence
710 Bailey Hill Rd
Dayville, CT 06241

143-007
688 Bailey Hill Rd
Walter E. & Debra Gene
Opperman
688 Bailey Hill Rd
Dayville, CT 06241

148-014
642 Bailey Hill Rd
William W. Gould, Jr.
642 Bailey Hill Rd
Dayville, CT 06241

148-015
630 Bailey Hill Rd
Jennifer Chapman
630 Bailey Hill Rd
Dayville, CT 06241

148-016
624 Bailey Hill Rd
Arthur P. & Geraldine Rickey
624 Bailey Hill Rd
Dayville, CT 06241

165-001
509 Bailey Hill Rd
Jean E. & Donald J. Carler
509 Bailey Hill Rd
Dayville, CT 06241

165-002
525 Bailey Hill Rd
Herbert A. & Karen M. Oatley
525 Bailey Hill Rd
Dayville, CT 06241

165-003
539 Bailey Hill Rd
Michael Oatley, Michelle Klein
& Roberto Flohery
160 Creamery Brook Rd
Brooklyn, CT 06234

165-008
582 Bailey Hill Rd
David T. & Judith E. Rzcuidlo
582 Bailey Hill Rd
Dayville, CT 06241

165-010
566 Bailey Hill Rd
Ronald J. & Judith M.
Rousselle
566 Bailey Hill Rd
Dayville, CT 06241

165-011
495 Bailey Hill Rd
Jason Robert & Valerie Smith
495 Bailey Hill Rd
Dayville, CT 06241

148-019
594 Bailey Hill Rd
David T. Rzcuidlo
582 Bailey Hill Rd
Dayville, CT 06241

168-1
430 Ledge Rd
George M. & Starlet M. Lenth
375 Ledge Rd
Dayville, CT 06241

168-1.002
402 Ledge Rd
George M. & Starlet M. Lenth
375 Ledge Rd
Dayville, CT 06241

168-1.003
400 Ledge Rd
George M. & Starlet M. Lenth
375 Ledge Rd
Dayville, CT 06241

169-001
226 Ledge Rd
Timothy G. Verroneault
36 Kara Rd
Brooklyn, CT 06234

169-2.001
304 Ledge Rd
Paul J. & Erin A. Romari
304 Ledge Rd
Dayville, CT 06241

169-2.002
306 Ledge Rd
Eric M. Quinn
306 Ledge Rd
Dayville, CT 06241

169-2.003
308 Ledge Rd
Jeffrey Ferron
308 Ledge Rd
Dayville, CT 06241

169-3.003
390 Ledge Rd
George M. & Starlet M. Lenth
375 Ledge Rd
Dayville, CT 06241

169-3.004
386 Ledge Rd
George M. & Starlet M. Lenth
375 Ledge Rd
Dayville, CT 06241

169-004
295 Ledge Rd
Todd & Justin Loomis
265 Ledge Rd
Dayville, CT 06241

169-005
275 Ledge Rd
Harold J. & Patricia S.
Swaine
255 Ledge Rd
Dayville, CT 06241

169-006
255 Ledge Rd
Wendy L. Brennan
255 Ledge Rd
Dayville, CT 06241

169-007
247 Ledge Rd
Harold J. & Patricia S.
Swaine
255 Ledge Rd
Dayville, CT 06241

169-008
225 Ledge Rd
Susan E. Erskine
P.O. Box 606
Dayville, CT 06241-0606

170-012
476 Bailey Hill Rd
Gabrielle Lobonle
P.O. Box 709
Brooklyn, CT 06234

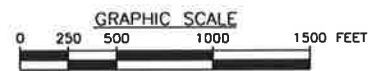
170-014
172 Ledge Rd
Joseph G. Keller, Jr.
172 Ledge Rd
Dayville, CT 06241

170-015
203 Ledge Rd
Susan E. Erskine
P.O. Box 606
Dayville, CT 06241-0606

170-016
181 Ledge Rd
Robert J. Gifford &
Elaine E. Nusser
181 Ledge Rd
Dayville, CT 06241

170-022
406 Bailey Hill Rd
Thomas Coder
406 Bailey Hill Rd
Killingly, CT 06239

ABUTTERS PLAN
22x34 SCALE: 1"=500'-0"
11x17 SCALE: 1"=1000'-0"



SOURCE:
NORTHEAST SURVEY CONSULTANTS, ABUTTERS PLAN
AND EXISTING CONDITIONS DATED 8/26/15

SITE SPECIFIC NOTES:
1. VERIFY AZIMUTHS W/ RF ENGINEER.

LEGEND:

	PROPERTY LINE-SUBJECT PARCEL
	PROPERTY LINE-ABUTTERS
	STATE LINE
	CONTOUR LINE
	DELINEATED WETLAND LINE
	(E) BUILDING
	ASSESSORS MAP-BLOCK-LOT NO.
	(E) TREE LINE

PREPARED FOR: CELLCO PARTNERSHIP D.B.A.

1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845

TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
Derek J. Greaser
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: DJR

APPROVED BY: DPH

SUBMITTALS

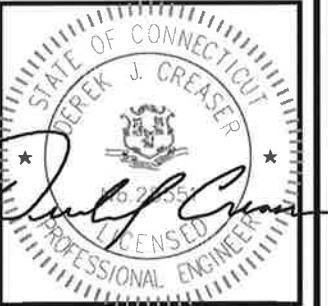
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2	01/13/17	REVISED PER COMMENTS	JK
1	01/09/16	REVISED PER COMMENTS	SLY
0	01/06/17	ISSUED FOR REVIEW	GC

SITE NAME:
DAYVILLE CT

SITE ADDRESS:
520 BAILEY HILL ROAD
KILLINGLY, CT 06241

SHEET TITLE
ABUTTERS PLAN

SHEET NUMBER
C-1



CHECKED BY: DJR

APPROVED BY: DPH

SUBMITTALS

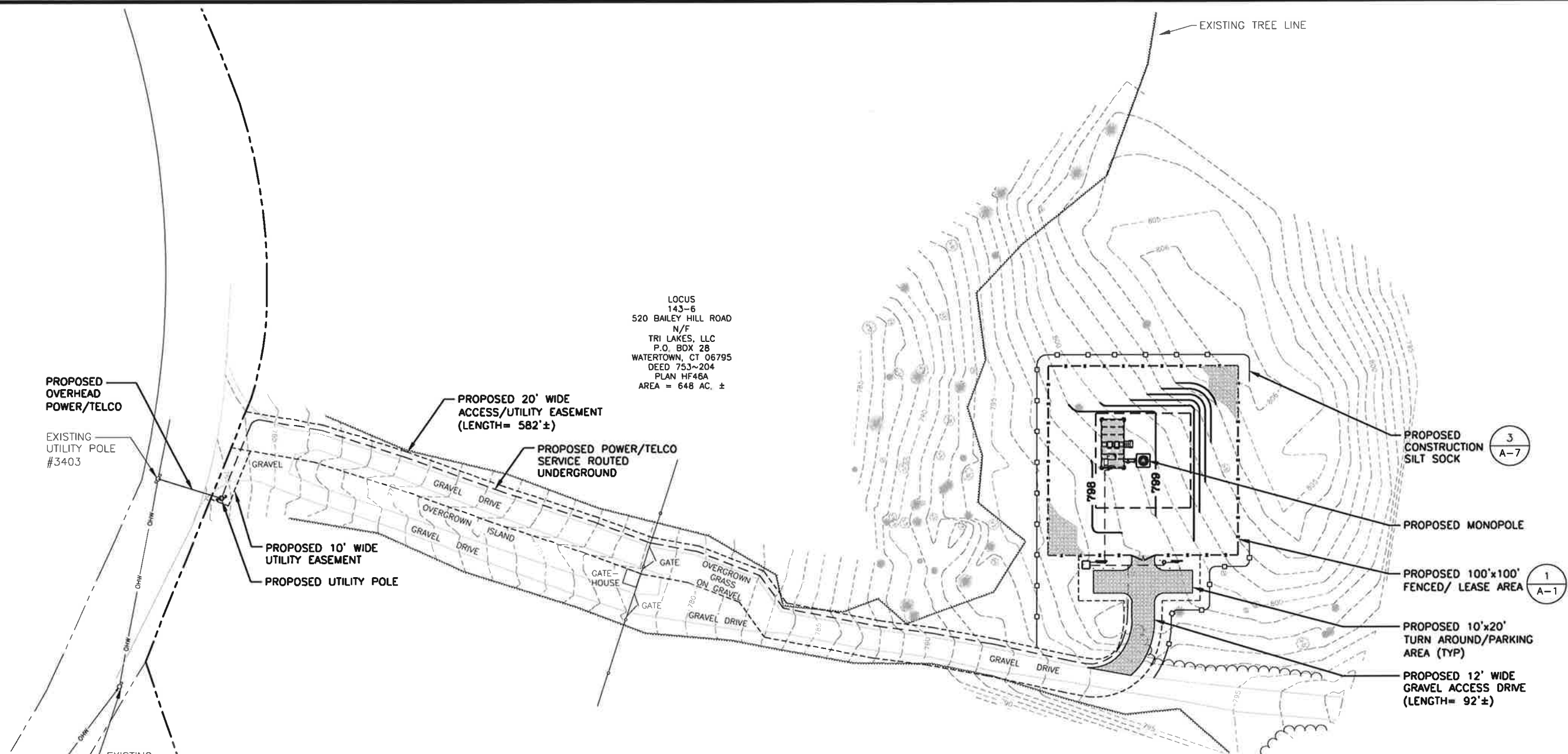
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SITE NAME:
DAYVILLE CT

SITE ADDRESS:
 520 BAILEY HILL ROAD
 KILLINGLY, CT 06241

SHEET TITLE
SITE PLAN

SHEET NUMBER
C-2



LOCUS
 143-6
 520 BAILEY HILL ROAD
 N/F
 TRI LAKES, LLC
 P.O. BOX 28
 WATERTOWN, CT 06795
 DEED 753~204
 PLAN HF48A
 AREA = 648 AC. ±

PROPOSED OVERHEAD POWER/TELCO

EXISTING UTILITY POLE #3403

PROPOSED 10' WIDE UTILITY EASEMENT
 PROPOSED UTILITY POLE

PROPOSED 20' WIDE ACCESS/UTILITY EASEMENT (LENGTH= 582'±)

PROPOSED POWER/TELCO SERVICE ROUTED UNDERGROUND

PROPOSED CONSTRUCTION SILT SOCK (3 A-7)

PROPOSED MONOPOLE

PROPOSED 100'x100' FENCED/ LEASE AREA (1 A-1)

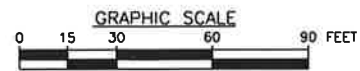
PROPOSED 10'x20' TURN AROUND/PARKING AREA (TYP)

PROPOSED 12' WIDE GRAVEL ACCESS DRIVE (LENGTH= 92'±)

EXISTING UTILITY POLE #1305



SITE PLAN
 22x34 SCALE: 1"=30'-0"
 11x17 SCALE: 1"=60'-0"
 1 C-2



EARTHWORK:

APPROXIMATE VOLUME OF CUT WITHIN COMPOUND:	138.64 CU YD
APPROXIMATE VOLUME OF FILL WITHIN COMPOUND:	8.48 CU YD
APPROXIMATE # OF TREES TO BE REMOVED >/=6" DBH:	2
TOTAL IMPACT AREA OF THE DISTURBED CONSTRUCTION SITE:	11,313.6 ± SQ. FT. OR 0.26± ACRE

LEGEND:

	PROPERTY LINE-SUBJECT PARCEL
	PROPERTY LINE-ABUTTERS
	STATE LINE
	CONTOUR LINE
	DELINEATED WETLAND LINE
	(E) BUILDING
	ASSESSORS MAP-BLOCK-LOT NO.
	(E) TREE LINE



CHECKED BY: DJR

APPROVED BY: DPH

SUBMITTALS

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0	01/06/17	ISSUED FOR REVIEW	CC

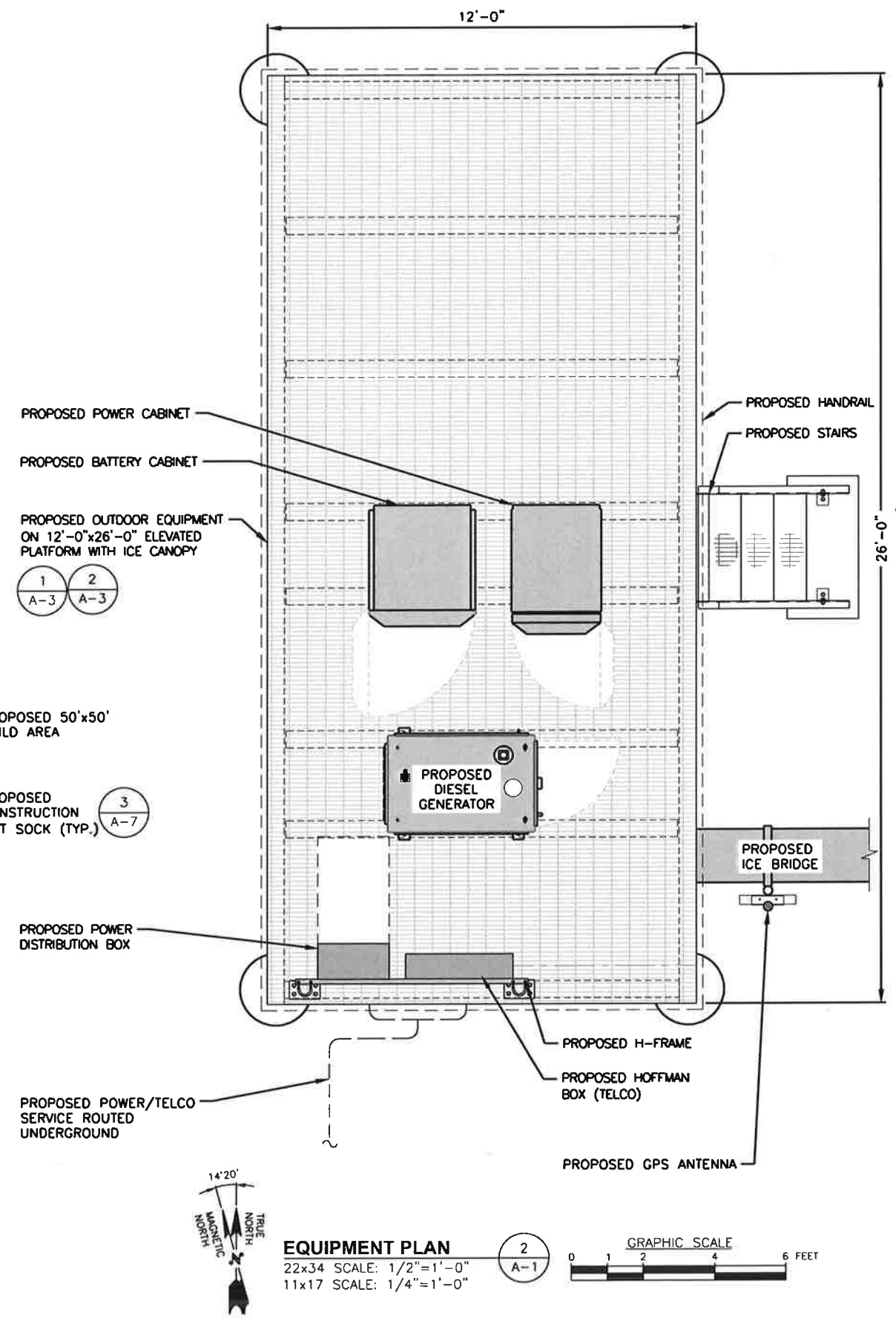
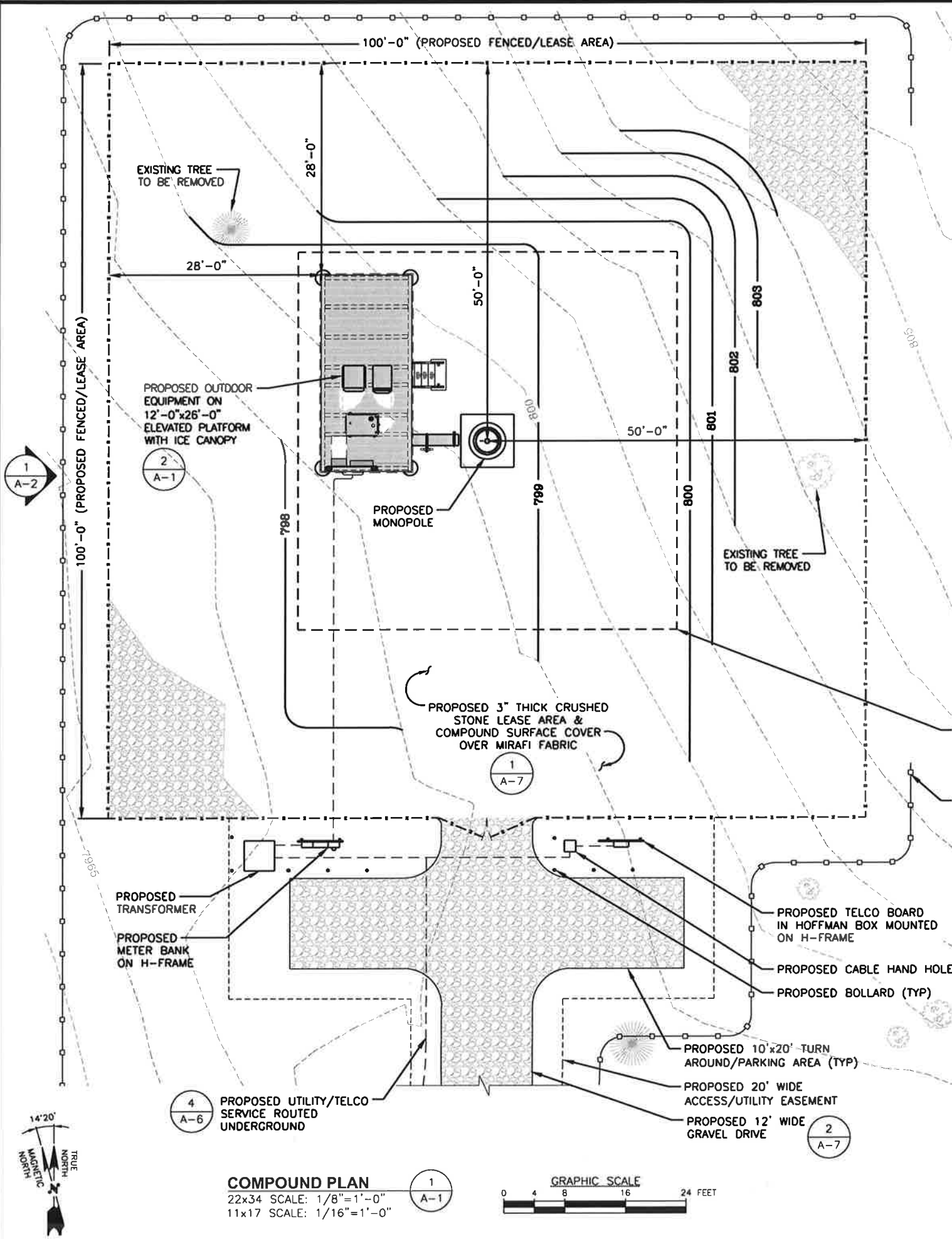
SITE NAME:
DAYVILLE CT

SITE ADDRESS:
520 BAILEY HILL ROAD
KILLINGLY, CT 06241

SHEET TITLE
COMPOUND PLAN

SHEET NUMBER

A-1



PROPOSED ANTENNA INFORMATION

SECTOR	STATUS	AZIMUTH	CABLE LENGTH
ALPHA	PROPOSED	0	206'
BETA	PROPOSED	190	206
GAMMA	PROPOSED	280	206

NOTE: CABLE LENGTH = EXACT LENGTH PLUS 25'

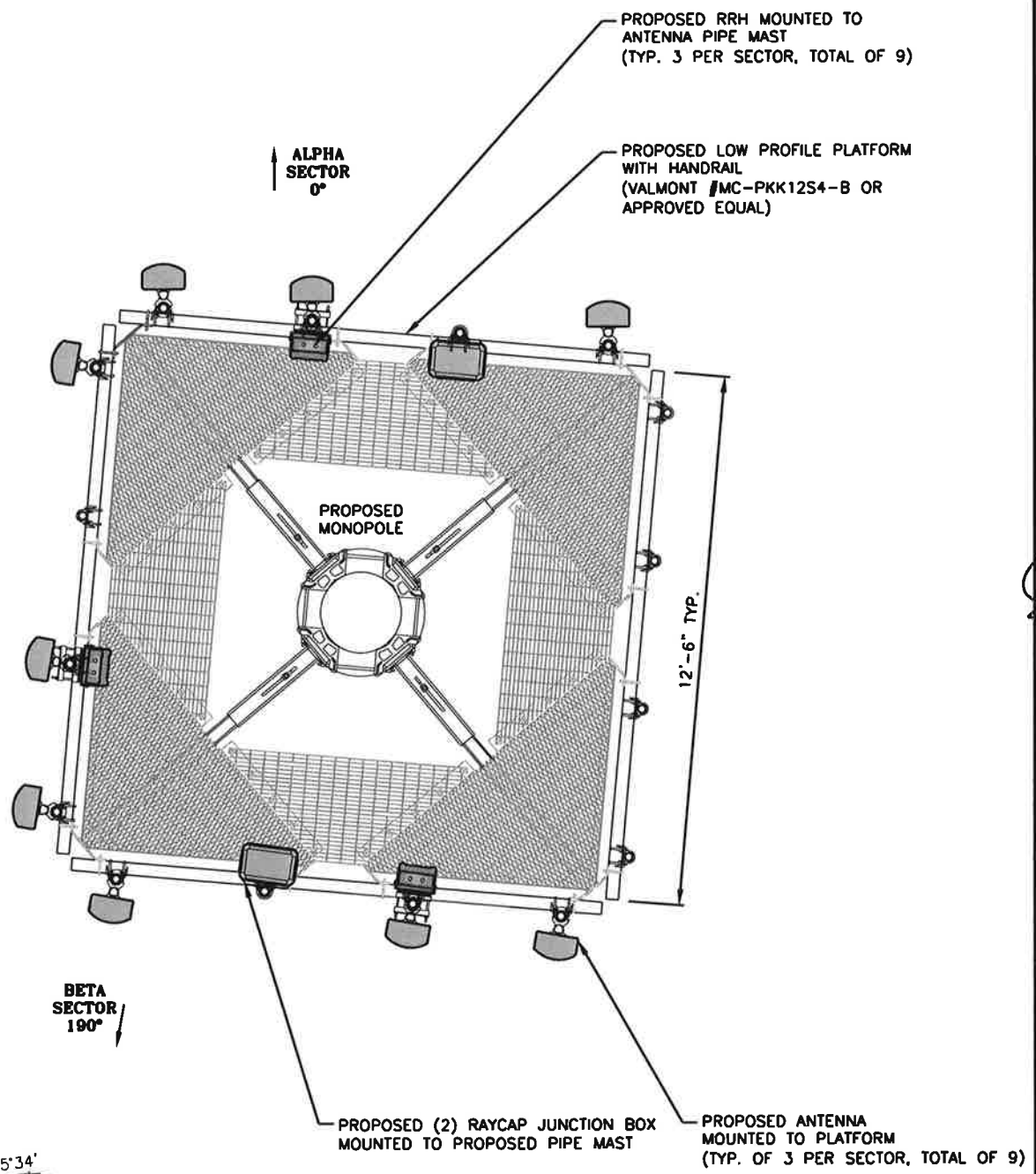
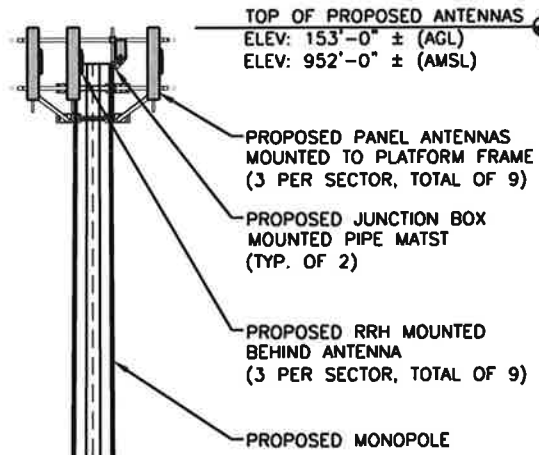
- NOTE:**
1. PROPOSED NEW TOWER AND FOUNDATION DESIGN BY OTHERS
 2. VERIFY AZIMUTHS W/ RF ENGINEER.

- TOWER NOTES:**
- 1.) TOWER ELEVATION IS SHOWN FOR REFERENCE ONLY. CONTRACTOR SHALL REFER TO TOWER MANUFACTURER DRAWINGS FOR COMPLETE INSTALLATION AND BILL OF MATERIAL INFORMATION.
 - 2.) TOWER MINIMUM DESIGN SPECIFICATIONS SHALL BE IN ACCORDANCE WITH ANSI/TIA/EIA 222-G "STRUCTURAL STANDARDS FOR SUPPORTING STRUCTURES AND ANTENNAS, REVISION G" AND GOVERNING FEDERAL, STATE, AND LOCAL CODE REQUIREMENTS
 - 3.) TOWER MANUFACTURER SHALL BE RESPONSIBLE FOR DESIGN AND STRUCTURAL COMPONENTS OF THE TOWER.
 - 4.) FINAL UTILITY CONNECTIONS SHALL BE COORDINATED WITH THE LOCAL UTILITIES.

TOP OF PROPOSED MONOPOLE
ELEV: 150'-0" ± (AGL)
ELEV: 949'-0" ± (AMSL)

☐ OF PROPOSED ANTENNAS
ELEV: 150'-0" ± (AGL)
ELEV: 949'-0" ± (AMSL)

TOP OF PROPOSED ANTENNAS
ELEV: 153'-0" ± (AGL)
ELEV: 952'-0" ± (AMSL)

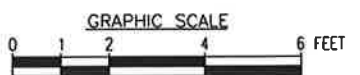


PROPOSED OUTDOOR EQUIPMENT ON 12'-0"x26'-0" ELEVATED PLATFORM WITH ICE CANOPY

GROUND LEVEL
ELEV: 0'-0" ± (AGL)
ELEV: 799'-0" ± (AMSL)

WEST ELEVATION
22x34 SCALE: 1/8"=1'-0"
11x17 SCALE: 1/16"=1'-0"

ANTENNA, RRH & JUNCTION BOX PLAN
22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"



PREPARED FOR: CELCO PARTNERSHIP D.B.A.



Hudson Design Group, LLC

1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845

TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
Derek J. Greaser
16.2.2005
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: DJR
APPROVED BY: DPH

SUBMITTALS

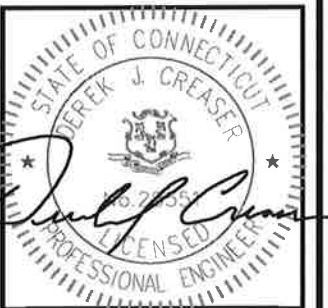
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SITE NAME:
DAYVILLE CT

SITE ADDRESS:
520 BAILEY HILL ROAD
KILLINGLY, CT 06241

SHEET TITLE
ELEVATION

SHEET NUMBER
A-2



CHECKED BY: DJR
 APPROVED BY: DPH

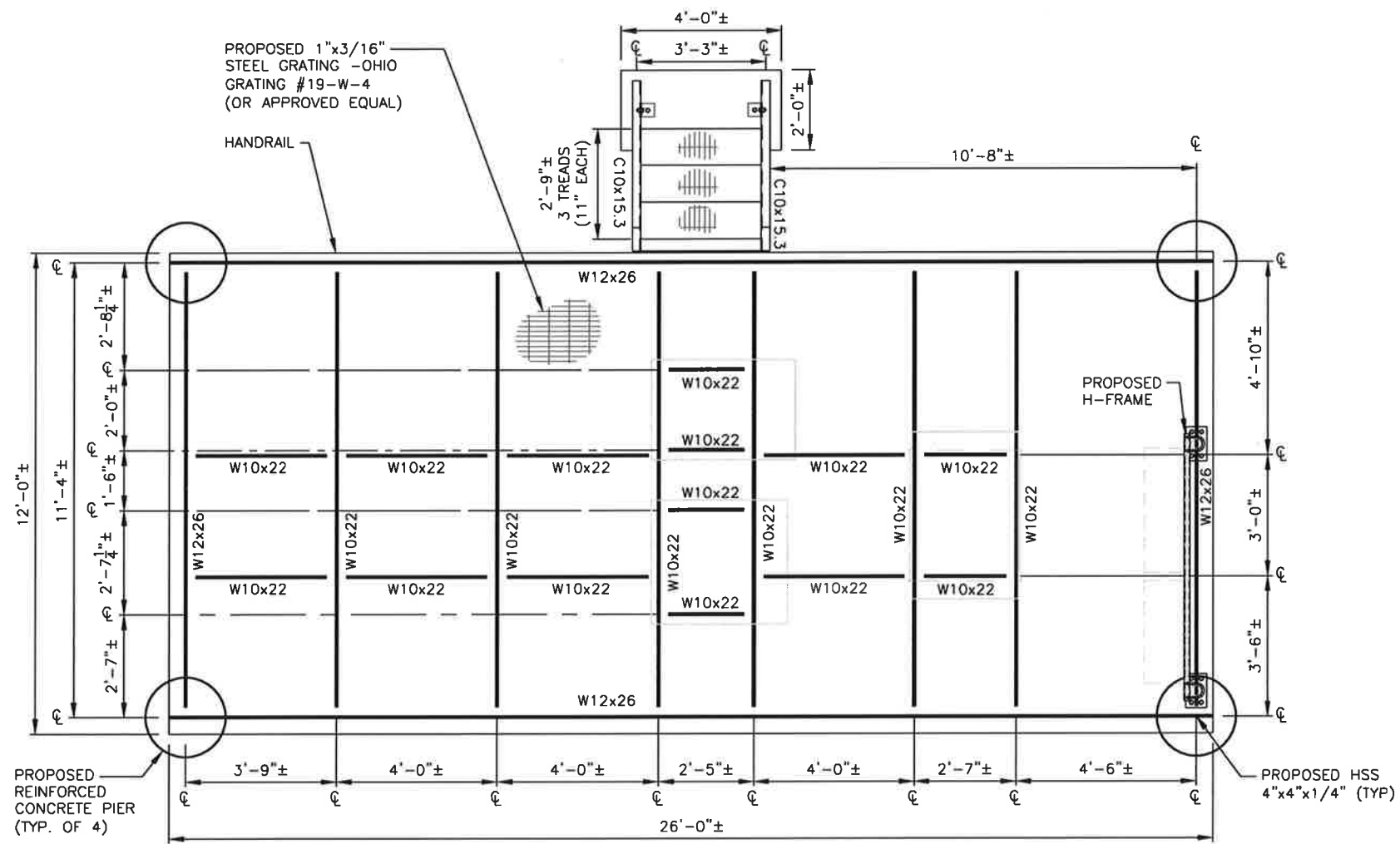
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DAYVILLE CT

SITE ADDRESS:
 520 BAILEY HILL ROAD
 KILLINGLY, CT 06241

SHEET TITLE
CANOPY FRAME & EQUIPMENT FRAME DETAILS

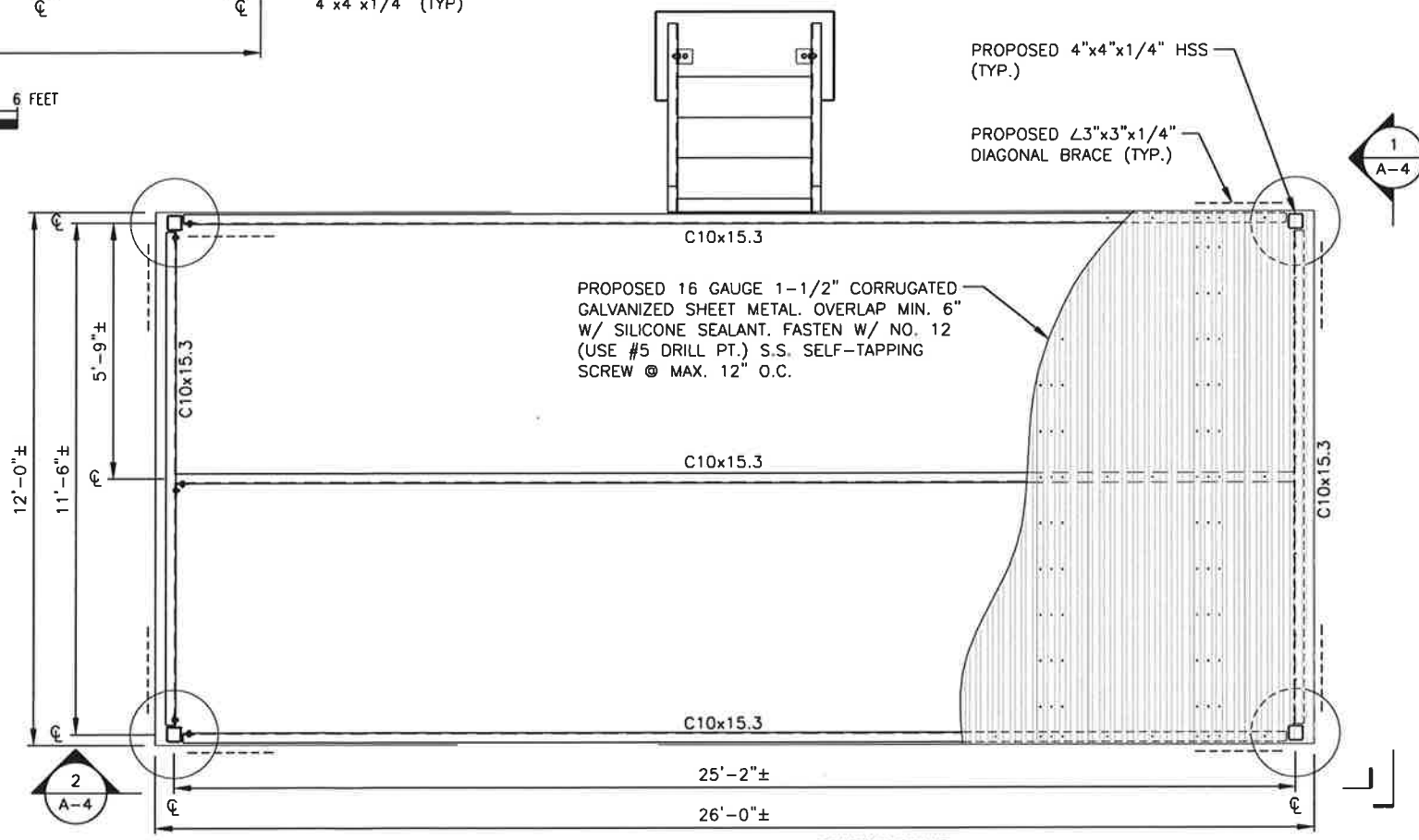
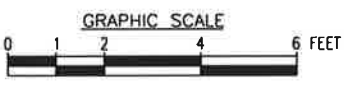
SHEET NUMBER
A-3



STEEL PLATFORM FRAME PLAN

22x34 SCALE: 1/2"=1'-0"
 11x17 SCALE: 1/4"=1'-0"

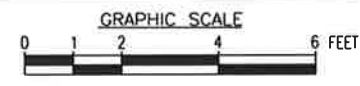
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A-3



ICE CANOPY FRAME PLAN

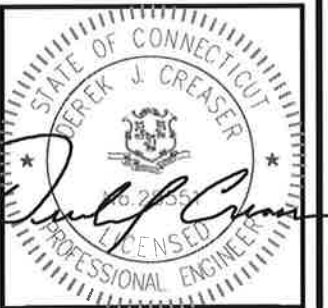
22x34 SCALE: 1/2"=1'-0"
 11x17 SCALE: 1/4"=1'-0"

2
A-3





1600 OSGOOD STREET
 BUILDING 20 NORTH, SUITE 3090 TEL: (978) 557-5553
 N. ANDOVER, MA 01845 FAX: (978) 336-5596



CHECKED BY: DJR

APPROVED BY: DPH

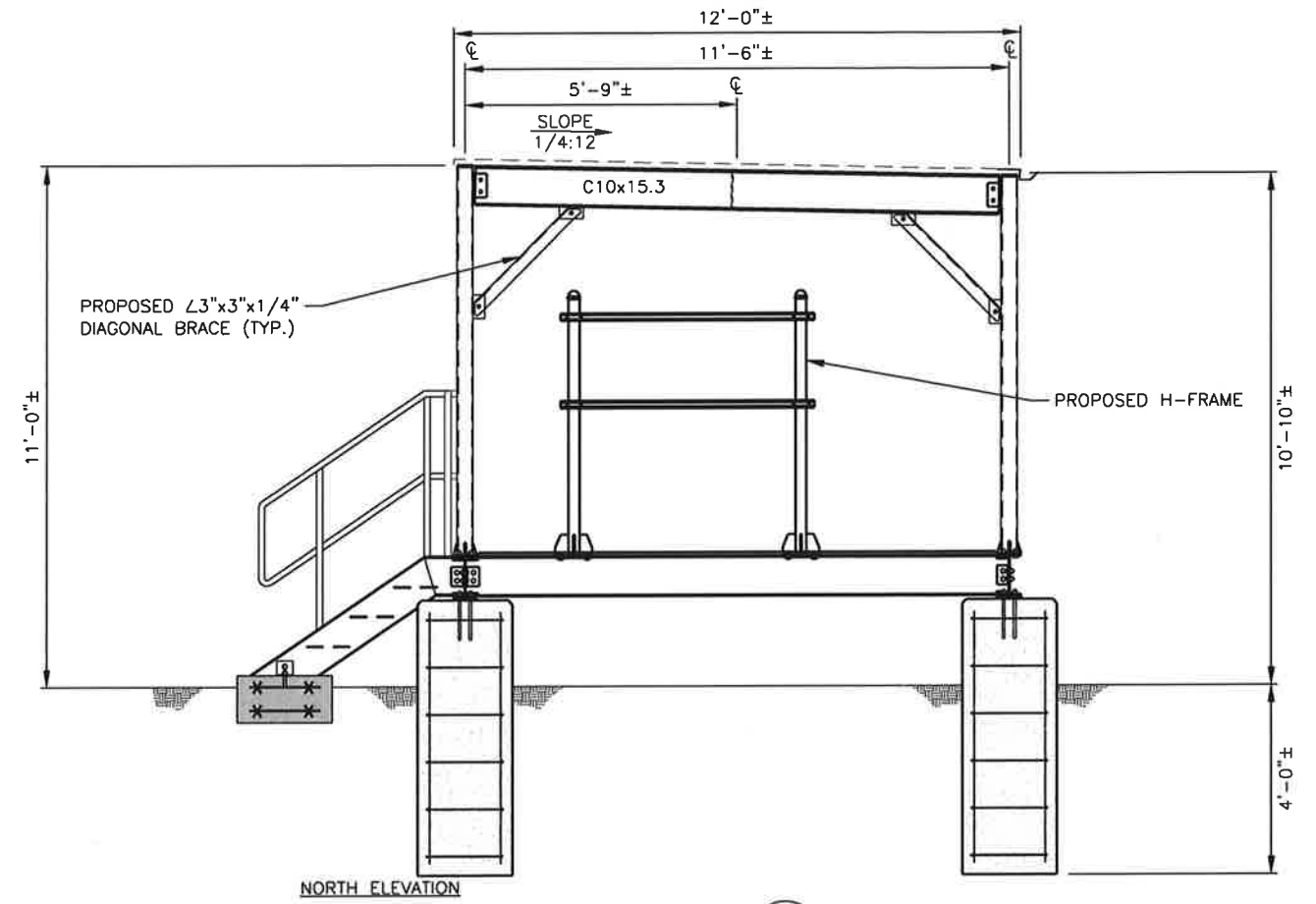
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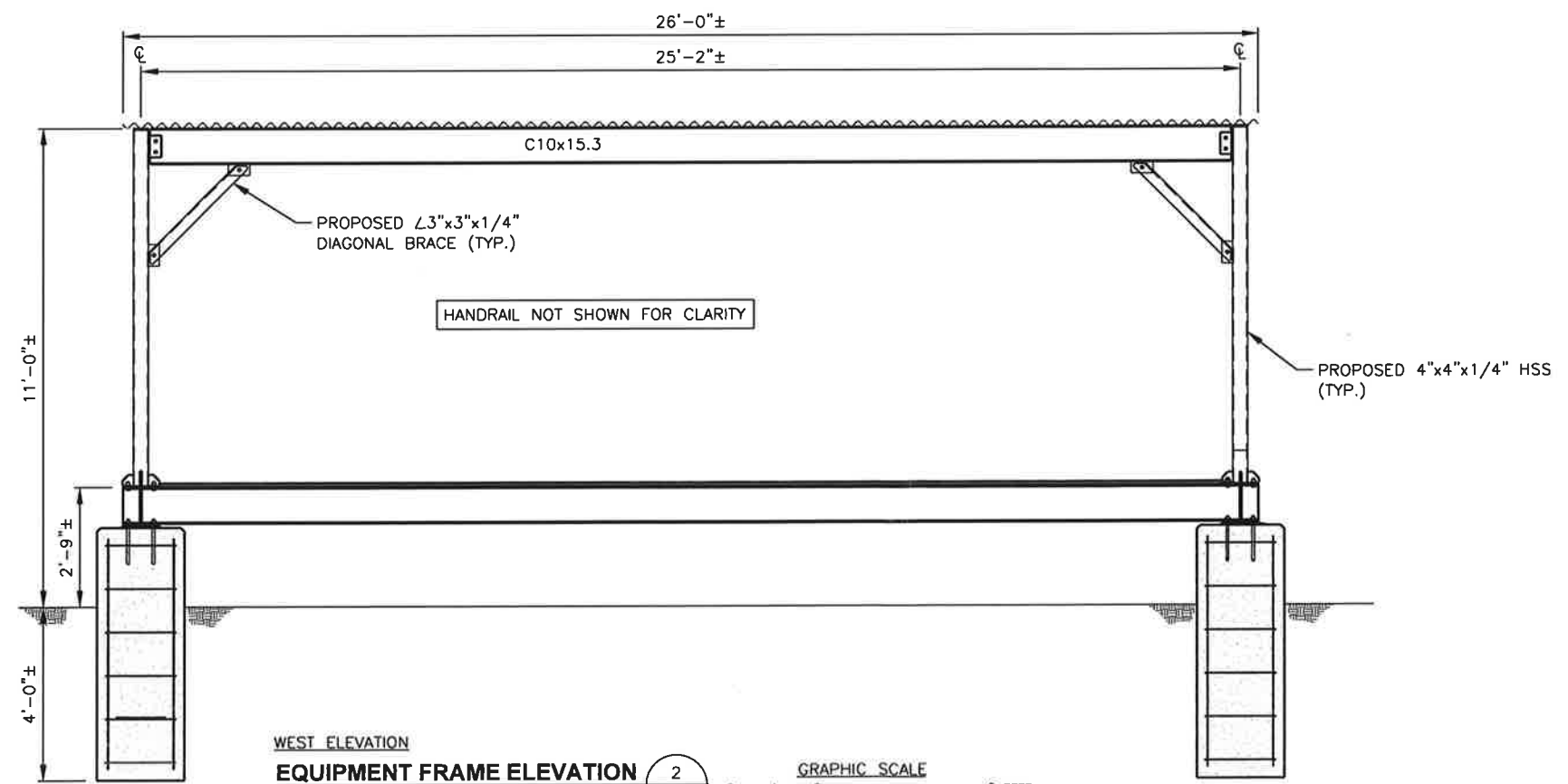
SITE ADDRESS:
 520 BAILEY HILL ROAD
 KILLINGLY, CT 06241

SHEET TITLE
**CANOPY FRAME &
 EQUIPMENT FRAME
 ELEVATION**

SHEET NUMBER
A-4



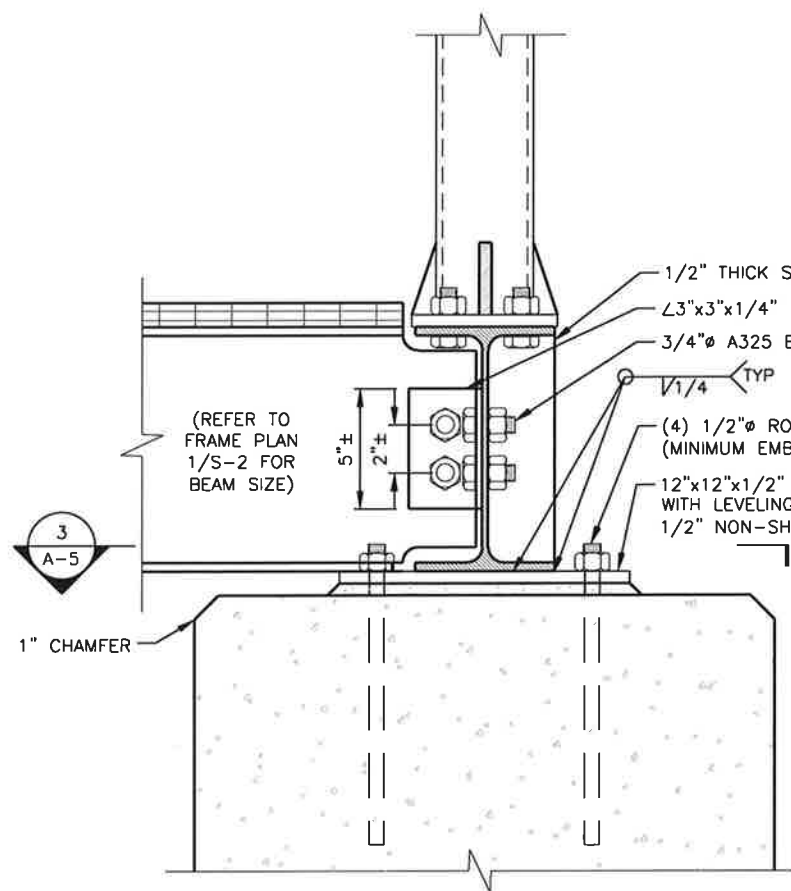
NORTH ELEVATION
EQUIPMENT FRAME ELEVATION 1
 22x34 SCALE: 1/2"=1'-0"
 11x17 SCALE: 1/4"=1'-0"
 GRAPHIC SCALE 0 1 2 4 6 FEET



WEST ELEVATION
EQUIPMENT FRAME ELEVATION 2
 22x34 SCALE: 1/2"=1'-0"
 11x17 SCALE: 1/4"=1'-0"
 GRAPHIC SCALE 0 1 2 4 6 FEET

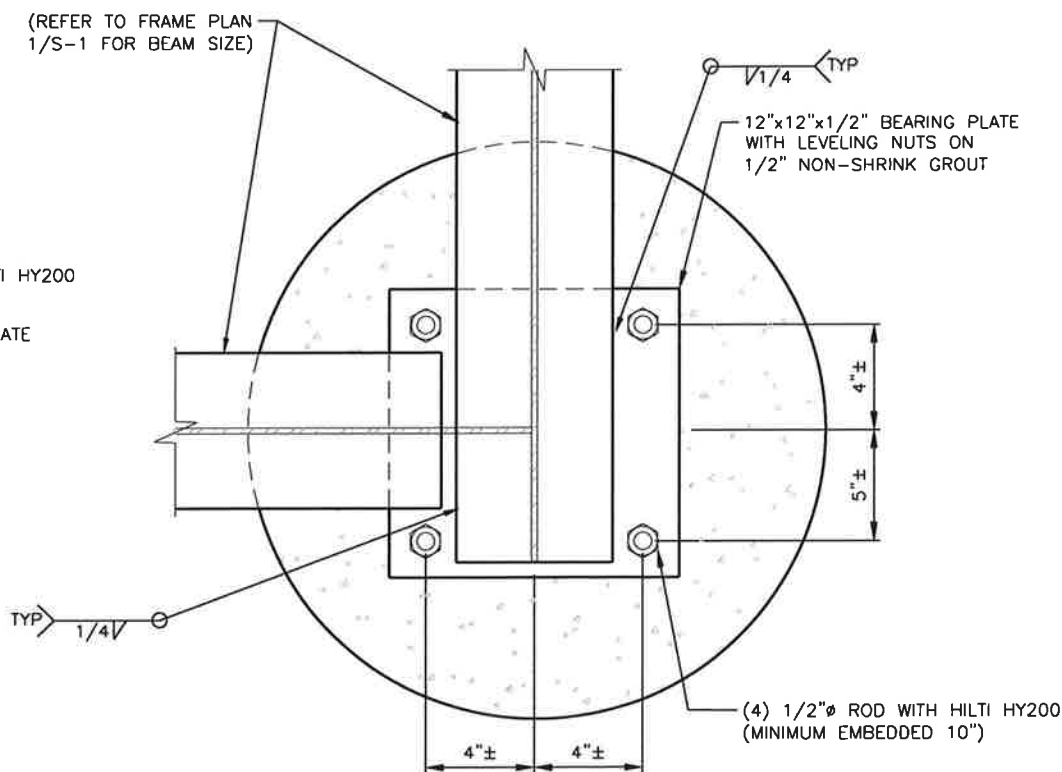
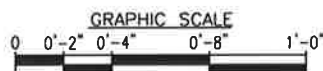
FOUNDATION NOTES & CONCRETE SPECIFICATIONS:

- FOUNDATION AREA SHALL BE EXCAVATED TO THE DEPTH AND DIMENSIONS SHOWN ON THE PLANS. EXISTING LEDGE AND ALL OTHER EXISTING UNSUITABLE MATERIAL SHALL BE REMOVED AND LEGALLY DISPOSED OF OFF-SITE. THE SUBGRADE SHALL BE ROLLED WITH A 1-TON, VIBRATORY, WALK-BEHIND ROLLER AT A SPEED OF LESS THAN 2 FPS, 6 PASSES MINIMUM, TO PROVIDE UNYIELDING SURFACE.
- UNDERCUT SOFT OR "WEAVING" AREAS A MINIMUM OF 12 INCHES DEEP. BACKFILL UNDERCUT AREA WITH FILL MEETING THE SPECIFICATIONS OF STRUCTURAL FILL.
- CONCRETE TO HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH (f'_c)=4000 psi. CONCRETE TO BE AIR ENTRAINED, DESIRED AIR CONTENT TO BE 6% (PLUS OR MINUS 2%)
- REINFORCING BAR TO BE ASTM A615 GRADE 60.
- WELDED WIRE FABRIC TO CONFORM TO THE REQUIREMENTS OF ASTM A185. WIRES FOR FABRIC TO CONFORM TO THE REQUIREMENTS OF ASTM A82.
- ALL REINFORCING TO HAVE MINIMUM CONCRETE COVER PER ACI SPECIFICATIONS.
- ALL CONCRETE MATERIALS AND WORKMANSHIP SHALL CONFORM TO LATEST EDITION OF ACI 318 AND APPLICABLE STATE BUILDING CODE.



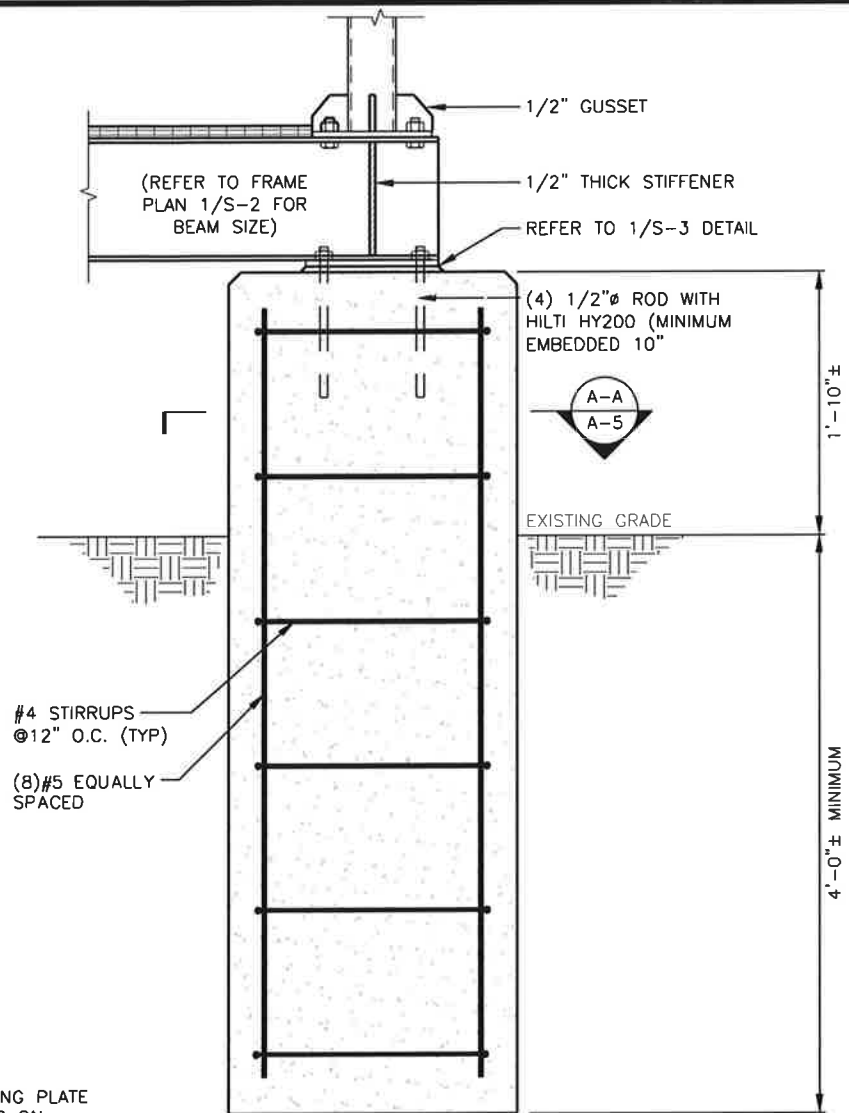
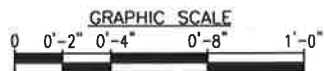
EQUIPMENT FRAME DETAIL (1)

22x34 SCALE: 3"=1'-0"
11x17 SCALE: 1-1/2"=1'-0"



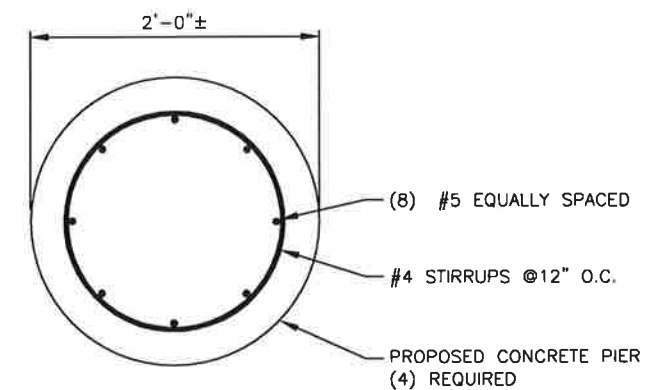
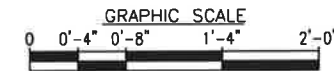
FRAME CONNECTION SECTION AT PIERS (3)

22x34 SCALE: 3"=1'-0"
11x17 SCALE: 1-1/2"=1'-0"



REINFORCED CONCRETE PIER DETAIL (2)

22x34 SCALE: 1-1/2"=1'-0"
11x17 SCALE: 3/4"=1'-0"



SECTION A-A CONCRETE PIER SECTION (A-A)

22x34 SCALE: 1-1/2"=1'-0"
11x17 SCALE: 3/4"=1'-0"



PREPARED FOR: CELLCO PARTNERSHIP D.B.A.



1400 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 334-5586



CHECKED BY: DJR

APPROVED BY: DPH

SUBMITTALS			
REV.	DATE	DESCRIPTION	BY
2	01/13/17	REVISED PER COMMENTS	JK
1	01/09/16	REVISED PER COMMENTS	SLY
0	01/06/17	ISSUED FOR REVIEW	GC

SITE NAME:
DAYVILLE CT

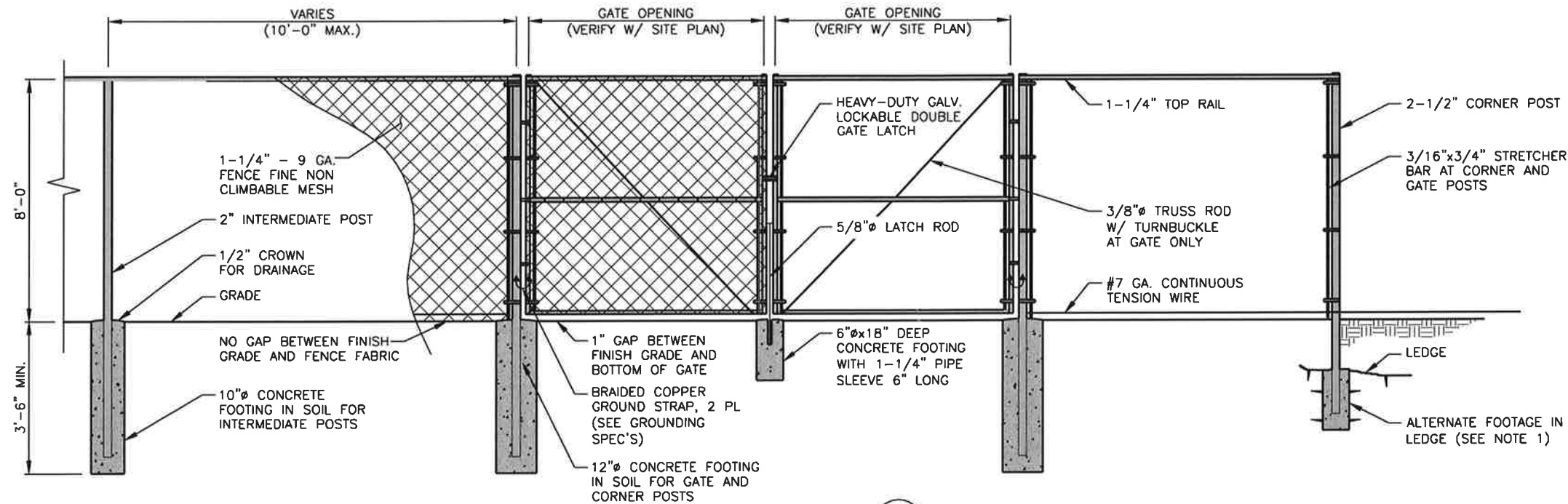
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520 BAILEY HILL ROAD
KILLINGLY, CT 06241

SHEET TITLE
**CONCRETE PIER
DETAILS &
NOTES**

SHEET NUMBER
A-5

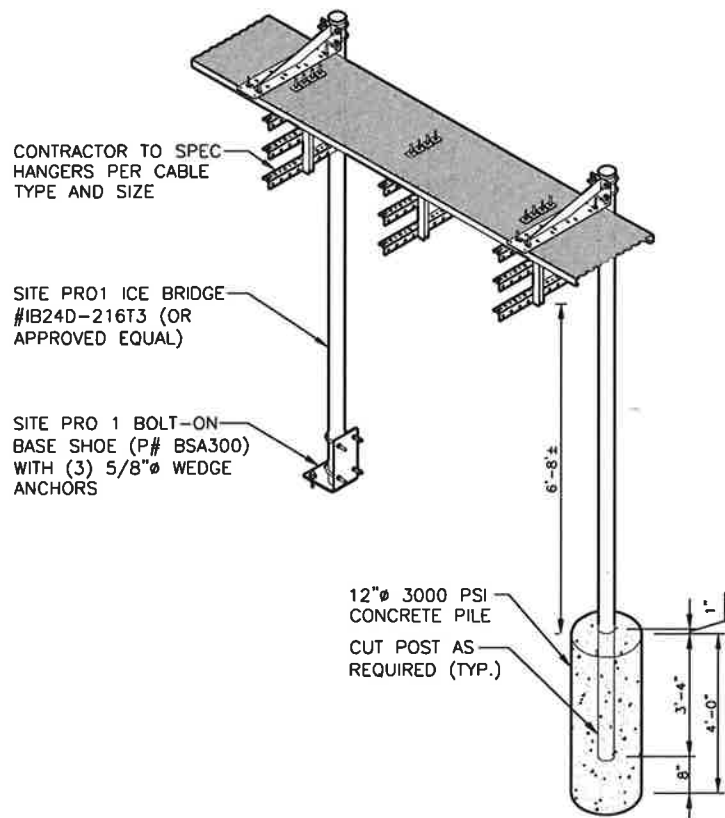
FENCE NOTES

1. ALTERNATE FOOTINGS FOR ALL FENCE POSTS IN LEDGE: IF LEDGE IS ENCOUNTERED AT GRADE, OR AT A DEPTH SHALLOWER THAN 3'-6", CORE DRILL AN 8" DIA HOLE 18" INTO THE LEDGE. CENTER POST IN THE HOLE AND FILL WITH CONCRETE OR GROUT. IF LEDGE IS BELOW FINISH GRADE, COAT BACKFILLED SECTION OF POST WITH COAL TAR, AND BACKFILL WITH WELL-DRAINING GRAVEL.
2. ATTACH EACH GATE WITH 1-1/2" PAIR OF NON-LIFT-OFF TYPE, MALLEABLE IRON OR FORGING, PIN-TYPE HINGES. ASSEMBLIES SHALL ALLOW FOR 180° OF GATE TRAVEL.



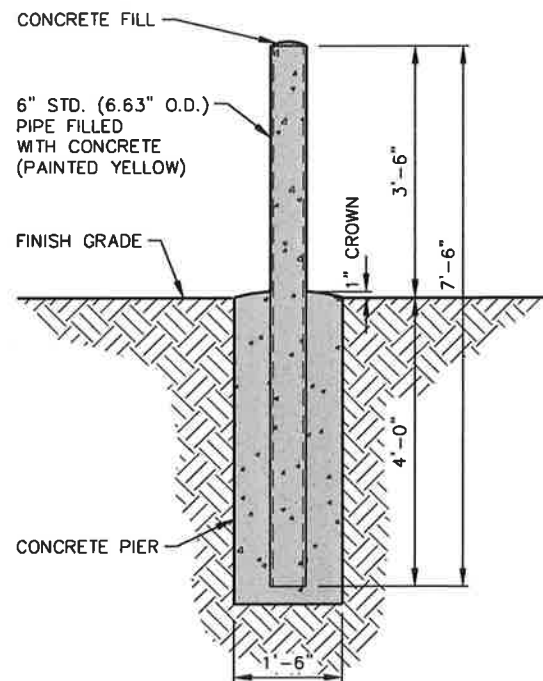
CHAINLINK FENCE DETAIL
SCALE: N.T.S.

1
A-6



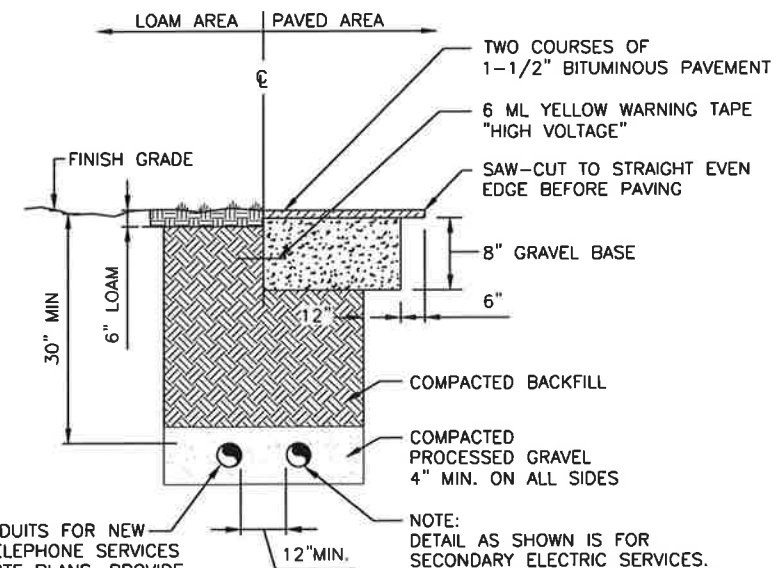
ICE BRIDGE DETAIL
SCALE: N.T.S.

2
A-6



CONCRETE FILLED BOLLARD
22x34 SCALE: N.T.S.

3
A-6

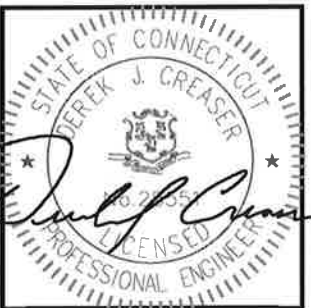


SCHEDULE 40 CONDUITS FOR NEW ELECTRICAL AND TELEPHONE SERVICES SEE UTILITY AND SITE PLANS. PROVIDE APPROVED PULL BOXES AS REQUIRED, AND COORDINATE INSTALLATION W/ ALL UTILITY COMPANIES FOR INTERFACING AT TERMINATION POINTS. PROVIDE FULL LENGTH PULL ROPES (TYP.).

NOTE: DETAIL AS SHOWN IS FOR SECONDARY ELECTRIC SERVICES. PRIMARY HIGH VOLTAGE SERVICE REQUIRES 4" CONCRETE ENCASEMENT.

TYPICAL DIRECT JOINT SERVICE BURIED CONDUIT DETAIL
SCALE: N.T.S.

4
A-6



CHECKED BY: DJR
APPROVED BY: DPH

SUBMITTALS

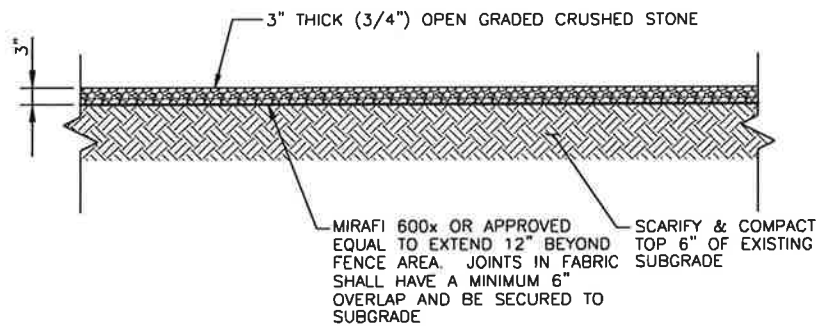
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2	01/13/17	REVISED PER COMMENTS	JK
1	01/09/16	REVISED PER COMMENTS	SLY
0	01/08/17	ISSUED FOR REVIEW	CC

SITE NAME:
DAYVILLE CT

SITE ADDRESS:
520 BAILEY HILL ROAD
KILLINGLY, CT 06241

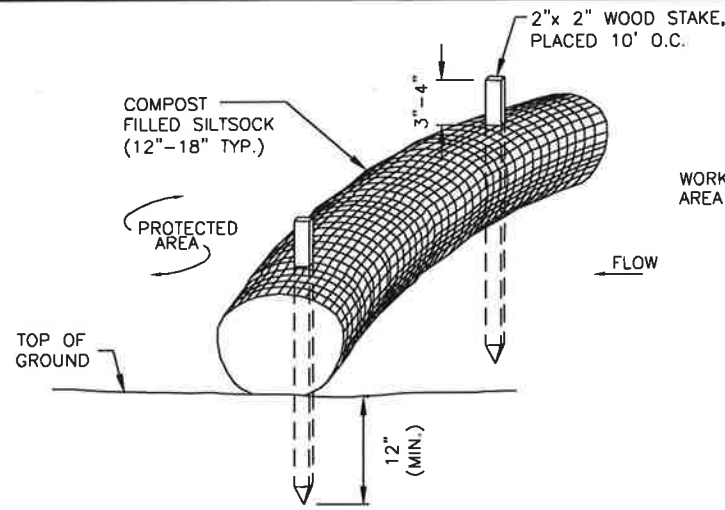
SHEET TITLE
SITE DETAILS

SHEET NUMBER
A-6



COMPOUND SURFACE DETAIL 1
 22x34 SCALE: 1"=1'-0"
 11x17 SCALE: 1/2"=1'-0"
 A-7

CRUSHED GRAVEL		PROCESSED AGGREGATE	
SIEVE	% PASSING BY WEIGHT	SIEVE	% PASSING BY WEIGHT
5"	100	2 1/4"	100
3 1/2"	90-100	2"	95-100
1 1/2"	55-95	3/4"	50-75
1/4"	25-60	1/4"	25-45
#10	15-45	#40	5-20
#40	5-25	#100	2-12
#100	0-10		
#200	0-5		



NOTES:

- SILT SOCK SHALL BE FILTREXX SILT SOCK, OR APPROVED EQUAL.
- COMPOST MATERIAL SHALL BE DISPERSED ON SITE, AS DETERMINED BY THE ENGINEER.
- SILT SOCK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS, AND REPAIR OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.
- SEE SPECIFICATIONS FOR SOCK SIZE, AND COMPOST FILL, REQUIREMENTS.

SILT SOCK DETAIL 3
 SCALE: N.T.S.
 A-7

EROSION CONTROL MEASURES:

- DISTURBED AREAS SHALL BE KEPT TO THE MINIMUM AREA NECESSARY TO CONSTRUCT THE ROADWAYS AND ASSOCIATED DRAINAGE FACILITIES.
- HAY BALE BARRIERS AND SEDIMENT TRAPS SHALL BE INSTALLED AS REQUIRED. BARRIERS AND TRAPS ARE TO BE MAINTAINED AND CLEANED UNTIL ALL SLOPES HAVE A HEALTHY STAND OF GRASS.
- BALED HAY AND MULCH SHALL BE MOWINGS OF ACCEPTABLE HERBACEOUS GROWTH, FREE FROM NOXIOUS WEEDS OR WOODY STEMS, AND SHALL BE DRY. NO SALT HAY SHALL BE USED.
- FILL MATERIAL SHALL BE FREE FROM STUMPS, WOOD, ROOTS, ETC.
- STOCKPILED MATERIALS SHALL BE PLACED ONLY IN AREAS SHOWN ON THE PLANS. STOCKPILES SHALL BE PROTECTED BY SILTATION FENCE AND SEEDED TO PREVENT EROSION. THESE MEASURES SHALL REMAIN UNTIL ALL MATERIAL HAS BEEN PLACED OR DISPOSED OFF SITE.
- ALL DISTURBED AREAS SHALL BE LOAMED AND SEEDED. A MINIMUM OF 4 INCHES OF LOAM SHALL BE INSTALLED WITH NOT LESS THAN ONE POUND OF SEED PER 50 SQUARE YARDS OF AREA.
- APPLICATION OF GRASS SEED, FERTILIZERS AND MULCH SHALL BE ACCOMPLISHED BY BROADCAST SEEDING OR HYDROSEEDING AT THE RATES OUTLINED BELOW:

LIMESTONE: 75-100 LBS./1,000 SQUARE FEET.
FERTILIZER: RATE RECOMMENDED BY MANUFACTURER.
MULCH: HAY MULCH APPROXIMATELY 3 TONS/ACRE UNLESS EROSION CONTROL MATTING IS USED.

SEED MIX (SLOPES LESS THAN 4:1)	LBS./ACRE
CREeping RED FESCUE	20
TALL FESCUE	20
REDTOP	2
	42

SLOPE MIX (SLOPES GREATER THAN 4:1)	LBS./ACRE
CREeping RED FESCUE	20
TALL FESCUE	20
BIRDSFOOT TREEFOIL	8
	48

TREATMENT SWALE PLANTING SPECIFICATIONS

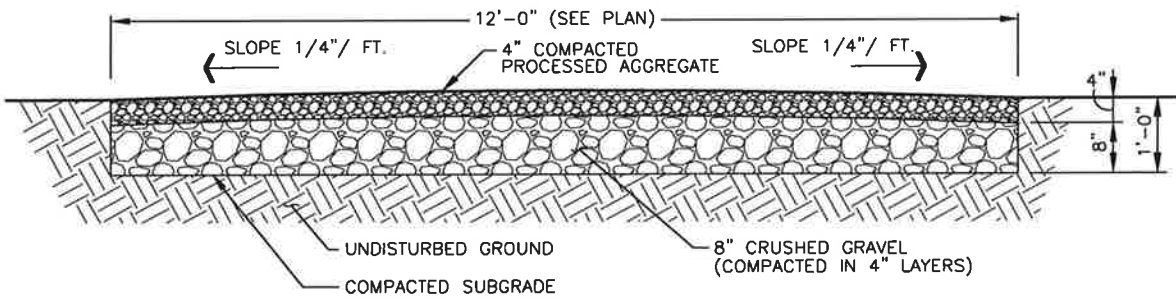
TALL FESCUE	20 LBS/ACRE	OR	0.45 LBS/10,000 SF
CREeping RED FESCUE	20 LBS/ACRE	OR	0.45 LBS/10,000 SF
BIRDSFOOT TREEFOIL	8 LBS/ACRE	OR	0.20 LBS/10,000 SF

LIME AND FERTILIZER SHOULD BE APPLIED PRIOR TO OR AT TIME OF SEEDING AND INCORPORATED INTO THE SOIL. THE FOLLOWING RATES ARE RECOMMENDED:

AGRICULTURAL LIMESTONE	2 TONS/ACRE	OR	100 LBS/1,000 SF
NITROGEN (N)	50 LBS/ACRE	OR	1.1 LBS/10,000 SF
PHOSPHATE (P2O5)	100 LBS/ACRE	OR	2.2 LBS/10,000 SF
POTASH (K2O)	100 LBS/ACRE	OR	2.2 LBS/10,000 SF

(THIS IS EQUIVALENT TO 500 LBS/ACRE OF 10-20-20 FERTILIZER OR 1,000 LBS/ACRE OF 5-10-10).

- AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED THE TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED.
- PAVED ROADWAYS MUST BE KEPT CLEAN AT ALL TIMES.
- ALL CATCH BASIN INLETS WILL BE PROTECTED WITH LOW POINT SEDIMENTATION BARRIER.
- ALL STORM DRAINAGE OUTLETS WILL BE STABILIZE AND CLEANED AS REQUIRED, BEFORE THE DISCHARGE POINTS BECOME OPERATIONAL.
- ALL DEWATERING OPERATIONS MUST DISCHARGE DIRECTLY INTO A SEDIMENT FILTER AREA.
- NO DISCHARGE SHALL BE DIRECTED TOWARDS ANY PROPOSED DITCHES, SWALES, OR PONDS UNTIL THEY HAVE BEEN PROPERLY STABILIZED.



GRAVEL ACCESS DRIVE 2
 SCALE: N.T.S.
 A-7

GENERAL CONSTRUCTION SEQUENCE:

THIS IS A GENERAL CONSTRUCTION SEQUENCE OUTLINE SOME ITEMS OF WHICH MAY NOT APPLY TO PARTICULAR SITES.

- CLEAR AND GRUB AREAS OF PROPOSED CONSTRUCTION.
- INSTALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES AS REQUIRED.
- REMOVE AND STOCKPILE TOPSOIL. STOCKPILE SHALL BE SEEDED TO PREVENT EROSION.
- CONSTRUCT CLOSED DRAINAGE SYSTEM. PROTECT CULVERT INLETS AND CATCH BASINS WITH SEDIMENTATION BARRIERS.
- CONSTRUCT ROADWAYS AND PERFORM SITE GRADING, PLACING HAY BALES AND SILTATION FENCES AS REQUIRED TO CONTROL SOIL EROSION.
- INSTALL UNDERGROUND UTILITIES.
- BEGIN TEMPORARY AND PERMANENT SEEDING AND MULCHING. ALL CUT AND FILL SLOPES SHALL BE SEEDED OR MULCHED IMMEDIATELY AFTER THEIR CONSTRUCTION. NO AREA SHALL BE LEFT UNSTABILIZED FOR A TIME PERIOD OF MORE THAN 30 DAYS.
- DAILY, OR AS REQUIRED, CONSTRUCT, INSPECT, AND IF NECESSARY, RECONSTRUCT TEMPORARY BERMS, DRAINS, DITCHES, SILT FENCES AND SEDIMENT TRAPS INCLUDING MULCHING AND SEEDING.
- BEGIN EXCAVATION FOR AND CONSTRUCTION OF TOWERS AND PLATFORMS.
- FINISH PAVING ALL ROADWAYS, DRIVES, AND PARKING AREAS.
- COMPLETE PERMANENT SEEDING AND LANDSCAPING.
- NO STORM WATER FLOW SHALL BE DIVERTED TO ANY WETLANDS UNTIL A HEALTHY STAND OF GRASS HAS BEEN ESTABLISHED IN REGRADED AREAS.
- AFTER GRASS HAS BEEN FULLY GERMINATED IN ALL SEEDED AREAS, REMOVE ALL TEMPORARY EROSION CONTROL MEASURES.

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
2	01/13/17	REVISED PER COMMENTS	JK
1	01/09/16	REVISED PER COMMENTS	SLY
0	01/06/17	ISSUED FOR REVIEW	GC

SITE NAME:
DAYVILLE CT

SITE ADDRESS:
 520 BAILEY HILL ROAD
 KILLINGLY, CT 06241

SHEET TITLE
SITE SURFACE & EROSION CONTROL DETAILS

SHEET NUMBER

A-7

150' 4C EXT 170' 6C MONOPOLE VERIZON WIRELESS DAYVILLE CT WINDHAM COUNTY, CT

TABLE OF CONTENTS

- T1 - BILL OF MATERIAL & NOTES
- S1 - ELEVATION VIEWS & DETAILS
- ABT - ANCHOR BOLTS & TEMPLATES

SYMBOL LEGEND

- AGL = ABOVE GROUND LEVEL
- BC = BOLT CIRCLE
- CL = CENTERLINE
- ELEV = ELEVATION
- (E) = EXISTING
- FV = FIELD VERIFY
- FW = FLAT WASHER
- HN = HEX NUT
- LW = LOCK WASHER
- OC = ON CENTER
- OD = OUTSIDE DIAMETER
- (P) = PROPOSED
- TBD = TO BE DETERMINED
- TOS = TOP OF STEEL
- TYP = TYPICAL
- NTS = NOT TO SCALE

DESIGN NOTES

1. MONOPOLE IS DESIGNED IN ACCORDANCE WITH TIA-222G FOR 110 MPH BASIC WIND & 50 MPH BASIC WIND SPEED WITH 1" ICE EXPOSURE - C TOPOGRAPHIC CATEGORY - 1 WITH CREST HEIGHT OF 0.00 FL.

COATING NOTES

1. ALL APPLICABLE MATERIALS SHALL BE HOT DIPPED GALVANIZED PER ASTM A153. ALL HARDWARE SHALL BE HOT DIPPED GALVANIZED PER ASTM A153, UNLESS OTHERWISE NOTED.

STRUCTURE NOTES

1. EE WILL NOT HONOR ANY BACKCHARGES WHICH HAVE NOT RECEIVED PRIOR WRITTEN AUTHORIZATION. CONTACT EE AT (440) 564-5484.
2. THE INSTALLER SHALL THOROUGHLY REVIEW EE'S STRUCTURAL ASSEMBLY & ERECTION PROCEDURES PRIOR TO INITIATING THE INSTALLATION OF THE MONOPOLE.
3. THE ORIENTATION OF THE MONOPOLE SHALL BE VERIFIED PRIOR TO INSTALLATION.
4. FOR MULTIPLE SECTION MONOPOLES:
 - 4.1. FOR PROPER SECTION TO SECTION ALIGNMENT A 2" HORIZONTAL WELD BEAD AND A MARK ARE POSITIONED ON EACH SECTION AT EACH SPICE. THE 2" HORIZONTAL WELD BEAD ARE ON THE MATCHING CORNERS. THE MARK NUMBER IS ON THE ADJACENT FLAT. THE CORNERS WITH WELD BEADS SHALL BE ALIGNED FROM TOP TO BOTTOM OF THE MONOPOLE. MARK NUMBERS SHALL BE MATCHED FOR EACH SIDE & SECTION OF THE MONOPOLE SHALL BE JACKED TOGETHER WITH A MINIMUM JACKING FORCE OF 10,000 LB APPLIED TO EACH SIDE. FOR MAXIMUM RECOMMENDED JACKING FORCE, SPICE LENGTH TO BRACE AND AIR GAP BETWEEN SECTIONS REFER TO EE'S STRUCTURE ASSEMBLY & ERECTION PROCEDURES.
 - 4.2. 1" FIELD ASSEMBLY JACKING NUTS FOR JACKING SECTIONS TOGETHER ARE LOCATED ON OPPOSING SECTION FLATS ABOVE AND BELOW THE SPICES. ALL JACKING EQUIPMENT SHALL BE SUPPLIED BY THE INSTALLER.
 - 4.3. ALL LONGITUDINAL SEAM WELDS WITHIN THE SLIP-JOINT AREA IN THE FEMALE SECTION SHALL BE 100% PENETRATION.

5. ALL BOLTED CONNECTIONS WITH A325 HIGH-STRENGTH BOLTS SHALL BE ASSEMBLED IN ACCORDANCE WITH SPECIFICATIONS FOR STRUCTURAL JOINTS USING A325 OR A490 BOLTS. HIGH STRENGTH BOLTS SHALL BE INSTALLED TO SNUG-TIGHT CONDITION PER ASTM A325/A490 AND THEN PRE-TENSION AS REQUIRED. TURN-OF-NUT METHOD IS RECOMMENDED BUT IS NOT LIMITED TO.

6. SHIMS WILL BE SUPPLIED BY EE, IF REQUIRED.

7. MONOPOLE BASE PLATE SHALL HAVE FULL PENETRATION WELD TO SHAFT.

8. ANCHOR RODS SHALL BE TIGHTENED AFTER THE MONOPOLE IS PLUMB. BOTH TOP & BOTTOM NUT SHALL BE TIGHTENED. FOR DETAIL OF ANCHOR ROD INSTALLATION INSTRUCTIONS, REFER TO EE'S STRUCTURE ASSEMBLY & ERECTION PROCEDURES.

9. MATERIALS
 - 9.1. STRUCTURAL STEEL - REFER TO DRAWING.
 - 9.2. BOLTS
 - 9.2.1. STRUCTURAL STEEL A325 HIGH STRENGTH BOLTS UNLESS OTHERWISE NOTED.
 - 9.2.2. ANCHOR RODS: A515-GR75 UNLESS OTHERWISE NOTED.

10. WELDING
 - 10.1. ALL WELDING SHALL MEET AWS LATEST D.1.1 EDITION

11. ASSEMBLY MARKING PROCEDURE
 - 11.1. EACH INDIVIDUAL ASSEMBLY SHALL HAVE A METAL TAG WELDED TO IT WHICH WILL BE ENGRAVED WITH THE ASSEMBLY MARK NO. AS SHOWN IN THE MATERIAL BLOCK. (MINIMUM OF 56" HIGH LETTERS).

BILL OF MATERIALS 18068-E01

Item	Part Number	Qty	Description	Weight Per	Wt Per Row
1	18068-E01-GS01	1	150' 4C EXT 170' 6C MONOPOLE	49240.48	49240.48
2	18068-E01-GS02	1	SHAFT ASSY. (TOP SECTION)	8483.67	8483.67
3	18068-E01-GS03	1	SHAFT ASSY. (MIDDLE SECTION)	14160.57	14160.57
4	K12461	1	SHAFT ASSY. (BOTTOM SECTION)	21954.06	21954.06
5	K12111	1	12' SQUARE ANTENNA PLATFORM 'H'	2132.72	2132.72
6	K12484	1	HANDRAIL KIT FOR 12' SQUARE PLATFORM	954.00	954.00
7	K12431	1	4-SECTOR UNIVERSAL BRACKET	350.14	350.14
8	K10062	12	10'-0" ADJUSTABLE ANTENNA MOUNT FOR STANDARD PLATFORM W/ HANDRAILS	52.20	626.40
9	K10333	1	BUSS BAR	7.50	7.50
10	K12064	1	7'-0" LIGHTNING ROD	28.60	28.60
11	18068-E01-P36-01	1	5'-0" LIGHTNING ROD EXTENSION MOUNT FOR STANDARD PLATFORM	38.02	38.02
30	DB1-160	1	COVER PLATE	60.10	60.10
31	10000-A01-A394-01	1	160'-0" SAFETY CLIMB KIT	1.08	124.20
32	K11489	115	Ø5/8" x 7" LG. BUTTON HEAD STEP BOLT w/(1) H.N. & (1) SQUARE NUT EACH	10.48	125.76
33	K11497	6	Ø6" x 18" HANDHOLE COVER PLATE & BOLTS	31.39	188.34
34	A-BX-A325-G-1X3.00	4	1" DIA X 3" LG. (A325) HEX BOLT w/(1) H.N. (A194-2H) & (2) F.W. (F436)	1.60	6.40
40	ANCHOR BOLT	1	FOR ANCHOR BOLTS REFER TO DWG. 18068-E01-ABT		
41	HD-INS-MONOPOLE	1	STRUCTURE ASSEMBLY AND ERECTION PROCEDURE		

STAMP

ENGINEERED ENDEAVORS

The Engineered Part of New
10978 Kilmer Road • Newbury, OH 44065-8787
Ph: (440) 564-5484 • Fax: (440) 270-3865
Fax: (440) 564-5489 • www.eneand.com

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REVISION HISTORY

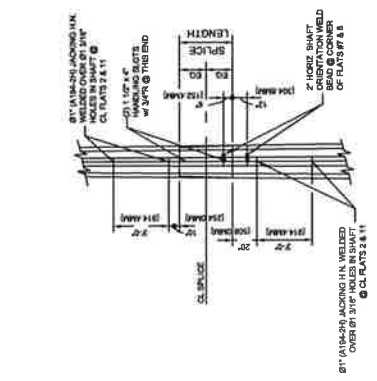
REV #	DATE	BY	DESCRIPTION
1	1/20/17	RPH	ISSUED FOR REVIEW
1	2/20/17	TR	ISSUED FOR REVIEW

150' 4C EXT 170' 6C MONOPOLE
VERIZON WIRELESS
DAYVILLE CT
WINDHAM COUNTY, CT
BILL OF MATERIALS & NOTES

DRAWING NUMBER	CREATED	PROJECT NUMBER
18068-E01-T1	1/25/17	18068

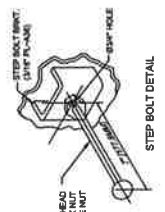
ANCHOR BOLT INSTALLATION TABLE

ANCHOR BOLT DIA, in	ANCHOR BOLT LENGTH, ft	EMBED IN CONCRETE, ft	PROJECT ABOVE CONCRETE, in	CLEARANCE UNDER BOTTOM NUT, in
2.14	8'-0"	7'-0"	12"	2.14
2.14	6'-0"	5'-0"	12"	2.14
1.34	6'-0"	5'-0"	12"	1.34
1.12	6'-0"	5'-2"	10"	1.12



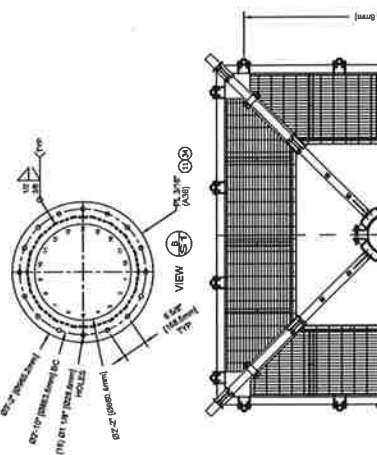
SLIP JOINT JACKING PROVISION DETAIL

NOTE: FOR REQUIRED TOLERANCES AT THE SLIP JOINT, REFER TO THE DRAWING ATTACHED WITH THIS DRAWING ASSEMBLY AND ERECTION PROCEDURES.



STEP BOLT DETAIL

SEE PLAN FOR LOCATION OF STEP BOLT HOLE. STEP BOLT SHALL BE 1/2\"/>



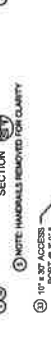
ELEVATION VIEW

14'-0" (4485 mm)
 13'-0" (4175 mm)
 12'-0" (3705 mm)
 11'-0" (3405 mm)
 10'-0" (3105 mm)
 9'-0" (2805 mm)
 8'-0" (2505 mm)
 7'-0" (2205 mm)
 6'-0" (1905 mm)
 5'-0" (1605 mm)
 4'-0" (1305 mm)
 3'-0" (1005 mm)
 2'-0" (705 mm)
 1'-0" (405 mm)
 0'-0" (105 mm)

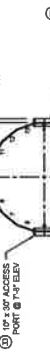


SECTION 57

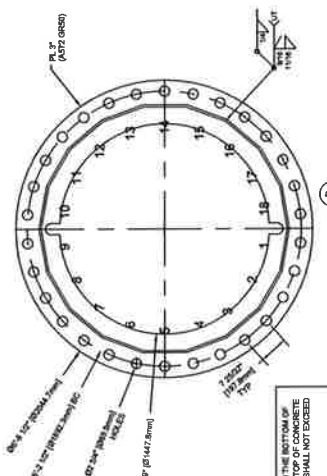
NOTE: HANDRAILS REMOVED FOR CLARITY



SECTION 58

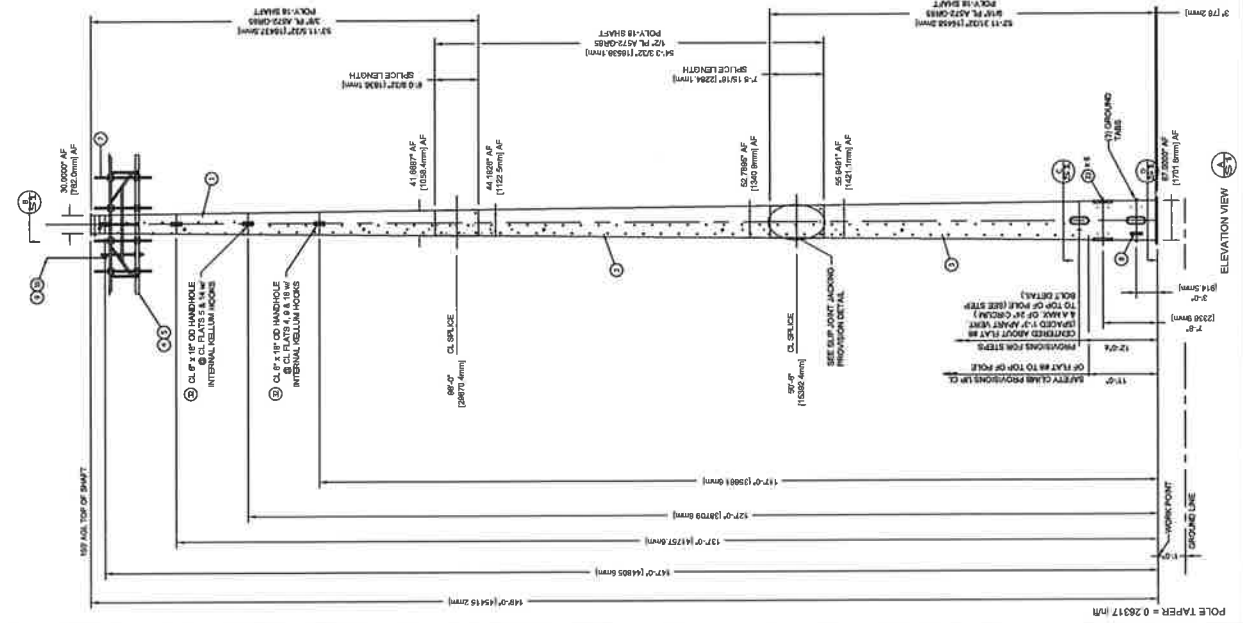


SECTION 59



SECTION 60

GAP BETWEEN THE BOTTOM OF HOUSING AND TOP OF CONCRETE SHALL NOT EXCEED 1/8\"/>



ELEVATION VIEW

14'-0" (4485 mm)
 13'-0" (4175 mm)
 12'-0" (3705 mm)
 11'-0" (3405 mm)
 10'-0" (3105 mm)
 9'-0" (2805 mm)
 8'-0" (2505 mm)
 7'-0" (2205 mm)
 6'-0" (1905 mm)
 5'-0" (1605 mm)
 4'-0" (1305 mm)
 3'-0" (1005 mm)
 2'-0" (705 mm)
 1'-0" (405 mm)
 0'-0" (105 mm)

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REV #	DATE	BY	DESCRIPTION
1	10/27/17	TS	ISSUED FOR REVIEW
2	10/27/17	TS	ISSUED FOR REVIEW

**150' 4C EXT 170' 6C MONOPOLE
 VERIZON WIRELESS
 DAYVILLE CT
 WINDHAM COUNTY, CT**

ELEVATION VIEW & DETAILS

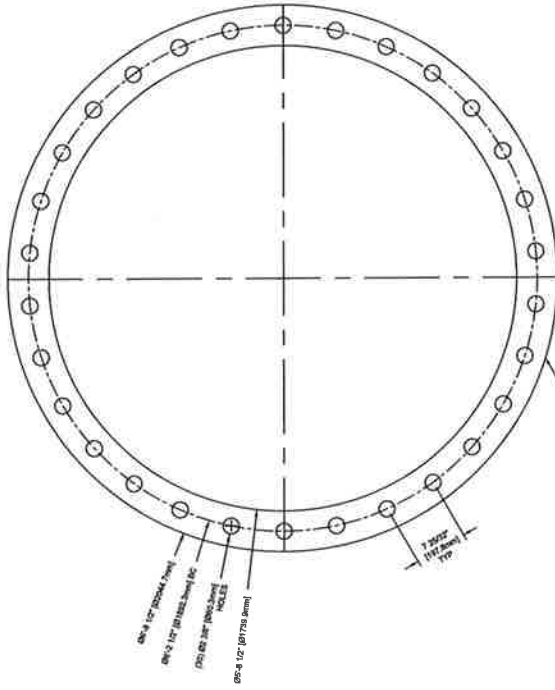
DRAWN BY	CREATED	PROJECT NUMBER
12/26/17	12/26/17	18068
DRAWING NUMBER	18068-E01-S1	

ENGINEERED ENDEAVORS

The Department Head of New

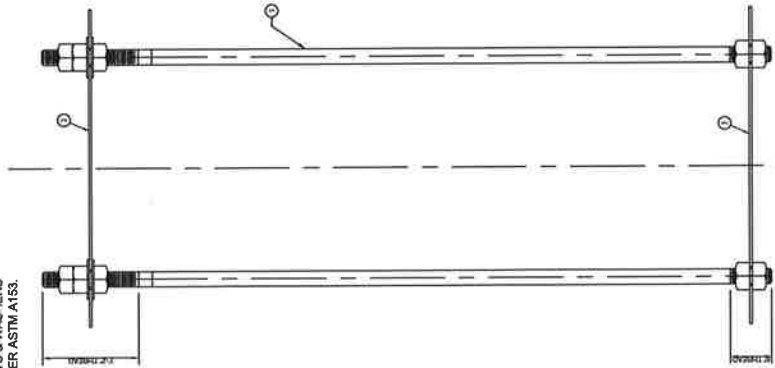


BILL OF MATERIALS				18068-E01-RPH		
Rev	Item	Part Number	Qty	Description	Weight P/Lr	Wt P/Lr Row
1		2.25-AB6-0-8DIE	30	2 1/4" x 5/8" (1.625-0.625) ANCHOR ROD WITH HEX NUTS (A194-GR2H) & (2) FLAT WASHERS (F-430)	96.90	2967.00
2		30-74-60-2-25	2	TOP & BOTTOM SETTING TEMPLATES	134.93	269.86
ANCHOR RODS & TEMPLATE WEIGHT						3226.86



MARK: 18068-E01
TOP & BOTTOM PLATE (MIN 3/8" THICK, A36)

ENTIRE BOLT AND ALL NUTS & WASHERS GALVANIZED PER ASTM A153.



ANCHOR BOLT ASSEMBLY

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REV. #	DATE	BY	DESCRIPTION
0	1/26/17	EPH	ISSUED FOR REVIEW
1	2/20/17	TJB	ISSUED FOR REVIEW

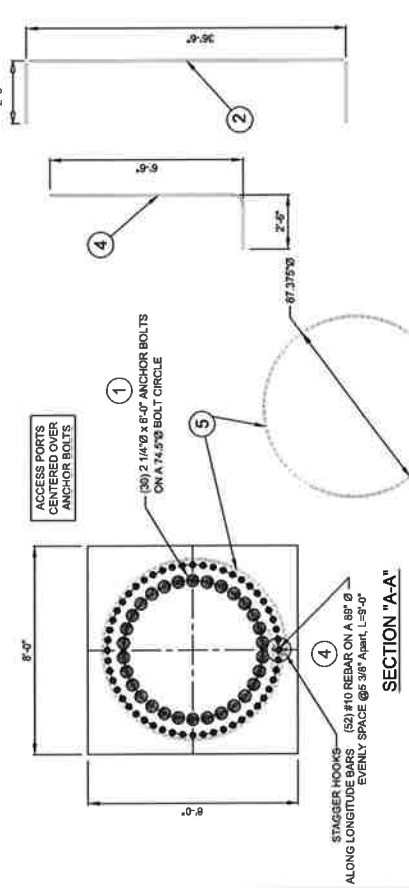
150' 4C EXT 170' 6C MONOPOLE
VERIZON WIRELESS
DAYVILLE CT
WINDHAM COUNTY, CT

ANCHOR BOLTS & TEMPLATES

DRAWN BY	EPH	CREATED	1/26/17	PROJECT NUMBER	18068
DRAWING NUMBER	18068-E01-ABT				

MAXIMUM OFF-SET BETWEEN THE CENTER OF ANCHOR BOLT CAGE AND CENTER OF THE FOUNDATION SHALL NOT EXCEED 3" IN ANY DIRECTION

FOUNDATION LOADING (PER TIA-222G WOLF)	
MOMENT	11111 kip-ft
SHEAR	86.0 kips
AXIAL	66.8 kips



1. ANCHOR BOLTS SHALL BE ATTACHED #1/2" HEX NUTS TO BOTH TEMPLATES
2. ANCHOR BOLTS SHALL BE INSTALLED W/ LONGER THREADED END UP

3. ANCHOR BOLT PROJECTION

4. ANCHOR BOLTS

5. (36) #2 1/4" x 6" ANCHOR BOLTS ON A 14.5" BOLT CIRCLE

6. (6) #4 REBAR @ 6" O.C. EQUALLY SPACED

7. (67) #9 REBAR EQUALLY SPACED @ 6" 1/8"

8. (16) #8 REBAR EQUALLY SPACED @ 12" 1/2"

9. CONSTRUCTION JOINT (IF REQUIRED)

10. COMPACT FILL IN 6" LIFTS AS PER ASTM 688

11. FOUNDATION TO BEAR ON 12" OF COMPACTED CRUSHED STONE

12. SQUARE FOOTING (N.T.S.)

MATERIAL LIST	
ITEM	DESCRIPTION
1	30 2 1/4" x 6" (A615-GR75) ANCHOR BOLTS
2	72 #8 REBAR x 4'-6" (ASTM A615-GR60)
3	118 #9 REBAR x 3'-6" (ASTM A615-GR60)
4	52 #10 REBAR x 9'-0" (ASTM A615-GR60)
5	6 #4 REBAR x 24'-0" (ASTM A615-GR60)
6	10 #4 REBAR x 6'-5" (ASTM A615-GR60)

VOL. CONCRETE @ 4000 psi (TYPE II CEMENT)	162 yd ³
STEEL (ASTM A615-GR 60)	26188 lbs

GENERAL NOTES:

- FOUNDATION DESIGN IS BASED ON THE FOLLOWING: E3, JOM 1906, DRAWING 1008-201 SOIL REPORT BY HUBBARD DESIGN GROUP (LLC), DATE: 7/22/2016.
- FOUNDATION EMBEDMENT IS SHOWN FROM THE GROUND LEVEL AT THE TIME OF SOIL INVESTIGATION AS DEPICTED IN THE SOIL REPORT. FOUNDATION DESIGN IS BASED ON THE ASSUMPTION THAT THE FOUNDATION DESIGNER SHOULD BE NOTIFIED IN ORDER TO RE-EVALUATE THE FOUNDATION DESIGN.
- SOIL REPORT SHOULD BE CONSULTED PRIOR TO CONSTRUCTION. CONCRETE REINFORCEMENT TO INCLUDE SEISMIC HOOKS.
- THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES.
- SPECIAL INSPECTION IS REQUIRED IN ACCORDANCE WITH 2015 IRC AND 780 CT.
 - FOUNDATION EXCAVATION SHALL BE INSPECTED PRIOR TO INSTALLATION OF REINFORCEMENT.
 - VERIFY VERTICAL AND DIAMETER OF THE FOUNDATION.
 - VERIFY ALL REBAR IS CORRECTLY PLACED WITHIN THE GEOTECHNICAL REPORT.
 - VERIFY SEISMIC HOOKS.
 - VERIFY GRADE, LENGTH, DIAMETER, AND QUANTITY OF REBAR AND COMPLIANCE WITH THE DRAWINGS.
 - VERIFY GRADE, LENGTH, DIAMETER, AND QUANTITY OF ANCHOR BOLTS AND BOLT PATTERN ON THE TEMPLATES.
 - CONCRETE
 - VERIFY STRENGTH, SLUMP, AIR, TEMPERATURE OF CONCRETE, AND DESIGN MIX.
 - REINFORCING STEEL
 - VERIFY ALL REBAR IS CORRECTLY PLACED WITHIN THE GEOTECHNICAL REPORT.
 - ALL REBAR CLOSURE SHALL BE ASSEMBLED USING STEEL WIRE WELDING IS NOT PERMITTED.
 - MINIMUM SPlice LENGTH FOR LONGITUDINAL BARS: 1.6 TIMES AND SMALLER: 44 x 18" DIA. BARS AND LARGER.
 - HORIZONTAL STRIPS SHALL BE STAGGERED ALONG THE REBAR CAGE WITH NO MORE THAN 50% OF SPICES IN ONE PLACE.
 - CONCRETE
 - MIX DESIGN AND CONSTRUCTION PROCEDURE SHALL BE IN COMPLIANCE WITH ACI 318-16, ACI 308.3R-16 AND ALL.
 - MINIMUM COMPRESSIVE STRENGTH: 4000 psi AT 28 DAYS AND TYPE II CEMENT SHALL BE USED UNLESS STATED OTHERWISE.
 - SLUMP: DRILLED PER 7" (11.7") MAX FOUNDATION: 7" (11.7").
 - TEMPERATURE: 50°F TO 90°F. REBAR SHALL BE PLACED IN ITS FINAL POSITION TO AVOID SEGREGATION DUE TO REMAINING OR R.O.WING.
 - REBAR AND ANCHOR BOLTS SHALL BE PROTECTED FROM CORROSION BY COATING WITH AN ANTI-CORROSION PRODUCT AND TO CORROSION BY COATING WITH AN ANTI-CORROSION PRODUCT.
 - ANCHOR BOLT INSTALLATION: ANCHOR BOLT PROTECTION SHALL BE USED WITH THE SITE OF THE ANCHOR BOLT PROTECTION FOR PROPER ACCESS POINT ORIENTATION AND ANCHOR BOLT ALIGNMENT PRIOR TO CONCRETE PLACEMENT.

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VERIZON WIRELESS
150' to 170' MONOPOLE
DAYVILLE CT
KILLINGLY, CT

PROJECT NO	18068
SCALE: N.T.S.	
SHEET 1 of 1	18068S-170 0

REV	DESCRIPTION	DATE	BY	CHK
1	CHANGED BOLT CIRCLE	3/1/2017	GEF	
0	COMPLETED DRAWING	10/20/17	GEF	

tnxTower Engineered Endeavors 10975 Kinsman Road Newbury, OH 44065-9787 Phone: (440) 564-5484 FAX: (440)564-5489	Job 18068-E01 /Dayville/CT	Page 1 of 21
	Project 150' to 170' Monopole	Date 10:08:32 02/17/17
	Client Verizon Wireless	Designed by gfisher

Tower Input Data

There is a pole section.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

Tower is located in Windham County, Connecticut.

Basic wind speed of 110 mph.

Structure Class II.

Exposure Category C.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 1.0000 in.

Ice thickness is considered to increase with height.

Ice density of 56.00 pcf.

A wind speed of 50 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	√ Use Clear Spans For Wind Area	SR Leg Bolts Resist Compression
√ Use Code Stress Ratios	Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	√ Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	√ Use Azimuth Dish Coefficients	Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist.
		Exemption
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice
		Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric		

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Numbe r of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	170.00-150.00	20.00	0.00	18	24.0000	30.0000	0.1875	0.7500	A572-65 (65000 psi)

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	Client Verizon Wireless	Designed by gfisher

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L2	150.00-96.08	53.92	5.85	18	30.0000	44.1900	0.3750	1.5000	A572-65 (65000 psi)
L3	96.08-47.87	54.06	7.28	18	41.9005	55.9500	0.5000	2.0000	A572-65 (65000 psi)
L4	47.87-1.00	54.15		18	53.0593	67.0000	0.5625	2.2500	A572-65 (65000 psi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	24.3702	14.1714	1015.221	8.4534	12.1920	83.2694	2031.778	7.0871	3.8940	20.768
	30.4628	17.7422	1992.236	10.5834	15.2400	130.7242	3987.093	8.8728	4.9500	26.4
L2	30.4628	35.2612	3909.765	10.5169	15.2400	256.5463	7824.675	17.6339	4.6200	12.32
	44.8717	52.1508	12648.64	15.5543	22.4485	563.4513	25313.93	26.0804	7.1174	18.98
L3	44.0906	65.7025	14227.55	14.6972	21.2854	668.4171	28473.82	32.8575	6.4945	12.989
	56.8131	87.9992	34183.69	19.6848	28.4226	1202.694	68412.37	44.0079	8.9672	17.934
L4	55.7798	93.7265	32633.66	18.6364	26.9541	1210.710	65310.26	46.8722	8.3484	14.842
	68.0336	118.6159	66146.48	23.5853	34.0360	1943.427	132379.9	59.3192	10.8020	19.204

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in	Double Angle Stitch Bolt Spacing Redundants in
ft	ft ²	in							
L1 170.00-150.00				1	1	1			
L2 150.00-96.08				1	1	1			
L3 96.08-47.87				1	1	1			
L4 47.87-1.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

tnxTower Engineered Endeavors 10975 Kinsman Road Newbury, OH 44065-9787 Phone: (440) 564-5484 FAX: (440)564-5489	Job	18068-E01 /Dayville/CT	Page	3 of 21
	Project	150' to 170' Monopole	Date	10:08:32 02/17/17
	Client	Verizon Wireless	Designed by	gfisher

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		CAA ft ² /ft	Weight plf
AVA7-50 (1-5/8 LOW DENS. FOAM)	C	No	Inside Pole	170.00 - 8.00	15	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENS. FOAM)	C	No	Inside Pole	160.00 - 4.00	15	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENS. FOAM)	C	No	Inside Pole	150.00 - 8.00	15	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENS. FOAM)	C	No	Inside Pole	140.00 - 8.00	15	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENS. FOAM)	C	No	Inside Pole	130.00 - 4.00	15	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENS. FOAM)	C	No	Inside Pole	120.00 - 8.00	15	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	CAA In Face ft ²	CAA Out Face ft ²	Weight lb
L1	170.00-150.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	324.00
L2	150.00-96.08	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2846.02
L3	96.08-47.87	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	3124.01
L4	47.87-1.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2669.98

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	CAA In Face ft ²	CAA Out Face ft ²	Weight lb
L1	170.00-150.00	A	2.341	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	324.00
L2	150.00-96.08	A	2.279	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	2846.02
L3	96.08-47.87	A	2.160	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	3124.01
L4	47.87-1.00	A	1.943	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00

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Tower Section	Tower Elevation ft	Face or Leg C	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight lb
				0.000	0.000	0.000	0.000	2669.98

Feed Line Center of Pressure

Section	Elevation ft	CP _x in	CP _z in	CP _x Ice in	CP _z Ice in
L1	170.00-150.00	0.0000	0.0000	0.0000	0.0000
L2	150.00-96.08	0.0000	0.0000	0.0000	0.0000
L3	96.08-47.87	0.0000	0.0000	0.0000	0.0000
L4	47.87-1.00	0.0000	0.0000	0.0000	0.0000

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustme nt °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight lb	
(3) LNX-6514DS-VTM W/MOUNTING PIPE	A	From Leg	4.00 0.00 0.00	0.00	170.00	No	8.30	7.27	68.94
						Ice	8.79	8.20	139.71
						1/2"	9.29	9.06	219.25
						Ice 1"			
(3) SBNH-1D65B W/MOUNTING PIPE	B	From Leg	4.00 0.00 0.00	0.00	170.00	No	8.19	7.14	75.34
						Ice	8.65	7.96	144.64
						1/2"	9.11	8.80	222.56
						Ice 1"			
(3) SBNHH-1D65B W/MOUNTING PIPE	C	From Leg	4.00 0.00 0.00	0.00	170.00	No	8.86	7.84	89.82
						Ice	9.58	9.18	166.66
						1/2"	10.22	10.25	252.91
						Ice 1"			
(2) RRUS A2 (20.4" x 18.5" x 10.8")	A	None		0.00	170.00	No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
						Ice 1"			

tnxTower Engineered Endeavors 10975 Kinsman Road Newbury, OH 44065-9787 Phone: (440) 564-5484 FAX: (440)564-5489	Job		18068-E01 /Dayville/CT		Page		5 of 21	
	Project		150' to 170' Monopole		Date		10:08:32 02/17/17	
	Client		Verizon Wireless		Designed by		gfisher	

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CAA Front	CAA Side	Weight lb	
(2) RRUS A2 (20.4" x 18.5" x 10.8")	B	None		0.00	170.00	No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
						Ice 1"			
(2) RRUS A2 (20.4" x 18.5" x 10.8")	C	None		0.00	170.00	No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
						Ice 1"			
(2) 20" x 12.5" x 12" RRH	C	None		0.00	170.00	No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
						Ice 1"			
(2) 20" x 12.5" x 12" RRH	C	None		0.00	170.00	No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
						Ice 1"			
(2) 20" x 12.5" x 12" RRH	C	None		0.00	170.00	No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
						Ice 1"			
37" x 12" x 6" RRH	C	None		0.00	170.00	No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
						Ice 1"			
37" x 12" x 6" RRH	C	None		0.00	170.00	No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
						Ice 1"			
37" x 12" x 6" RRH	C	None		0.00	170.00	No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
						Ice 1"			
EE 12' Platform w/Handrails (K10994A + K12076)	C	None		0.00	170.00	No	38.00	38.00	1300.00
						Ice	48.00	48.00	1800.00
						1/2"	58.00	58.00	2400.00
						Ice 1"			
***** (3) LNX-6514DS-VTM W/MOUNTING PIPE	A	From Leg	4.00 0.00	0.00	160.00	No	8.30	7.27	68.94
						Ice	8.79	8.20	139.71

tnxTower Engineered Endeavors 10975 Kinsman Road Newbury, OH 44065-9787 Phone: (440) 564-5484 FAX: (440)564-5489	Job		18068-E01 /Dayville/CT					Page		6 of 21
	Project		150' to 170' Monopole					Date		10:08:32 02/17/17
	Client		Verizon Wireless					Designed by		gfisher

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustme nt °	Placement ft	CAA Front ft ²	CAA Side ft ²	Weight lb	
			0.00			9.29	9.06	219.25	
						1/2"			
						Ice			
						1"			
						Ice			
(3) SBNH-1D65B W/MOUNTING PIPE	B	From Leg	4.00	0.00	160.00	No	8.19	7.14	75.34
			0.00			Ice	8.65	7.96	144.64
			0.00			1/2"	9.11	8.80	222.56
						Ice			
						1"			
						Ice			
(3) SBNHH-1D65B W/MOUNTING PIPE	C	From Leg	4.00	0.00	160.00	No	8.86	7.84	89.82
			0.00			Ice	9.58	9.18	166.66
			0.00			1/2"	10.22	10.25	252.91
						Ice			
						1"			
						Ice			
(2) RRUS A2 (20.4" x 18.5" x 10.8")	A	None		0.00	160.00	No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
						Ice			
						1"			
						Ice			
(2) RRUS A2 (20.4" x 18.5" x 10.8")	B	None		0.00	160.00	No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
						Ice			
						1"			
						Ice			
(2) RRUS A2 (20.4" x 18.5" x 10.8")	C	None		0.00	160.00	No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
						Ice			
						1"			
						Ice			
(2) 20" x 12.5" x 12" RRH	C	None		0.00	160.00	No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
						Ice			
						1"			
						Ice			
(2) 20" x 12.5" x 12" RRH	C	None		0.00	160.00	No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
						Ice			
						1"			
						Ice			
(2) 20" x 12.5" x 12" RRH	C	None		0.00	160.00	No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
						Ice			
						1"			
						Ice			
37" x 12" x 6" RRH	C	None		0.00	160.00	No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
						Ice			
						1"			

tnxTower Engineered Endeavors 10975 Kinsman Road Newbury, OH 44065-9787 Phone: (440) 564-5484 FAX: (440)564-5489	Job		18068-E01 /Dayville/CT					Page		7 of 21
	Project		150' to 170' Monopole					Date		10:08:32 02/17/17
	Client		Verizon Wireless					Designed by		gfisher

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustme nt °	Placement ft	CAA Front ft ²	CAA Side ft ²	Weight lb	
37" x 12" x 6" RRH	C	None		0.00	160.00	Ice			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
37" x 12" x 6" RRH	C	None		0.00	160.00	Ice			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
EE 12' Platform w/Handrails (K10994A + K12076)	C	None		0.00	160.00	Ice			
						No	38.00	38.00	1300.00
						Ice	48.00	48.00	1800.00
						1/2"	58.00	58.00	2400.00
***** (3) LNX-6515DS-A1M w/Mounting Pipe	A	From Leg	4.00 0.00 0.00	0.00	150.00	Ice			
						No	11.43	9.60	101.60
						Ice	12.05	10.70	188.18
						1/2"	12.67	11.70	285.11
(3) SBNHH-1D65B W/MOUNTING PIPE	B	From Leg	4.00 0.00 0.00	0.00	150.00	Ice			
						No	8.86	7.84	89.82
						Ice	9.58	9.18	166.66
						1/2"	10.22	10.25	252.91
(3) SBNHH-1D65B W/MOUNTING PIPE	C	From Leg	4.00 0.00 0.00	0.00	150.00	Ice			
						No	8.86	7.84	89.82
						Ice	9.58	9.18	166.66
						1/2"	10.22	10.25	252.91
(2) RRUS A2 (20.4" x 18.5" x 10.8")	A	None		0.00	150.00	Ice			
						No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
(2) RRUS A2 (20.4" x 18.5" x 10.8")	B	None		0.00	150.00	Ice			
						No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
(2) RRUS A2 (20.4" x 18.5" x 10.8")	C	None		0.00	150.00	Ice			
						No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
(2) 20" x 12.5" x 12" RRH	C	None		0.00	150.00	Ice			
						No	2.08	2.00	50.00

tnxTower Engineered Endeavors 10975 Kinsman Road Newbury, OH 44065-9787 Phone: (440) 564-5484 FAX: (440)564-5489	Job		18068-E01 /Dayville/CT					Page		8 of 21
	Project		150' to 170' Monopole					Date		10:08:32 02/17/17
	Client		Verizon Wireless					Designed by		gfisher

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustme nt °	Placement ft	CAA Front ft ²	CAA Side ft ²	Weight lb	
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
						Ice			
						1"			
(2) 20" x 12.5" x 12" RRH	C	None		0.00	150.00	No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
						Ice			
						1"			
(2) 20" x 12.5" x 12" RRH	C	None		0.00	150.00	No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
						Ice			
						1"			
37" x 12" x 6" RRH	C	None		0.00	150.00	No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
						Ice			
						1"			
37" x 12" x 6" RRH	C	None		0.00	150.00	No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
						Ice			
						1"			
37" x 12" x 6" RRH	C	None		0.00	150.00	No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
						Ice			
						1"			
EE 12' Square Platform w/Handrails (K11130 + K11914)	C	None		0.00	150.00	No	75.00	75.00	3131.00
						Ice	75.00	75.00	3131.00
						1/2"	75.00	75.00	3131.00
						Ice			
						1"			
						Ice			
*****						Ice			
(3) LNX-6515DS-A1M w/Mounting Pipe	A	From Leg	4.00 0.00 0.00	0.00	140.00	No	11.43	9.60	101.60
						Ice	12.05	10.70	188.18
						1/2"	12.67	11.70	285.11
						Ice			
						1"			
(3) SBNHH-1D65B W/MOUNTING PIPE	B	From Leg	4.00 0.00 0.00	0.00	140.00	No	8.86	7.84	89.82
						Ice	9.58	9.18	166.66
						1/2"	10.22	10.25	252.91
						Ice			
						1"			
(3) SBNHH-1D65B W/MOUNTING PIPE	C	From Leg	4.00 0.00 0.00	0.00	140.00	No	8.86	7.84	89.82
						Ice	9.58	9.18	166.66
						1/2"	10.22	10.25	252.91

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	Project		150' to 170' Monopole		Date		10:08:32 02/17/17	
	Client		Verizon Wireless		Designed by		gfisher	

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CAA Front ft ²	CAA Side ft ²	Weight lb	
(2) RRUS A2 (20.4" x 18.5" x 10.8")	A	None		0.00	140.00	Ice 1"			
						No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
(2) RRUS A2 (20.4" x 18.5" x 10.8")	B	None		0.00	140.00	Ice 1"			
						No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
(2) RRUS A2 (20.4" x 18.5" x 10.8")	C	None		0.00	140.00	Ice 1"			
						No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
(2) 20" x 12.5" x 12" RRH	C	None		0.00	140.00	Ice 1"			
						No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
(2) 20" x 12.5" x 12" RRH	C	None		0.00	140.00	Ice 1"			
						No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
(2) 20" x 12.5" x 12" RRH	C	None		0.00	140.00	Ice 1"			
						No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
37" x 12" x 6" RRH	C	None		0.00	140.00	Ice 1"			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
37" x 12" x 6" RRH	C	None		0.00	140.00	Ice 1"			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
37" x 12" x 6" RRH	C	None		0.00	140.00	Ice 1"			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
37" x 12" x 6" RRH	C	None		0.00	140.00	Ice 1"			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
37" x 12" x 6" RRH	C	None		0.00	140.00	Ice 1"			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
37" x 12" x 6" RRH	C	None		0.00	140.00	Ice 1"			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
37" x 12" x 6" RRH	C	None		0.00	140.00	Ice 1"			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
37" x 12" x 6" RRH	C	None		0.00	140.00	Ice 1"			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
37" x 12" x 6" RRH	C	None		0.00	140.00	Ice 1"			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
37" x 12" x 6" RRH	C	None		0.00	140.00	Ice 1"			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
37" x 12" x 6" RRH	C	None		0.00	140.00	Ice 1"			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
37" x 12" x 6" RRH	C	None		0.00	140.00	Ice 1"			
						No	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22

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	Project	150' to 170' Monopole	Date	10:08:32 02/17/17
	Client	Verizon Wireless	Designed by	gfisher

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustme nt °	Placement ft	CAA Front	CAA Side	Weight lb	
						ft ²	ft ²		
EE 12' Platform w/Handrails (K10994A + K12076)	C	None		0.00	140.00	No	38.00	38.00	1300.00
						Ice	48.00	48.00	1800.00
						1/2"	58.00	58.00	2400.00
						Ice 1"			
						Ice			
***** (3) LNX-6515DS-A1M w/Mounting Pipe	A	From Leg	4.00 0.00 0.00	0.00	130.00	No	11.43	9.60	101.60
						Ice	12.05	10.70	188.18
						1/2"	12.67	11.70	285.11
						Ice 1"			
						Ice			
(3) SBNHH-1D65C W/MOUNTING PIPE	B	From Leg	4.00 0.00 0.00	0.00	130.00	No	11.39	9.56	78.80
						Ice	12.01	10.97	165.51
						1/2"	12.63	12.24	261.94
						Ice 1"			
						Ice			
(3) SBNHH-1D65B W/MOUNTING PIPE	C	From Leg	4.00 0.00 0.00	0.00	130.00	No	8.86	7.84	89.82
						Ice	9.58	9.18	166.66
						1/2"	10.22	10.25	252.91
						Ice 1"			
						Ice			
(2) RRUS A2 (20.4" x 18.5" x 10.8")	A	None		0.00	130.00	No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
						Ice 1"			
						Ice			
(2) RRUS A2 (20.4" x 18.5" x 10.8")	B	None		0.00	130.00	No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
						Ice 1"			
						Ice			
(2) RRUS A2 (20.4" x 18.5" x 10.8")	C	None		0.00	130.00	No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
						1/2"	3.59	2.20	129.79
						Ice 1"			
						Ice			
(2) 20" x 12.5" x 12" RRH	C	None		0.00	130.00	No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
						Ice 1"			
						Ice			
(2) 20" x 12.5" x 12" RRH	C	None		0.00	130.00	No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
						Ice 1"			
						Ice			
(2) 20" x 12.5" x 12" RRH	C	None		0.00	130.00	No	2.08	2.00	50.00
						Ice	2.27	2.18	72.22

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	Project		150' to 170' Monopole		Date		10:08:32 02/17/17	
	Client		Verizon Wireless		Designed by		gfisher	

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustme nt °	Placement ft	CAA Front ft ²	CAA Side ft ²	Weight lb	
(2) RRUS A2 (20.4" x 18.5" x 10.8")	C	None		0.00	120.00	1"			
						Ice			
						No	3.15	1.84	71.40
						Ice	3.36	2.01	98.89
(2) 20" x 12.5" x 12" RRH	C	None		0.00	120.00	1/2"	3.59	2.20	129.79
						Ice			
						1"			
						Ice	2.08	2.00	50.00
(2) 20" x 12.5" x 12" RRH	C	None		0.00	120.00	Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
						Ice			
						1"			
(2) 20" x 12.5" x 12" RRH	C	None		0.00	120.00	Ice	2.08	2.00	50.00
						No	2.27	2.18	72.22
						Ice	2.27	2.18	72.22
						1/2"	2.46	2.37	97.51
(2) 20" x 12.5" x 12" RRH	C	None		0.00	120.00	Ice			
						1"			
						Ice	2.08	2.00	50.00
						No	2.27	2.18	72.22
37" x 12" x 6" RRH	C	None		0.00	120.00	Ice	2.46	2.37	97.51
						Ice			
						1"			
						Ice	2.08	2.00	50.00
37" x 12" x 6" RRH	C	None		0.00	120.00	Ice	2.27	2.18	72.22
						No	2.46	2.37	97.51
						Ice			
						1"			
37" x 12" x 6" RRH	C	None		0.00	120.00	Ice	3.78	2.10	55.00
						Ice	4.05	2.34	80.73
						1/2"	4.32	2.58	110.22
						Ice			
37" x 12" x 6" RRH	C	None		0.00	120.00	Ice			
						1"			
						Ice	3.78	2.10	55.00
						No	4.05	2.34	80.73
37" x 12" x 6" RRH	C	None		0.00	120.00	Ice	4.32	2.58	110.22
						Ice			
						1"			
						Ice	3.78	2.10	55.00
EE 12' Platform w/Handrails (K10994A + K12076)	C	None		0.00	120.00	Ice	4.05	2.34	80.73
						No	4.32	2.58	110.22
						Ice			
						1"			
EE 12' Platform w/Handrails (K10994A + K12076)	C	None		0.00	120.00	Ice	3.78	2.10	55.00
						No	4.05	2.34	80.73
						Ice	4.05	2.34	80.73
						1/2"	58.00	58.00	2400.00
EE 12' Platform w/Handrails (K10994A + K12076)	C	None		0.00	120.00	Ice			
						1"			
						Ice	38.00	38.00	1300.00
						No	48.00	48.00	1800.00
EE 12' Platform w/Handrails (K10994A + K12076)	C	None		0.00	120.00	Ice	58.00	58.00	2400.00
						Ice			
						1"			
						Ice			

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	Project 150' to 170' Monopole	Date 10:08:32 02/17/17
	Client Verizon Wireless	Designed by gfisher

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	170 - 150	Pole	Max Tension	26	0.00	-0.00	-0.00
			Max. Compression	26	-27722.79	1.63	-0.86
			Max. Mx	20	-5627.93	318.46	-0.30
			Max. My	14	-5614.98	0.23	-318.49
			Max. Vy	20	-21984.03	318.46	-0.30
			Max. Vx	2	-21984.75	0.37	317.50
			Max. Torque	24			1.20
L2	150 - 96.08	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-94492.06	0.35	2.86
			Max. Mx	20	-30000.49	3020.12	3.54
			Max. My	2	-29926.37	3.99	3035.05
			Max. Vy	20	-72280.39	3020.12	3.54
			Max. Vx	2	-72695.78	3.99	3035.05
			Max. Torque	23			-4.60
L3	96.08 - 47.87	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-120780.76	0.35	2.86
			Max. Mx	20	-52257.62	6570.28	9.44
			Max. My	2	-52219.20	9.73	6604.65
			Max. Vy	20	-79299.08	6570.28	9.44
			Max. Vx	2	-79714.17	9.73	6604.65
			Max. Torque	23			-4.58
L4	47.87 - 1	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-159769.27	0.35	2.86
			Max. Mx	20	-85678.45	11054.34	16.01
			Max. My	2	-85677.58	16.30	11110.90
			Max. Vy	20	-85686.55	11054.34	16.01
			Max. Vx	2	-86089.09	16.30	11110.90
			Max. Torque	23			-4.55

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	27	159769.27	8.41	18936.77
	Max. H _x	21	64325.10	85598.12	119.05
	Max. H _z	2	85766.81	119.05	86000.20
	Max. M _x	2	11110.90	119.05	86000.20
	Max. M _z	8	11052.57	-85598.12	-119.05
	Max. Torsion	11	4.54	-74189.67	-43103.18
	Min. Vert	11	64325.10	-74189.67	-43103.18
	Min. H _x	9	64325.10	-85598.12	-119.05
	Min. H _z	14	85766.81	-119.05	-86000.20
	Min. M _x	14	-11109.56	-119.05	-86000.20
	Min. M _z	20	-11054.34	85598.12	119.05
	Min. Torsion	23	-4.54	74189.67	43103.18

Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	71472.34	0.00	0.00	-0.53	0.70	0.00

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Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
1.2 Dead+1.6 Wind 0 deg - No Ice	85766.81	-119.05	-86000.20	-11110.90	16.30	1.52
0.9 Dead+1.6 Wind 0 deg - No Ice	64325.10	-119.05	-86000.18	-11006.75	15.93	1.54
1.2 Dead+1.6 Wind 30 deg - No Ice	85766.80	42695.96	-74418.81	-9614.87	-5512.42	-0.86
0.9 Dead+1.6 Wind 30 deg - No Ice	64325.10	42695.96	-74418.81	-9524.70	-5461.04	-0.84
1.2 Dead+1.6 Wind 60 deg - No Ice	85766.80	74070.62	-42896.99	-5542.61	-9564.00	-3.01
0.9 Dead+1.6 Wind 60 deg - No Ice	64325.10	74070.62	-42896.99	-5490.56	-9474.69	-3.00
1.2 Dead+1.6 Wind 90 deg - No Ice	85766.80	85598.12	119.05	14.76	-11052.57	-4.35
0.9 Dead+1.6 Wind 90 deg - No Ice	64325.10	85598.12	119.05	14.79	-10949.34	-4.35
1.2 Dead+1.6 Wind 120 deg - No Ice	85766.80	74189.67	43103.18	5567.92	-9579.22	-4.53
0.9 Dead+1.6 Wind 120 deg - No Ice	64325.10	74189.67	43103.18	5515.97	-9489.80	-4.54
1.2 Dead+1.6 Wind 150 deg - No Ice	85766.80	42902.16	74537.86	9628.82	-5538.97	-3.49
0.9 Dead+1.6 Wind 150 deg - No Ice	64325.10	42902.16	74537.86	9538.87	-5487.37	-3.51
1.2 Dead+1.6 Wind 180 deg - No Ice	85766.81	119.05	86000.20	11109.56	-14.48	-1.52
0.9 Dead+1.6 Wind 180 deg - No Ice	64325.10	119.05	86000.18	11005.77	-14.58	-1.54
1.2 Dead+1.6 Wind 210 deg - No Ice	85766.80	-42695.96	74418.81	9613.53	5514.19	0.86
0.9 Dead+1.6 Wind 210 deg - No Ice	64325.10	-42695.96	74418.81	9523.71	5462.35	0.84
1.2 Dead+1.6 Wind 240 deg - No Ice	85766.80	-74070.62	42896.99	5541.32	9565.74	3.01
0.9 Dead+1.6 Wind 240 deg - No Ice	64325.10	-74070.62	42896.99	5489.60	9475.98	3.00
1.2 Dead+1.6 Wind 270 deg - No Ice	85766.80	-85598.12	-119.05	-16.01	11054.34	4.36
0.9 Dead+1.6 Wind 270 deg - No Ice	64325.10	-85598.12	-119.05	-15.72	10950.64	4.36
1.2 Dead+1.6 Wind 300 deg - No Ice	85766.80	-74189.67	-43103.18	-5569.17	9581.04	4.53
0.9 Dead+1.6 Wind 300 deg - No Ice	64325.10	-74189.67	-43103.18	-5516.90	9491.14	4.54
1.2 Dead+1.6 Wind 330 deg - No Ice	85766.80	-42902.16	-74537.86	-9630.11	5540.81	3.49
0.9 Dead+1.6 Wind 330 deg - No Ice	64325.10	-42902.16	-74537.86	-9539.82	5488.73	3.51
1.2 Dead+1.0 Ice+1.0 Temp	159769.27	-0.00	-0.01	-2.86	0.35	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	159769.27	-8.41	-18936.77	-2532.65	1.86	0.05
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	159769.27	9422.10	-16395.27	-2193.10	-1257.24	-0.13
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	159769.27	16327.96	-9460.96	-1266.75	-2179.35	-0.29
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	159769.27	18859.03	8.41	-1.86	-2517.35	-0.36
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	159769.27	16336.36	9475.52	1262.65	-2180.79	-0.34
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	159769.27	9436.66	16403.68	2187.95	-1259.74	-0.23

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Load Combination	Vertical lb	Shear _x lb	Shear _y lb	Overturning Moment, M _x kip-ft	Overturning Moment, M _y kip-ft	Torque kip-ft
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	159769.27	8.41	18936.76	2526.06	-1.02	-0.06
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	159769.27	-9422.10	16395.27	2186.51	1258.07	0.13
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	159769.27	-16327.96	9460.96	1260.16	2180.19	0.29
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	159769.27	-18859.03	-8.41	-4.74	2518.19	0.36
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	159769.27	-16336.36	-9475.52	-1269.24	2181.63	0.34
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	159769.27	-9436.66	-16403.68	-2194.54	1260.57	0.23
Dead+Wind 0 deg - Service	71472.34	-19.81	-14308.43	-1842.90	3.29	0.26
Dead+Wind 30 deg - Service	71472.34	7103.61	-12381.56	-1594.80	-913.49	-0.15
Dead+Wind 60 deg - Service	71472.34	12323.63	-7137.06	-919.52	-1585.30	-0.51
Dead+Wind 90 deg - Service	71472.34	14241.53	19.81	1.99	-1832.13	-0.74
Dead+Wind 120 deg - Service	71472.34	12343.43	7171.37	922.82	-1587.85	-0.77
Dead+Wind 150 deg - Service	71472.34	7137.92	12401.36	1596.23	-917.90	-0.60
Dead+Wind 180 deg - Service	71472.34	19.81	14308.43	1841.78	-1.81	-0.26
Dead+Wind 210 deg - Service	71472.34	-7103.61	12381.56	1593.68	914.96	0.15
Dead+Wind 240 deg - Service	71472.34	-12323.63	7137.06	918.40	1586.78	0.51
Dead+Wind 270 deg - Service	71472.34	-14241.53	-19.81	-3.11	1833.61	0.74
Dead+Wind 300 deg - Service	71472.34	-12343.43	-7171.37	-923.94	1589.33	0.77
Dead+Wind 330 deg - Service	71472.34	-7137.92	-12401.36	-1597.35	919.38	0.60

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-71472.34	0.00	0.00	71472.34	0.00	0.000%
2	-119.05	-85766.80	-86000.17	119.05	85766.81	86000.20	0.000%
3	-119.05	-64325.10	-86000.17	119.05	64325.10	86000.18	0.000%
4	42695.96	-85766.80	-74418.81	-42695.96	85766.80	74418.81	0.000%
5	42695.96	-64325.10	-74418.81	-42695.96	64325.10	74418.81	0.000%
6	74070.62	-85766.80	-42896.99	-74070.62	85766.80	42896.99	0.000%
7	74070.62	-64325.10	-42896.99	-74070.62	64325.10	42896.99	0.000%
8	85598.11	-85766.80	119.05	-85598.12	85766.80	-119.05	0.000%
9	85598.11	-64325.10	119.05	-85598.12	64325.10	-119.05	0.000%
10	74189.67	-85766.80	43103.18	-74189.67	85766.80	-43103.18	0.000%
11	74189.67	-64325.10	43103.18	-74189.67	64325.10	-43103.18	0.000%
12	42902.16	-85766.80	74537.86	-42902.16	85766.80	-74537.86	0.000%
13	42902.16	-64325.10	74537.86	-42902.16	64325.10	-74537.86	0.000%
14	119.05	-85766.80	86000.17	-119.05	85766.81	-86000.20	0.000%
15	119.05	-64325.10	86000.17	-119.05	64325.10	-86000.18	0.000%
16	-42695.96	-85766.80	74418.81	42695.96	85766.80	-74418.81	0.000%
17	-42695.96	-64325.10	74418.81	42695.96	64325.10	-74418.81	0.000%
18	-74070.62	-85766.80	42896.99	74070.62	85766.80	-42896.99	0.000%
19	-74070.62	-64325.10	42896.99	74070.62	64325.10	-42896.99	0.000%
20	-85598.11	-85766.80	-119.05	85598.12	85766.80	119.05	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
21	-85598.11	-64325.10	-119.05	85598.12	64325.10	119.05	0.000%
22	-74189.67	-85766.80	-43103.18	74189.67	85766.80	43103.18	0.000%
23	-74189.67	-64325.10	-43103.18	74189.67	64325.10	43103.18	0.000%
24	-42902.16	-85766.80	-74537.86	42902.16	85766.80	74537.86	0.000%
25	-42902.16	-64325.10	-74537.86	42902.16	64325.10	74537.86	0.000%
26	0.00	-159769.27	0.00	0.00	159769.27	0.01	0.000%
27	-8.41	-159769.27	-18936.45	8.41	159769.27	18936.77	0.000%
28	9422.08	-159769.27	-16395.24	-9422.10	159769.27	16395.27	0.000%
29	16327.92	-159769.27	-9460.94	-16327.96	159769.27	9460.96	0.000%
30	18858.72	-159769.27	8.41	-18859.03	159769.27	-8.41	0.000%
31	16336.33	-159769.27	9475.50	-16336.36	159769.27	-9475.52	0.000%
32	9436.64	-159769.27	16403.65	-9436.66	159769.27	-16403.68	0.000%
33	8.41	-159769.27	18936.45	-8.41	159769.27	-18936.76	0.000%
34	-9422.08	-159769.27	16395.24	9422.10	159769.27	-16395.27	0.000%
35	-16327.92	-159769.27	9460.94	16327.96	159769.27	-9460.96	0.000%
36	-18858.72	-159769.27	-8.41	18859.03	159769.27	8.41	0.000%
37	-16336.33	-159769.27	-9475.50	16336.36	159769.27	9475.52	0.000%
38	-9436.64	-159769.27	-16403.65	9436.66	159769.27	16403.68	0.000%
39	-19.81	-71472.34	-14308.42	19.81	71472.34	14308.43	0.000%
40	7103.61	-71472.34	-12381.55	-7103.61	71472.34	12381.56	0.000%
41	12323.62	-71472.34	-7137.06	-12323.63	71472.34	7137.06	0.000%
42	14241.53	-71472.34	19.81	-14241.53	71472.34	-19.81	0.000%
43	12343.43	-71472.34	7171.36	-12343.43	71472.34	-7171.37	0.000%
44	7137.92	-71472.34	12401.36	-7137.92	71472.34	-12401.36	0.000%
45	19.81	-71472.34	14308.42	-19.81	71472.34	-14308.43	0.000%
46	-7103.61	-71472.34	12381.55	7103.61	71472.34	-12381.56	0.000%
47	-12323.62	-71472.34	7137.06	12323.63	71472.34	-7137.06	0.000%
48	-14241.53	-71472.34	-19.81	14241.53	71472.34	19.81	0.000%
49	-12343.43	-71472.34	-7171.36	12343.43	71472.34	7171.37	0.000%
50	-7137.92	-71472.34	-12401.36	7137.92	71472.34	12401.36	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00033830
3	Yes	4	0.00000001	0.00015897
4	Yes	6	0.00000001	0.00005644
5	Yes	5	0.00000001	0.00055245
6	Yes	6	0.00000001	0.00005845
7	Yes	5	0.00000001	0.00057449
8	Yes	5	0.00000001	0.00004505
9	Yes	4	0.00000001	0.00067912
10	Yes	6	0.00000001	0.00005574
11	Yes	5	0.00000001	0.00054456
12	Yes	6	0.00000001	0.00005806
13	Yes	5	0.00000001	0.00057015
14	Yes	4	0.00000001	0.00035617
15	Yes	4	0.00000001	0.00018170
16	Yes	6	0.00000001	0.00005787
17	Yes	5	0.00000001	0.00056802
18	Yes	6	0.00000001	0.00005586
19	Yes	5	0.00000001	0.00054595
20	Yes	5	0.00000001	0.00005749
21	Yes	4	0.00000001	0.00086092

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22	Yes	6	0.0000001	0.00005862
23	Yes	5	0.0000001	0.00057615
24	Yes	6	0.0000001	0.00005630
25	Yes	5	0.0000001	0.00055062
26	Yes	4	0.0000001	0.00000662
27	Yes	5	0.0000001	0.00060132
28	Yes	6	0.0000001	0.00013019
29	Yes	6	0.0000001	0.00013178
30	Yes	5	0.0000001	0.00059648
31	Yes	6	0.0000001	0.00013014
32	Yes	6	0.0000001	0.00013017
33	Yes	5	0.0000001	0.00059817
34	Yes	6	0.0000001	0.00013152
35	Yes	6	0.0000001	0.00012962
36	Yes	5	0.0000001	0.00059740
37	Yes	6	0.0000001	0.00013195
38	Yes	6	0.0000001	0.00013224
39	Yes	4	0.0000001	0.00003957
40	Yes	4	0.0000001	0.00047956
41	Yes	4	0.0000001	0.00052428
42	Yes	4	0.0000001	0.00007777
43	Yes	4	0.0000001	0.00047071
44	Yes	4	0.0000001	0.00051603
45	Yes	4	0.0000001	0.00003962
46	Yes	4	0.0000001	0.00051326
47	Yes	4	0.0000001	0.00047038
48	Yes	4	0.0000001	0.00008034
49	Yes	4	0.0000001	0.00053167
50	Yes	4	0.0000001	0.00048438

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	170 - 150	26.67	50	1.41	0.00
L2	150 - 96.08	20.87	50	1.33	0.00
L3	101.93 - 47.87	9.26	50	0.90	0.00
L4	55.145 - 1	2.58	50	0.44	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
170.00	(3) LNX-6514DS-VTM W/MOUNTING PIPE	50	26.67	1.41	0.00	34853
160.00	(3) LNX-6514DS-VTM W/MOUNTING PIPE	50	23.73	1.38	0.00	17426
150.00	(3) LNX-6515DS-A1M w/Mounting Pipe	50	20.87	1.33	0.00	8995
140.00	(3) LNX-6515DS-A1M w/Mounting Pipe	50	18.13	1.27	0.00	7760
130.00	(3) LNX-6515DS-A1M w/Mounting Pipe	50	15.54	1.19	0.00	6995
120.00	(3) LNX-6515DS-A1M w/Mounting	50	13.13	1.09	0.00	6359

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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft	Pipe		in	°	°	ft

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	170 - 150	160.37	2	8.49	0.01
L2	150 - 96.08	125.55	2	8.04	0.01
L3	101.93 - 47.87	55.79	2	5.42	0.01
L4	55.145 - 1	15.56	2	2.66	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
170.00	(3) LNX-6514DS-VTM W/MOUNTING PIPE	2	160.37	8.49	0.01	6088
160.00	(3) LNX-6514DS-VTM W/MOUNTING PIPE	2	142.76	8.30	0.01	3042
150.00	(3) LNX-6515DS-A1M w/Mounting Pipe	2	125.55	8.04	0.01	1566
140.00	(3) LNX-6515DS-A1M w/Mounting Pipe	2	109.10	7.65	0.01	1341
130.00	(3) LNX-6515DS-A1M w/Mounting Pipe	2	93.58	7.15	0.01	1200
120.00	(3) LNX-6515DS-A1M w/Mounting Pipe	2	79.07	6.57	0.01	1085

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio P _u / φP _n
	ft		ft	ft		in ²	lb	lb	
L1	170 - 150 (1)	TP30x24x0.1875	20.00	0.00	0.0	17.742 2	-5621.10	1123340.00	0.005
L2	150 - 96.08 (2)	TP44.19x30x0.375	53.92	0.00	0.0	50.318 4	-29926.40	3619610.00	0.008
L3	96.08 - 47.87 (3)	TP55.95x41.9005x0.5	54.06	0.00	0.0	84.998 6	-52219.20	6203230.00	0.008
L4	47.87 - 1 (4)	TP67x53.0593x0.5625	54.14	0.00	0.0	118.61 60	-85677.60	8413710.00	0.010

tnxTower Engineered Endeavors 10975 Kinsman Road Newbury, OH 44065-9787 Phone: (440) 564-5484 FAX: (440)564-5489	Job 18068-E01 /Dayville/CT	Page 20 of 21
	Project 150' to 170' Monopole	Date 10:08:32 02/17/17
	Client Verizon Wireless	Designed by gfisher

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{ux} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M_{uy} kip-ft	ϕM_{uy} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
L1	170 - 150 (1)	TP30x24x0.1875	318.60	689.73	0.462	0.00	689.73	0.000
L2	150 - 96.08 (2)	TP44.19x30x0.375	3035.05	3143.45	0.966	0.00	3143.45	0.000
L3	96.08 - 47.87 (3)	TP55.95x41.9005x0.5	6604.66	6821.97	0.968	0.00	6821.97	0.000
L4	47.87 - 1 (4)	TP67x53.0593x0.5625	11110.92	11487.67	0.967	0.00	11487.67	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	170 - 150 (1)	TP30x24x0.1875	21980.70	561670.00	0.039	0.75	1381.15	0.001
L2	150 - 96.08 (2)	TP44.19x30x0.375	72695.90	1809800.00	0.040	1.53	6294.59	0.000
L3	96.08 - 47.87 (3)	TP55.95x41.9005x0.5	79714.30	3101610.00	0.026	1.52	13660.67	0.000
L4	47.87 - 1 (4)	TP67x53.0593x0.5625	86089.20	4206850.00	0.020	1.52	23003.42	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u ϕP_n	Ratio M_{ux} ϕM_{ux}	Ratio M_{uy} ϕM_{uy}	Ratio V_u ϕV_n	Ratio T_u ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	170 - 150 (1)	0.005	0.462	0.000	0.039	0.001	0.468	1.000	4.8.2 ✓
L2	150 - 96.08 (2)	0.008	0.966	0.000	0.040	0.000	0.975	1.000	4.8.2 ✓
L3	96.08 - 47.87 (3)	0.008	0.968	0.000	0.026	0.000	0.977	1.000	4.8.2 ✓
L4	47.87 - 1 (4)	0.010	0.967	0.000	0.020	0.000	0.978	1.000	4.8.2 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capaci ty	Pass Fail
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tnxTower Engineered Endeavors 10975 Kinsman Road Newbury, OH 44065-9787 Phone: (440) 564-5484 FAX: (440)564-5489	Job	18068-E01 /Dayville/CT	Page	21 of 21
	Project	150' to 170' Monopole	Date	10:08:32 02/17/17
	Client	Verizon Wireless	Designed by	gfisher

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$\emptyset P_{allow}$ lb	% Capacity	Pass Fail	
L1	170 - 150	Pole	TP30x24x0.1875	1	-5621.10	1123340.00	46.8	Pass	
L2	150 - 96.08	Pole	TP44.19x30x0.375	2	-29926.40	3619610.00	97.5	Pass	
L3	96.08 - 47.87	Pole	TP55.95x41.9005x0.5	3	-52219.20	6203230.00	97.7	Pass	
L4	47.87 - 1	Pole	TP67x53.0593x0.5625	4	-85677.60	8413710.00	97.8	Pass	
							Summary		
							Pole (L4)	97.8	Pass
							RATING	97.8	Pass
							=		

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: _____
 Site Name: _____
 App #: _____

Reactions		
Mu	320	ft-kips
Axial, Pu:	5.6	kips
Shear, Vu:	22	kips
Elevation:	150	feet

Bolt Threads:
X-Excluded
$\phi V_n = \phi(0.55 A_b F_u)$
$\phi = 0.75, \phi^* V_n$ (kips):
38.88

Pole Manufacturer: **Other**

If No stiffeners, Criteria: **TIA G** <-Only Applicable to Unstiffened Cases

Bolt Data

Qty:	16		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	
N/A:	55	<-- Disregard	
Circle (in.):	34		

Flange Bolt Results

Bolt Tension Capacity, $\phi^* T_n, B1$: 54.54 kips
 Adjusted $\phi^* T_n$ (due to $V_u = V_u / Q_t$), **B**: 54.51 kips
 Max Bolt directly applied T_u : 27.89 Kips
 Min. PL "tc" for **B** cap. **w/o Prying**: 1.031 in
 Min PL "treq" for actual **T w/ Prying**: 0.547 in
 Min PL "t1" for actual **T w/o Prying**: 0.737 in
 T allowable with Prying: 53.30 kips $0 \leq \alpha \leq 1$ case
 Prying Force, q: 0.00 kips
 Total Bolt Tension = $T_u + q$: 27.89 kips
 Prying Bolt Stress Ratio = $(T_u + q) / (B)$: 51.2% **Pass**

Rigid
$\phi^* T_n$
$\phi T_n [1 - (V_u / \phi V_n)^2]^{0.5}$

Plate Data

Diam:	38	in
Thick, t:	1	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	5.95	in

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress: 22.3 ksi
 Allowable Plate Stress: 32.4 ksi
 Compression Plate Stress Ratio: 68.8% **Pass**

Rigid
TIA G
$\phi^* F_y$
Comp. Y.L. Length:
16.00

Stiffener Data (Welding at Both Sides)

Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

No Prying

Tension Side Stress Ratio, $(treq/t)^2$: 29.9% **Pass**

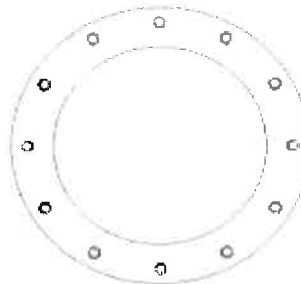
n/a

Stiffener Results

Horizontal Weld : n/a
 Vertical Weld: n/a
 Plate Flex+Shear, $f_b / F_b + (f_v / F_v)^2$: n/a
 Plate Tension+Shear, $f_t / F_t + (f_v / F_v)^2$: n/a
 Plate Comp. (AISC Bracket): n/a

Pole Results

Pole Punching Shear Check: n/a



Pole Data		
Diam:	30	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

EI Job #:	18068-E01
Site Name:	Dayville CT
Structure:	150ft to 170ft Pole

Client:	Verizon Wireless
Site #:	
Location:	Killingly, CT

Base Reactions	
Moment, M_u =	11111 ft-kip
Shear, V_u =	86 kip
Vertical, P_u =	85.8 kip

Base Plate Properties	
Base Plate Material =	A572GR50
Outside Diameter =	80.5 in
Inside Diameter =	57 in
Weight =	2108 lbf

Pole Properties at Base	
Pole Diameter =	67 in
Pole Thickness =	0.5625 in
Yield Strength =	65 ksi
Monopole Shape =	18-Sided

Effective Base Plate Bend Line	
Desantis' Bend Line =	44.62 in
% Reduction =	60 %
Reduced Bend Line =	21.27 in
Brinker's Bend Line =	9.20 in
Effective Bend Line =	9.20 in

Anchor Rod Properties & Bolt Circle Diam	
Anchor Material =	A615GR75
Anchor Diameter =	2.25 in
Minimum Bolt Circle \emptyset =	74.53 in
Actual Bolt Circle \emptyset =	74.5 in
Spacing =	7.80 in
Anchor Length =	6 ft
No. of Anchors =	30
Weight =	2679 lbs

Base Plate Thickness	
Section Modulus: Plastic	
Φ_b =	0.9
Minimum Thickness =	2.96 in
Actual Thickness =	3 in
M_{ub} =	906 in-k
ΦM_n =	931 in-kip
Usage ratio, % =	97.2%

Anchor Rod Inter. Eq. 1 (4.9.9)	
P_{ub} =	241 kip
V_{ub} =	2.87 kip
η =	0.5
Φ_t =	0.80
$\Phi_t R_{nt}$ =	260 kip
Inter. Eq. 1 =	0.95

Setting Template Properties	
Outside Diameter =	80.5 in
Inside Diameter =	68.5 in
Thickness =	0.375 in
Template Hole \emptyset =	2.375 in
Template Weight =	135.2 lbs
<i>*Bottom Template Must Be Bolted*</i>	

Anchor Rod Inter. Eq. 2 (4.9.9)	
L_{ar} =	2.25 in
V_{ub} =	2.87 kip
P_{ub} =	241 kip
M_{ub} =	4.19 kip-in
$\Phi_v R_{nv}$ =	134 kip
$\Phi_t R_{nt}$ =	260 kip
$\Phi_f R_{nm}$ =	95 kip-in
Inter. Eq. 2 =	0.95

Summary Table	
Anchor Material =	A615GR75
Anchor Diameter =	2.25 in
No. of Anchors =	30
Actual Bolt Circle \emptyset =	74.5 in
Anchor Length =	6 ft
Base Plate Material =	A572GR50
Actual Thickness =	3 in
Outside Diameter =	80.5 in
Inside Diameter =	57 in



**DESIGN CALCULATIONS
FOR
SPREAD FOOTER FOUNDATION**

**Verizon Wireless
150-ft to 170ft Monopole
Dayville, CT / Site

Killingly, CT**

EEL Project Number 18068-E01, Rev. 0

February 17, 2017

10975 Kinsman Road & Newbury, Ohio 44065
Phone: (440) 564-5484 & Phone: (888) 270-3855
Fax: (440) 564-5489 & www.engend.com

FOUNDATION DESIGN CALCULATIONS FOR A SPREAD FOOTER FOUNDATION



CUSTOMER: Verizon Wireless

DATE: 2/17/2017

LOCATION: Killingly, CT

150-ft to 170ft Monopole

SITE NAME: Dayville, CT

JOB NUMBER: 18068-E01

SITE NUMBER:

STATUS: Rev. 0

FOUNDATION DESIGN LOADS

DESIGN CODE		TIA-222-G		
	OVERTURNING MOMENT, kip-ft	SHEAR, kips	AXIAL, kips	
TIA/EIA 222F	0.0	0	0	
TIA-222-G	11111.00	86	85.8	
FACTORED $w/\phi=0.75$	14814.7	114.7	114.4	

ANCHOR BOLT DATA

QUANTITY	LENGTH	BOLT CIRCLE Ø	PROJECTION
30	6.0 ft	74.5 in	12.0 in

SOIL UNIT WEIGHT, pcf **110.00**

CONCRETE UNIT WEIGHT, pcf **150.00**

MINIMUM FOUNDATION PARAMETERS

PEDESTAL MINIMUM WIDTH 96.0 in
FOUNDATION MINIMUM HEIGHT 5.50 ft

PEDESTAL PROJECTION **12.0 in**

ACTUAL FOUNDATION SIZE

	HEIGHT, ft	WIDTH, ft
SLAB	3.00	37.00
PEDESTAL	4.00	8.00

STABILITY

Foundation Weight, kips 654.45
Concrete, cub.yd. 161.59
Soil Weight, kips 430.65
Total weight foundation and soil (unfactored), kips 1085.10

Total Vertical Load, kips 1053.81
Total Overturning Moment, kip-ft 11713.00
Total Resisting Moment, kip-ft 19495.49

OVERTURNING SAFETY FACTOR **1.66**

Kern of Eccentricity, ft 6.17
Actual Eccentricity, ft 11.11

Allowable Net Soil Pressure, ksf (see soil report) **12.0**
Max soil pressure, ksf per TIA-222-G **3.4**
per TIA/EIA-222-F **n/a**

uplift exists!
(min SF=1.5)
Per Soil Report
(Include. OLF)



CONCRETE REINFORCEMENT

	BAR SIZE	BAR WEIGHT (lbs/ft)	QUANTITY	LENGTH (ft)	WEIGHT (lbs)
TOP PAD	# 9	3.40	72	41.50	10159.20
BOTTOM PAD	# 9	3.40	114	36.50	14147.40
VERTICAL BARS	# 10	3.40	52	9.00	1591.20
HORIZONTAL TIES	# 4	1.50	8	24.65	295.75

TOTAL STEEL WEIGHT (lbs) 26193.55

FOOTING STRENGTH DESIGN

Concrete, psi 3000
Steel, ksi 60

Concrete cover, in 3
Distance, d (slab), in 32

NOTES

TWO-WAY SHEAR IN THE SLAB

Vertical Load, kips	85.80	
Bearing Soil Pressure, ksf	0.06	
Shear in the slab, kips	78.89	
Design shear Vn, kips	1525.56	$\phi = 0.85$ OK

ONE-WAY SHEAR IN THE SLAB

Max soil pressure, ksf	2.57	
Actual Eccentricity, ft	11.11	
Kern of Eccentricity, ft	6.17	
Pressure Distribution Zone, ft	22.16	
Effective Pressure Zone, ft	11.83	
Max Shear Force, kips	1125.4	
Design Shear, kips	1322.9	$\phi = 0.85$ OK

SLAB DESIGN IN FLEXURE

Max Soil Pressure, ksf	2.57	
Actual Eccentricity, ft	11.11	
Kern of Eccentricity, ft	6.17	
Pressure Distribution Zone, ft	22.16	
Effective Pressure Zone, ft	14.50	
Soil Pressure at Effective Zone Edge	0.89	
Shear Force at Critical Section, kip	927.8	
Bending Moment, k-ft	7816.9	
Coefficient of Resistance, Rn	229.2	$\phi = 0.90$
Min. Required Reinf. Ratio by Analysis	0.00401	
Min. Reinf. Ratio per ACI 318, 200/Fy	0.00330	
Min. Reinf. Ratio per ACI 318	0.00401	ACI-318 Sect.10.5.3
Design Reinforcement Ratio	0.00401	
Min. Steel Area, sq.in.	56.97	
Bar size	9	
Bar section area, in ²	1.00	

BOTTOM BARS

Min. No.of Bars/One direction	57.00	
Actual No.of Bars/One direction	55	revise bottom bars
Actual Steel Area, sq.in.	55.00	
Steel Ratio Actual	0.00387	revise bottom bars
Revised Coefficient of Resistance, Rn	232.24	
Design Moment, kip-ft	7919.10	
Total bottom bars	114	
Horizontal Spacing (shor), in	8.11	OK

TOP BARS

Min. Steel Area, sq.in (0.18%)	25.57	
Minimum Number of Bars REQUIRED	26	One Direction
Actual Number of Bars	36	OK
Top Steel Area, sq.in	36.00	
Total Top Bars	72	
Horizontal Spacing, in	12.51	OK

PEDESTAL DESIGN

Pedestal Width, in	96
Concrete Strength, ksi	3
Reinforcement Strength, ksi	60
Actual Rebars	QTY 52
Nominal Bars	QTY 12
Minimum reinforcement ratio	0.0033
Actual reinforcement ratio	0.0072
Concrete cover, in	3
Rebar layout radius, in	44.50

Ultimate Moment 11455.0 ft-kips

Rebar	10
Area, sq.in	1.27
Area, sq.in	5.50
Rebar space, in	5.38
ϵ_u	0.003
ϵ_y	0.00207

BENDING ABOUT THE MAJOR AXIS

Rebar Number	Angle degrees	Coordinate in	Edge Dist. in
1	0	44.50	3.50
2	30	38.54	9.46
3	60	22.25	25.75
4	90	0.00	48.00
5	120	-22.25	70.25
6	150	-38.54	86.54

Rebar Number	Angle degrees	Coordinate in	Edge Dist. in
7	180	-44.50	92.50
8	210	-38.54	86.54
9	240	-22.25	70.25
10	270	0.00	48.00
11	300	22.25	25.75
12	330	38.54	9.46

Location of Neutral Axis

Compression Zone

Compression Zone		
Rebar Number	ϵ in/in	Force kips
1	0.0021	330.20

c = 11.79 in

a = 10.02 in

Tension Zone

Tension Zone		
Rebar Number	ϵ in/in	Force kips
2	-0.0006	-94.46
3	0.0036	330.20
4	0.0092	330.20
5	0.0149	330.20
6	0.0190	330.20
7	0.0205	330.20
8	0.0190	330.20
9	0.0149	330.20
10	0.0092	330.20
11	0.0036	330.20
12	-0.0006	-94.46

Concrete, kips 2452.69

Total Compression, kips 2782.89

Total Tension, kips 2782.89

Moment Due to Compression

Rebar Number	Force kips	Arm in	Moment k-ft
1	330.20	44.50	1224.49
2	0.00	38.54	0.00
12	0.00	38.54	0.00

Concrete	2452.69	42.99	8786.85
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Moment Due to Tension

Rebar Number	Force kips	Arm in	Moment k-ft
2	-94.46	38.54	303.34
3	330.20	22.25	-612.25
4	330.20	0.00	0.00
5	330.20	-22.25	612.25
6	330.20	-38.54	1060.44
7	330.20	-44.50	1224.49
8	330.20	-38.54	1060.44
9	330.20	-22.25	612.25
10	330.20	0.00	0.00
11	330.20	22.25	-612.25
12	-94.46	38.54	303.34

Total in Compression 10011.34

Total in Tension 3952.06

Design Moment about the Major Axis, kip-ft 12567.06 OK

BENDING ABOUT THE DIAGONAL

Rebar Number	Angle, deg phi	Coord., in c1	Edge Dist., in di
1	0	44.50	23.38
2	30	38.54	29.34
3	60	22.25	45.63
4	90	0.00	67.88
5	120	-22.25	90.13
6	150	-38.54	106.42

Rebar Number	Angle, deg phi	Coord., in c1	Edge Dist., in di
7	180	-44.50	112.38
8	210	-38.54	106.42
9	240	-22.25	90.13
10	270	0.00	67.88
11	300	22.25	45.63
12	330	38.54	29.34

Location of Neutral Axis

Compression Zone

$$c = 34.26 \text{ in}$$

$$a = 29.12 \text{ in}$$

Compression Zone		
Rebar Number	ϵ in/in	Force kips
1	0.000952	330.20

Concrete, kips 2161.93

Total Compression, kips 2492.13

Tension Zone		
Rebar Number	ϵ in/in	Force kips
2	-0.0004	-68.65
3	0.0010	159.01
4	0.0029	330.20
5	0.0049	330.20
6	0.0063	330.20
7	0.0068	330.20
8	0.0063	330.20
9	0.0049	330.20
10	0.0029	330.20
11	0.0010	159.01
12	-0.0004	-68.65

Total tension, kips 2492.13

Moment Due to Compression

Rebar Number	Force kips	Arm in	Moment k-ft
1	330.20	44.50	1224.49
2	0.00	38.54	0.00
12	0.00	38.54	0.00

Concrete	2161.93	58.18	10481.11
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Total in Compression, kips 11705.60

Moment Due to Tension

Rebar Number	Force kips	Arm in	Moment k-ft
3	159.01	22.25	-294.83
4	330.20	22.25	-612.25
5	330.20	0.00	0.00
6	330.20	-22.25	612.25
7	330.20	-44.50	1224.49
8	330.20	-38.54	1060.44
9	330.20	-22.25	612.25
10	330.20	0.00	0.00
11	159.01	22.25	-294.83

Total in Tension, kips 2307.51

Design Moment, kip-ft 12611.80

Pedestal Design Moment, kip-ft 12567.06 OK

GEOTECHNICAL EVALUATION of SUBSURFACE CONDITIONS

for

DAYVILLE, CT

520 Bailey Hill Road
Killingly, CT 06241



Prepared for:

verizon^v

99 East River Drive
East Hartford, CT 08108

Dated: December 22, 2016

Prepared by:



1600 Osgood Street, Building 20 North, Suite 3090
North Andover, MA 01845
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. 12/22/16



PROJECT LOCATION & DESCRIPTION

The site and project of concern is located at 520 Bailey Hill Road, in Killingly CT. The proposed personal cellular communications antenna tower and compound will be located approximately 480 feet east of Bailey Hill Road. The proposed project can be generally located at 41° 49' 56.76" N and 71° 48' 33.23" W on the East Killingly, CT USGS quadrangle (1974 Photo revised) or viewed in Google Earth or other internet based geographic mapping software.

The proposed Verizon Wireless communications facility and antenna tower will consist of a 100'x100' lease area, 50'x50' crushed stone surface compound with chain-link perimeter security fence, 12'x26' steel raised platform with exterior mounted communications equipment, a small cabinet style emergency electrical generator, and additional supporting infrastructure. The proposed cellular communications antenna tower will consist of a 150' monopole with Verizon panel antennas located at 150' above ground level. The proposed compound and antenna tower can accommodate additional commercial carriers and Town of Killingly emergency responder's communications equipment.

The property is owned by Tri Lakes, LLC and the communications compound and designated access areas will be leased by Verizon Wireless.

PROJECT PURPOSE

The purpose of this Geotechnical Evaluation of Subsurface Conditions is to determine the subsurface soil conditions and properties to be used in the structural design of the proposed cellular communication antenna tower foundation. The soil investigation and report were completed for Verizon Wireless.

The Geotechnical Evaluation was completed in accordance with standard practice, ANSI /TIA-222-G Structural Standards for Steel Antennas Towers and Supporting Structures (2009), International Building Code (IBC) 2009, and CT State Building Code (2016), as applicable.

METHODS OF INVESTIGATION

Hudson Design Group (HDG) completed a limited document review consisting of USDA-NRCS Soil Survey data, USGS Killingly, CT topographic map or quadrangle, and USGS Bedrock Geologic Map of Connecticut (1985) for the area of interest. The field or on-site investigation consisted of one primary soil boring with rock core and four (4) auger probes at the proposed antenna tower, with nine (9) additional auger probes along the proposed underground electric and telecommunications route parallel to the driveway.

The soil borings and rock coring were performed in general accordance with ASTM D 1586 and D 2113-08, respectively. The soil borings were completed with a Diedrich D-50 tracked drill vehicle with safety hammer rigging system. The primary soil boring included Standard Penetration Testing (SPT) with continuous split spoon soil sampling to refusal or bedrock.

Those present during the Geotechnical field or on site investigation of 12/9/16 included Orrin Cone and Mike Gionfrido of New England Boring Company (NEBC). No field or laboratory tests were completed on the recovered soil samples or rock core for this project.

RESULTS

USDA SOIL DATA

Based on review of the USDA, Natural Resource Conservation Service (NRCS) Soil Survey for Windham County, CT, HDG determined that the reported soils located within the communications compound consist primarily of Gloucester Gravelly Sandy Loam, with 3% to 15% natural terrain ground slopes, Map unit 59C. Surrounding soils include Sutton fine sandy loam (52C) to the west, and Canton and Charlton Fine sandy loam (62C) soils to the east,

The hydrologic soil group rating or classification for the Gloucester Gravelly Sandy Loam soil is A. Hydrologic Group A soils typically have rapid infiltration rates when thoroughly wet and are well drained to excessively drained soils consisting primarily of gravelly sands and sand. The reported depth to water table and any restrictive layer are both greater than 78 inches below grade.

Based on further on-line or internet based review of the USDA-NRCS soil survey data, the soil of interest at the proposed cellular communications facility with the Gloucester Gravelly Sandy Loam has a reported sand, silt, and clay content of 81%, 16%, and 3%, respectively. The soil was classified or rated as SM according to the Unified Soil Classification (USC) system.

USGS BEDROCK DATA

Based on review of the USGS Bedrock Geologic Map of Connecticut (1985) for the area of interest, the project appears to be within the Avalonian Continental Terrane. Based on the bedrock mapping color legend and identification labels, Zsh, the anticipated bedrock within the project area is likely of the Hope Valley Alaskite Gneiss. The intrusive igneous bedrock is reported to from the late Proterozoic Geologic Period. The depth to bedrock is not listed on the USGS bedrock map.

SOIL BORING

Based on soil the primary boring B-1, the soil encountered was primarily classified as brown fine sand and gravel with a trace of silt. Only one increment of standard penetration testing (SPT) was completed and bedrock was encountered at seven (7) feet below grade at the proposed center of antenna tower. As only one increment of blowcounts was completed near the surface and bedrock was encountered at 7 feet below grade, no soil properties or shallow bearing capacity for the soil are listed due to the extremely limited data.

Groundwater was not reported as being detected for the date or locations of testing. In addition, the nine (9) auger probes completed along the proposed underground electrical and telecommunications route found bedrock between 18-inches and 5-feet below grade.

ROCK CORING

Upon reaching refusal due to the presence of bedrock at 7 feet, one (1), 5-foot NX rock core was completed within the bedrock at B-1. The rock core was extracted from 7 feet to 12 feet.

From HDGs review of the rock core photographs and drillers log, the bedrock appears to be white to very light gray granite transitioning to light gray to very light pinkish gneiss with trace grain banding. The rock core demonstrates little decomposition, some weathering, with oxide staining at upper portions of the core, but is moderately fractured. The driller reported the bedrock core as light pink granite.

Based on the quantity and summing of rock sections 4-inches in length or greater, the core has a Rock Quality Designation (RQD) of 53% with a rock quality classification of POOR. HDGs estimation of RQD was performed in accordance with ASTM D 6032-08 and based on review of the drillers rock core photographs.

From review of the USGS Bedrock map, reported bedrock core descriptions and review of digital rock core photographs from the driller, HDG estimates the bedrock as listed below and correlated to presumptive values.

Table 1. Maximum presumptive properties and strengths for cored bedrock*.

Estimated Rock Type	RQD	Vertical Compressive Strength (psf)	Lateral Bearing Pressure (psf/ft)	Sliding Coefficient
Crystalline Bedrock (1)	53	12,000	1,200	0.70
Crystalline Bedrock (2)	53	100,000	1,200	0.60

1 Based on International Building Code, Chapter 18, Soils and Foundations (2009).

2 Connecticut State Building Code, Table 1806.2 Presumptive Load Bearing Values (2016).

CONCLUSIONS & RECOMMENDATIONS

Based on the USDA-NRCS Soil Survey data, USGS Geologic Bedrock map and descriptions, on-site investigations and empirical relations, the estimated soil and rock properties and bearing capacities are listed in the table above. In the event an empirical relation could not be established or determined, a presumptive value will be listed and stated as such and be according to the International Building Code (2009) and Connecticut Building Code amendments, as applicable.

SOIL

Since only one increment of Standard Penetration Testing (SPT) was completed within the soil and bedrock was encountered at seven (7) feet below grade, it is unlikely that the proposed cellular communications antenna tower will be supported by soil. As such, no soil properties or shallow (mat) foundation bearing capacity can be estimated for the granular soil.

BEDROCK

Based on boring B-1 and associated auger probes, the proposed antenna tower foundation will likely be supported by bedrock. Although the Connecticut State Building Code presumptive load bearing value is much greater than that listed in the International Building Code (IBC), HDG recommends using the lower presumed rock compressive strength per IBC in Table 1 unless destructive tests are completed on rock core specimens. As such, the **maximum net allowable rock compressive strength of 6 TSF**, or 12,000 lbs per square foot for analysis and design purposes should be used in the design of a cement concrete mat foundation.

Alternatives to use of the presumptive value for the bedrock for foundation design are to complete laboratory tests on core specimens such as ASTM D 7012-13, Standard Test Method for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures and ASTM D3967-08, Standard Test Method for Splitting Tensile Strength of Intact Rock Core Specimens.

FOUNDATION ALTERNATIVES

HDG recommends a steel-reinforced cement concrete mat foundation supported by bedrock for the proposed antenna tower foundation. The foundation shall be placed on sound bedrock and broken or foliated layers of bedrock shall be blasted, hoe-hammered, ripped, and removed until massive bedrock is found and a level base has been established.

The proposed cement concrete foundation should be of areal dimensions that impose a bearing pressure less than the presumptive rock bearing capacity listed in Table 1, and of a sufficient concrete mass to resist overturning moments and sliding forces in accordance with ANSI /TIA-222-G Structural Standards for Steel Antennas Towers and Supporting Structures (2009), International Building Code (IBC) 2009, and CT State Building Code (2016), as applicable.

ADDITIONAL DESIGN CRITERIA

Based on review of the UBC United States Seismic Zones Map, the project location is within the Zone 2A (0.15g) Seismic Zone (ground acceleration). The average overall frost design depth for this location is 30 inches, while CT code requires a minimum frost depth of 42 inches below finished grade.

Although groundwater was not detected or reported the date and location of drillers investigation, permanent measures to facilitate groundwater drainage below the foundation bottom should be implemented to the greatest extent practicable. Temporary measures for adequate de-watering and maintaining the groundwater table well below the proposed antenna tower foundation subgrade or base elevation shall be completed prior to foundation excavation and be maintained throughout foundation construction.

LIMITATIONS

As applicable, our recommendations are based on limited field observations, investigations, analysis, empirical relationships, and field or laboratory testing completed to date and limited to contractual arrangements for authorized tasks. It is important to understand that the soil investigation completed is very limited in scope and breadth and that subsurface soil conditions can vary greatly, or remain consistent with the soils identified in the soil logs during the investigation and incorporated into the calculations or estimates and report.

If during the construction of the foundation soil conditions are found to be greatly different from those identified in the soil logs, HDG shall not be held liable or responsible in any way for foundation design modifications or limitations that may be required as a result of differing or unforeseen conditions. Furthermore, the opinions and estimated values are based on professional experience, formal education, and a standard level of care and due-diligence practiced within the profession. No guarantee or warranty of work is explicitly or implicitly implied. This report is solely for the use of our client.



Figure 1a through 1e. View of bedrock core from 7 to 12 feet.

