Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

December 3, 2018

Via Federal Express

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

Re: **Docket No. 471 – 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 208 Kirk Road, Hamden, 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 On Air Engineering, LLC for the approved telecommunications facility at 208 Kirk Road in Hamden, 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 prepared by Sabre Industries.

3. Geotechnical Evaluation of Subsurface Conditions prepared by Terracon Consultants, Inc., dated October 17, 2018.

Together, this information constitutes the final D&M Plan submission for the approved telecommunications facility at 208 Kirk Road in Hamden.

Robinson+Cole

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

Enclosures
Copy to:
Curt B. Leng, Hamden Mayor
Patricia Sorrentino
Bridget M. D'Angelo, Esq.
Andrew Candiello
Chuck Webberly

ATTACHMENT 1

verizon

WIRELESS COMMUNICATIONS FACILITY

DEVELOPMENT AND MANAGEMENT PLAN
DOCKET NO. 471

SITE NAME: HAMDEN 8 CT

208 KIRK ROAD
SITE ACCESS OFF COUNTRY CLUB DRIVE
HAMDEN, CT 06514

SITE DIRECTIONS

FROM: 20 ALEXANDER DRIVE, WALLINGFORD, CT TO: 208 KIRK RD., HAMDEN, CT

- TAKE CT-68 BARNES RD. WEST
- TAKE US-5 NORTH
- TAKE CT-15 WILBUR CROSS PKWY. SOUTH
- AT EXIT 62, TAKE RAMP RIGHT FOR WHITNEY AVE TOWARD HAMDEN
- BEAR RIGHT ONTO WHITNEY AVE
- KEEP STRAIGHT ONTO CT-10/WHITNEY AVE
- TURN LEFT ONTO HAMDEN HILLS DR
- ROAD NAME CHANGES TO SHERMAN LN
- KEEP STRAIGHT ONTO SHERMAN AVE
- TURN RIGHT ONTO KIRK RD
- TURN LEFT ONTO BEAR PATH RD
- TURN RIGHT ONTO COUNTRY CLUB DR
- SITE ACCESS TO PARCEL IS AT THE END OF THE CUL-DE-SAC OF COUNTRY CLUB DR

PROJECT DESCRIPTION

- INSTALLATION OF A 120 FT. STEEL MONOPOLE TOWER DESIGNED TO SUPPORT A MINIMUM OF (4) TELECOMMUNICATION CARRIER ANTENNAS; TOWER TO BE FACTORY PAINTED BROWN
- INSTALLATION OF A 50'x30' FENCED COMPOUND WITHIN A 50'x55' LEASE AREA
- INSTALLATION OF CELLCO PARTNERSHIP EQUIPMENT CABINETS INCLUDING A DIESEL FUELED GENERATOR ON A CONCRETE SLAB-ON-GRADE
- INSTALLATION OF (6) CELLCO PARTNERSHIP PANEL ANTENNAS MOUNTED AT A CENTERLINE ELEVATION OF 120 FT. WITH ACCESSORY EQUIPMENT (AS REQUIRED) (PAINTED BROWN)
- POWER AND TELCO UTILITIES SHALL BE ROUTED UNDERGROUND FROM EXISTING DEMARCS TO THE PROPOSED UTILITY BACKBOARD AND EQUIPMENT AT THE COMPOUND. FINAL DEMARC LOCATIONS AND ROUTING SHALL BE VERIFIED/DETERMINED BY THE UTILITY COMPANIES.
- THE PROPOSED FACILITY SHALL BE DESIGNED IN ACCORDANCE WITH THE 2018 CT BUILDING CODE INCLUDING, BUT NOT LIMITED TO, THE REFERENCED TIA-222-G STANDARD
- THERE WILL BE NO LIGHTING UNLESS REQUIRED BY THE FCC OR THE FAA.

AERIAL MAP

N

NOT-TO-SCALE

PROJECT SUMMARY

SITE NAME:	HAMDEN 8 CT
SITE ADDRESS:	208 KIRK RD. HAMDEN, CT 06514
PROPERTY OWNER:	JOSEPH VIGNOLA & DENISE COURTMANCHE VIGNOLA 208 KIRK RD. HAMDEN, CT 06518
PARCEL M-B-L:	2826-024-00-0000
TOWER COORDINATES:	41° 23' 43.872" N 72° 55' 47.732" W GROUND ELEVATION 327.7 FT. ± A.M.S.L.
APPLICANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 20 ALEXANDER DR. WALLINGFORD, CT 06492
VERIZON WIRELESS CONTACTS:	MIKE HUMPHREYS - CONST. (860) 560-6410 JAIME LAREDO - RF (860) 308-4534
LEGAL/REGULATORY COUNSEL:	KENNETH C. BALDWIN, ESQ. ROBINSON & COLE, LLP (860) 275-8345

DRAWING SCHEDULE

SHEET NO.	SHEET DESCRIPTION
T-1	TITLE SHEET
C-1	PARTIAL SITE PLAN
C-2	SITE UTILITY PLAN
C-3	COMPOUND PLAN, SOUTH ELEVATION & ANTENNA PLAN
C-4	PROFILES AND SECTIONS
C-5	SEDIMENT AND EROSION CONTROL NOTES
C-6	SEDIMENT AND EROSION CONTROL DETAILS
C-7	DETAILS
C-8	STRUCTURAL & ENVIRONMENTAL NOTES
C-9	EQUIPMENT PLAN, ELEVATION & DETAILS

Cellco Partnership
d/b/a Verizon Wireless

verizon

WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

STATE OF CONNECTICUT — DAVID A. WEINPAHL — NO. 22144 — LICENSED PROFESSIONAL ENGINEER

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	03.05.18	REVIEW D&M PLANS
1	03.15.18	REVISED PER CLIENT COMMNETS
2	10.31.18	D&M PLANS FINAL

DRAWN BY:	CHECKED BY:
MF	DW

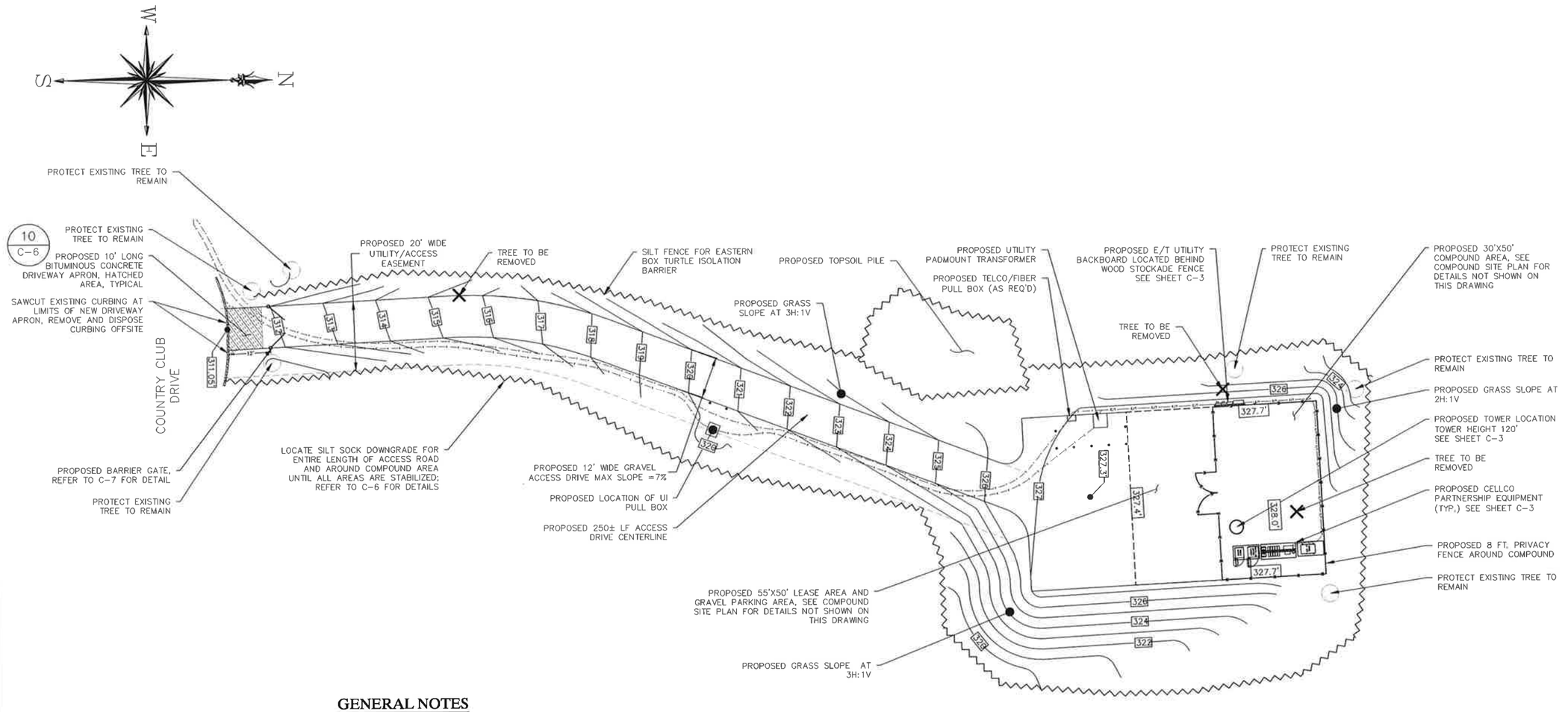
--

SITE NAME:
HAMDEN 8 CT

PROJECT INFORMATION:
208 KIRK RD.
HAMDEN, CT 06514

DRAWING TITLE:
TITLE SHEET

SHEET NUMBER:
T-1



SYMBOLS LEGEND

- PROPERTY LINE
- EASMENT LINE
- EXISTING CONTOUR
- PROPOSED CONTOUR
- CHAIN LINK FENCE
- SILT FENCE
- SILT SOCK
- ROAD CENTERLINE
- EXISTING TREE LINE
- EXISTING TREE FARM LINE
- EXISTING UTILITY POLE (POLE #XXXX)
- IRON PIN
- METAL POST
- DECIDUOUS TREE
- TREE TO BE DEMOLISHED
- BITUMINOUS CONCRETE DRIVEWAY APRON
- GEOGRID REINFORCED GRAVEL DRIVEWAY
- RIP RAP STABILIZED SLOPE

REFERENCE MAP:
1. "PROPERTY AND TOPOGRAPHIC PLAN" FOR PROPERTY AT 208 KIRK ROAD, HAMDEN, CONNECTICUT; DATE: 11-11-2016; SCALE: 1"=20'; PREPARED BY MARTINEZ COUCH & ASSOCIATES, LLC

GENERAL NOTES

CONSTRUCTION NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL MEASUREMENTS. ANY VARIATIONS FROM CONDITIONS SHOWN ARE TO BE BROUGHT TO THE ATTENTION OF THE DESIGN PROFESSIONAL AND/OR MCA PRIOR TO BIDDING FOR RESOLUTION IN ACCORDANCE WITH CONTRACT DOCUMENT REQUIREMENTS.
2. ALL REQUIRED PERMITS ARE TO BE OBTAINED BY THE CONTRACTOR AT HIS EXPENSE.
3. ALL DIMENSIONS ARE TO THE OUTSIDE FACE OF THE NOTED ITEM.
4. WORK LIMITS SHALL BE AS NOTED. ALL ITEMS DISTURBED BY ANY AND ALL CONSTRUCTION ACTIVITIES SHALL BE RESTORED SUBSTANTIALLY TO THE CONDITION THEY EXISTED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, TO THE OWNERS APPROVAL.
5. THE CONTRACTOR AT A MINIMUM SHALL MAINTAIN ALL SEDIMENT AND EROSION CONTROL DEVICES AS DIRECTED, AS NECESSARY, AND IN ACCORDANCE WITH CONTRACT REQUIREMENTS, AND SHALL CHECK ALL SYSTEMS ON A DAILY BASIS TO ENSURE THE PREVENTION OF SEDIMENT TRANSPORT AND THE CONTROL OF EROSION.
6. THE LOCATIONS OF SITE UTILITIES ARE UNKNOWN. PRIOR TO COMMENCING ANY EXCAVATION, THE CONTRACTOR SHALL PLACE A "CALL BEFORE YOU DIG" (CBYD) REQUEST (PHONE: 1-800-922-4455). THE PROTECTION OF EXISTING UTILITIES IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AT HIS EXPENSE.
7. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL ACTIVITY ON THE SUBJECT PROPERTY.
8. ALL FUEL, OIL PAINTS, OR OTHER HAZARDOUS MATERIALS STORED ON-SITE DURING THE CONSTRUCTION PERIOD SHOULD BE IN A SECONDARY CONTAINER AND REMOVED TO A LOCKED INDOOR AREA WITH AN IMPERVIOUS FLOOR WHEN THEY ARE NOT BEING USED. BULK FUEL FOR CONSTRUCTION EQUIPMENT SHALL NOT TO BE STORED ON-SITE. IF THIS BECOMES NECESSARY, FUEL SHOULD BE LOCATED WITHIN A SECONDARY CONTAINMENT SYSTEM TO PREVENT LEAKS FROM ENTERING THE ENVIRONMENT, SHELTERED FROM PRECIPITATION, AND IN A SECURED AREA. A SUPPLY OF ABSORBENT SPILL RESPONSE MATERIAL SHOULD BE AVAILABLE, ESPECIALLY DURING REFUELING, TO CLEAN UP ANY SPILLS OF HAZARDOUS MATERIAL SUCH AS GASOLINE OR OIL. IF SPILL OCCURS CALL 24-HOURS A DAY AT (800) 424-3338 TO ALERT SPILL RESPONSE TEAM.
9. THE CONTRACTOR MUST MAINTAIN (REPAIR/REPLACE WHEN NECESSARY) THE SILTATION CONTROL DEVICES, AS SHOWN ON THIS SHEET AND DETAILS SHEETS, UNTIL ALL INSTALLATION IS COMPLETED AND ALL DISTURBED AREAS ARE PERMANENTLY STABILIZED.
10. INDICATED UNDERGROUND UTILITIES ARE BASED ON INDICATED MAP REFERENCES. THE LOCATIONS ARE CONSIDERED APPROXIMATE AND ALL UTILITIES MAY NOT BE SHOWN. PRIOR TO ANY CONSTRUCTION THE CONTRACTOR SHALL CALL 1-800-922-4455 AND HAVE ALL UTILITIES MARKED ON THE GROUND.
11. ALL MATERIAL EXCAVATION, FILLING SHALL BE IN CONFORMANCE WITH APPROPRIATE SECTIONS OF THE TOWN OF HAMDEN REGULATIONS AND OSHA WORKPLACE SAFETY REGULATIONS.
12. CONTRACTOR SHALL USE WORK METHODS APPROVED BY OSHA FOR ALL TRENCHING AND EXCAVATION.
13. NO GRADED EARTH SLOPE SHALL EXCEED A 3H:1V SLOPE. UNLESS NOTED
14. PROVIDE POSITIVE DRAINAGE OF FINISHED GRADE AT ALL DISTURBED AREAS AS INTENDED BY THESE PLANS.
15. ALL SITE WORK SHALL BE IN CONFORMANCE WITH CONN. D.O.T. FORM 817 OR LATEST EDITION AS A MINIMUM ACCEPTABLE STANDARD.

SURVEY NOTES

THIS SURVEY AND MAP HAS BEEN PREPARED IN ACCORDANCE WITH SECTIONS 20-300B-1 THRU 20-300B-20 OF THE REGULATIONS OF CONNECTICUT STATE AGENCIES - "MINIMUM STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" AS ENDORSED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON SEPT. 26, 1996. THE LIMITED TOPOGRAPHIC SURVEY PORTION OF THIS PLAN CONFORMS TO A VERTICAL ACCURACY OF CLASS T-2 AND IS INTENDED TO BE USED TO DEPICT A PROPOSED TELECOMMUNICATION SITE.

THE PROPERTY/BOUNDARY LINES DEPICTED HEREON ARE COMPILED FROM OTHER MAPS, DEEDS AND LIMITED FIELD SURVEY. THESE LINES ARE NOT TO BE CONSTRUED AS A BOUNDARY OPINION AND ARE SUBJECT TO CHANGE AS AN ACCURATE FIELD SURVEY MAY DISCLOSE. PROPERTY MAY BE SUBJECT TO ENCUMBRANCES, EASEMENTS, RIGHTS OF WAY AS A TITLE SEARCH REPORT MAY DISCLOSE. PLANIMETRIC FEATURES SUCH AS PARKING AREAS, PAVED DRIVE ARE COMPILED FROM OTHER MAPS AND LIMITED FIELD SURVEY.

NORTH ORIENTATION AND COORDINATES REFER TO CONNECTICUT GRID SYSTEM NAD 83.

ELEVATIONS BASED ON NGVD 1929 DATUM.

PARCEL OWNER OF RECORD: JOSEPH A VIGNOLA & DENISE COURTEMANCHE

PARCEL KNOWN AS 1075 PARADISE AVENUE

PARCEL AREA= 9.34± ACRES

PARCEL IS IN THE RESIDENTIAL ZONING DISTRICT R3.

MAP 2826, LOT NO. 24, HAMDEN ASSESSORS MAP

PARCEL IS NOT IN A FLOOD ZONE BASED ON THE FLOOD INSURANCE RATE MAP, NEW HAVEN COUNTY, CONNECTICUT, ALL JURISDICTIONS, PANEL 293 OF 635, COMMUNITY MAP NUMBER 09009C0293H, MAP EFFECTIVE DATE DECEMBER 17, 2010, BY FEDERAL EMERGENCY MANAGEMENT AGENCY.

PARCEL IS SUBJECT TO RIGHTS AND EASEMENTS AS OF RECORD MAY APPEAR.

ALL IMPROVEMENTS ARE NOT SHOWN.

HOURS OF CONSTRUCTION:
7AM--7PM OR AS DIRECTED
BY HAMDEN BLDG. DEPT.

GRAPHIC SCALE

15 0 15 30 45 60
(IN FEET)
1 inch = 15 ft.

SITE EARTH WORK SUMMARY:

1. CLEAN FILL APPROX. 50 CU. YDS. REQUIRED FOR ACCESS ROAD CUT/FILL; REFER TO C-4 FOR ROAD PROFILE AND CROSS SECTIONS.
2. CRUSHED STONE REQUIRED FOR ACCESS ROAD/TURNAROUND AREA APPROX. 100 CU. YDS.
3. CRUSHED STONE REQUIRED FOR EQUIPMENT COMPOUND APPROX. 20 CU. YDS.
4. PROPOSED GRAVEL ACCESS ROAD SLOPE IS 7% MAX. EXISTING TERRAIN THIS AREA APPROX. 10% MAX. REFER TO C-4.
5. THREE (3) EXISTING DECIDUOUS TREES (LARGER THAN 10" DIAMETER) ALONG ACCESS ROAD AND AT COMPOUND TO BE REMOVED. NOTIFY ENGINEER IF ANY OTHER TREES ARE IMPACTED BY CONSTRUCTION AND MUST BE REMOVED.

Cellco Partnership
d/b/a Verizon Wireless

verizon

WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

STATE OF CONNECTICUT · DAVID A. WEINPAHL · NO. 22144 · LICENSED PROFESSIONAL ENGINEER

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	03.05.18	REVIEW D&M PLANS
1	03.15.18	REVISED PER CLIENT COMMNETS
2	10.31.18	D&M PLANS FINAL

DRAWN BY: MF
CHECKED BY: DW

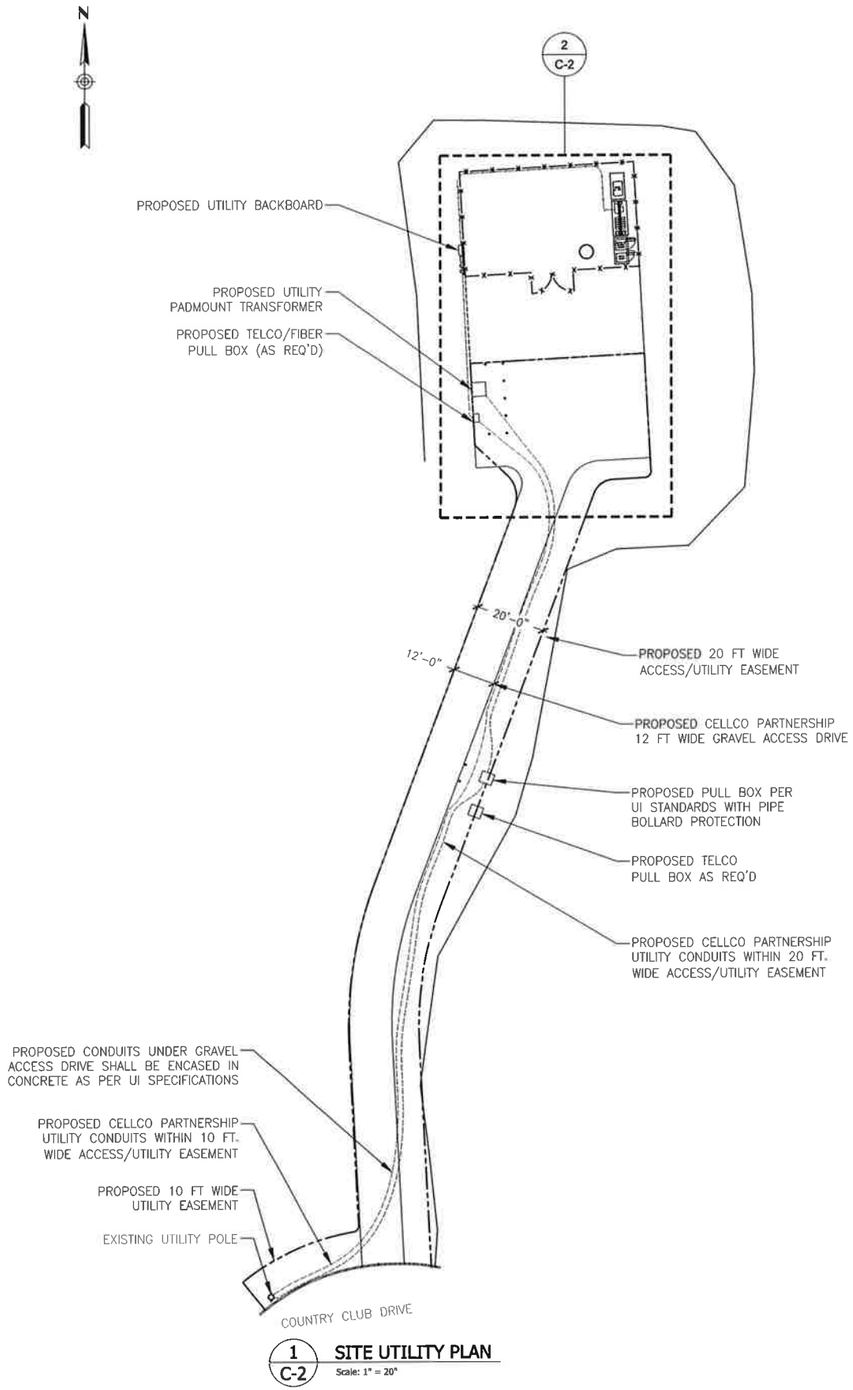
--

SITE NAME:
HAMDEN 8 CT

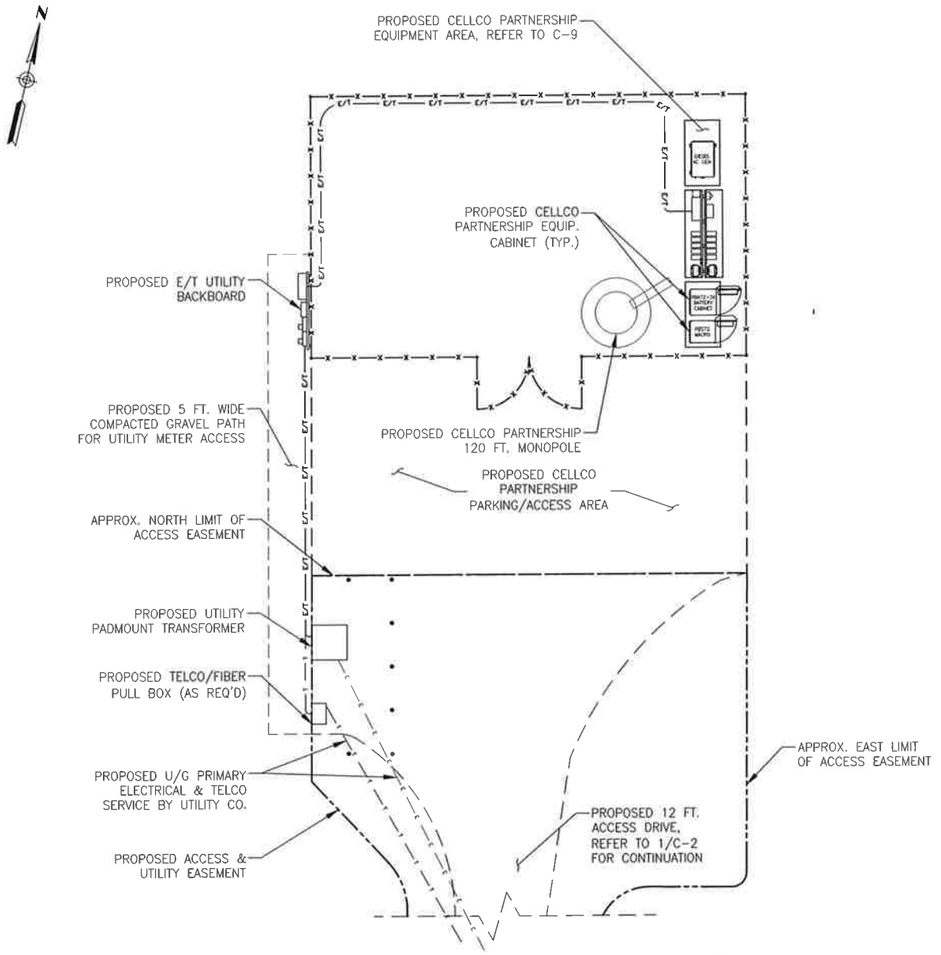
PROJECT INFORMATION:
208 KIRK RD.
HAMDEN, CT 06514

DRAWING TITLE:
PARTIAL SITE PLAN

SHEET NUMBER:
C-1



1 C-2 **SITE UTILITY PLAN**
Scale: 1" = 20'



2 C-2 **COMPOUND UTILITY PLAN**
Scale: 1/8" = 1'-0"

Cellco Partnership
d/b/a Verizon Wireless

verizon

WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

STATE OF CONNECTICUT · DAVID A. WEINPAHL · NO. 22144 · LICENSED PROFESSIONAL ENGINEER

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	03.05.18	REVIEW D&M PLANS
1	03.15.18	REVISED PER CLIENT COMMNETS
2	10.31.18	D&M PLANS FINAL

DRAWN BY:	CHECKED BY:
MF	DW

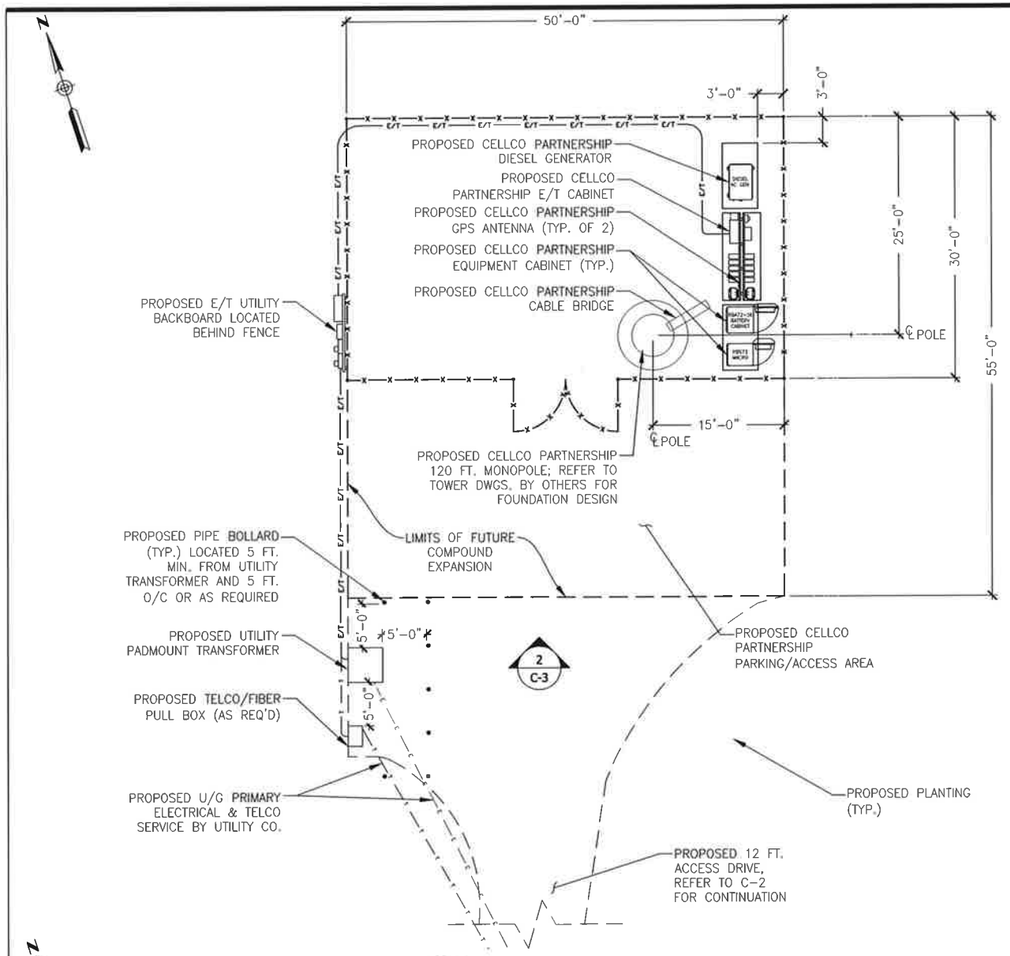
--

SITE NAME:
HAMDEN 8 CT

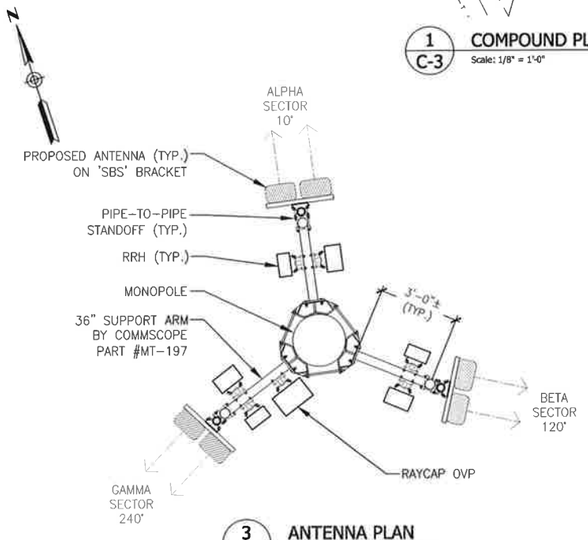
PROJECT INFORMATION:
208 KIRK RD.
HAMDEN, CT 06514

DRAWING TITLE:
SITE & COMPOUND UTILITY PLANS

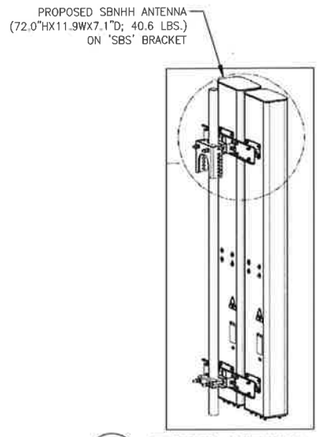
SHEET NUMBER:
C-2



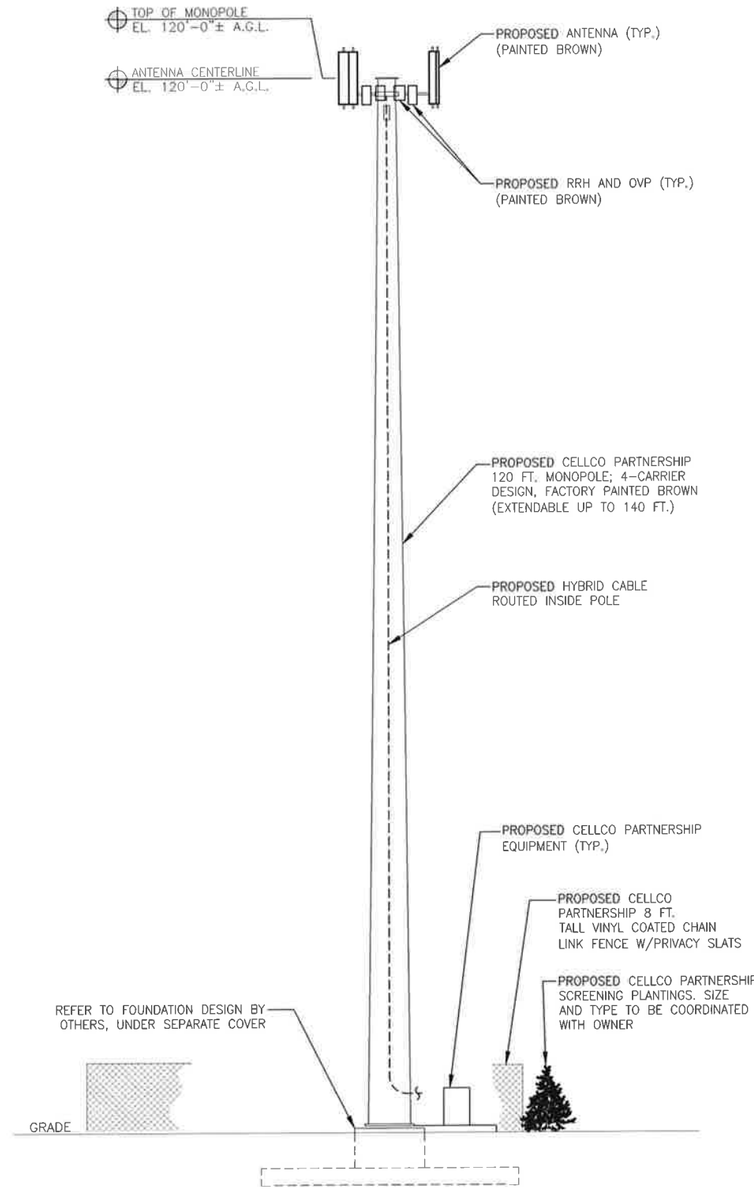
1 C-3 **COMPOUND PLAN**
Scale: 1/8" = 1'-0"



3 C-3 **ANTENNA PLAN**
Scale: 3/8" = 1'-0"



4 C-3 **TYPICAL ANTENNA DETAIL**
Scale: N.T.S.



2 C-3 **SOUTH ELEVATION**
Scale: 1/8" = 1'-0"

Cellco Partnership
d/b/a Verizon Wireless

verizon

WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

STATE OF CONNECTICUT · DAVID A. WEINPAHL · NO. 22144 · LICENSED PROFESSIONAL ENGINEER

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	03.05.18	REVIEW D&M PLANS
1	03.15.18	REVISED PER CLIENT COMMNETS
2	10.31.18	D&M PLANS FINAL

DRAWN BY:	CHECKED BY:
MF	DW

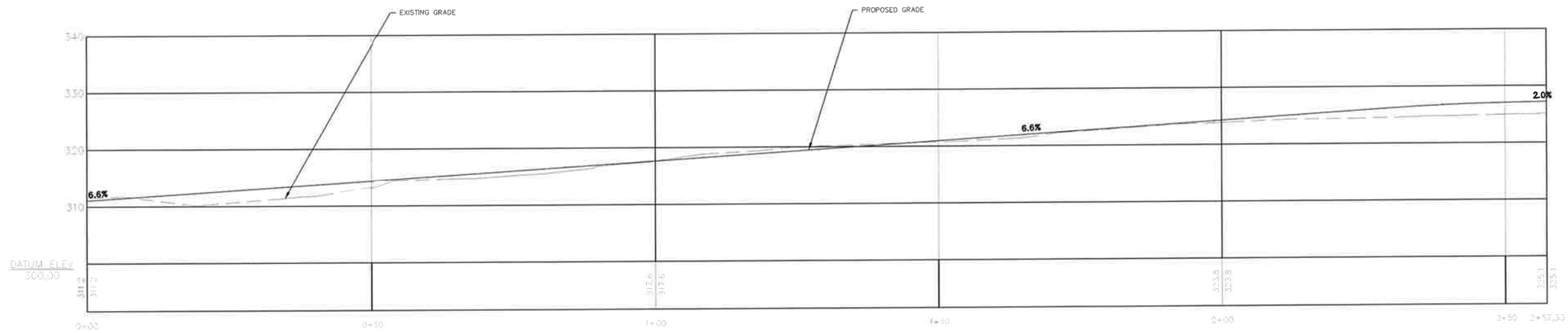
--

SITE NAME:
HAMDEN 8 CT

PROJECT INFORMATION:
208 KIRK RD.
HAMDEN, CT 06514

DRAWING TITLE:
COMPOUND PLAN, SOUTH ELEVATION & ANTENNA PLANS

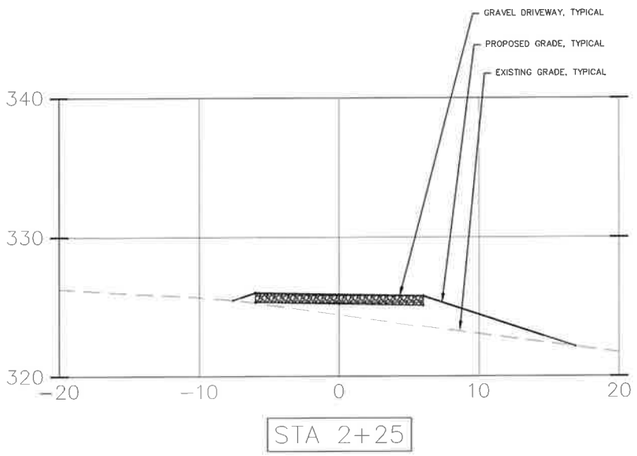
SHEET NUMBER:
C-3



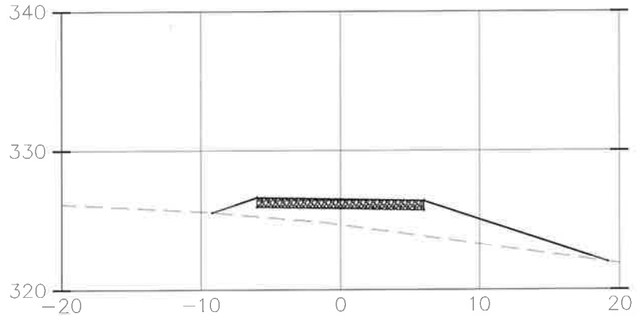
ACCESS DRIVE PROFILE

SCALE: 1" = 10'

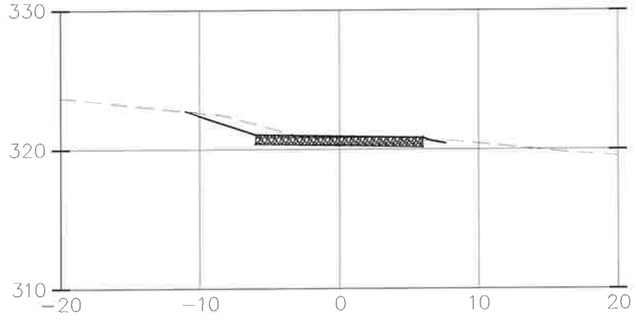
5' 0 10'
1" = 10'



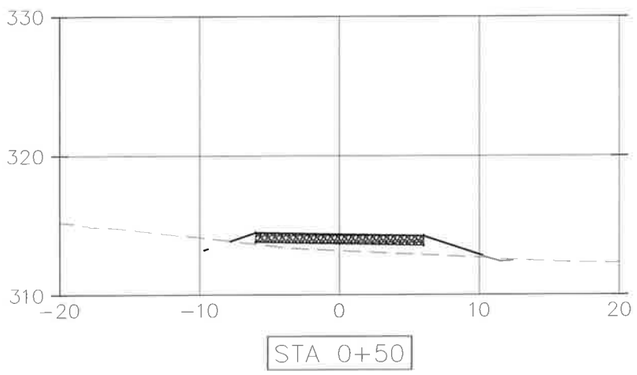
STA 2+25



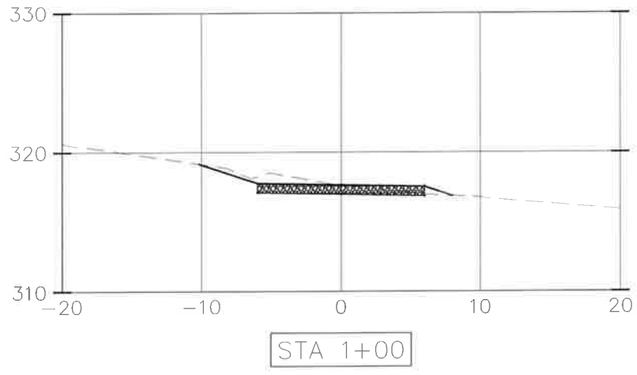
STA 2+35



STA 1+50



STA 0+50



STA 1+00

CROSS SECTIONS

SCALE: 1" = 5'

2.5' 0 5'
1" = 5'

Cellco Partnership
d/b/a Verizon Wireless

verizon

WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

STATE OF CONNECTICUT — DAVID A. WEINPAHL — NO. 22144 — LICENSED PROFESSIONAL ENGINEER

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	03.05.18	REVIEW D&M PLANS
1	03.15.18	REVISED PER CLIENT COMMNETS
2	10.31.18	D&M PLANS FINAL

DRAWN BY:	CHECKED BY:
MF	DW

--

SITE NAME:

HAMDEN 8 CT

PROJECT INFORMATION:

208 KIRK RD.
HAMDEN, CT 06514

DRAWING TITLE:

PROFILES AND SECTIONS

SHEET NUMBER:

C-4

GENERAL SOIL EROSION AND SEDIMENT CONTROL NOTES

(A) THE SOIL EROSION AND SEDIMENT CONTROL CONTACT PERSON: THE GENERAL CONTRACTOR HAS THE RESPONSIBILITY FOR IMPLEMENTING THE SOIL EROSION AND SEDIMENT CONTROL PLAN. THIS RESPONSIBILITY INCLUDES:
- THE INSTALLATION AND MAINTENANCE OF THE REQUIRED CONTROL MEASURES
- INFORMING ALL PARTIES ENGAGED ON THE CONSTRUCTION SITE OF THE REQUIREMENTS AND OBJECTIVES OF THE SOIL EROSION AND SEDIMENT CONTROL PLAN
- NOTIFYING THE PLANNING AND ZONING OFFICE OF ANY TRANSFER OF THIS RESPONSIBILITY
- CONVEYING A COPY OF THE SOIL EROSION AND SEDIMENT CONTROL PLAN IF THE TITLE TO THE LAND IS TRANSFERRED.

(B) ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN PLACE PRIOR TO ANY GRADING ACTIVITY, INSTALLATION OF PROPOSED STRUCTURES OR UTILITIES. MEASURES SHALL BE LEFT IN PLACE AND MAINTAINED UNTIL CONSTRUCTION IS COMPLETED AND/OR AREA IS STABILIZED.

(C) ALL ENTRANCES TO THE PROJECT SITE ARE TO BE PROTECTED BY STONE TRACKING PADS OF ASTM C-33, SIZE NO. 2 OR 3, OR CT. D.O.T. 2" CRUSHED GRAVEL. THE STONE TRACKING PAD IS TO BE MAINTAINED AT ALL TIMES DURING THE CONSTRUCTION PERIOD.

(D) LAND DISTURBANCE WILL BE KEPT TO A MINIMUM AND RESTABILIZATIONS WILL BE SCHEDULED AS SOON AS PRACTICAL.

(E) ALL SOIL EROSION AND SEDIMENT CONTROL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE CONNECTICUT GUIDELINES FOR EROSION AND SEDIMENT CONTROL INCLUDING THE LATEST DATE FROM THE CONNECTICUT COUNCIL ON SOIL AND WATER CONSERVATION.

(F) ANY ADDITIONAL EROSION/SEDIMENTATION CONTROL DEEMED NECESSARY BY TOWN STAFF DURING CONSTRUCTION, SHALL BE INSTALLED BY THE DEVELOPER. IN ADDITION, THE DEVELOPER SHALL BE RESPONSIBLE FOR THE REPAIR/REPLACEMENT/MAINTENANCE OF ALL EROSION CONTROL MEASURES UNTIL ALL DISTURBED AREAS ARE STABILIZED TO THE SATISFACTION OF THE TOWN STAFF.

(G) IN ALL AREAS, REMOVAL OF TREES, BUSHES AND OTHER VEGETATION AS WELL AS DISTURBANCE OF THE SOIL IS TO BE KEPT TO AN ABSOLUTE MINIMUM WHILE ALLOWING PROPER DEVELOPMENT OF THE SITE. DURING CONSTRUCTION, EXPOSE AS SMALL AN AREA OF SOIL AS POSSIBLE FOR AS SHORT A TIME AS POSSIBLE.

(H) SILTATION FENCE SHALL BE PLACED AS INDICATED BEFORE A CUT SLOPE HAS BEEN CREATED. SEDIMENT DEPOSITS SHOULD BE PERIODICALLY REMOVED FROM THE UPSTREAM SIDES OF SILTATION FENCE. THIS MATERIAL IS TO BE SPREAD AND STABILIZED IN AREAS NOT SUBJECT TO EROSION, OR TO BE USED IN AREAS WHICH ARE NOT TO BE PAVED OR BUILT ON. SILTATION FENCE ARE TO BE REPLACED AS NECESSARY TO PROVIDE PROPER FILTERING ACTION. SILTATION FENCES ARE TO REMAIN IN PLACE AND BE MAINTAINED TO INSURE EFFICIENT SILTATION CONTROL UNTIL ALL AREAS ABOVE THE EROSION CHECKS ARE STABILIZED AND VEGETATION HAS BEEN ESTABLISHED.

(I) TOPSOIL IS TO BE STRIPPED AND STOCKPILED IN AMOUNTS NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED AREAS REQUIRING TOPSOIL. THE STOCKPILED TOPSOIL IS TO BE LOCATED AS INDICATED ON THE PLANS. IF THE STOCKPILE IS TO REMAIN FOR MORE THAN 30 DAYS, THE STOCKPILE SHALL BE TEMPORARILY SEEDED AND RINGED WITH A SILTATION FENCE TO PREVENT EROSION.

(J) PIPE DISCHARGE AREAS (TEMPORARY & PERMANENT) WILL BE PROTECTED WITH RIPRAP SPLASH PADS. ENERGY DISSIPATERS WILL BE PROVIDED AS NECESSARY.

(K) PIPE INLETS WILL BE PROTECTED WITH HAY BALE FILTERS OR SILTATION FENCES THROUGHOUT CONSTRUCTION AND UNTIL ALL DISTURBED AREAS ARE THOROUGHLY STABILIZED.

(L) THERE IS TO BE NO STOCKPILING OF SOIL WITHIN A TEN FOOT LIMIT OF ADJOINING PROPERTIES. ANY AND ALL FILL MATERIAL IS TO BE FREE OF BRUSH, RUBBISH, TIMBER, LOGS, VEGETATIVE MATTER AND STUMPS IN AMOUNTS THAT WILL BE DETRIMENTAL TO CONSTRUCTING STABLE FILLS. MAXIMUM SIDE SLOPES OF EXPOSED SURFACES OF EARTH TO BE 2:1 OR AS OTHERWISE SPECIFIED BY LOCAL AUTHORITIES.

(M) ALL FILL AREAS SHALL BE COMPACTED SUFFICIENTLY FOR THEIR INTENDED PURPOSE AND AS REQUIRED TO REDUCE SLIPPING, EROSION OR EXCESS SATURATION.

(N) TOPSOIL SHALL NOT BE PLACED WHILE IN A FROZEN OR MUDDY CONDITION, WHEN THE SUBGRADE IS EXCESSIVELY WET, OR IN A CONDITION THAT MAY OTHERWISE BE DETRIMENTAL TO PROPER GRADING OR PROPOSED SODDING OR SEEDING.

TEMPORARY VEGETATIVE COVER (TV):

TEMPORARY VEGETATIVE COVER SHALL BE ESTABLISHED ON ALL SOILS EXPOSED FOR PERIODS OF UP TO 12 MONTHS.

1. SITE PREPARATION:

(A) GRADE AREA AS NEEDED AND FEASIBLE TO PERMIT THE USE OF EQUIPMENT FOR SEEDBED PREPARATION, SEEDING, MULCH APPLICATION AND MULCH ANCHORING. ALL GRADING SHOULD BE DONE IN ACCORDANCE WITH THE MEASURE FOR LAND GRADING (SEE LATEST REVISION OF STATE OF CT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL).

(B) INSTALL NEEDED EROSION CONTROL MEASURES SUCH AS DIVERSIONS, GRADE STABILIZATION STRUCTURES, SEDIMENT BASINS AND GRASSED WATERWAYS.

2. SEEDBED PREPARATION:

(A) APPLY LIMESTONE AND FERTILIZER ACCORDING TO SOIL TEST RECOMMENDATIONS SUCH AS THOSE OFFERED BY THE UNIVERSITY OF CT SOIL TESTING LABORATORY. SOIL SAMPLE MAILERS ARE AVAILABLE FROM THE LOCAL COOPERATIVE EXTENSION SERVICE OFFICE. IF SOIL TESTING IS NOT FEASIBLE ON SMALL OR VARIABLE SITES, OR WHERE TIMING IS CRITICAL, FERTILIZER MAY BE APPLIED AT THE RATE OF 300 LBS. PER ACRE OR 7.5 LBS PER 1,000 SQ.FT. OF 10-10-10 OR EQUIVALENT. APPLY LIMESTONE (EQUIVALENT TO 50 PERCENT CALCIUM PLUS MAGNESIUM OXIDE) AS FOLLOWS:

SOIL TEXTURE	TONS/ACRE	LBS/1,000 SQ.FT.
CLAY, CLAY LOAM AND HIGH ORGANIC SOIL	3	135
SANDY LOAM, LOAM, SILT LOAM	2	90
LOAMY SAND, SAND	1	45

REFER TO COUNTY SOIL SURVEY REPORT FOR SOIL TEXTURES AT THE SITE.

(B) WHERE THE SOIL HAS BEEN COMPACTED BY CONSTRUCTION OPERATIONS, LOOSEN SOIL TO DEPTH OF 2 INCHES BEFORE APPLYING FERTILIZER LIME AND SEED.

(C) APPLY SEED UNIFORMLY BY HAND, CYCLONE SEEDER, DRILL, CULTIPACKER TYPE SEEDER OR HYDROSEEDER (SLURRY INCLUDING SEED AND FERTILIZER). HYDROSEEDINGS, WHICH INCLUDE MULCH, MAY BE LEFT ON SOIL SURFACE. SEEDING RATES MUST BE INCREASED 10% WHEN HYDROSEEDING.

3. MULCHING

(A) SEE GUIDELINES IN TEMPORARY MULCHING

PERMANENT VEGETATIVE COVER (PV):

PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED ON ALL EXPOSED SOILS WHERE PERENNIAL VEGETATION IS NEEDED FOR LONG TERM PROTECTION.

1. SITE PREPARATION:

(A) GRADE AS NEEDED AND FEASIBLE TO PERMIT THE USE OF CONVENTIONAL EQUIPMENT FOR SEEDBED PREPARATION, SEEDING, MULCH APPLICATION AND ANCHORING AND MAINTENANCE. ALL GRADING SHOULD BE DONE IN ACCORDANCE WITH THE MEASURE FOR LAND GRADING (AS SPECIFIED IN THE LATEST REVISION OF THE STATE OF CT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL).

2. SEEDBED PREPARATION:

(A) APPLY LIMESTONE AND FERTILIZER ACCORDING TO SOIL TESTS SUCH AS THOSE OFFERED BY THE UNIVERSITY OF CONNECTICUT SOIL TESTING LABORATORY. SOIL SAMPLE MAILERS ARE AVAILABLE FROM THE LOCAL COOPERATIVE EXTENSION SERVICE OFFICE. IF SOIL TESTING IS NOT FEASIBLE ON SMALL OR VARIABLE SITES, OR WHERE TIMING IS CRITICAL, FERTILIZER MAY BE APPLIED AT RATE OF 300 LBS. PER ACRE OR 7.5 LBS. PER 1,000 SQ.FT. USING 10-10-10 OR EQUIVALENT. IN ADDITION, 300 LBS. OF 36-0-0 PER ACRE OR EQUIVALENT OF SLOW RELEASE NITROGEN MAY BE USED FOR TOPDRESSING. APPLY GROUND LIMESTONE (EQUIVALENT TO 50% CALCIUM PLUS MAGNESIUM OXIDE) AS FOLLOWS:

SOIL TEXTURE	TONS/ACRE	LBS/1,000 SQ.FT.
CLAY, CLAY LOAM AND HIGH ORGANIC SOIL	4	180
SANDY LOAM, LOAM, SILT LOAM	3	135
LOAMY SAND, SAND	2	90

REFER TO COUNTY SOIL SURVEY REPORT FOR SOIL TEXTURES AT THE SITE.

(B) WORK LIME AND FERTILIZER INTO THE SOIL AS NEARLY AS PRACTICAL TO A DEPTH OF 4 INCHES WITH A DISC, SPRING TOOTH HARROW OR OTHER SUITABLE EQUIPMENT. THE FINAL HARROWING OR DISCING OPERATION SHOULD BE ON THE GENERAL CONTOUR. CONTINUE TILLAGE UNTIL A REASONABLE UNIFORM, FINE SEEDBED IS PREPARED. ALL BUT CLAY OR SILTY SOILS AND COARSE SANDS SHOULD BE ROLLED TO FIRM THE SEEDBED WHEREVER FEASIBLE.

(C) REMOVE FROM THE SURFACE ALL STONES TWO INCHES OR LARGER IN ANY DIMENSION. REMOVE ALL OTHER DEBRIS, SUCH AS WIRE, CABLE, TREE ROOTS, PIECES OF CONCRETE, CLODS, LUMPS OR OTHER UNSUITABLE MATERIAL.

3. SEEDING DATES

(A) SPRING SEEDINGS USUALLY GIVE THE BEST RESULTS. SPRING SEEDINGS OF ALL SEED MIXES WITH LEGUMES IS RECOMMENDED, HOWEVER LATE SUMMER SEEDINGS PRIOR TO SEPTEMBER 1 CAN BE MADE. WHEN CROWN VETCH IS SEEDED IN LATE SUMMER AT LEAST 35 PERCENT OF THE SEED SHOULD BE HARD SEED (UNSCARIFIED). THE RECOMMENDED SEEDING DATES ARE:
APRIL 15 THROUGH JUNE 15
AUGUST 15 THROUGH SEPTEMBER 1

4. SEEDING

(A) SELECT A MIXTURE FROM THE SEEDING SCHEDULE OR USE MIXTURE RECOMMENDED BY THE SOIL CONSERVATION SERVICE. INOCULATE ALL LEGUME SEED WITH THE CORRECT TYPE AND AMOUNT OF INOCULANT.

(B) APPLY SEED UNIFORMLY BY HAND, CYCLONE SEEDER, DRILL, CULTIPACKER TYPE SEEDER OR HYDROSEEDER (SLURRY INCLUDING SEED OR FERTILIZER). NORMAL SEEDING DEPTH IS FROM 1/4 TO 1/2 INCH. HYDROSEEDINGS WHICH ARE MULCHED MAY BE LEFT ON SOIL SURFACE.

(C) WHERE FEASIBLE, EXCEPT WHERE EITHER A CULTIPACKER TYPE SEEDER OR HYDROSEEDER IS USED, THE SEEDBED SHOULD BE FIRMED FOLLOWING SEEDING OPERATIONS WITH A ROLLER, OR LIGHT DRAG. SEEDING OPERATIONS SHOULD BE ON THE CONTOUR.

(D) FROST CRACK SEEDING CAN BE USED. FROST CRACK SEEDING MUST BE DONE IN LATE WINTER OR EARLY SPRING. SUITABLE WEATHER CONDITIONS ARE FREEZING NIGHTS AND THAWING DAYS WITH LITTLE OR NO SNOW COVER. SEEDING RATES MUST BE INCREASED 10 PERCENT WHEN USING THIS METHOD.

(E) HYDRAULIC APPLICATION (HYDROSEEDING), IS A SUITABLE METHOD FOR USE ON CRITICAL AREAS. WHEN HYDROSEEDING, A SEEDBED IS PREPARED IN THE CONVENTIONAL WAY OR BY HAND RAKING TO LOOSEN AND SMOOTH THE SOIL AND TO REMOVE SURFACE STONES LARGER THAN SIX INCHES IN DIAMETER. SLOPES MUST BE NO STEEPER THAN 2 TO 1 (2 FEET HORIZONTALLY TO 1 FOOT VERTICALLY). LIME AND FERTILIZER MAY BE APPLIED SIMULTANEOUSLY WITH THE SEED. THE USE OF FIBER MULCH ON CRITICAL AREAS IS NOT RECOMMENDED (UNLESS IT IS USED TO HOLD STRAW OR HAY). FIBER MULCH DOES NOT PROVIDE ADEQUATE SEEDBED PROTECTION. BETTER PROTECTION IS GAINED BY USING STRAW MULCH AND HOLDING IT WITH ADHESIVE MATERIALS OR 500 POUNDS PER ACRE OF WOOD FIBER MULCH. SEEDING RATES MUST BE INCREASED 10 PERCENT WHEN HYDROSEEDING.

(F) APPLY MULCH ACCORDING TO THE TEMPORARY MULCHING MEASURE.

(G) IF SEEDING CANNOT BE DONE WITHIN THE SEEDING DATES, USE THE TEMPORARY MULCHING MEASURE TO PROTECT THE SITE AND DELAY SEEDING UNTIL THE NEXT RECOMMENDED SEEDING PERIOD.

5. MAINTENANCE

(A) LIME ACCORDING TO A SOIL TEST OR AT A MINIMUM OF EVERY FIVE YEARS USING A RATE OF TWO TONS PER ACRE (100 POUNDS PER 1,000 SQUARE FEET).

(B) WHERE GRASSES PREDOMINATE, FERTILIZE ACCORDING TO A SOIL TEST OR BROADCAST BIENNIALLY, 300 POUNDS OF 10-10-10 OR EQUIVALENT PER ACRE (7.5 POUNDS PER 1,000 SQUARE FEET).

(C) WHERE LEGUMES PREDOMINATE, FERTILIZE ACCORDING TO A SOIL TEST OR BROADCAST EVERY THREE YEARS 300 POUNDS OF 0-20-20 OR EQUIVALENT PER ACRE (7.5 POUNDS PER 1,000 SQUARE FEET).

SILT FENCES - INSTALLATION REQUIREMENTS

1. SHEET FLOW APPLICATIONS ONLY

(A) SYNTHETIC FILTER FABRIC SHALL BE A PERVIOUS SHEET OF PROPYLENE, NYLON, POLYESTER OR ETHYLENE FILAMENTS AND SHALL BE CERTIFIED BY THE MANUFACTURER OR SUPPLIER AS CONFORMING TO THE REQUIREMENTS OF THE GUIDELINES.

(B) THE HEIGHT OF THE BARRIER SHALL NOT EXCEED 36 INCHES. IDEALLY THE BARRIER SHOULD BE PLACED 10 FEET AWAY FROM TOE OF SLOPE.

(C) WHEN JOINTS ARE NECESSARY, THE FILTER CLOTH SHALL BE SPLICED TOGETHER AND SECURELY SEALED AT A SUPPORT POST OR OVERLAPPED ACCORDING TO THE MANUFACTURER'S RECOMMENDATION.

(D) POSTS SHALL BE SPACED A MAXIMUM OF 10 FEET APART ALONG THE BARRIER AND SHALL BE DRIVEN SECURELY INTO THE GROUND (12 INCHES MINIMUM).

(E) A TRENCH APPROXIMATELY 6 INCHES WIDE AND 6 INCHES DEEP SHALL BE EXCAVATED ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.

(F) THE TOE IN FABRIC FLAP SHALL BE EXTENDED INTO THE TRENCH. THE TRENCH SHALL BE BACKFILLED AND THE SOIL COMPACTED OVER THE FILTER FABRIC.

(G) FILTER BARRIERS SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.

(H) THE FABRIC SHALL BE PREASSEMBLED WITH HARDWOOD POSTS OR WITH POCKETS FOR USE WITH WOOD OR METAL POSTS. THE FABRIC SHALL BE ATTACHED TO THE POSTS ACCORDING TO THE MANUFACTURER'S RECOMMENDATION.

2. MAINTENANCE

(A) FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

(B) THE BARRIER SHALL BE REPLACED PROMPTLY, SHOULD THE FABRIC DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE ESTABLISHMENT OF PERMANENT VEGETATIVE COVER.

(C) SEDIMENT DEPOSITS SHOULD BE REMOVED WHEN THEY REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.

(D) ANY SEDIMENT DEPOSIT REMAINING IN PLACE AFTER THE SILT FENCE OR FILTER BARRIER IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE PREPARED AND SEEDED.

TEMPORARY MULCHING (MU)

DEFINITION
APPLICATION OF PLANT RESIDUES OR OTHER SUITABLE MATERIALS TO THE SOIL SURFACE.

1. INSTALLATION REQUIREMENTS

(A) AREAS WHICH HAVE BEEN TEMPORARILY OR PERMANENTLY SEEDED SHALL BE MULCHED IMMEDIATELY FOLLOWING SEEDING. MULCH ANCHORING WILL BE USED ON SLOPES GREATER THAN 3 PERCENT AND CONCENTRATED FLOW AREAS SUCH AS DIVERSION AND WATERWAY CHANNELS. AREAS WHICH CANNOT BE SEEDED WITHIN THE SEEDLING DATES SHOULD BE MULCHED TO PROVIDE TEMPORARY PROTECTION TO THE SOIL SURFACE. AN ORGANIC MULCH OTHER THAN WOOD FIBER ALONE SHALL BE USED, AND THE AREA SHALL BE SEEDED AS SOON AS SEEDING DATES PERMIT. MULCH SHALL BE USED WHEN TREE, SHRUB, AND GROUND COVER PLANTINGS DO NOT PROVIDE ADEQUATE EROSION PROTECTION.

2. ORGANIC MULCHES

(A) ORGANIC MULCHES MAY BE USED IN ANY AREA WHERE MULCH IS REQUIRED, SUBJECT TO THE RESTRICTIONS NOTED IN THE STATE OF CT "GUIDELINES FOR SOIL EROSION & SEDIMENT CONTROL". STRAW OR HAY MULCH MUST BE ANCHORED IMMEDIATELY AFTER SPREADING TO PREVENT WINDBLOWING. OTHER ORGANIC MULCHES DO NOT REQUIRE ANCHORING. THE FOLLOWING METHODS OF ANCHORING STRAW OR HAY MAY BE USED.

(1) MULCH ANCHORING TOOL
THIS IS A TRACTOR-DRAWN IMPLEMENT DESIGNED TO PUNCH MULCH INTO THE SOIL SURFACE. THIS METHOD PROVIDES MAXIMUM EROSION CONTROL WITH STRAW. IT IS LIMITED TO USE ON SLOPES NO STEEPER THAN 3 TO 1 (3 HORIZONTALLY TO 1 VERTICALLY), WHERE EQUIPMENT CAN OPERATE SAFELY. MACHINERY SHALL BE OPERATED ON THE CONTOUR.

(2) TRACKING
APPLY MULCH AND DRIVE TRACKED EQUIPMENT UP AND DOWN SLOPE OVER ENTIRE SURFACE SO CLEAT MARKS ARE PARALLEL TO CONTOUR.

(3) LIQUID MULCH BINDERS
APPLICATION OF LIQUID MULCH BINDERS AND TACKIFIERS SHOULD BE HEAVIEST AT EDGES OF AREAS AND AT CRESTS OF RIDGES AND BANKS TO PREVENT WINDBLOWING. THE REMAINDER OF THE AREA SHOULD HAVE BINDER APPLIED UNIFORMLY. BINDERS MAY BE APPLIED AFTER MULCH IS SPREAD OR MAY BE SPRAYED INTO THE MULCH AS IT IS BEING BLOWN ONTO THE SOIL. APPLYING STRAW AND BINDER TOGETHER IS THE MOST EFFECTIVE METHOD. THE FOLLOWNG TYPES OF BINDERS MAY BE USED:

(a) ASPHALT
APPLY IN ACCORDANCE WITH CT DOT STANDARD SPECIFICATION FORM 817, SPEC. 9.4503 SEC(4A).

(b) SYNTHETIC BINDERS
CHEMICAL BINDERS SUCH AS PETROSET, TERRATACK, HYDRO MULCH AND AEROSPRAY MAY BE USED AS RECOMMENDED BY THE MANUFACTURER TO ANCHOR MULCH. THEY ARE USEFUL IN RESIDENTIAL AREAS WHERE ASPHALT MAY BE A PROBLEM.

(4) MULCH NETTINGS
INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

(5) PEG AND TWINE
DRIVE 4-INCH TO 6-INCH WOODEN PEGS TO WITHIN 3 INCHES OF THE SOIL SURFACE EVERY 3 FEET IN ALL DIRECTIONS. STAKES MAY BE DRIVEN BEFORE OR AFTER STRAW IS SPREAD. SECURE MULCH BY STRETCHING TWINE BETWEEN PEGS IN A CRISS-CROSS-WITHIN-A-SQUARE PATTERN. TURN TWINE 2 OR MORE TIMES AROUND EACH PEG.

3. CHEMICAL MULCHES

(A) CHEMICAL MULCHES MAY BE USED ALONE IN THE FOLLOWING SITUATIONS:
FROM MAY 1 TO JUNE 15 AND SEPTEMBER 15 TO OCTOBER 15, PROVIDED THAT THEY ARE USED ON AREAS WITH SLOPES NO STEEPER THAN 4 TO 1 (4 HORIZONTALLY TO 1 VERTICALLY), WHICH HAVE BEEN ROUGHENED. IF EROSION STILL OCCURS, ANOTHER MULCH MATERIAL SHALL BE APPLIED IMMEDIATELY.

(B) NOTE: CHEMICAL MULCHES MAY BE USED TO BIND OTHER MULCHES OR WITH WOOD FIBER IN A HYDROSEEDED SLURRY AT ANY TIME. MANUFACTURER'S RECOMMENDATIONS FOR APPLICATION OF CHEMICAL MULCHES SHALL BE FOLLOWED.

4. MATS

(A) INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS

5. MAINTENANCE
ALL MULCHES MUST BE INSPECTED PERIODICALLY, OR IN PARTICULAR AFTER RAINSTORMS, TO CHECK FOR SOIL EROSION. WHERE EROSION IS OBSERVED, ADDITIONAL MULCH SHOULD BE APPLIED. NET SHOULD BE INSPECTED AFTER RAINSTORMS FOR DISLOCATION OR FAILURE. IF WASHOUTS OR BREAKAGE OCCUR, RE-INSTALL NET AS NECESSARY AFTER REPAIRING DAMAGE TO THE INSPECTIONS SHOULD TAKE PLACE UNTIL GRASSES ARE FIRMLY ESTABLISHED. GRASSES SHALL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED WHICH IS MATURE ENOUGH TO CONTROL SOIL EROSION AND TO SURVIVE SEVERE WEATHER CONDITIONS. WHERE MULCH IS USED IN CONJUNCTION WITH ORNAMENTAL PLANTINGS, INSPECT PERIODICALLY THROUGHOUT THE YEAR TO DETERMINE IF MULCH IS MAINTAINING COVERAGE OF THE SOIL SURFACE. REPAIR AS NEEDED.

DUST CONTROL MEASUREMENT AND RECOMMENDATIONS

CONSTRUCTION ACTIVITIES AT THE PROJECT SITE WILL RESULT IN EMISSIONS OF FUGITIVE DUST TO THE ATMOSPHERE. THE QUANTITY OF FUGITIVE DUST GENERATED WILL BE CONTROLLED BUT IS DEPENDENT UPON WEATHER CONDITIONS. FUGITIVE DUST PARTICLES HAVE A GREATER PROPENSITY TO BECOME AIRBORNE DURING DRY AND BREEZY METEOROLOGICAL CONDITIONS. CONSTRUCTION ACTIVITIES AT THE SITE WHICH WILL RESULT IN THE GENERATION OF FUGITIVE DUST INCLUDE GRADING, MATERIAL LOADING AND UNLOADING, MATERIAL STORAGE PILES AND CONSTRUCTION TRAFFIC. THE CONTRACTOR WILL IMPLEMENT THE FOLLOWING REASONABLE PRECAUTIONS DURING CONSTRUCTION TO MINIMIZE THE GENERATION OF FUGITIVE DUST:

(A) USE WATER FOR DUST CONTROL OF ACTIVE CONSTRUCTION AREAS, ACTIVE UNPAVED ROADS, AND OTHER SURFACES WHICH CAN GIVE RISE TO AIRBORNE. A TYPICAL PRACTICE TO BE FOLLOWED DURING SITE GRADING WILL BE TO FOLLOW THE EARTH MOVING EQUIPMENT WITH A WATER TRUCK TO IMMEDIATELY WET THE NEWLY DISTURBED AREA.
(B) APPLY SEED FOR A VEGETATIVE COVER ON STORAGE PILES, ESPECIALLY THOSE THAT WILL REMAIN DORMANT FOR AN EXTENDED PERIOD.
(C) APPLY THE BINDER COURSE OF PAVING MATERIAL TO SITE AS SOON AS FEASIBLE DURING CONSTRUCTION.
(D) THE CONTRACTOR MUST CLEAN/SWEEP DAILY ALL ON-SITE PAVED ROADS AND THAT PORTION OF THE EXISTING PAVED SURFACES ON AND OFFSITE THAT ARE USED FOR THE DURATION OF THE PROJECT BY CONSTRUCTION TRAFFIC.
(E) INSTITUTE A MAXIMUM ON SITE SPEED LIMIT OF 15 MILES PER HOUR.
(F) THE CONTRACTOR IS RESPONSIBLE FOR DUST CONTROL DURING THE CONSTRUCTION PROCESS. THE CONTRACTOR SHALL INSPECT THE SITE TO ASSURE DUST IS ADEQUATELY CONTROLLED. IF THE OWNERS REPRESENTATIVE DETERMINES DUST CONTROL MEASURES ARE NOT ADEQUATE THE CONTRACTOR SHALL BE REQUIRED TO INCREASE THESE MEASURES AS DIRECTED.

SEEDING SCHEDULE

PERMANENT SEEDING

PERMANENT SEEDING SHALL BE ACCOMPLISHED WITH ONE OF THE FOLLOWING SEEDING MIXTURES:

KIND OF AREA:
BORROW AREAS, ROADSIDES, DIKES, LEVEES, POND BANKS AND OTHER SLOPES AND BANKS

SEED MIXTURE	LBS/ACRE	LBS/1,000 SQ.FT.
KENTUCKY BLUEGRASS	20	0.45
CREEPING RED FESCUE	20	0.45
PERENNIAL RYEGRASS	5	0.1
TOTAL	45	1.0

KIND OF AREA:
LAWNS AND HIGH MAINTENANCE AREAS

SEED MIXTURE	LBS/ACRE	LBS/1,000 SQ.FT.
KENTUCKY BLUEGRASS	20	0.45
CREEPING RED FESCUE	20	0.45
PERENNIAL RYEGRASS	5	0.1
TOTAL	45	1.0

TEMPORARY SEEDING RATES AND DATES

SEED MIXTURE	LBS/ACRE	LBS/1,000 SQ.FT.
ANNUAL RYEGRASS	40	1.0

SEEDING NOTES:
(1) MAY BE PLANTED THROUGHOUT SUMMER IF SOIL IS ADEQUATE OR CAN BE IRRIGATED.
(2) SEED AT TWICE THE INDICATED DEPTH FOR SANDY SOILS.

SOURCE: U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, STORRS, CT

ORGANIC MULCH MATERIALS AND APPLICATION RATES

MULCHES	PER ACRE	PER 1,000 SQ.FT.
STRAW OR HAY	1/2-2 TONS	70-90 LBS

Cellco Partnership
d/b/a Verizon Wireless
verizon
WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

STATE OF CONNECTICUT — DAVID A. WEINPAHL — NO. 22144 — LICENSED PROFESSIONAL ENGINEER

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	03.05.18	REVIEW D&M PLANS
1	03.15.18	REVISED PER CLIENT COMMNETS
2	10.31.18	D&M PLANS FINAL

DRAWN BY:	CHECKED BY:
MF	DW

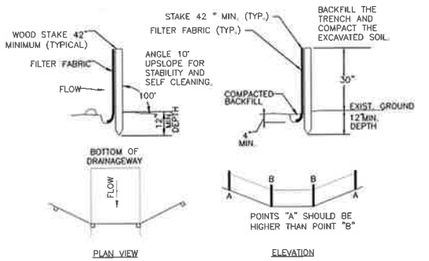
--

SITE NAME:
HAMDEN 8 CT

PROJECT INFORMATION:
208 KIRK RD.
HAMDEN, CT 06514

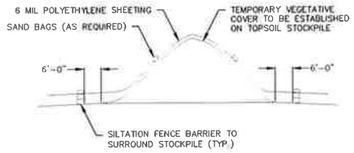
DRAWING TITLE:
SEDIMENT AND EROSION CONTROL NOTES

SHEET NUMBER:
C-5

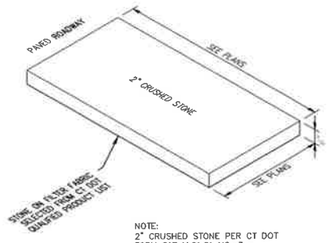


A) MINIMUM LENGTH OF SILT FENCE IS 15 L.F.
B) MAXIMUM POST SPACING IS 10 L.F.
C) JOINTS ONLY AT SUPPORT POST WITH MINIMUM 6" OVERLAP, SECURELY SEALED.
D) SEDIMENTATION DEPOSITS SHALL BE REMOVED WHEN THEY REACH 1/2 THE HEIGHT OF THE SILT FENCE.
E) SILT FENCE SHALL NOT BE USED IN A WATER COURSE.
F) UPON ESTABLISHMENT OF GROUND COVER ON DISTURBED AREAS, AND WHEN DIRECTED BY THE ENGINEER, FENCE WILL BE REMOVED AND ANY SEDIMENTATION WILL BE THINLY SPREAD UPON EXISTING GROUND COVER.

1 / C-6 SILTATION FENCE DETAILS AND CONSTRUCTION
N.T.S.

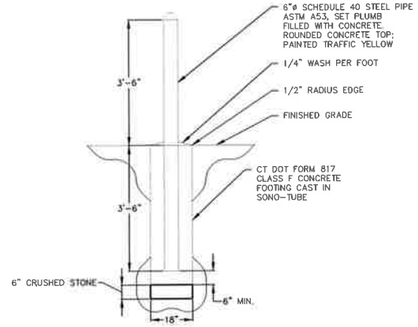


3 / C-6 SOIL STOCKPILE
N.T.S.



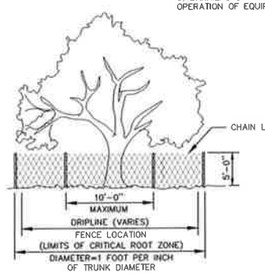
NOTE:
2" CRUSHED STONE PER CT DOT FORM 817 M.01.01 NO. 3.

4 / C-6 CONSTRUCTION ENTRANCE TRACKPAD
N.T.S.



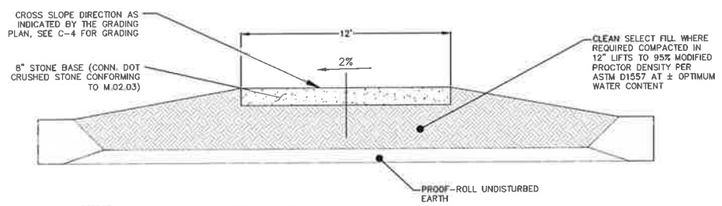
NOTES:
1. EACH BARRIER SHALL BE FILLED WITH CONCRETE AND HAVE A WATER SHEDDING CAP.
2. BARRIER SHALL BE PAINTED WITH YELLOW COLOR HIGH VISIBILITY PAINT.
3. PROTECTIVE BARRIERS ARE REQUIRED WHEN PADMOUNTED EQUIPMENT IS LOCATED IN AN AREA EXPOSED TO VEHICULAR TRAFFIC, SNOW REMOVAL EQUIPMENT, ETC.
4. WHERE BARRIERS ARE REQUIRED, THEY SHALL BE INSTALLED BY THE CONTRACTOR BEFORE THE PADMOUNTED EQUIPMENT IS SET IN PLACE.
5. BARRIERS SHALL BE INSTALLED ON THE SIDES EXPOSED TO VEHICULAR TRAFFIC.
6. BARRIERS SHALL NOT INTERFERE WITH THE OPENING OF EQUIPMENT DOORS OR THE OPERATION OF EQUIPMENT.

5 / C-6 TYPICAL BOLLARD
N.T.S.

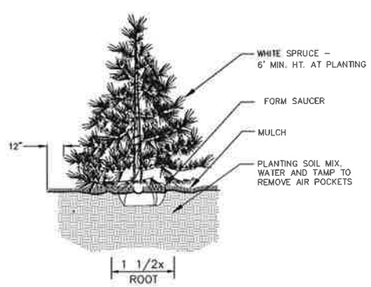


TREE PROTECTION NOTES:
1. BEFORE BEGINNING ANY SITE WORK OR CONSTRUCTION, TREE PROTECTION FENCING SHALL BE INSTALLED AROUND TREES INDICATED TO REMAIN ON THIS PLAN. FOLLOWING THE INSTALLATION OF TREE PROTECTION FENCING AND FOR THE ENTIRE CONSTRUCTION PERIOD THE FOLLOWING SHALL APPLY:
   - NO MATERIALS, VEHICLES OR EQUIPMENT MAY BE STORED OR STOCKPILED WITHIN THE AREAS ENCLOSED BY TREE PROTECTION FENCING.
   - NO VEHICLES OR EQUIPMENT MAY BE DRIVEN, OPERATED OR PARKED WITHIN AREAS ENCLOSED BY TREE PROTECTION.
   - AREAS ENCLOSED BY TREE PROTECTION CAN NOT BE USED AS ROUTES FOR SITE TRAFFIC
   - FENCING SHALL BE RESECURED AS NECESSARY AND MAINTAINED TAUT. FENCING SHALL BE REPAIRED OR REPLACED WHEN DAMAGED AT THE CONTRACTOR'S EXPENSE.
   - IN SPECIAL CASES WHERE CONSTRUCTION OPERATIONS ABSOLUTELY REQUIRE SOME TEMPORARY ENCROACHMENT INTO TREE PROTECTION AREAS, THE CONTRACTOR SHALL PRESENT A WORK PLAN FOR TEMPORARY ENCROACHMENT FOR THE OWNER'S APPROVAL.
2. ALL EXCAVATION OR TRENCHING WITHIN THE AREAS OF EXISTING TREE ROOTS SHALL BE PERFORMED BY HAND.
   - ROOTS IN TRENCH SHALL BE CUT SMOOTH AND CLEAN USING SHARP TOOLS. NO RIPPING OF TREE ROOTS BY MACHINES IS PERMITTED.
   - NO JAGGED EDGES OF ROOTS SHALL BE PERMITTED.
   - SIDES OF EXCAVATIONS SHALL BE CLEAN AND STRAIGHT.
   - IMMEDIATELY FOLLOWING TRENCHING OR EXCAVATION OPERATIONS, AREAS AT TREE ROOTS SHALL BE BACKFILLED.
   - ROOTS SHALL NOT BE LEFT EXPOSED OVERNIGHT.
   - BACKFILL SHALL BE A MIX OF 50% TOPSOIL AND 50% CLEAN SAND.
   - BACKFILL SHALL BE HAND COMPACTED IN PLACE TO FILL ALL VOIDS.
3. EXTREME CARE SHALL BE TAKEN TO AVOID ANY DAMAGE TO TRUNKS, BRANCHES AND ROOTS. ANY DAMAGE CAUSED TO TREES SHALL BE IMMEDIATELY REMEDIED BY THE CONTRACTOR.
   - REMEDIAL WORK MAY INCLUDE PRUNING, WOUND TREATMENT, CABLING OR ADDITIONAL MEASURES AS DETERMINED BY THE OWNER OR THEIR AGENT.
4. THE CONTRACTOR SHALL REVIEW ALL PLANNED CONSTRUCTION OPERATIONS THAT MAY RESULT IN TREE DAMAGE FOR REVIEW AND APPROVAL BY THE OWNER OR THEIR AGENT.
   - SPECIAL ATTENTION SHALL BE MADE TO THE PATH OF PLACING CONSTRUCTION MATERIAL ON SITE BY CRANE.
   - THE CONTRACTOR SHALL PRESENT A WORK PLAN AND PROPOSED TREE PROTECTION MEASURES TO MINIMIZE DAMAGE TO TREES.

6 / C-6 TREE PROTECTION
N.T.S.

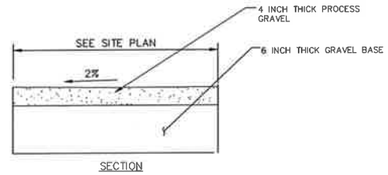


9 / C-8 GRAVEL ACCESS ROAD
N.T.S.



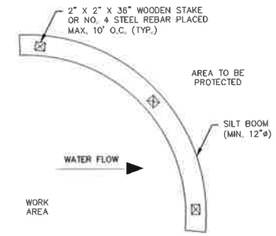
NOTES:
1. PROVIDE STAKING AS REQUIRED.
2. PLANT SO THAT TOP OF ROOT BALL IS EVEN WITH THE FINISHED GRADE.
3. PAINT ALL CUTS OVER 1" DIA.
4. REMOVE ALL CONTAINERS AND BASKETS FROM ROOT BALL.
5. REMOVE BURLAP FROM TOP 1/3 OF ROOT BALL.

7 / C-6 TYPICAL EVERGREEN TREE
N.T.S.

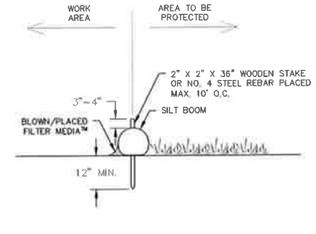


SECTION

10 / C-6 GRAVEL PARKING AREA AND DRIVEWAY
N.T.S.



PLAN



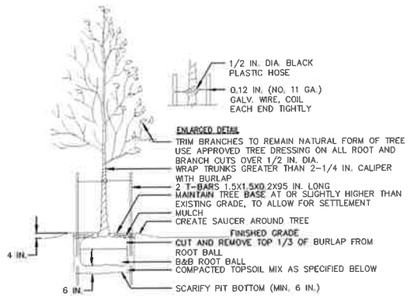
SECTION

NOTES:
1. CONTRACTOR SHALL MAINTAIN SILT SOCK IN A FUNCTIONAL CONDITION AT ALL TIMES. SILT SOCK SHALL BE ROUTINELY INSPECTED.
2. IF DAMAGED, SILT SOCK SHALL BE REPAIRED OR REPLACED.
3. CONTRACTOR SHALL REMOVE SEDIMENT IN THE BASE OF THE UPSLOPE SIDE OF THE SILT SOCK WHEN ACCUMULATION HAS REACHED 1/2 OF EFFECTIVE HEIGHT, WHICH SHALL BE DETERMINED BASED ON TABLE 1 OR AS DIRECTED BY TOWN OR ENGINEER.
4. SILT SOCK SHALL BE MAINTAINED UNTIL DISTURBED AREA HAS BEEN PERMANENTLY STABILIZED AND CONSTRUCTION ACTIVITY HAS CEASED.

TABLE 1

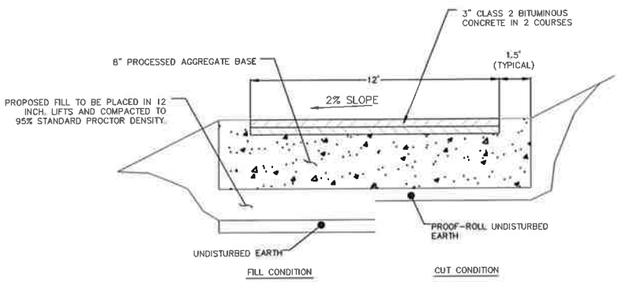
SILT BOOM DIAMETER	EFFECTIVE HEIGHT	HALF OF EFFECTIVE HEIGHT
12 INCHES	9.5 INCHES	4.8 INCHES
18 INCHES	14.5 INCHES	7.3 INCHES
24 INCHES	19 INCHES	9.5 INCHES

2 / C-6 TYPICAL SILT SOCK
N.T.S.



NOTES:
1. TOPSOIL MIX, SEE SPEC.
2. DO NOT DAMAGE MAIN ROOTS OR DESTROY ROOT BALL WHEN INSTALLING TREE STAKE.
3. WATER THOROUGHLY AFTER INSTALLATION.
4. REMOVE TREE RINGS AND STAKES TWO YEARS AFTER INSTALLATION.
5. PROVIDE DRAINAGE FOR PLANTING PIT IN IMPERMEABLE SOIL.
6. ALL TREES MUST BE TAGGED AND APPROVED BY CONSULTANT WITHIN 14 DAYS AFTER TENDER CLOSING.

8 / C-6 TYPICAL DECIDUOUS TREE
N.T.S.



11 / C-6 BITUMUOUS CONCRETE DRIVEWAY APRON
N.T.S.

Cellco Partnership
d/b/a Verizon Wireless
verizon
WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

STATE OF CONNECTICUT — DAVID A. WEINPAHL — NO. 22144 — LICENSED PROFESSIONAL ENGINEER

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	03.05.18	REVIEW D&M PLANS
1	03.15.18	REVISED PER CLIENT COMMNETS
2	10.31.18	D&M PLANS FINAL

DRAWN BY:	CHECKED BY:
MF	DW

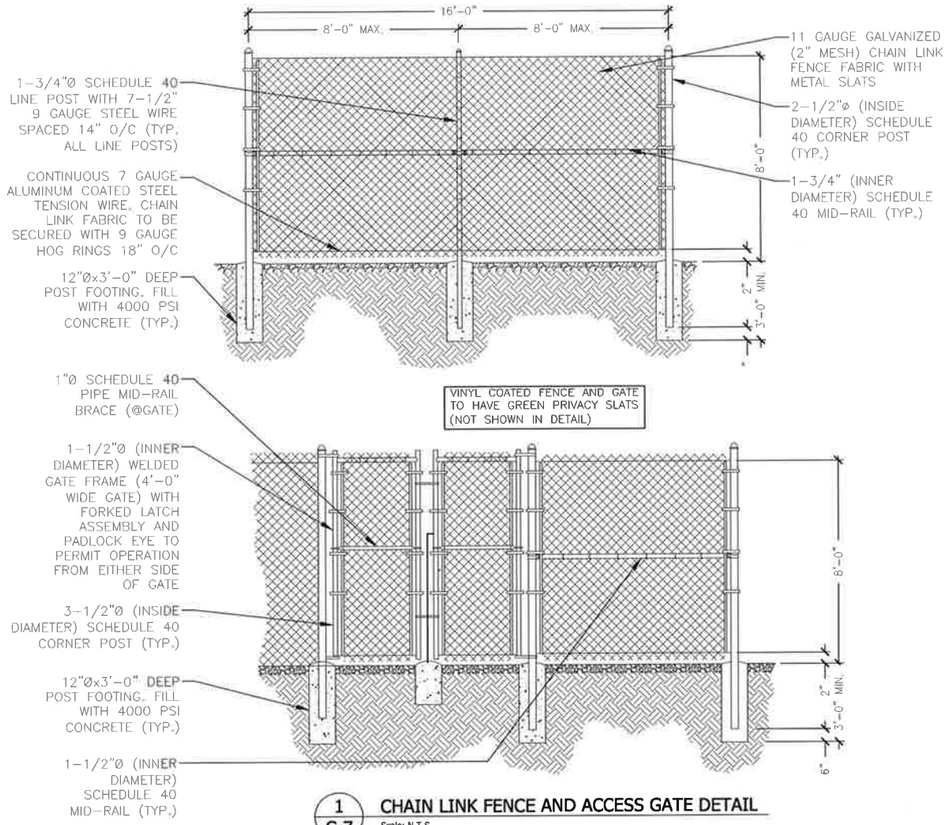
--

SITE NAME:
HAMDEN 8 CT

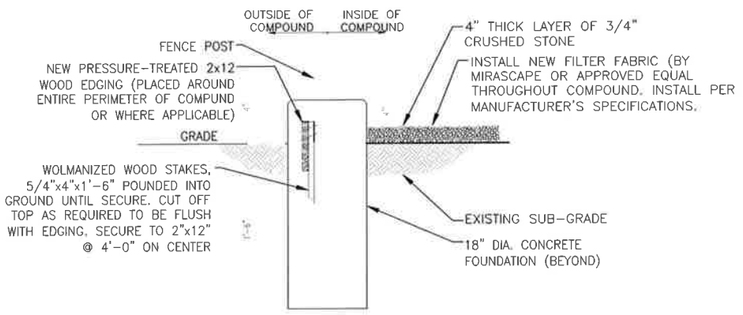
PROJECT INFORMATION:
208 KIRK RD.
HAMDEN, CT 06514

DRAWING TITLE:
SEDIMENT AND EROSION CONTROL DETAILS

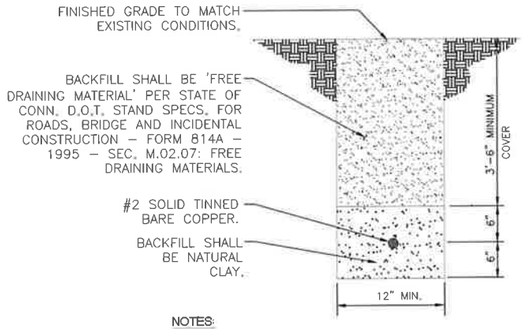
SHEET NUMBER:
C-6



1 C-7 **CHAIN LINK FENCE AND ACCESS GATE DETAIL**
Scale: N.T.S.



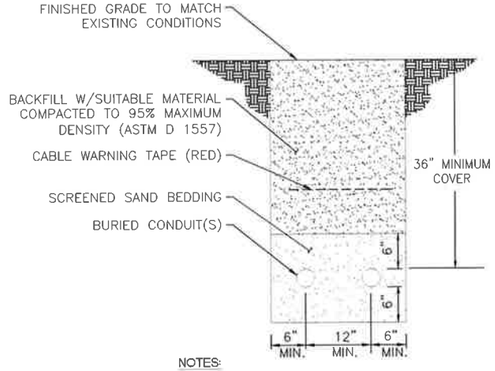
4 C-7 **FENCE POST/GRADE DETAIL**
Scale: N.T.S.



NOTES:

1. ENGINEER SHALL INSPECT PLACEMENT OF EGR CONDUCTOR PRIOR TO BACKFILLING.
2. MAINTAIN MIN. 2'-0" LINEAR CLEARANCE BETWEEN NATURAL CLAY BACKFILL AND THE FOLLOWING: FOUNDATION, UNDERGROUND PIPING/CONDUIT, UNDERGROUND SERVICES. IN THE CLEARANCE AREAS, USE EARTH BACKFILL INSTEAD.
3. EXERCISE HANDLING AND USE PRECAUTION OF BACKFILL MATERIAL PER MFR'S REQUIREMENTS.

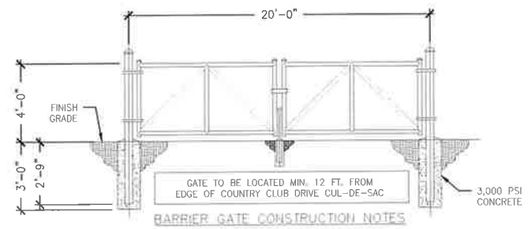
2 C-7 **EGR TRENCH/BACKFILL DETAIL**
Scale: N.T.S.



NOTES:

1. THE CLEAN FILL SHALL PASS THROUGH A 3/8" MESH SCREEN AND SHALL NOT CONTAIN SHARP STONES. OTHER BACKFILL SHALL NOT CONTAIN ASHES, CINDERS, SHELLS, FROZEN MATERIAL, LOOSE DEBRIS OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION.
2. WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.

3 C-7 **TYPICAL ELECTRICAL TRENCH DETAIL**
Scale: N.T.S.



BARRIER GATE CONSTRUCTION NOTES

1. GATE POST 3" ø SCHEDULE 40 FOR GATE WIDTHS UP THRU 6 FEET OR 12 FEET FOR DOUBLE SWING BARRIER GATE PER ASTM-F1083.
2. GATE FRAME: 2" ø SCHEDULE 40 PIPE PER ASTM-F1083.
3. CENTER UPRIGHT AND ANGLE BRACES: 1 5/8" ø SCHEDULE 40 PIPE PER ASTM-F1083.
4. HINGES: INDUSTRIAL OFFSET HINGES (H.D.H.)
5. INDUSTRIAL DROP ROD AND LATCH.
6. PROVIDE CAPS ON POSTS AND UPRIGHTS

6 C-7 **ACCESS DRIVE SECURITY GATE DETAIL**
Scale: N.T.S.

Cellco Partnership
d/b/a Verizon Wireless

verizon

WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	03.05.18	REVIEW D&M PLANS
1	03.15.18	REVISED PER CLIENT COMMNETS
2	10.31.18	D&M PLANS FINAL

DRAWN BY:	CHECKED BY:
MF	DW

--

SITE NAME:
HAMDEN 8 CT

PROJECT INFORMATION:
208 KIRK RD.
HAMDEN, CT 06514

DRAWING TITLE:
DETAILS

SHEET NUMBER:
C-7

ENVIRONMENTAL NOTES

EASTERN BOX TURTLE PROTECTION PROGRAM

EASTERN BOX TURTLE (*TERRAPENNE CAROLINA CAROLINA*), A STATE SPECIAL CONCERN SPECIES AFFORDED PROTECTION UNDER THE CONNECTICUT ENDANGERED SPECIES ACT, IS KNOWN TO OCCUR WITHIN THE VICINITY OF THE PROPOSED COMMUNICATIONS TOWER FACILITY AT 208 KIRK ROAD IN HAMDEN, CONNECTICUT. THE FOLLOWING TURTLE PROTECTION MEASURES SATISFY REQUIREMENTS FROM THE CONNECTICUT DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION ("DEEP") WILDLIFE DIVISION IN ACCORDANCE WITH THEIR NATURAL DIVERSITY DATA BASE ("NDDB") DETERMINATION LETTER (NO. 201703459) DATED APRIL 27, 2017; THIS DETERMINATION IS VALID UNTIL APRIL 27, 2019 PROVIDED THE SCOPE OF THE PROJECT HAS NOT CHANGED AND WORK HAS BEGUN ON THE PROJECT PRIOR TO THE EXPIRATION DATE.

IT IS OF THE UTMOST IMPORTANCE THAT THE CONTRACTOR COMPLIES WITH THE REQUIREMENT FOR IMPLEMENTATION OF THESE PROTECTIVE MEASURES AND THE EDUCATION OF ITS EMPLOYEES AND SUBCONTRACTORS PERFORMING WORK ON THE PROJECT SITE. THIS PROTECTION PLAN SHALL BE IMPLEMENTED IF WORK WILL OCCUR DURING EITHER THE TURTLE'S ACTIVE PERIOD (APRIL 1ST TO SEPTEMBER 30TH) OR INACTIVE PERIOD (OCTOBER 1ST THROUGH MARCH 30TH).

IT IS RECOMMENDED THAT WORK SHOULD OCCUR WHEN THESE TURTLES ARE ACTIVE (APRIL 1ST TO SEPTEMBER 30TH), IF POSSIBLE. CONDUCTING LAND CLEARING WHILE TURTLES ARE ACTIVE WILL ALLOW THE ANIMAL TO MOVE OUT OF HARM'S WAY AND MINIMIZE MORTALITY TO HIBERNATING INDIVIDUALS; HIBERNATION HABITAT TYPICALLY INCLUDES WOODLANDS, WOODLAND EDGES AND FORESTED WETLANDS.

ALL-POINTS TECHNOLOGY CORPORATION, P.C. ("APT") WILL SERVE AS THE ENVIRONMENTAL MONITOR FOR THIS PROJECT TO ENSURE THAT THESE PROTECTION MEASURES ARE IMPLEMENTED PROPERLY. APT WILL PROVIDE AN EDUCATION SESSION FOR THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION ACTIVITIES ON EASTERN BOX TURTLE THAT MAY BE ENCOUNTERED DUE TO THE PROJECT'S LOCATION WITHIN POTENTIALLY SENSITIVE HABITAT. THE CONTRACTOR SHALL CONTACT DEAN GUSTAFSON, SENIOR BIOLOGIST AT APT, AT LEAST 5 BUSINESS DAYS PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITIES. MR. GUSTAFSON CAN BE REACHED BY PHONE AT (860) 663-1697 EXT. 201 OR VIA EMAIL AT DGUSTAFSON@ALLPOINTSTECH.COM.

THE PROPOSED PROTECTION PROGRAM CONSISTS OF SEVERAL COMPONENTS: EDUCATION OF ALL CONTRACTORS AND SUB-CONTRACTORS PRIOR TO INITIATION OF WORK ON THE SITE; PROTECTIVE MEASURES; PERIODIC INSPECTION OF THE CONSTRUCTION PROJECT; AND, REPORTING.

PROTECTION PLAN FOR TURTLES DURING ACTIVE PERIOD (APRIL 1ST THROUGH OCTOBER 31ST) AND INACTIVE PERIOD (OCTOBER 1ST THROUGH MARCH 30TH):

1. ISOLATION MEASURES & SEDIMENTATION AND EROSION CONTROLS

a. PLASTIC NETTING USED IN A VARIETY OF EROSION CONTROL PRODUCTS (I.E., EROSION CONTROL BLANKETS, FIBER ROLLS [WATTLES], REINFORCED SILT FENCE) HAS BEEN FOUND TO ENTANGLE WILDLIFE, INCLUDING REPTILES, AMPHIBIANS, BIRDS AND SMALL MAMMALS, BUT PARTICULARLY SNAKES. NO PERMANENT EROSION CONTROL PRODUCTS OR REINFORCED SILT FENCE WILL BE USED ON THE PROJECT. TEMPORARY EROSION CONTROL PRODUCTS WILL USE EITHER EROSION CONTROL BLANKETS AND FIBER ROLLS COMPOSED OF PROCESSED FIBERS MECHANICALLY BOUND TOGETHER TO FORM A CONTINUOUS MATRIX (NETLESS) OR NETTING COMPOSED OF PLANAR WOVEN NATURAL BIODEGRADABLE FIBER TO AVOID/MINIMIZE WILDLIFE ENTANGLEMENT.

b. INSTALLATION OF SEDIMENTATION AND EROSION CONTROLS, REQUIRED FOR EROSION CONTROL COMPLIANCE AND CREATION OF A BARRIER TO POSSIBLE MIGRATING/DISPERSING TURTLES, SHALL BE PERFORMED BY THE CONTRACTOR FOLLOWING CLEARING ACTIVITIES AND PRIOR TO ANY EARTHWORK. THE ENVIRONMENTAL MONITOR WILL INSPECT THE WORK ZONE AREA PRIOR TO AND FOLLOWING EROSION CONTROL BARRIER INSTALLATION TO ENSURE THE AREA IS FREE OF EASTERN BOX TURTLE AND DOCUMENT BARRIERS HAVE BEEN SATISFACTORILY INSTALLED. THE INTENT OF THE BARRIER IS TO SEGREGATE THE MAJORITY OF THE WORK ZONE AND ISOLATE IT FROM FORAGING/MIGRATING/DISPERSING TURTLES, SNAKES AND OTHER HERPETOFAUNA. OFTENTIMES COMPLETE ISOLATION OF A WORK ZONE IS NOT FEASIBLE DUE TO ACCESSIBILITY NEEDS AND LOCATIONS OF STAGING/MATERIAL STORAGE AREAS, ETC. ALTHOUGH THE BARRIERS MAY NOT COMPLETELY ISOLATE THE WORK ZONE, THEY WILL BE POSITIONED TO DEFLECT MIGRATING/DISPERSAL ROUTES AWAY FROM THE WORK ZONE TO MINIMIZE POTENTIAL ENCOUNTERS WITH TURTLES, SNAKES AND OTHER HERPETOFAUNA.

c. THE CONTRACTOR IS RESPONSIBLE FOR DAILY INSPECTIONS OF THE SEDIMENTATION AND EROSION CONTROLS FOR TEARS OR BREECHES AND ACCUMULATION LEVELS OF SEDIMENT, PARTICULARLY FOLLOWING STORM EVENTS THAT GENERATE A DISCHARGE. APT WILL PROVIDE PERIODIC INSPECTIONS OF THE SEDIMENTATION AND EROSION CONTROLS THROUGHOUT THE DURATION OF CONSTRUCTION ACTIVITIES ONLY AS IT PERTAINS TO THEIR FUNCTION AS ISOLATION MEASURES FOR THE PROTECTION OF RARE SPECIES. THIRD PARTY MONITORING OF SEDIMENTATION AND EROSION CONTROLS WILL BE PERFORMED BY OTHER PARTIES, AS NECESSARY, UNDER APPLICABLE LOCAL, STATE AND/OR FEDERAL REGULATIONS.

d. THE EXTENT OF THE SEDIMENTATION AND EROSION CONTROLS WILL BE AS SHOWN ON THE SITE PLANS. THE CONTRACTOR SHALL HAVE ADDITIONAL SEDIMENTATION AND EROSION CONTROLS STOCKPILED ON SITE SHOULD FIELD OR CONSTRUCTION CONDITIONS WARRANT EXTENDING THE CONTROLS AS DIRECTED BY APT OR OTHER REGULATORY AGENCIES.

e. NO EQUIPMENT, VEHICLES OR CONSTRUCTION MATERIALS SHALL BE STORED OUTSIDE OF THE SEDIMENTATION AND EROSION CONTROLS WITHIN 100 FEET OF WETLANDS OR WATERCOURSES.

f. ALL SEDIMENTATION AND EROSION CONTROLS SHALL BE REMOVED WITHIN 30 DAYS OF COMPLETION OF WORK AND PERMANENT STABILIZATION OF SITE SOILS SO THAT REPTILE AND AMPHIBIAN MOVEMENT BETWEEN UPLANDS AND WETLANDS IS NOT RESTRICTED.

2. CONTRACTOR EDUCATION

a. PRIOR TO WORK ON SITE, THE CONTRACTOR SHALL ATTEND AN EDUCATIONAL SESSION AT THE PRE-CONSTRUCTION MEETING WITH APT. THIS ORIENTATION AND EDUCATIONAL SESSION WILL CONSIST OF AN INTRODUCTORY MEETING WITH APT PROVIDING PHOTOS OF EASTERN BOX TURTLE EMPHASIZING THE NON-AGGRESSIVE NATURE OF THESE SPECIES, THE ABSENCE OF NEED TO DESTROY ANIMALS THAT MIGHT BE ENCOUNTERED AND THE NEED TO FOLLOW PROTECTIVE MEASURES AS DESCRIBED IN SECTION 4 BELOW. WORKERS WILL ALSO BE PROVIDED INFORMATION REGARDING THE IDENTIFICATION OF OTHER TURTLES, SNAKES AND COMMON HERPETOFAUNA SPECIES THAT COULD BE ENCOUNTERED.

b. THE EDUCATION SESSION WILL ALSO FOCUS ON MEANS TO DISCRIMINATE BETWEEN THE SPECIES OF CONCERN AND OTHER NATIVE SPECIES TO AVOID UNNECESSARY "FALSE ALARMS". ENCOUNTERS WITH ANY SPECIES OF TURTLES OR SNAKES WILL BE DOCUMENTED.

c. THE CONTRACTOR WILL BE PROVIDED WITH CELL PHONE AND EMAIL CONTACTS FOR APT PERSONNEL TO IMMEDIATELY REPORT ANY ENCOUNTERS WITH EASTERN BOX TURTLE OR OTHER SPECIES. EDUCATIONAL POSTER MATERIALS WILL BE PROVIDED BY APT AND DISPLAYED ON THE JOB SITE TO MAINTAIN WORKER AWARENESS AS THE PROJECT PROGRESSES.

d. IF AN EASTERN BOX TURTLE IS ENCOUNTERED DURING THE INACTIVE PERIOD, THE CONTRACTOR SHALL IMMEDIATELY CEASE ALL WORK, AVOID DISTURBANCE OF THE TURTLE AND CONTACT APT.

3. PETROLEUM MATERIALS STORAGE AND SPILL PREVENTION

a. CERTAIN PRECAUTIONS ARE NECESSARY TO STORE PETROLEUM MATERIALS, REFUEL AND CONTAIN AND PROPERLY CLEAN UP ANY INADVERTENT FUEL OR PETROLEUM (I.E., OIL, HYDRAULIC FLUID, ETC.) SPILL TO AVOID POSSIBLE IMPACT TO NEARBY HABITATS.

b. A SPILL CONTAINMENT KIT CONSISTING OF A SUFFICIENT SUPPLY OF ABSORBENT PADS AND ABSORBENT MATERIAL WILL BE MAINTAINED BY THE CONTRACTOR AT THE CONSTRUCTION SITE THROUGHOUT THE DURATION OF THE PROJECT. IN ADDITION, A WASTE DRUM WILL BE KEPT ON SITE TO CONTAIN ANY USED ABSORBENT PADS/MATERIAL FOR PROPER AND TIMELY DISPOSAL OFF SITE IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL LAWS.

c. THE FOLLOWING PETROLEUM AND HAZARDOUS MATERIALS STORAGE AND REFUELING RESTRICTIONS AND SPILL RESPONSE PROCEDURES WILL BE ADHERED TO BY THE CONTRACTOR.

i. PETROLEUM AND HAZARDOUS MATERIALS STORAGE AND REFUELING

1. REFUELING OF VEHICLES OR MACHINERY SHALL OCCUR A MINIMUM OF 100 FEET FROM WETLANDS OR WATERCOURSES AND SHALL TAKE PLACE ON AN IMPERVIOUS PAD WITH SECONDARY CONTAINMENT DESIGNED TO CONTAIN FUELS.
2. ANY FUEL OR HAZARDOUS MATERIALS THAT MUST BE KEPT ON SITE SHALL BE STORED ON AN IMPERVIOUS SURFACE UTILIZING SECONDARY CONTAINMENT A MINIMUM OF 100 FEET FROM WETLANDS OR WATERCOURSES.

ii. INITIAL SPILL RESPONSE PROCEDURES

1. STOP OPERATIONS AND SHUT OFF EQUIPMENT.
2. REMOVE ANY SOURCES OF SPARK OR FLAME.
3. CONTAIN THE SOURCE OF THE SPILL.
4. DETERMINE THE APPROXIMATE VOLUME OF THE SPILL.
5. IDENTIFY THE LOCATION OF NATURAL FLOW PATHS TO PREVENT THE RELEASE OF THE SPILL TO SENSITIVE NEARBY WATERWAYS OR WETLANDS.
6. ENSURE THAT FELLOW WORKERS ARE NOTIFIED OF THE SPILL.

iii. SPILL CLEAN UP & CONTAINMENT

1. OBTAIN SPILL RESPONSE MATERIALS FROM THE ON-SITE SPILL RESPONSE KIT. PLACE ABSORBENT MATERIALS DIRECTLY ON THE RELEASE AREA.
2. LIMIT THE SPREAD OF THE SPILL BY PLACING ABSORBENT MATERIALS AROUND THE PERIMETER OF THE SPILL.
3. ISOLATE AND ELIMINATE THE SPILL SOURCE.
4. CONTACT THE APPROPRIATE LOCAL, STATE AND/OR FEDERAL AGENCIES, AS NECESSARY.
5. CONTACT A DISPOSAL COMPANY TO PROPERLY DISPOSE OF CONTAMINATED MATERIALS IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.

iv. REPORTING

1. COMPLETE AN INCIDENT REPORT.
2. SUBMIT A COMPLETED INCIDENT REPORT TO THE APPROPRIATE TOWN OF HAMDEN, CONNECTICUT SITING COUNCIL AND OTHER APPLICABLE LOCAL, STATE AND FEDERAL OFFICIALS.

4. TURTLE PROTECTIVE MEASURES

a. DURING THE TURTLE ACTIVE PERIOD AND PRIOR TO THE START OF CONSTRUCTION EACH DAY, THE CONTRACTOR SHALL SEARCH THE ENTIRE WORK AREA FOR TURTLES.

b. IF A TURTLE IS FOUND DURING THE ACTIVE PERIOD, IT SHALL BE IMMEDIATELY MOVED, UNHARMED, BY CAREFULLY GRASPED IN BOTH HANDS, ONE ON EACH SIDE OF THE SHELL, BETWEEN THE TURTLE'S FORELIMBS AND THE HIND LIMBS, AND PLACED JUST OUTSIDE OF THE ISOLATION BARRIER IN THE SAME APPROXIMATE DIRECTION IT WAS WALKING.

c. DURING THE ACTIVE TURTLE PERIOD, SPECIAL CARE SHALL BE TAKEN BY THE CONTRACTOR DURING EARLY MORNING AND EVENING HOURS SO THAT POSSIBLE BASKING OR FORAGING TURTLES ARE NOT HARMED BY CONSTRUCTION ACTIVITIES.

d. THE CONTRACTOR SHALL BE PARTICULARLY DILIGENT DURING THE MONTH OF JUNE WHEN TURTLES ARE ACTIVELY SELECTING NESTING SITES WHICH RESULTS IN AN INCREASE IN TURTLE MOVEMENT ACTIVITY.

5. HERBICIDE AND PESTICIDE RESTRICTIONS

a. THE USE OF HERBICIDES AND PESTICIDES AT THE PROPOSED COMMUNICATIONS TOWER FACILITY SHALL BE AVOIDED WHEN POSSIBLE. IN THE EVENT HERBICIDES AND/OR PESTICIDES ARE REQUIRED AT THE PROPOSED FACILITY, THEIR USE WILL BE USED IN ACCORDANCE WITH INTEGRATED PEST MANAGEMENT ("IPM") PRINCIPLES WITH PARTICULAR ATTENTION TO MINIMIZE APPLICATIONS WITHIN 100 FEET OF WETLAND OR WATERCOURSE RESOURCES. NO APPLICATIONS OF HERBICIDES OR PESTICIDES ARE ALLOWED WITHIN ACTUAL WETLAND OR WATERCOURSE RESOURCES.

6. REPORTING

a. DAILY COMPLIANCE MONITORING REPORTS (BRIEF NARRATIVE AND APPLICABLE PHOTOS) DOCUMENTING EACH APT INSPECTION WILL BE SUBMITTED BY APT TO VERIZON WIRELESS FOR COMPLIANCE VERIFICATION. ANY OBSERVATIONS OF TURTLES WILL BE INCLUDED IN THE REPORTS.

b. FOLLOWING COMPLETION OF THE CONSTRUCTION PROJECT, APT WILL PROVIDE A COMPLIANCE MONITORING SUMMARY REPORT TO VERIZON WIRELESS DOCUMENTING IMPLEMENTATION OF THE EASTERN BOX TURTLE PROTECTION PROGRAM, MONITORING AND ANY SPECIES OBSERVATIONS. VERIZON WIRELESS WILL PROVIDE A COPY OF THE COMPLIANCE MONITORING SUMMARY REPORT TO THE CONNECTICUT SITING COUNCIL FOR COMPLIANCE VERIFICATION.

c. ANY OBSERVATIONS OF EASTERN BOX TURTLE WILL BE REPORTED TO CTDEEP BY APT ON THE APPROPRIATE SPECIAL ANIMAL REPORTING FORM, WITH PHOTO-DOCUMENTATION (IF POSSIBLE) AND SPECIFIC INFORMATION ON THE LOCATION AND DISPOSITION OF THE ANIMAL.

ADDITIONAL PROTECTION MEASURES FOR TURTLES IF CONSTRUCTION ACTIVITIES OCCUR DURING INACTIVE PERIOD (OCTOBER 1ST THROUGH MARCH 30TH):

1. TURTLE PROTECTIVE MEASURES

a. KEEP HEAVY EQUIPMENT OUT OF TURTLE HIBERNATION HABITAT (E.G., WOODLANDS AND WOODLAND EDGES) TO THE GREATEST EXTENT POSSIBLE AND HAND-FELL TREES TO THE GREATEST EXTENT POSSIBLE TO MINIMIZE THE POTENTIAL FOR HEAVY MACHINERY THAT MAY CRUSH HIBERNATING TURTLES.

b. AVOID AND LIMIT ANY EQUIPMENT USE WITHIN 50 FEET OF WETLANDS.

c. WHEN FELLING TREES ADJACENT TO BROOKS AND STREAMS CUT THEM TO FALL AWAY FROM THE WATERWAY AND DO NOT DRAG TREES ACROSS THE WATERWAY OR REMOVE STUMPS FROM STREAM BANKS.

d. NO HEAVY MACHINERY OR VEHICLES MAY BE PARKED IN ANY TURTLE HABITAT.

GENERAL STRUCTURAL NOTES:

1. ALL EQUIPMENT SHALL BE INSTALLED PLUMB AND LEVEL.

2. ALL WIDE FLANGE STRUCTURAL STELL SHALL CONFORM WITH A992 SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST AISC CODE AND ASTM SPECIFICATION. STEEL SHALL CONFORM TO ASTM A-36. PIPE SHALL CONFORM TO ASTM A-501 OR ASTM TYPE EOR S A-53 (GRADE B).

3. ALL CONNECTIONS OF STRUCTURAL STEEL MEMBERS SHALL BE MADE USING SPECIFIED WELDS WITH WELDING ELECTRODES E-70XX OR SPECIFIED HIGH STRENGTH BOLTS TO BE ASTM A325, THREAD EXCLUDED FROM SHEAR PLANE.

4. ALL STEEL EXPOSED TO MOISTURE SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION PER ASTM A-123. ALL DAMAGED SURFACES, WELDED AREAS AND AUTHORIZED NON-GALVANIZED MEMBERS OR PARTS (EXISTING OR NEW) SHALL BE PAINTED WITH 2 COATS OF ZRC COLD GALVANIZING COMPOUND MANUFACTURED BY ZRC CHEMICAL PRODUCTS CO. QUINCY, MA. OR USE THERMAL SPRAYING WITH PLATTZINC 85/15 AS MANUFACTURED BY PLATT BROTHERS & COMPANY, WATERBURY, CT 1-800-752-8276.

5. ALL SHOP AND FIELD WELDING SHALL BE DONE BY WELDERS QUALIFIED AS DESCRIBED IN THE "AMERICAN WELDING SOCIETY'S STANDARD QUALIFICATION PROCEDURE" TO PERFORM THE TYPE OF WORK REQUIRED.

6. ALL PIPE SIZES ARE NOMINAL DIAMETER (INSIDE DIAMETER).

CAST-IN-PLACE CONCRETE:

1. ALL CONCRETE WORK SHALL CONFORM TO THE LATEST EDITION OF THE ACI BUILDING CODE.

2. ALL CONCRETE SHALL ATTAIN 4000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.

3. READY MIX: COMPLY WITH ACI-301 AND ASTM C-94. ALL CONCRETE EXPOSED TO THE GROUND OR WEATHER SHALL BE AIR ENTRAINED.

4. COLD WEATHER CONCRETE POURING SHALL BE IN ACCORDANCE WITH ACI-306.

5. THROUGHOUT CONSTRUCTION THE CONCRETE WORK SHALL BE ADEQUATELY PROTECTED AGAINST DAMAGE DUE TO EXCESSIVE LOADING, CONSTRUCTION EQUIPMENT, MATERIALS OR THODS, ICE, RAIN, SNOW, EXCESSIVE HEAT AND FREEZING TEMPERATURES.

6. EARLY DRYING OUT OF CONCRETE, ESPECIALLY DURING THE FIRST 24 HOURS, SHALL BE CAREFULLY GUARDED AGAINST. ALL SURFACES SHALL BE PROTECTED USING MOIST CURING OR A MEMBRANE CURING AGENT APPLIED AS SOON AS FORMS ARE REMOVED OR FINISHING OPERATIONS ARE COMPLETE. CARE SHALL BE EXERCISED SO AS NOT TO DAMAGE COATING.

7. APPLY NON-SLIP BROOM FINISH IMMEDIATELY AFTER TROWEL FINISHING.

8. CONTRACTOR TO COORDINATE REQUIREMENTS OF STRUCTURAL, CIVIL, MECHANICAL AND ELECTRICAL DRAWINGS INCLUDING ANY AND ALL PENETRATIONS SPECIFIED PRIOR TO POURING CONCRETE.

9. CONTRACTOR SHALL PROVIDE A 3/4" CHAMFER ON ALL CONCRETE SLABS.

REINFORCING:

1. ALL REINFORCING BAR SHALL CONFORM TO THE LATEST ACI CODE AND DETAILING MANUAL.

2. WHERE REINFORCING IS CALLED OUT IN THE CONSTRUCTION DOCUMENTS IT SHALL BE 3" CLEAR COVER (MINIMUM UNLESS OTHERWISE NOTED).

3. ALL BARS SHALL BE ASTM A-615, GRADE 60.

4. WELDED WIRE FABRIC SHALL BE ASTM A-185.

5. WHERE CONTINUOUS BARS ARE CALLED FOR, THEY SHALL BE RUN CONTINUOUSLY AROUND CORNERS AND LAPPED AT NECESSARY SPLICES OR HOOKED AT DISCONTINUOUS ENDS. LAP SHALL BE 40 BAR DIAMETERS.

FOUNDTAION

FOOTINGS SHALL BEAR ON UNDISTURBED SOIL AND /OR SUPERVISED COMPACTED FILL, FREE OF FROST,HAVING A MINIMUM ALLOWABLE BEARING CAPACITY OF 1 1/2 TONS PER SQUARE FOOT

Cellco Partnership
d/b/a Verizon Wireless
verizon
WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

STATE OF CONNECTICUT · DAVID A. WEINPAHL · NO. 22144 · LICENSED PROFESSIONAL ENGINEER

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	03.05.18	REVIEW D&M PLANS
1	03.15.18	REVISED PER CLIENT COMMNETS
2	10.31.18	D&M PLANS FINAL

DRAWN BY:	CHECKED BY:
MF	DW

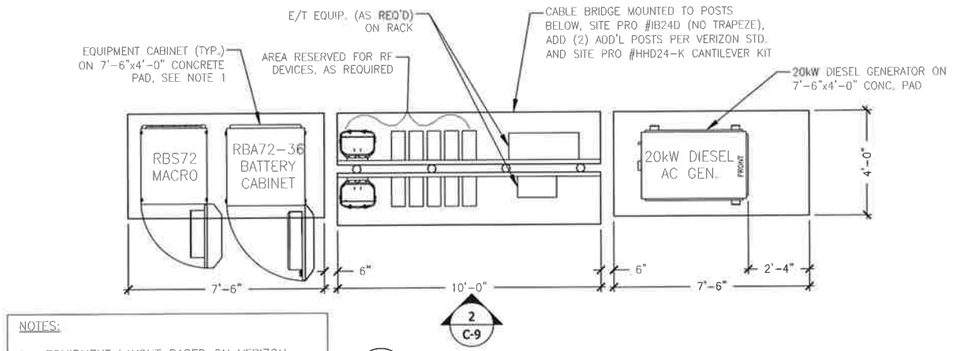
--

SITE NAME:
HAMDEN 8 CT

PROJECT INFORMATION:
208 KIRK RD.
HAMDEN, CT 06514

DRAWING TITLE:
STRUCTURAL & ENVIRONMENTAL NOTES

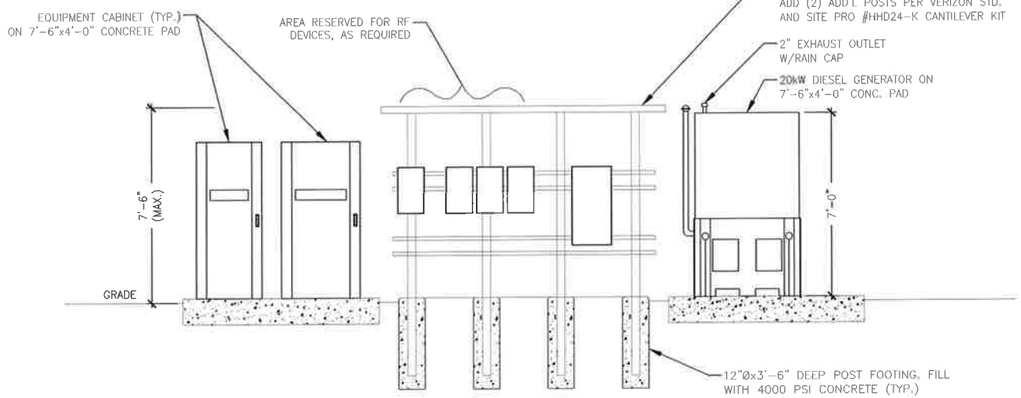
SHEET NUMBER:
C-8



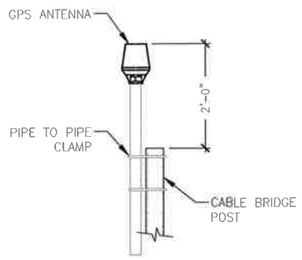
NOTES:

1. EQUIPMENT LAYOUT BASED ON VERIZON NATIONAL STANDARD.

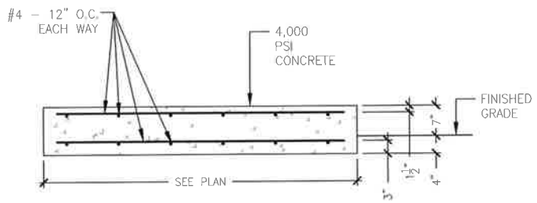
1 C-9 **EQUIPMENT PLAN**
Scale: 3/8" = 1'-0"



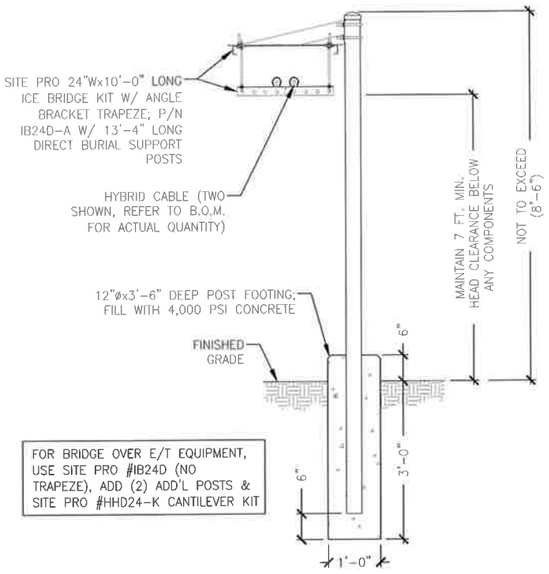
2 C-9 **EQUIPMENT ELEVATION (FRONT)**
Scale: 3/8" = 1'-0"



5 C-9 **GPS MOUNTING DETAIL**
Scale: N.T.S.



3 C-9 **CONCRETE PAD DETAIL**
Scale: 3/4" = 1'-0"



4 C-9 **CABLE BRIDGE DETAIL**
Scale: N.T.S.

Cellco Partnership
d/b/a Verizon Wireless

verizon

WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

STATE OF CONNECTICUT — DAVID A. WEINPAHL — NO. 22144 — LICENSED PROFESSIONAL ENGINEER

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	03.05.18	REVIEW D&M PLANS
1	03.15.18	REVISED PER CLIENT COMMNETS
2	10.31.18	D&M PLANS FINAL

DRAWN BY:	CHECKED BY:
MF	DW

--

SITE NAME:
HAMDEN 8 CT

PROJECT INFORMATION:
208 KIRK RD.
HAMDEN, CT 06514

DRAWING TITLE:
EQUIPMENT PLAN, ELEVATION & DETAILS

SHEET NUMBER:
C-9

ATTACHMENT 2

Sabre Industries™
Towers and Poles

Structural Design Report

120' Extendible to 140' Monopole
Site: Hamden 8, CT

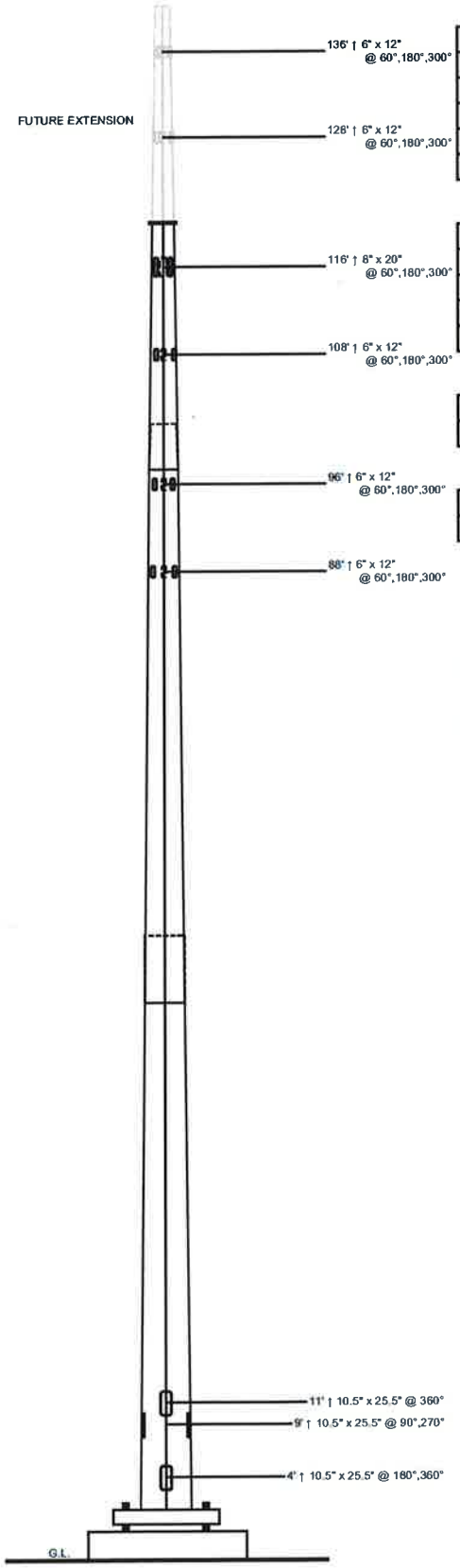
Prepared for: VERIZON WIRELESS
by: Sabre Towers & Poles ™

Job Number: 19-4005-RAM-R1

November 8, 2018

11/9/18

Length (ft)	20'-0"	22'-9"	53'-6"	53'-3"
Number Of Sides			18	
Thickness (in)	1/4"	5/16"	1/2"	
Lap Splice (ft)		4' - 3"	6' - 3"	
Top Diameter (in)	18"	24.18"	29.17"	42.48"
Bottom Diameter (in)	24.06"	31.08"	45.38"	58.62"
Taper (in/ft)			0.303	
Grade			A572-65	
Weight (lbs)	1597	2685	11417	17309
Overall Steel Height (ft)	20 (Extension)		119	



Designed Appurtenance Loading

Elev	Description	Tx-Line
140***	(1) 200 sq.ft. (no ice) 225 sq.ft. (ice)	(12) 1 5/8"
130***	(1) 200 sq.ft. (no ice) 225 sq.ft. (ice)	(12) 1 5/8"
120	(1) 250 Sq. Ft. EPA (6000 lbs)	(18) 1 5/8"
110	(1) 200 sq.ft. (no ice) 225 sq.ft. (ice)	(12) 1 5/8"
100	(1) 200 sq.ft. (no ice) 225 sq.ft. (ice)	(12) 1 5/8"

Load Case Reactions

Description	Axial (kips)	Shear (kips)	Moment (ft-k)	Deflection (ft)	Sway (deg)
3s Gusted Wind	65.68	68.67	7765.03	11.75	9.63
3s Gusted Wind 0.9 Dead	49.29	68.52	7656.35	11.54	9.45
3s Gusted Wind&Ice	102.97	20.28	2375.19	3.7	2.97
Service Loads	54.74	14.68	1659.27	2.56	2.08

Base Plate Dimensions

Shape	Diameter	Thickness	Bolt Circle	Bolt Qty	Bolt Diameter
Round	71.5"	2.5"	65.75"	24	2.25"

Anchor Bolt Dimensions

Length	Diameter	Hole Diameter	Weight	Type	Finish
84"	2.25"	2.625"	2906.4	A615-75	Galv

Notes

1) Antenna Feed Lines Run Inside Pole
2) All dimensions are above ground level, unless otherwise specified.
3) Weights shown are estimates. Final weights may vary.
4) The Monopole was designed for a basic wind speed of 97 mph with 0" of radial ice, and 50 mph with 3/4" of radial ice, in accordance with ANSI/TIA-222-G, Structure Class II, Exposure Category C, Topographic Category 1.
5) The tower design meets the requirements for an Ultimate Wind Speed of 125 mph (Risk Category II), in accordance with the 2015 International Building Code.
6) Full Height Step Bolts
7) Tower Rating: 100%

*** These Appurtenances cannot be installed until the Monopole has been extended.

Sabre Industries
Towers and Poles

Sabre Communications Corporation
7101 Southbridge Drive
P.O. Box 658
Sioux City, IA 51102-0658
Phone: (712) 258-6690
Fax: (712) 279-0814

Information contained herein is the sole property of Sabre Communications Corporation, constitutes a trade secret as defined by Iowa Code Ch. 550 and shall not be reproduced, copied or used in whole or part for any purpose whatsoever without the prior written consent of Sabre Communications Corporation.

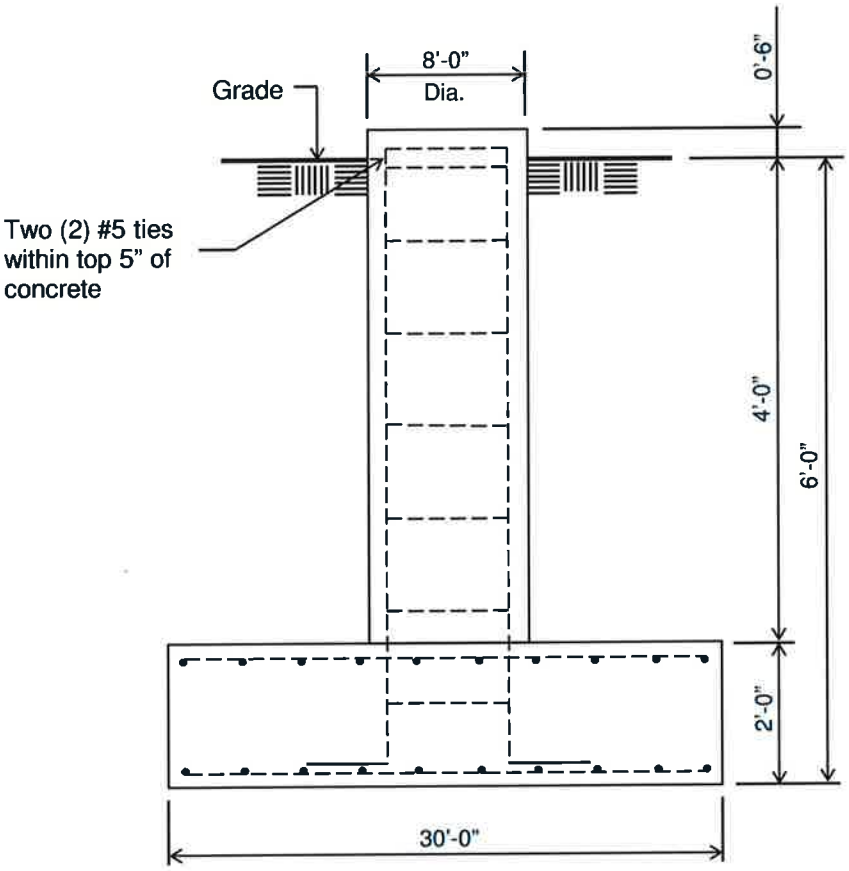
Job:	**19-4005-RAM-R1**
Customer:	VERIZON WIRELESS
Site Name:	Hamden 8, CT
Description:	120' ext. 140' Monopole
Date:	11/8/2018 By: MH

Sabre Industries™
Towers and Poles

No.: 19-4005-RAM-R1

Date: 11/08/18
By: MH

Customer: VERIZON WIRELESS
Site: Hamden 8, CT
120' Monopole Extendible to 140'



ELEVATION VIEW
(75.04 Cu. Yds.)
(1 REQUIRED; NOT TO SCALE)

Notes:

1) Concrete shall have a minimum 28-day compressive strength of 4,500 psi, in accordance with ACI 318-11.

2) Rebar to conform to ASTM specification A615 Grade 60.

3) All rebar to have a minimum of 3" concrete cover.

4) All exposed concrete corners to be chamfered 3/4".

5) The foundation design is based on the geotechnical report by Terracon Project No. J2185044, dated: 10/17/2018.

6) See the geotechnical report for compaction requirements, if specified.

7) 4 ft of soil cover is required over the entire area of the foundation slab.

8) The foundation is based on the following factored loads:
   Moment = 7,765.03 k-ft
   Axial = 65.68 k
   Shear = 68.67 k

Rebar Schedule for Pad and Pier	
Pier	(44) #9 vertical rebar w/ hooks at bottom w/ #5 ties, two within top 5" of pier, then 12" C/C
Pad	(67) #8 horizontal rebar evenly spaced each way top and bottom (268 total)

Information contained herein is the sole property of Sabre Towers & Poles, constitutes a trade secret as defined by Iowa Code Ch. 550 and shall not be reproduced, copied or used in whole or part for any purpose whatsoever without the prior written consent of Sabre Towers & Poles.

7101 Southbridge Drive - P.O. Box 658 - Sioux City, IA 51102-0658 - Phone 712.258.6690 - Fax 712.279.0814

(USA 222-G) - Monopole Spatial Analysis (c)2015 Guymast Inc.

Tel:(416)736-7453 Fax:(416)736-4372 Web:www.guymast.com

Processed under license at:

Sabre Towers and Poles on: 8 nov 2018 at: 9:39:42

120' ext. 140' Monopole / Hamden 8, CT

* All pole diameters shown on the following pages are across corners.
See profile drawing for widths across flats.

POLE GEOMETRY

ELEV ft	SECTION NAME	No. SIDE	OUTSIDE DIAM in	THICK -NESS in	RESISTANCES ♦*Pn kip	♦*Mn ft-kip	SPLICE TYPE	...OVERLAP... LENGTH ft	RATIO	w/t
139.0										
	A	18	18.28	0.250	1046.4	379.8				10.9
			24.43	0.250	1403.7	685.7				
119.0										
	B	18	24.56	0.312	1759.2	859.4				11.9
			30.24	0.312	2171.5	1312.7				
100.5										
	B/C	18	30.24	0.312	2171.5	1312.7	SLIP	4.25	1.67	
			30.93	0.500	3532.8	2158.9				
96.2										
	C	18	30.93	0.500	3532.8	2158.9				9.0
			44.14	0.500	5066.1	4461.0				
53.2										
	C/D	18	44.14	0.500	5066.1	4461.0	SLIP	6.25	1.69	
			45.08	0.500	5175.0	4656.0				
47.0										
	D	18	45.08	0.500	5175.0	4656.0				13.9
			59.52	0.500	6570.9	7849.2				
0.0										

POLE ASSEMBLY

SECTION NAME	BASE ELEV ft	.....BOLTS AT BASE OF SECTION..... NUMBER	TYPE	DIAM in	STRENGTH ksi	THREADS IN SHEAR PLANE	CALC BASE ELEV ft
A	119.000	0	A325	0.00	92.0	0	119.000
B	96.250	0	A325	0.00	92.0	0	96.250
C	47.000	0	A325	0.00	92.0	0	47.000
D	0.000	0	A325	0.00	92.0	0	0.000

POLE SECTIONS

SECTION NAME	No.of SIDES	LENGTH ft	OUTSIDE.DIAMETER BOT * in	TOP * in	BEND RAD in	MAT-ERIAL ID	FLANGE.ID BOT	TOP	FLANGE.WELD ..GROUP.ID.. BOT	TOP
A	18	20.00	24.43	18.28	0.000	1	0	0	0	0
B	18	22.75	31.56	24.56	0.000	2	0	0	0	0
C	18	53.50	46.08	29.61	0.000	3	0	0	0	0
D	18	53.25	59.52	43.14	0.000	4	0	0	0	0

* - Diameter of circumscribed circle

MATERIAL TYPES

TYPE OF SHAPE	TYPE NO	NO OF ELEM.	ORIENT & deg	HEIGHT in	WIDTH in	.THICKNESS. WEB in	FLANGE in	IRREGULARITY .PROJECTION. % OF AREA	ORIENT deg
PL	1	1	0.0	24.43	0.25	0.250	0.250	0.00	0.0
PL	2	1	0.0	31.56	0.31	0.312	0.312	0.00	0.0
PL	3	1	0.0	46.08	0.50	0.500	0.500	0.00	0.0

PL 4 1 0.0 59.52 0.50 0.500 0.500 0.00 0.0

& - With respect to vertical

MATERIAL PROPERTIES

MATERIAL TYPE NO.	ELASTIC MODULUS ksi	UNIT WEIGHT pcf	.. STRENGTH .. Fu ksi	Fy ksi	THERMAL COEFFICIENT /deg
1	29000.0	490.0	80.0	65.0	0.00001170
2	29000.0	490.0	80.0	65.0	0.00001170
3	29000.0	490.0	80.0	65.0	0.00001170
4	29000.0	490.0	80.0	65.0	0.00001170

* Only 3 condition(s) shown in full
* Some concentrated wind loads may have been derived from full-scale wind tunnel testing

LOADING CONDITION A

97 mph wind with no ice. Wind Azimuth: 0♦

LOADS ON POLE

LOAD TYPE	ELEV ft	APPLY..LOAD..AT RADIUS ft	AZI	LOAD AZI	.....FORCES..... HORIZ kip	DOWN kip	.....MOMENTS..... VERTICAL ft-kip	TORSNAL ft-kip
C	139.000	0.00	0.0	0.0	10.9425	3.7200	0.0000	0.0000
C	137.000	0.00	0.0	0.0	0.0000	2.0517	0.0000	0.0000
C	129.000	0.00	0.0	0.0	0.0000	1.9319	0.0000	0.0000
C	129.000	0.00	0.0	0.0	10.7731	3.7200	0.0000	0.0000
C	119.000	0.00	0.0	0.0	13.2414	7.2000	0.0000	0.0000
C	117.000	0.00	0.0	0.0	0.0000	2.6283	0.0000	0.0000
C	109.000	0.00	0.0	0.0	0.0000	1.6324	0.0000	0.0000
C	109.000	0.00	0.0	0.0	10.4008	3.7200	0.0000	0.0000
C	99.000	0.00	0.0	0.0	0.0000	1.4826	0.0000	0.0000
C	99.000	0.00	0.0	0.0	10.1942	3.7200	0.0000	0.0000
D	139.000	0.00	180.0	0.0	0.0563	0.0601	0.0000	0.0000
D	119.000	0.00	180.0	0.0	0.0682	0.0746	0.0000	0.0000
D	119.000	0.00	180.0	0.0	0.0728	0.1006	0.0000	0.0000
D	100.500	0.00	180.0	0.0	0.0817	0.1156	0.0000	0.0000
D	100.500	0.00	180.0	0.0	0.0852	0.3125	0.0000	0.0000
D	96.250	0.00	180.0	0.0	0.0852	0.3125	0.0000	0.0000
D	96.250	0.00	180.0	0.0	0.0895	0.2086	0.0000	0.0000
D	81.917	0.00	180.0	0.0	0.0895	0.2086	0.0000	0.0000
D	81.917	0.00	180.0	0.0	0.0978	0.2364	0.0000	0.0000
D	67.583	0.00	180.0	0.0	0.0978	0.2364	0.0000	0.0000
D	67.583	0.00	180.0	0.0	0.1045	0.2642	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1045	0.2642	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1082	0.5628	0.0000	0.0000
D	47.000	0.00	180.0	0.0	0.1082	0.5628	0.0000	0.0000
D	47.000	0.00	180.0	0.0	0.1079	0.2962	0.0000	0.0000
D	35.250	0.00	180.0	0.0	0.1079	0.2962	0.0000	0.0000
D	35.250	0.00	180.0	0.0	0.1085	0.3190	0.0000	0.0000
D	23.500	0.00	180.0	0.0	0.1085	0.3190	0.0000	0.0000
D	23.500	0.00	180.0	0.0	0.1049	0.3419	0.0000	0.0000
D	11.750	0.00	180.0	0.0	0.1049	0.3419	0.0000	0.0000
D	11.750	0.00	180.0	0.0	0.1070	0.3647	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.1070	0.3647	0.0000	0.0000

LOADING CONDITION M

97 mph wind with no ice. Wind Azimuth: 0♦

LOADS ON POLE

LOAD TYPE	ELEV ft	APPLY..LOAD..AT RADIUS ft	AZI	LOAD AZI	.....FORCES..... HORIZ kip	DOWN kip	.....MOMENTS..... VERTICAL ft-kip	TORSNAL ft-kip
C	139.000	0.00	0.0	0.0	10.9425	2.7900	0.0000	0.0000
C	137.000	0.00	0.0	0.0	0.0000	1.5388	0.0000	0.0000
C	129.000	0.00	0.0	0.0	0.0000	1.4489	0.0000	0.0000
C	129.000	0.00	0.0	0.0	10.7731	2.7900	0.0000	0.0000
C	119.000	0.00	0.0	0.0	13.2414	5.4000	0.0000	0.0000
C	117.000	0.00	0.0	0.0	0.0000	1.9712	0.0000	0.0000

C	109.000	0.00	0.0	0.0	0.0000	1.2243	0.0000	0.0000
C	109.000	0.00	0.0	0.0	10.4008	2.7900	0.0000	0.0000
C	99.000	0.00	0.0	0.0	0.0000	1.1120	0.0000	0.0000
C	99.000	0.00	0.0	0.0	10.1942	2.7900	0.0000	0.0000
D	139.000	0.00	180.0	0.0	0.0563	0.0450	0.0000	0.0000
D	119.000	0.00	180.0	0.0	0.0682	0.0560	0.0000	0.0000
D	119.000	0.00	180.0	0.0	0.0728	0.0755	0.0000	0.0000
D	100.500	0.00	180.0	0.0	0.0817	0.0867	0.0000	0.0000
D	100.500	0.00	180.0	0.0	0.0852	0.2344	0.0000	0.0000
D	96.250	0.00	180.0	0.0	0.0852	0.2344	0.0000	0.0000
D	96.250	0.00	180.0	0.0	0.0895	0.1565	0.0000	0.0000
D	81.917	0.00	180.0	0.0	0.0895	0.1565	0.0000	0.0000
D	81.917	0.00	180.0	0.0	0.0978	0.1773	0.0000	0.0000
D	67.583	0.00	180.0	0.0	0.0978	0.1773	0.0000	0.0000
D	67.583	0.00	180.0	0.0	0.1045	0.1981	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1045	0.1981	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1082	0.4221	0.0000	0.0000
D	47.000	0.00	180.0	0.0	0.1082	0.4221	0.0000	0.0000
D	47.000	0.00	180.0	0.0	0.1079	0.2221	0.0000	0.0000
D	35.250	0.00	180.0	0.0	0.1079	0.2221	0.0000	0.0000
D	35.250	0.00	180.0	0.0	0.1085	0.2393	0.0000	0.0000
D	23.500	0.00	180.0	0.0	0.1085	0.2393	0.0000	0.0000
D	23.500	0.00	180.0	0.0	0.1049	0.2564	0.0000	0.0000
D	11.750	0.00	180.0	0.0	0.1049	0.2564	0.0000	0.0000
D	11.750	0.00	180.0	0.0	0.1070	0.2735	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.1070	0.2735	0.0000	0.0000

LOADING CONDITION Y

50 mph wind with 0.75 ice. Wind Azimuth: 0♦

LOADS ON POLE

LOAD TYPE	ELEV ft	APPLY..LOAD..AT RADIUS ft	AZI	LOAD AZI	.....FORCES..... HORIZ kip	DOWN kip	.....MOMENTS..... VERTICAL ft-kip	TORSNAL ft-kip
C	139.000	0.00	0.0	0.0	2.6045	7.8797	0.0000	0.0000
C	137.000	0.00	0.0	0.0	0.0000	2.0517	0.0000	0.0000
C	129.000	0.00	0.0	0.0	0.0000	1.9319	0.0000	0.0000
C	129.000	0.00	0.0	0.0	2.5585	7.8490	0.0000	0.0000
C	119.000	0.00	0.0	0.0	5.9518	17.4402	0.0000	0.0000
C	117.000	0.00	0.0	0.0	0.0000	2.6283	0.0000	0.0000
C	109.000	0.00	0.0	0.0	0.0000	1.6324	0.0000	0.0000
C	109.000	0.00	0.0	0.0	2.4578	7.7806	0.0000	0.0000
C	99.000	0.00	0.0	0.0	0.0000	1.4826	0.0000	0.0000
C	99.000	0.00	0.0	0.0	2.4022	7.7421	0.0000	0.0000
D	139.000	0.00	180.0	0.0	0.0204	0.1040	0.0000	0.0000
D	119.000	0.00	180.0	0.0	0.0239	0.1276	0.0000	0.0000
D	119.000	0.00	180.0	0.0	0.0253	0.1572	0.0000	0.0000
D	112.833	0.00	180.0	0.0	0.0253	0.1572	0.0000	0.0000
D	112.833	0.00	180.0	0.0	0.0266	0.1683	0.0000	0.0000
D	106.667	0.00	180.0	0.0	0.0266	0.1683	0.0000	0.0000
D	106.667	0.00	180.0	0.0	0.0279	0.1793	0.0000	0.0000
D	100.500	0.00	180.0	0.0	0.0279	0.1793	0.0000	0.0000
D	100.500	0.00	180.0	0.0	0.0290	0.3792	0.0000	0.0000
D	96.250	0.00	180.0	0.0	0.0290	0.3792	0.0000	0.0000
D	96.250	0.00	180.0	0.0	0.0302	0.2791	0.0000	0.0000
D	81.917	0.00	180.0	0.0	0.0302	0.2791	0.0000	0.0000
D	81.917	0.00	180.0	0.0	0.0326	0.3144	0.0000	0.0000
D	67.583	0.00	180.0	0.0	0.0326	0.3144	0.0000	0.0000
D	67.583	0.00	180.0	0.0	0.0345	0.3491	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0345	0.3491	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0355	0.6522	0.0000	0.0000
D	47.000	0.00	180.0	0.0	0.0355	0.6522	0.0000	0.0000
D	47.000	0.00	180.0	0.0	0.0352	0.3871	0.0000	0.0000
D	35.250	0.00	180.0	0.0	0.0352	0.3871	0.0000	0.0000
D	35.250	0.00	180.0	0.0	0.0352	0.4135	0.0000	0.0000
D	23.500	0.00	180.0	0.0	0.0352	0.4135	0.0000	0.0000
D	23.500	0.00	180.0	0.0	0.0338	0.4380	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.0343	0.4571	0.0000	0.0000

MAXIMUM POLE DEFORMATIONS CALCULATED(w.r.t. wind direction)

MAST ELEV ft	DEFLECTIONS (ft) HORIZONTAL ALONG	HORIZONTAL ACROSS	DOWN	ROTATIONS (deg) TILT ALONG	TILT ACROSS	TWIST
139.0	11.75C	-0.03H	1.38C	9.63C	-0.02H	0.00K
134.0	10.93C	-0.03H	1.25C	9.57C	-0.02H	0.00K
129.0	10.13C	-0.03H	1.11C	9.42C	-0.02H	0.00K
124.0	9.33C	-0.03H	0.98C	9.17C	-0.02H	0.00K
119.0	8.57C	-0.02H	0.86C	8.83C	-0.02H	0.00K
112.8	7.66C	-0.02H	0.73C	8.40C	-0.02H	0.00K
106.7	6.80C	-0.02H	0.61C	7.87C	-0.02H	0.00H
100.5	6.00C	-0.02H	0.50C	7.26C	-0.02H	0.00H
96.2	5.48C	-0.02H	0.43C	6.97C	-0.02H	0.00H
81.9	3.90C	-0.01H	0.26C	5.84C	-0.02H	0.00H
67.6	2.59C	-0.01H	0.14C	4.67C	-0.01H	0.00H
53.2	1.57C	0.00H	0.06C	3.57C	-0.01H	0.00H
47.0	1.21C	0.00H	0.04C	3.11C	-0.01H	0.00H
35.2	0.66C	0.00H	0.02C	2.24C	-0.01H	0.00H
23.5	0.29C	0.00H	0.00C	1.43C	0.00H	0.00H
11.7	0.07C	0.00H	0.00C	0.69C	0.00H	0.00H
0.0	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A

MAXIMUM POLE FORCES CALCULATED(w.r.t. to wind direction)

MAST ELEV ft	TOTAL AXIAL kip	SHEAR.w.r.t.WIND.DIR ALONG kip	SHEAR.w.r.t.WIND.DIR ACROSS kip	MOMENT.w.r.t.WIND.DIR ALONG ft-kip	MOMENT.w.r.t.WIND.DIR ACROSS ft-kip	TORSION ft-kip
139.0	7.88 AG	10.96 C	-0.01 U	-0.03 A	-0.02 U	0.00 U
	10.47 AG	11.25 C	-0.01 U	-58.08 H	0.03 U	0.01 N
134.0	10.47 Z	11.27 L	-0.04 L	-58.10 E	0.06 U	0.02 N
	11.04 Z	11.57 L	-0.04 L	-118.57 L	0.16 L	0.04 T
129.0	20.82 AC	22.38 R	-0.07 F	-118.64 L	0.18 L	0.05 T
	21.41 AC	22.70 R	-0.07 F	-237.69 B	0.51 L	-0.09 L
124.0	21.41 AB	22.73 E	-0.07 L	-237.66 K	0.49 L	-0.08 L
	22.03 AB	23.06 E	-0.07 L	-358.83 E	0.81 L	-0.14 L
119.0	39.47 Z	36.30 C	-0.08 X	-358.77 E	0.78 L	-0.13 L
	43.07 Z	36.76 C	-0.08 X	-598.68 E	1.11 L	-0.18 L
112.8	43.07 AC	36.77 C	-0.09 Q	-598.74 E	1.06 F	-0.18 L
	53.52 AC	47.64 C	-0.09 Q	-867.96 C	1.57 L	-0.25 L
106.7	53.52 Z	47.65 C	-0.12 Q	-867.97 C	1.61 L	-0.25 L
	54.63 Z	48.14 C	-0.12 Q	-1181.87 C	2.14 Q	0.32 K
100.5	54.63 Z	48.19 E	-0.20 B	-1181.96 C	2.17 Q	0.34 K
	65.46 Z	58.74 E	-0.20 B	-1429.67 C	2.63 H	0.36 K
96.2	65.46 AI	58.78 C	-0.21 H	-1429.42 C	2.45 H	0.37 K
	69.46 AI	60.06 C	-0.21 H	-2330.39 C	5.47 H	-0.64 H
81.9	69.46 AI	60.07 C	-0.18 H	-2330.36 C	5.48 H	-0.64 H

67.6	73.97 AI	61.46 C	-0.18 H	-3247.44 C	8.07 H	-0.86 H
	73.97 AI	61.46 C	-0.20 H	-3247.42 C	8.07 H	-0.86 H
53.2	78.97 AI	62.95 C	-0.20 H	-4180.06 C	10.88 H	-1.05 H
	78.97 AI	62.95 C	-0.20 H	-4180.05 C	10.90 H	-1.06 H
47.0	83.05 AI	63.62 C	-0.20 H	-4591.73 C	12.13 H	-1.12 H
	83.05 AI	63.63 C	-0.26 H	-4591.70 C	12.15 H	-1.12 H
35.2	87.59 AI	64.90 C	-0.26 H	-5373.40 C	15.24 H	-1.26 H
	87.59 AI	64.93 C	-0.25 H	-5373.42 C	15.23 H	-1.26 H
23.5	92.45 AI	66.21 C	-0.25 H	-6163.74 C	18.20 H	-1.35 H
	92.45 AI	66.18 C	-0.26 H	-6163.77 C	18.20 H	-1.35 H
11.7	97.66 AI	67.42 C	-0.26 H	-6961.16 C	21.29 H	-1.40 H
	97.66 AI	67.42 C	-0.26 H	-6961.16 C	21.29 H	-1.40 H
	102.97 AI	68.67 C	-0.26 H	-7765.03 C	24.36 H	-1.42 H
base reaction	102.97 AI	-68.67 C	0.26 H	7765.03 C	-24.36 H	1.42 H

COMPLIANCE WITH 4.8.2 & 4.5.4

ELEV ft	AXIAL	BENDING	SHEAR + TORSIONAL	TOTAL	SATISFIED	D/t(w/t)	MAX ALLOWED
139.00	0.01AG	0.00K	0.02C	0.01AC	YES	10.93A	45.2
	0.01AG	0.13H	0.02C	0.14H	YES	12.00A	45.2
134.00	0.01Z	0.13E	0.02L	0.14C	YES	12.00A	45.2
	0.01Z	0.23L	0.02L	0.23L	YES	13.07A	45.2
129.00	0.02AC	0.23L	0.04R	0.24L	YES	13.07A	45.2
	0.02AC	0.40B	0.03R	0.41B	YES	14.14A	45.2
124.00	0.02AB	0.40K	0.03E	0.41B	YES	14.14A	45.2
	0.02AB	0.52E	0.03E	0.53E	YES	15.21A	45.2
119.00	0.02Z	0.42E	0.04C	0.43E	YES	11.88A	45.2
	0.02Z	0.60E	0.04C	0.61E	YES	12.94A	45.2
112.83	0.02AC	0.60E	0.04C	0.61E	YES	12.94A	45.2
	0.03AC	0.75C	0.05C	0.77C	YES	13.99A	45.2
106.67	0.03Z	0.75C	0.05C	0.77C	YES	13.99A	45.2
	0.03Z	0.90C	0.04C	0.92C	YES	15.05A	45.2
100.50	0.02Z	0.57C	0.03E	0.58C	YES	8.74A	45.2
	0.02Z	0.64C	0.03E	0.65C	YES	9.20A	45.2
96.25	0.02AI	0.66C	0.03C	0.67C	YES	8.98A	45.2
	0.02AI	0.82C	0.03C	0.83C	YES	10.51A	45.2
81.92	0.02AI	0.82C	0.03C	0.83C	YES	10.51A	45.2
	0.02AI	0.90C	0.03C	0.91C	YES	12.04A	45.2
67.58	0.02AI	0.90C	0.03C	0.91C	YES	12.04A	45.2
	0.02AI	0.94C	0.02C	0.95C	YES	13.57A	45.2
53.25	0.02AI	0.94C	0.02C	0.95C	YES	13.57A	45.2
	0.02AI	0.94C	0.02C	0.95C	YES	14.24A	45.2
47.00	0.02AI	0.99C	0.02C	1.00C	YES	13.89A	45.2
	0.02AI	0.99C	0.02C	1.00C	YES	15.14A	45.2
35.25							

	0.02AI	0.99C	0.02C	1.00C	YES	15.14A	45.2
	0.02AI	0.98C	0.02C	0.99C	YES	16.40A	45.2
23.50							
	0.02AI	0.98C	0.02C	0.99C	YES	16.40A	45.2
	0.02AI	0.99C	0.02C	1.00C	YES	17.65A	45.2
11.75							
	0.02AI	0.99C	0.02C	1.00C	YES	17.65A	45.2
	0.02AI	0.99C	0.02C	1.00C	YES	18.91A	45.2
0.00							

MAXIMUM LOADS ONTO FOUNDATION(w.r.t. wind direction)

DOWN	SHEAR.w.r.t.WIND.DIR ALONG	ACROSS	MOMENT.w.r.t.WIND.DIR ALONG	ACROSS	TORSION
kip	kip	kip	ft-kip	ft-kip	ft-kip
102.97	68.67	-0.26	-7765.03	24.36	-1.42
AI	C	H	C	H	H

(USA 222-G) - Monopole Spatial Analysis (c)2015 Guymast Inc.

Tel:(416)736-7453 Fax:(416)736-4372 Web:www.guymast.com

Processed under license at:

Sabre Towers and Poles on: 8 nov 2018 at: 9:39:50

120' ext. 140' Monopole / Hamden 8, CT

********** Service Load Condition **********

* Only 1 condition(s) shown in full
* Some concentrated wind loads may have been derived from full-scale wind tunnel testing

LOADING CONDITION A

60 mph wind with no ice. Wind Azimuth: 0♦

LOADS ON POLE

LOAD TYPE	ELEV ft	APPLY..LOAD..AT RADIUS ft	AZI	LOAD AZI	.....FORCES..... HORIZ kip	DOWN kip	.....MOMENTS..... VERTICAL ft-kip	TORSNAL ft-kip
C	139.000	0.00	0.0	0.0	2.3413	3.1000	0.0000	0.0000
C	137.000	0.00	0.0	0.0	0.0000	1.7098	0.0000	0.0000
C	129.000	0.00	0.0	0.0	0.0000	1.6099	0.0000	0.0000
C	129.000	0.00	0.0	0.0	2.3050	3.1000	0.0000	0.0000
C	119.000	0.00	0.0	0.0	2.8331	6.0000	0.0000	0.0000
C	117.000	0.00	0.0	0.0	0.0000	2.1902	0.0000	0.0000
C	109.000	0.00	0.0	0.0	0.0000	1.3603	0.0000	0.0000
C	109.000	0.00	0.0	0.0	2.2254	3.1000	0.0000	0.0000
C	99.000	0.00	0.0	0.0	0.0000	1.2355	0.0000	0.0000
C	99.000	0.00	0.0	0.0	2.1812	3.1000	0.0000	0.0000
D	139.000	0.00	180.0	0.0	0.0120	0.0501	0.0000	0.0000
D	119.000	0.00	180.0	0.0	0.0146	0.0622	0.0000	0.0000
D	119.000	0.00	180.0	0.0	0.0156	0.0838	0.0000	0.0000
D	100.500	0.00	180.0	0.0	0.0175	0.0963	0.0000	0.0000
D	100.500	0.00	180.0	0.0	0.0182	0.2604	0.0000	0.0000
D	96.250	0.00	180.0	0.0	0.0182	0.2604	0.0000	0.0000
D	96.250	0.00	180.0	0.0	0.0191	0.1738	0.0000	0.0000
D	81.917	0.00	180.0	0.0	0.0191	0.1738	0.0000	0.0000
D	81.917	0.00	180.0	0.0	0.0209	0.1970	0.0000	0.0000
D	67.583	0.00	180.0	0.0	0.0209	0.1970	0.0000	0.0000
D	67.583	0.00	180.0	0.0	0.0224	0.2201	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0224	0.2201	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0231	0.4690	0.0000	0.0000
D	47.000	0.00	180.0	0.0	0.0231	0.4690	0.0000	0.0000
D	47.000	0.00	180.0	0.0	0.0231	0.2468	0.0000	0.0000
D	35.250	0.00	180.0	0.0	0.0231	0.2468	0.0000	0.0000
D	35.250	0.00	180.0	0.0	0.0232	0.2659	0.0000	0.0000
D	23.500	0.00	180.0	0.0	0.0232	0.2659	0.0000	0.0000

D	23.500	0.00	180.0	0.0	0.0224	0.2849	0.0000	0.0000
D	11.750	0.00	180.0	0.0	0.0224	0.2849	0.0000	0.0000
D	11.750	0.00	180.0	0.0	0.0229	0.3039	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.0229	0.3039	0.0000	0.0000

MAXIMUM POLE DEFORMATIONS CALCULATED(w.r.t. wind direction)

MAST ELEV ft	DEFLECTIONS (ft) HORIZONTAL ALONG	HORIZONTAL ACROSS	DOWN	ROTATIONS (deg) TILT ALONG	TILT ACROSS	TWIST
139.0	2.56C	0.00K	0.07E	2.08C	0.00K	0.00K
134.0	2.38C	0.00K	0.06E	2.06C	0.00K	0.00K
129.0	2.20C	0.00K	0.05E	2.03C	0.00K	0.00K
124.0	2.03C	0.00K	0.05E	1.98C	0.00K	0.00K
119.0	1.86C	0.00K	0.04E	1.90C	0.00K	0.00K
112.8	1.66C	0.00K	0.04E	1.81C	0.00K	0.00K
106.7	1.47C	0.00K	0.03E	1.69C	0.00K	0.00K
100.5	1.30C	0.00K	0.03E	1.56C	0.00K	0.00K
96.2	1.18C	0.00K	0.02E	1.50C	0.00K	0.00K
81.9	0.84C	0.00K	0.01E	1.25C	0.00K	0.00K
67.6	0.56C	0.00K	0.01E	1.00C	0.00K	0.00K
53.2	0.34C	0.00K	0.00E	0.76C	0.00K	0.00C
47.0	0.26C	0.00K	0.00E	0.67C	0.00K	0.00C
35.2	0.14C	0.00K	0.00E	0.48C	0.00K	0.00C
23.5	0.06C	0.00K	0.00E	0.31C	0.00K	0.00C
11.7	0.01C	0.00K	0.00E	0.15C	0.00K	0.00C
0.0	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A

MAXIMUM POLE FORCES CALCULATED(w.r.t. to wind direction)

MAST ELEV ft	TOTAL AXIAL kip	SHEAR.w.r.t.WIND.DIR ALONG kip	SHEAR.w.r.t.WIND.DIR ACROSS kip	MOMENT.w.r.t.WIND.DIR ALONG ft-kip	MOMENT.w.r.t.WIND.DIR ACROSS ft-kip	TORSION ft-kip
139.0	3.10 H	2.35 C	0.00 E	0.01 C	0.00 E	0.00 E
134.0	5.07 H	2.41 C	0.00 E	-12.62 C	0.01 K	0.00 H
	5.07 H	2.41 C	0.01 F	-12.62 K	0.01 K	0.00 H
129.0	5.34 H	2.47 C	0.01 F	-25.73 C	-0.03 F	0.00 C
	10.05 C	4.78 L	-0.01 H	-25.74 C	-0.02 F	0.00 B
124.0	10.34 C	4.85 L	-0.01 H	-51.53 K	0.06 H	0.00 C
	10.34 I	4.86 K	-0.01 B	-51.55 C	0.07 H	0.00 C
119.0	10.64 I	4.93 K	-0.01 B	-77.73 K	0.11 H	0.00 C
	16.65 K	7.76 L	0.02 K	-77.72 K	0.11 H	0.00 C
112.8	19.36 K	7.86 L	0.02 K	-129.50 L	0.18 H	0.01 K
	19.36 K	7.87 L	0.02 K	-129.50 L	0.17 H	0.01 K
106.7	24.38 K	10.20 L	0.02 K	-187.47 L	0.24 B	0.01 K
	24.38 K	10.20 L	-0.02 B	-187.47 L	0.24 B	0.01 K
100.5	24.96 K	10.30 L	-0.02 B	-254.95 L	0.37 B	0.02 K
	24.96 I	10.31 B	0.01 H	-254.97 L	0.38 B	0.02 K
96.2	30.40 I	12.57 B	0.01 H	-307.98 L	0.41 B	0.02 K
	30.40 D	12.57 C	0.02 K	-307.98 L	0.41 B	0.02 K

81.9	32.89 D	12.84 C	0.02 K	-500.63 L	0.59 B	0.03 K
	32.89 K	12.83 B	0.02 F	-500.63 L	0.59 B	0.03 K
67.6	35.72 K	13.13 B	0.02 F	-696.31 C	-0.81 K	0.04 K
	35.72 K	13.13 H	0.02 F	-696.31 C	-0.82 K	0.04 K
53.2	38.87 K	13.45 H	0.02 F	-894.98 C	-1.05 K	0.05 K
	38.87 K	13.47 C	-0.02 C	-894.98 C	-1.05 K	0.05 K
47.0	41.80 K	13.61 C	-0.02 C	-982.70 C	-1.17 K	0.05 K
	41.80 K	13.61 C	-0.02 C	-982.70 C	-1.17 K	0.05 K
35.2	44.70 K	13.88 C	-0.02 C	-1149.23 C	-1.41 K	-0.06 C
	44.70 K	13.87 C	0.02 K	-1149.23 C	-1.41 K	-0.06 C
23.5	47.83 K	14.15 C	0.02 K	-1317.53 C	-1.68 K	-0.06 C
	47.83 K	14.15 C	0.03 K	-1317.54 C	-1.69 K	-0.06 C
11.7	51.17 K	14.41 C	0.03 K	-1487.58 C	-1.98 K	-0.06 C
	51.17 K	14.41 C	0.03 K	-1487.58 C	-1.98 K	-0.06 C
	54.74 K	14.68 C	0.03 K	-1659.27 C	-2.29 K	-0.06 C
base reaction	54.74 K	-14.68 C	-0.03 K	1659.27 C	2.29 K	0.06 C

COMPLIANCE WITH 4.8.2 & 4.5.4

ELEV ft	AXIAL	BENDING	SHEAR + TORSIONAL	TOTAL	SATISFIED	D/t(w/t)	MAX ALLOWED
139.00	0.00H	0.00C	0.00C	0.00C	YES	10.93A	45.2
	0.00H	0.03C	0.00C	0.03C	YES	12.00A	45.2
134.00	0.00H	0.03K	0.00C	0.03K	YES	12.00A	45.2
	0.00H	0.05C	0.00C	0.05C	YES	13.07A	45.2
129.00	0.01C	0.05C	0.01L	0.06C	YES	13.07A	45.2
	0.01C	0.09K	0.01L	0.09K	YES	14.14A	45.2
124.00	0.01I	0.09C	0.01K	0.09C	YES	14.14A	45.2
	0.01I	0.11K	0.01K	0.12K	YES	15.21A	45.2
119.00	0.01K	0.09K	0.01L	0.10K	YES	11.88A	45.2
	0.01K	0.13L	0.01L	0.14L	YES	12.94A	45.2
112.83	0.01K	0.13L	0.01L	0.14L	YES	12.94A	45.2
	0.01K	0.16L	0.01L	0.17L	YES	13.99A	45.2
106.67	0.01K	0.16L	0.01L	0.17L	YES	13.99A	45.2
	0.01K	0.19L	0.01L	0.21L	YES	15.05A	45.2
100.50	0.01I	0.12L	0.01B	0.13L	YES	8.74A	45.2
	0.01I	0.14L	0.01B	0.15L	YES	9.20A	45.2
96.25	0.01D	0.14L	0.01C	0.15L	YES	8.98A	45.2
	0.01D	0.18L	0.01C	0.18L	YES	10.51A	45.2
81.92	0.01K	0.18L	0.01C	0.18C	YES	10.51A	45.2
	0.01K	0.19C	0.01C	0.20C	YES	12.04A	45.2
67.58	0.01K	0.19C	0.01H	0.20C	YES	12.04A	45.2
	0.01K	0.20C	0.01H	0.21C	YES	13.57A	45.2
53.25	0.01K	0.20C	0.01C	0.21C	YES	13.57A	45.2
	0.01K	0.20C	0.01C	0.21C	YES	14.24A	45.2
47.00							

	0.01K	0.21C	0.01C	0.22C	YES	13.89A	45.2
	0.01K	0.21C	0.00C	0.22C	YES	15.14A	45.2
35.25							
	0.01K	0.21C	0.00C	0.22C	YES	15.14A	45.2
	0.01K	0.21C	0.00C	0.22C	YES	16.40A	45.2
23.50							
	0.01K	0.21C	0.00C	0.22C	YES	16.40A	45.2
	0.01K	0.21C	0.00C	0.22C	YES	17.65A	45.2
11.75							
	0.01K	0.21C	0.00C	0.22C	YES	17.65A	45.2
	0.01K	0.21C	0.00C	0.22C	YES	18.91A	45.2
0.00							

MAXIMUM LOADS ONTO FOUNDATION(w.r.t. wind direction)

DOWN	SHEAR.w.r.t.WIND.DIR ALONG	ACROSS	MOMENT.w.r.t.WIND.DIR ALONG	ACROSS	TORSION
kip	kip	kip	ft-kip	ft-kip	ft-kip
54.74	14.68	0.03	-1659.27	-2.29	-0.06
K	C	K	C	K	C

Sabre Industries™
Towers and Poles

SO#: 19-4005-RAM-R1
Site Name: Hamden 8, CT
Date: 11/8/2018

Round Flange Plate and Bolts per ANSI/TIA 222-G
Elevation = 119 feet

Pole Data

Diameter:	24.06	in
Thickness:	0.25	in
Yield (Fy):	65	ksi
# of Sides:	18	"0" IF Round
Strength (Fu):	80	ksi

Reactions

Moment, Mu:	358.83	ft-kips
Axial, Pu:	20.01	kips
Shear, Vu:	36.3	kips

Bolt Data

Quantity:	12	
Diameter:	1	in
Bolt Material:	A325	
Strength (Fu):	120	ksi
Yield (Fy):	92	ksi
BC Diam. (in):	27.5	BC Override:

Flange Bolt Results

Allowable Φ*Rnt:	54.54 kips
Adjusted Φ*Rnt (due to shear):	54.37 kips
Maximum Bolt Tension:	50.53 kips
Bolt Interaction Ratio:	**92.9% Pass**

Plate Data

Diameter (in):	30	Dia. Override:
Thickness:	1.5	in
Center Hole Diam.:	16	in
Yield (Fy):	50	ksi
Single-Rod B-eff:	6.36	in
Drain Hole:	1	in. diameter
Drain Location:	11	in. center of pole to center of drain hole

Flange Plate Results

Compression Side Plate (Mu/Z):	17.4 ksi
Allowable Φ*Fy:	45.0 ksi
Compr. Plate Interaction Ratio:	**38.7% Pass**

Sabre Industries™
Towers and Poles

SO#: 19-4005-RAM-R1
Site Name: Hamden 8, CT
Date: 11/8/2018

Round Base Plate and Anchor Rods, per ANSI/TIA 222-G

Pole Data

Diameter:	58.620	in (flat to flat)
Thickness:	0.5	in
Yield (Fy):	65	ksi
# of Sides:	18	"0" IF Round
Strength (Fu):	80	ksi

Reactions

Moment, Mu:	7765.03	ft-kips
Axial, Pu:	65.68	kips
Shear, Vu:	68.67	kips

Anchor Rod Data

Quantity:	24		
Diameter:	2.25	in	
Rod Material:	A615		
Strength (Fu):	100	ksi	
Yield (Fy):	75	ksi	
BC Diam. (in):	65.75	BC Override:	

Anchor Rod Results

Maximum Rod (Pu+ Vu/η):	244.7 Kips	
Allowable Φ*Rnt:	260.0 Kips	(per 4.9.9)
Anchor Rod Interaction Ratio:	**94.1% Pass**	

Plate Data

Diameter (in):	71.5	Dia. Override:	
Thickness:	2.5	in	
Yield (Fy):	50	ksi	
Eff Width/Rod:	7.75	in	
Drain Hole:	2.625	in. diameter	
Drain Location:	27	in. center of pole to center of drain hole	
Center Hole:	46	in. diameter	

Base Plate Results

Base Plate (Mu/Z):	43.5 ksi	
Allowable Φ*Fy:	45.0 ksi	(per AISC)
Base Plate Interaction Ratio:	**96.7% Pass**	

MAT FOUNDATION DESIGN BY SABRE TOWERS & POLES
140' Monopole VERIZON WIRELESS Hamden 8, CT (19-4005-RAM-R1) 11/08/18 MH

Overall Loads:			
Factored Moment (ft-kips)	7765.03		
Factored Axial (kips)	65.68		
Factored Shear (kips)	68.67		
Bearing Design Strength (ksf)	9	Max. Net Bearing Press. (ksf)	6.07
Water Table Below Grade (ft)	**999**		
Width of Mat (ft)	30	Allowable Bearing Pressure (ksf)	**6.00**
Thickness of Mat (ft)	2	Safety Factor	**2.00**
Depth to Bottom of Slab (ft)	6	Ultimate Bearing Pressure (ksf)	12.00
Quantity of Bolts in Bolt Circle	24	Bearing Φs	0.75
Bolt Circle Diameter (in)	65.75		
Top of Concrete to Top of Bottom Threads (in)	60		
Diameter of Pier (ft)	8	Minimum Pier Diameter (ft)	6.81
Ht. of Pier Above Ground (ft)	0.5	Equivalent Square b (ft)	7.09
Ht. of Pier Below Ground (ft)	4	Square Pier? (Y/N)	**N**
Quantity of Bars in Mat	67		
Bar Diameter in Mat (in)	1		
Area of Bars in Mat (in^2)	52.62		
Spacing of Bars in Mat (in)	5.35	Recommended Spacing (in)	5 to 12
Quantity of Bars Pier	44		
Bar Diameter in Pier (in)	1.128		
Tie Bar Diameter in Pier (in)	0.625		
Spacing of Ties (in)	12		
Area of Bars in Pier (in^2)	43.97	Minimum Pier A_s (in^2)	36.19
Spacing of Bars in Pier (in)	6.26	Recommended Spacing (in)	5 to 12
f'c (ksi)	4.5		
fy (ksi)	60		
Unit Wt. of Soil (kcf)	**0.1**		
Unit Wt. of Concrete (kcf)	0.15		
Volume of Concrete (yd^3)	75.04		
Two-Way Shear Action:			
Average d (in)	20		
ϕv_c (ksi)	0.228	v_u (ksi)	0.190
$\phi v_c = \phi(2 + 4/\beta_c)f'_c{}^{1/2}$	0.342		
$\phi v_c = \phi(\alpha_s d/b_o+2)f'_c{}^{1/2}$	0.239		
$\phi v_c = \phi 4f'_c{}^{1/2}$	0.228		
Shear perimeter, b_o (in)	364.42		
β_c	1		
One-Way Shear:			
ϕV_c (kips)	821.1	V_u (kips)	462.3
Stability:			
Overturning Design Strength (ft-k)	9430.5	Total Applied M (ft-k)	8211.4

Pier Design:

ϕV_n (kips)	844.6	V_u (kips)	68.7
$\phi V_c=\phi 2(1+N_u/(2000A_g))f'_c{}^{1/2}b_wd$	844.6		
V_s (kips)	0.0	*** V_s max = $4\ f'_c{}^{1/2}b_wd$ (kips)	1978.3
Maximum Spacing (in)	7.62	(Only if Shear Ties are Required)	
Actual Hook Development (in)	19.00	Req'd Hook Development l_{dh} (in)	14.12
		*** Ref. To Spacing Requirements ACI 11.5.4.3	

Flexure in Slab:

ϕM_n (ft-kips)	4464.5	M_u (ft-kips)	4418.3
a (in)	2.29		
Steel Ratio	0.00731		
β_1	0.825		
Maximum Steel Ratio (ρ_t)	0.0197		
Minimum Steel Ratio	0.0018		
Rebar Development in Pad (in)	134.46	Required Development in Pad (in)	26.50

Condition	1 is OK, 0 Fails
Maximum Soil Bearing Pressure	1
Pier Area of Steel	1
Pier Shear	1
Interaction Diagram Visual Check	1
Two-Way Shear Action	1
One-Way Shear Action	1
Overturning	1
Flexure	1
Steel Ratio	1
Length of Development in Pad	1
Hook Development	1

ATTACHMENT 3

Terracon GeoReport

Geotechnical Engineering Report

Monopole Telecommunications Tower – Hamden 8 CT
Hamden, Connecticut
October 17, 2018
Terracon Project No. J2185044

Prepared for:
On Air Engineering LLC
Cold Spring, New York

Prepared by:
Terracon Consultants, Inc.
Rocky Hill, Connecticut

October 17, 2018

On Air Engineering LLC
88 Foundry Pond Road
Cold Spring, New York 10516

Attn: Mr. David Weinpahl, P.E. – Project Manager
P: (201) 456 4624
E: onair@optonline.net

Re: Geotechnical Engineering Report
Monopole Telecommunications Tower – Hamden 8 CT
208 Kirk Road
Hamden, Connecticut
Terracon Project No. J2185044

Dear Mr. Weinpahl:

We have completed the Geotechnical Engineering services for the above-referenced project. This study was performed in general accordance with our Authorization to Proceed, dated September 10, 2018. This report presents the findings of the subsurface explorations and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and equipment slabs for the proposed Telecommunications Tower. An environmental assessment was not part of this project.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Brian D. Opp, P.E.
Senior Geotechnical Engineer

Stephen C. Lanne, P.E.
Geotechnical Department Manager

REPORT TOPICS

Note: This report was originally delivered in a web-based format. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

Geotechnical Engineering Report
Monopole Telecommunications Tower – Hamden 8 CT
208 Kirk Road
Hamden, Connecticut
Terracon Project No. J2185044
October 17, 2018

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed Telecommunications Tower to be located at 208 Kirk Road in Hamden, Connecticut. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil and rock conditions
- Groundwater conditions
- Site preparation and earthwork
- Foundation design and construction
- Slab design and construction
- Seismic considerations

The geotechnical engineering Scope of Services for this project included the advancement of four test borings, B-1 through B-4, to depths ranging from approximately 5.5 to 15 feet below existing site grades.

Maps showing the site and boring locations are shown in **Site Location** and **Exploration Plan**. The results of the field explorations are included on the boring logs in **Exploration Results**.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The site is located at 208 Kirk Road, approximately 250 feet north of Country Club Drive, in the town of Hamden, Connecticut. Approximate Site Coordinates: 41.3954, -72.9298 See **Site Location**
Existing Improvements	Tree farm
Current Ground Cover	Topsoil

Item	Description
Existing Topography [1]	The site slopes gradually downward towards the south from approximately Elevation (El) 328 Feet, within the vicinity of the compound, to El 310 Feet, at the compound's access road ingress/egress.
Geology	The *Surficial Materials Map of Connecticut, 1992,* depicts soils within the vicinity of the site consist of a thin layer of glacial till. The *Bedrock Geological Map of Connecticut, 1985,* identifies that bedrock underlying the site consists of arkose.

1. *'Hamden 8 CT D&M Plan'*, revised March 15, 2018, by On Air Engineering, LLC of Cold Spring, New York.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	Drawing set titled *'Wireless Communication Facility'*, Sheet No. T-1 and C-1 through C-9, revised March 15, 2018 by On Air Engineering, LLC of Cold Spring, New York.
Project Description	120-foot-tall monopole telecommunications tower constructed within a new 30-foot by 50-foot fenced compound with associated ancillary equipment.
Estimated Maximum Loads	■ Tower dead load: 60 kips ■ Equipment pads: 150 pounds per square foot (psf)
Base of Tower Elevation	El 328 Feet
Grading/Slopes [1]	Fills up to about five feet are anticipated for site development within compound, with about a foot, or so, of fill anticipated at the tower location. Cuts and fills up to about 2 feet are anticipated for site development within the proposed roadway. Permanent soil slopes, as steep as 2 Horizontal to 1 Vertical (2H:1V) are proposed.

1. *'Hamden 8 CT D&M Plan'*, revised March 15, 2018, by On Air Engineering, LLC of Cold Spring, New York.

GEOTECHNICAL CHARACTERIZATION

Subsurface Profile

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs can be found in Exploration Results and the GeoModel can be found in Figures.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Native Sand**	Poorly graded sand (SP), red, loose to dense
2	**Weathered Rock**	Highly weathered arkose, red, very dense
3	**Bedrock**	Arkose, red to brown, slightly weathered, weak rock, very close to close fracture spacing, very poor RQD

Groundwater Conditions

Groundwater was not encountered in our explorations while drilling, or for the short duration the explorations could remain open. However, groundwater may become temporarily perched on the bedrock surface. Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower then levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

In Situ Electrical Resistivity Testing

On September 21, 2018, a Terracon field engineer completed one electrical resistivity test, consisting of two perpendicular arrays. Testing was performed in general accordance with ASTM G57 by the Wenner four probe method using an AGI MiniSting earth resistivity meter. Electrode "A" spacings of about 2, 5, 10, 20, and 40 feet were used. The approximate location and orientation of the test can be found on the Exploration Plan. The results of electrical resistivity testing are tabulated below.

Electrode Spacing (feet)	Resistivity (ohm*cm)	
	Northeast – Southwest	Northwest – Southeast
2	98,050	93,450
5	157,605	149,850
10	70,470	127,730
20	20,230	36,560
40	12,255	14,480

GEOTECHNICAL OVERVIEW

We understand that minor site grading will be performed as part of this development. Fills up to about 5 feet are anticipated in the area of the compound with only a foot or so of fill anticipated at the tower location. In the proposed roadway, cuts and fill of about 2 feet are anticipated.

The site is underlain by a relatively thin layer of native sand, which is then underlain by weathered bedrock over more competent bedrock. At your request, Terracon conducted four test borings about 10 feet or so from the proposed tower center. Based on these explorations, weathered bedrock was encountered at depths ranging from about 2 to 3 feet below existing grade. Competent bedrock was encountered at depths ranging from about 5.5 to 10 feet.

Based on the subsurface conditions, it is our opinion that the proposed telecommunications tower may be supported on either a monolithic mat or a pier-and-pad foundation bearing directly on the weathered bedrock. Localized 'high spots' of competent bedrock may exist within portions of the foundation excavation. In these areas, the bedrock will need to be excavated so that the foundation bears on a thin layer of Crushed Stone placed over the competent bedrock. Sand and gravel fill should not be placed directly over bedrock. Foundation recommendations can be found in **Shallow Foundations**.

The proposed equipment slabs may derive support from the native sand or weathered bedrock. Slab design and construction recommendations can be found in **Slabs**.

We recommend the exposed subgrades be thoroughly evaluated after excavation to proposed grade. We further recommend the geotechnical engineer be retained to evaluate bearing material for the foundation subgrade.

The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

Earthwork is anticipated to include clearing and grubbing, excavations, and fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations and slabs.

Site Preparation

Preparation of the site should include removal of topsoil, organic subsoil (subsoil with visible roots), or otherwise unsuitable materials. The soil subgrade should be proof rolled with a vibratory roller or heavy plate compactor. Unstable subgrades should be removed and replaced with compacted Structural Fill or Crushed Stone, as necessary. If required, Structural Fill may then be placed within the compound area to attain the required grade.

Limited excavation into bedrock may be required to achieve desired grades. Bedrock excavation can be carried out by explosive or non-explosive methods. Because of the low RQD of the cored rock and limited amount of expected rock removal, it is our opinion mechanical methods (including ripping and hoe ramming) would be appropriate for rock removal.

Bedrock subgrades, if encountered, should not be steeper than 4 Horizontal to 1 Vertical (4H:1V). Low spots in the bedrock subgrade may be filled with lean concrete or Crushed Stone to provide a reasonably level surface. Bedrock subgrades do not require proof rolling.

Reuse of Onsite Materials

Based on our visual observations of the exploration results, it is our opinion the native sand may be selectively reused for Common and Structural Fill, provided it is close to meeting our gradation requirements presented below. The reused material must be placed at moisture contents suitable to facilitate compaction and be compacted to the densities provided below. Cobbles and boulders should be culled from the material prior to reuse.

Fill Material Types

Fill and backfill should meet the following material property requirements.

Fill Type [1]	USCS Classification	Acceptable Location for Placement
Structural Fill [2]	GW, GW-GM, SW, SW-SM, SP, GP	All locations and elevations. Imported Structural Fill should meet the gradation requirements in Note 2 (below). Cobbles and boulders should be culled prior to reuse.
Slab Base / Pavement Subbase	GW, GW-GM, SW, SW-SM, SP, GP	Imported material used as select fill beneath slabs and pavements should meet the gradation requirements of CTDOT M.02.06, Grading B.
Common Fill [3]	Varies	Common Fill may be used for general site grading. Common Fill should not be used under settlement or frost-sensitive structures. Cobbles and boulders should be culled prior to reuse.
Crushed Stone	GP	For use on wet subgrades, as a replacement for Structural Fill (if desired), and as drainage fill. Should be uniform ¾-inch angular crushed stone.
Lean Concrete	Not applicable	Can be used to level subgrades between foundations and native soils. Lean concrete should be flowable, self-compacting concrete with a compressive strength between 300 and 2,000 psi.

Fill Type [1]	USCS Classification	Acceptable Location for Placement

1. Compacted fill should consist of approved materials free of organic matter and debris. Frozen material should not be used. Fill should not be placed on a frozen subgrade.
2. Imported Structural Fill should meet the following gradation specifications:

Percent Passing by Weight

Sieve Size	Structural Fill
6"	100
3"	70 to 100
2"	(100)*
¾"	45 to 95
No. 4	30 to 90
No. 10	25 to 80
No. 40	10 to 50
No. 200	0 to 12

* Maximum 2-inch particle size within 12 inches of the underside of footings or slabs

3. Common Fill should have a maximum particle size of 6 inches and no more than 25 percent by weight passing the No. 200 sieve.

Fill Compaction Requirements

Structural and Common Fill should meet the following compaction requirements.

Item	Description
Maximum Fill Lift Thickness	■ 12 inches or less in loose thickness when heavy, self-propelled compaction equipment is used. ■ 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used.
Compaction Requirements [1]	95 percent maximum dry density as determined by ASTM D1557, Method C.

Item	Description
Moisture Content – Granular Material	Workable moisture levels.

1. We recommend fill be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested, as required, until the specified moisture and compaction requirements are achieved.

Utility Trench Backfill

Trench excavations should be made with sufficient working space to permit construction, including backfill placement and compaction. As utility trenches can provide a conduit for groundwater flow, trenches should be backfilled with material approximately matching the permeability characteristics of the surrounding soil. Should higher permeability fill be used in trenches, consideration should be given to installing seepage collars and/or check dams to reduce the likelihood of migration of water through the trenches. Fill placed as backfill for utilities located below equipment slabs should consist of compacted Structural Fill or suitable bedding material.

Grading and Drainage

Available site plans depict permanent soil slopes to develop the compound area. Soil slopes should be designed at a maximum grade of 3 Horizontal (H) : 1 Vertical (V). Steeper grades, up to 2H:1V, may be feasible for slopes of limited height, but should be reviewed by Terracon prior to final design.

Permanent fill and cut slope surfaces should be vegetated, or covered with an erosion control mat, to protect against erosion. Temporary sedimentation and erosion control methods should be implemented during construction and left in place until the slope surface has been permanently stabilized.

Adequate drainage should be provided at the site to reduce the likelihood of an increase in moisture content of the foundation soils. Pavement should be sloped away from the compound area to reduce the likelihood of water ponding near the structures.

Earthwork Construction Considerations

Although the exposed subgrade is anticipated to be relatively stable upon initial exposure, unstable subgrade conditions could develop during general construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. Should unstable subgrade conditions develop, stabilization measures will need to be employed.

Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become frozen, wet, or disturbed, the affected material should be removed, or should be scarified, moisture conditioned, and recompacted.

As a minimum, temporary excavations should be sloped or braced, as required by Occupational Safety and Health Administration (OSHA) regulations, to provide stability and safe working conditions. Temporary excavations will probably be required during grading operations. The contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations, as required, to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, State, and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

Groundwater was not encountered at the time of our explorations. Therefore, we do not anticipate that significant temporary dewatering will be required. However, water may become temporarily perched above weathered and competent bedrock and limited dewatering may be required.

Terracon should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation; proofrolling; placement and compaction of controlled compacted fills; backfilling of excavations in the completed subgrade; and just prior to construction of foundations.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in Earthwork, the following design parameters are applicable for shallow foundations.

Shallow Footing Design Parameters

We recommend that the proposed monopole telecommunications tower be supported on either a monolithic mat or a pier-and-pad foundation bearing on the weathered bedrock. The mat/pad should not be supported partially on bedrock and partially on soil. Therefore, if competent bedrock is encountered, the rock should be removed to a level to provide 8 inches of crushed stone below the foundations. The size and depth of the footing will likely be dictated by providing overturning and sliding resistance. Design recommendations and construction considerations for the recommended foundation system are presented in the following tables and paragraphs.

Item	Description
Net Allowable Bearing Pressure [1]	6,000 psf (weathered bedrock)
Minimum Embedment Below Finished Grade for Frost Protection	42 inches
Approximate Total Settlement [2]	< 1 inch
Estimated Differential Settlement [2]	½ inch
Total Unit Weight of Rock (γ)	145 pcf
Passive Pressure Coefficient, K_p [3] **(compacted fill around base of foundation)**	3.0 (ultimate)
Passive Pressure Coefficient, K_p [3] **(foundation concrete cast against weathered rock face)**	6.0 (ultimate
Coefficient of Sliding Friction [4]	0.5 (ultimate)

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation.
2. Foundation settlement will depend upon the variations within the subsurface profile, the structural loading conditions, the embedment depth of the foundation, the thickness of compacted fill, and the quality of the earthwork operations.
3. Passive pressure calculated with this parameter should be reduced by at least a factor of safety of 3, to reflect the amount of movement required to mobilize the passive resistance.
4. A factor of safety of at least 1.5 should be applied to the sliding resistance.

Uplift resistance for the tower foundation may be computed as the sum of the weight of the foundation element and the weight of the soil overlying the foundation. We recommend using a soil unit weight of 100 pounds per cubic foot (pcf) for engineered fill overlying the footing placed as described in this section of this report. A unit weight of 150 pcf may be used for reinforced footing concrete. A factor of safety of 1.0 may be applied to calculations of dead load; a higher factor of safety may be appropriate for loadings resisted by dead load.

Foundation Construction Considerations

Competent bedrock was encountered in the explorations at depths ranging from about 5.5 to 10 feet below existing ground surface. We expect foundations to be approximately 6 to 8 feet below existing grade. Therefore, limited excavation into bedrock will likely be required in order for the foundation to provide adequate resistance to overturning. Bedrock excavation can be carried out by explosive or non-explosive methods. Because of the relatively weak rock type, low RQD of the cored rock, and limited amount of expected rock removal, it is our opinion mechanical methods (including ripping and hoe ramming) would be appropriate for rock removal. However, the contractor should be aware that portions of the bedrock may be more competent than those

encountered in our explorations. If blasting is to be avoided, greater mechanical effort than is typical for this method may be required.

Bedrock subgrades should be no steeper than 4H:1V and free of loose rock or soil. Bedrock subgrades steeper than 4H:1V should be benched to provide a relatively level bearing surface. Minor irregularities in the level of the rock surface may be filled with lean concrete or Crushed Stone to provide a level working surface. The joints in competent bedrock should be tight; care should be taken not to displace the joints in the bedrock during excavation. The base of foundation excavations should be free of water and loose soil/broken rock prior to placing concrete. The Geotechnical Engineer should be retained to observe the foundation bearing materials.

Groundwater was not encountered at the time of our explorations but may become temporarily perched above bedrock subgrades during construction. However, the contractor should prevent groundwater, if encountered, and surface water runoff from collecting in the excavation. Subgrade soils that become unstable because of water and/or reworking by construction activity should be replaced with compacted Structural Fill or Crushed Stone, as necessary.

SEISMIC CONSIDERATIONS

Description	Value
Code Used [1]	2018 Connecticut State Building Code (CT SBC)
Site Class [2]	B
Liquefaction potential in event of an earthquake	Not susceptible

1. The CT SBC incorporates the Seismic Design Category approach from the *2015 International Building Code (IBC)*.
2. The *IBC* uses a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope requested does not include the required 100-foot soil profile determination; the borings performed for this report extended to a maximum depth of 15 feet. However, the bedrock will extend to at least 100 feet.

SLABS

The equipment slabs may be supported on slabs deriving support from the native sand or weathered bedrock. A minimum 12-inch thick layer of Slab Base should be used beneath slabs deriving support from the native sand or weathered bedrock. Design recommendations and considerations are provided below.

Slab Design Parameters

Item	Description
Floor Slab Support [1, 2]	Minimum 12-inch thick layer of Slab Base over proofcompacted weathered bedrock.
Estimated Modulus of Subgrade Reaction [3]	200 pounds per square inch per in (psi/in)

1. Air entraining admixtures should be used for concrete exposed to freezing. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundations.
2. Specifications for Slab Base are shown in the table in **Earthwork**.
3. Modulus of Subgrade Reaction considers the 12-inch thick layer of Slab Base.

Slab Construction Considerations

Site grading is generally accomplished early in the construction phase. However, as construction proceeds, the subgrade may be disturbed because of utility excavations, construction traffic, precipitation, etc. As a result, the floor slab subgrade may not be suitable for placement of slab base and concrete, and corrective action will be required.

We recommend the area underlying the slabs be rough graded and then thoroughly proofrolled with a vibratory roller or heavy plate compactor prior to final grading and placement of Structural Fill. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas previously filled or backfilled. Ares where unsuitable or unstable conditions are located should be repaired by removing and replacing the affected material with properly compacted Structural Fill, as necessary.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of

pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

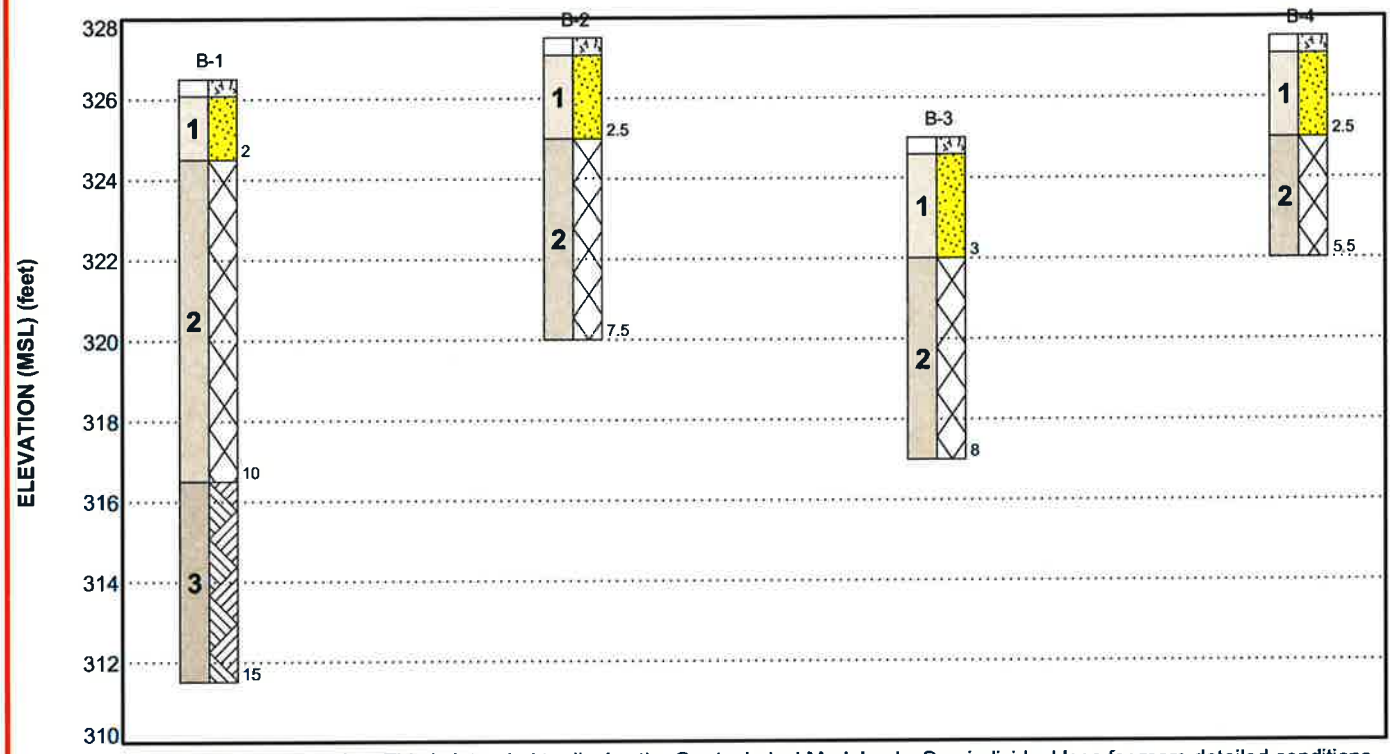
FIGURES

Contents:

GEOMODEL

Monopole Telecommunications Tower ■ Hamden, Connecticut
10/17/2018 ■ Terracon Project No. J2185044

Terracon GeoReport



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	NATIVE SAND	Poorly Graded Sand (SP), red, loose to dense
2	WEATHERED ROCK	Highly weathered arkose, red, very dense
3	BEDROCK	Arkose, red to brown, slightly weathered, weak rock, very close to close fracture spacing, very poor RQD

LEGEND

- Topsoil
- Poorly-graded Sand
- Weathered Rock
- Bedrock

- First Water Observation
- Second Water Observation
- Final Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet)	Location
4	5.5 to 15	Telecommunications Compound

Boring Layout and Elevations: Unless otherwise noted, Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±10 feet) and approximate elevations were obtained by interpolation from the provided *'Partial Site Plan'* by On Air Engineering of Cold Spring, New York, dated March 15, 2018.

Subsurface Exploration Procedures: We advanced the borings with an ATV-mounted Diedrich D-50 rotary drill rig using 4-inch diameter continuous flight solid stem augers. Bedrock was cored in B-1 from 10 to 15 feet using an NQ2-sized core barrel. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the middle 12 inches of a normal 24-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs.

Resistivity Testing: An electrical resistivity test, consisting of perpendicular arrays, was performed in general accordance with ASTM G57 using the Wenner four-pin method. Electrode "A" spacings of about 2, 5, 10, 20, and 40 feet were used.

Laboratory Testing

Descriptive classifications of the soils indicated on the boring logs are in accordance with the General Notes, the Unified Soil Classification System (USCS), and the Description of Rock Properties. USCS symbols are also shown. A brief description of the USCS is attached to this report. Classification was generally by visual/manual procedures.

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

SITE LOCATION

Monopole Telecommunications Tower ■ Hamden, Connecticut
October 17, 2018 ■ Terracon Project No. J2185044

Terracon GeoReport

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY QUADRANGLES INCLUDE: MOUNT CARMEL, CT (1/1/1984) and NEW HAVEN, CT (1/1/1984).

EXPLORATION PLAN

Monopole Telecommunications Tower ■ Hamden, Connecticut
October 17, 2018 ■ Terracon Project No. J2185044

Terracon GeoReport

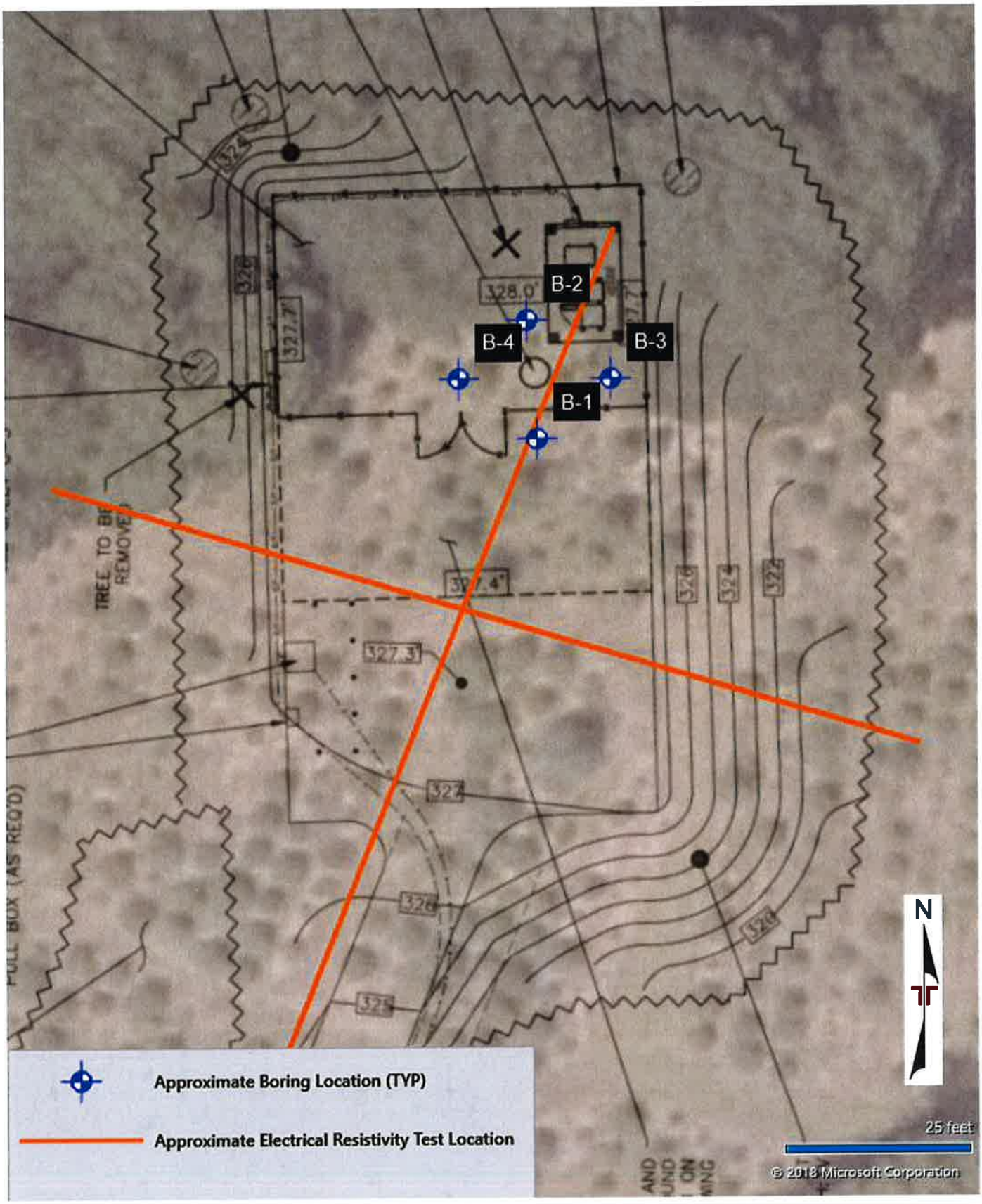


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

'Hamden 8 CT D&M Plans 03-15-18 V1 Revised', Undated, by On Air Engineering, LLC of Cold Spring, NY

EXPLORATION RESULTS

Contents:

Boring Logs (B-1 through B-4)

Note: All attachments are one page unless noted above.

BORING LOG NO. B-1

PROJECT: Monopole Telecommunications Tower

CLIENT: On Air Engineering LLC
Cold Spring, New York

SITE: 208 Kirk Road
Hamden, Connecticut

LOCATION See Exploration Plan

Latitude: 41.3955° Longitude: -72.9299°

Approximate Surface Elev: 326.5 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
		0.4	326+/-	**TOPSOIL**					
1		2.0	324.5+/-	**POORLY GRADED SAND (SP)**, red, loose				10	5-2-3-3 N=5
2		10.0	316.5+/-	**HIGHLY WEATHERED ARKOSE**, red, very dense	5			4	50/4"
								1	50/1"
								1	50/1"
3		15.0	311.5+/-	**ARKOSE**, red to brown, slightly weathered, weak rock, very close to close fracture spacing, very poor RQD	10			60	Core Rate (min/ft): 2-2-2-2-2 RQD: 23%
				Boring Terminated at 15 Feet	15				

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples taken with 2" outside-diameter split spoon sampler driven by an autohammer

Advancement Method:
4-inch diameter continuous flight solid stem augers to 10 feet. NQ2-sized core barrel to 15 feet.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field with Garmin eTrex 20x

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
201 Hammer Mill Rd
Rocky Hill, CT

Boring Started: 09-18-2018	Boring Completed: 09-18-2018
Drill Rig: Diedrich D-50	Driller: C. Johnston
Project No.: J2185044	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J2185044 MONOPOLE TELECOMM.GPJ TERRACON_DATATEMPLATE.GDT 10/17/18

BORING LOG NO. B-2

PROJECT: Monopole Telecommunications Tower

CLIENT: On Air Engineering LLC
Cold Spring, New York

SITE: 208 Kirk Road
Hamden, Connecticut

LOCATION See Exploration Plan

Latitude: 41.3955° Longitude: -72.9299°

Approximate Surface Elev: 327.5 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
		0.4	327+/-	**TOPSOIL**					
1				POORLY GRADED SAND (SP), red, loose to medium dense				14	3-3-5-9 N=8
		2.5	325+/-						
2				HIGHLY WEATHERED ARKOSE, red, very dense	5			14	10-15-50/4"
								2	50/3"
		7.5	320+/-					0	50/1"
				Auger Refusal on Competent Bedrock at 7.5 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples taken with 2" outside-diameter split spoon sampler driven by an autohammer

Advancement Method:
4-inch diameter continuous flight solid stem augers.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

WATER LEVEL OBSERVATIONS

No free water observed

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field with Garmin eTrex 20x

Notes:

Terracon
201 Hammer Mill Rd
Rocky Hill, CT

Boring Started: 09-18-2018	Boring Completed: 09-18-2018
Drill Rig: Diedrich D-50	Driller: C. Johnston
Project No.: J2185044	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J2185044 MONOPOLE TELECOMM.GPJ TERRACON_DATATEMPLATE.GDT 10/17/18

BORING LOG NO. B-3

PROJECT: Monopole Telecommunications Tower

CLIENT: On Air Engineering LLC
Cold Spring, New York

SITE: 208 Kirk Road
Hamden, Connecticut

LOCATION See Exploration Plan

Latitude: 41.3955° Longitude: -72.9299°

Approximate Surface Elev: 325 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
		0.4	324.5+/-	**TOPSOIL**					
1				**POORLY GRADED SAND (SP)**, red, loose to dense				12	4-2-5-9 N=7
		3.0	322+/-					13	22-20-50/5"
2				**HIGHLY WEATHERED ARKOSE**, red, very dense	5			2	50/4"
								1	50/1"
		8.0	317+/-	***Auger Refusal on Competent Bedrock at 8 Feet***					

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples taken with 2" outside-diameter split spoon sampler driven by an autohammer

Advancement Method:
4-inch diameter continuous flight solid stem augers.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field with Garmin eTrex 20x

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
201 Hammer Mill Rd
Rocky Hill, CT

Boring Started: 09-18-2018	Boring Completed: 09-18-2018
Drill Rig: Diedrich D-50	Driller: C. Johnston
Project No.: J2185044	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J2185044 MONOPOLE TELECOMM.GPJ TERRACON_DATATEMPLATE.GDT 10/17/18

BORING LOG NO. B-4

PROJECT: Monopole Telecommunications Tower

CLIENT: On Air Engineering LLC
Cold Spring, New York

SITE: 208 Kirk Road
Hamden, Connecticut

LOCATION See Exploration Plan

Latitude: 41.3955° Longitude: -72.9299°

Approximate Surface Elev: 327.5 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
		0.4 **TOPSOIL**	327+/-					
1		**POORLY GRADED SAND (SP)**, red, loose					4	1-2-2-2 N=4
		2.5	325+/-				6	8-50/3"
2		**HIGHLY WEATHERED ARKOSE**, red, very dense		5			0.5	50/1"
		5.5	322+/-				0	50/1"
		Auger Refusal on Competent Bedrock at 5.5 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples taken with 2" outside-diameter split spoon sampler driven by an autohammer

Advancement Method:
4-inch diameter continuous flight solid stem augers.

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field with Garmin eTrex 20x

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
201 Hammer Mill Rd
Rocky Hill, CT

Boring Started: 09-18-2018	Boring Completed: 09-18-2018
Drill Rig: Diedrich D-50	Driller: C. Johnston
Project No.: J2185044	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J2185044 MONOPOLE TELECOMM.GPJ TERRACON_DATATEMPLATE.GDT 10/17/18

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

Monopole Telecommunications Tower ■ Hamden, Connecticut

October 17, 2018 ■ Terracon Project No. J2185044

Terracon GeoReport

SAMPLING	WATER LEVEL	FIELD TESTS
Rock Core ▯ Split Spoon ▯	▽ Water Initially Encountered ▽ Water Level After a Specified Period of Time ▼ Water Level After a Specified Period of Time Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (tsf)	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL		RELATIVE PROPORTIONS OF FINES	
Descriptive Term(s) of other constituents	Percent of Dry Weight	Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	<15	Trace	<5
With	15-29	With	5-12
Modifier	>30	Modifier	>12

GRAIN SIZE TERMINOLOGY		PLASTICITY DESCRIPTION	
Major Component of Sample	Particle Size	Term	Plasticity Index
Boulders	Over 12 in. (300 mm)	Non-plastic	0
Cobbles	12 in. to 3 in. (300mm to 75mm)	Low	1 - 10
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)	Medium	11 - 30
Sand	#4 to #200 sieve (4.75mm to 0.075mm	High	> 30
Silt or Clay	Passing #200 sieve (0.075mm)		

UNIFIED SOIL CLASSIFICATION SYSTEM

Terracon GeoReport

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or [$Cc<1$ or $Cc>3.0$] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or [$Cc<1$ or $Cc>3.0$] [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K, L, M, N]
			Liquid limit - not dried			Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K, L, M, P]
			Liquid limit - not dried			Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

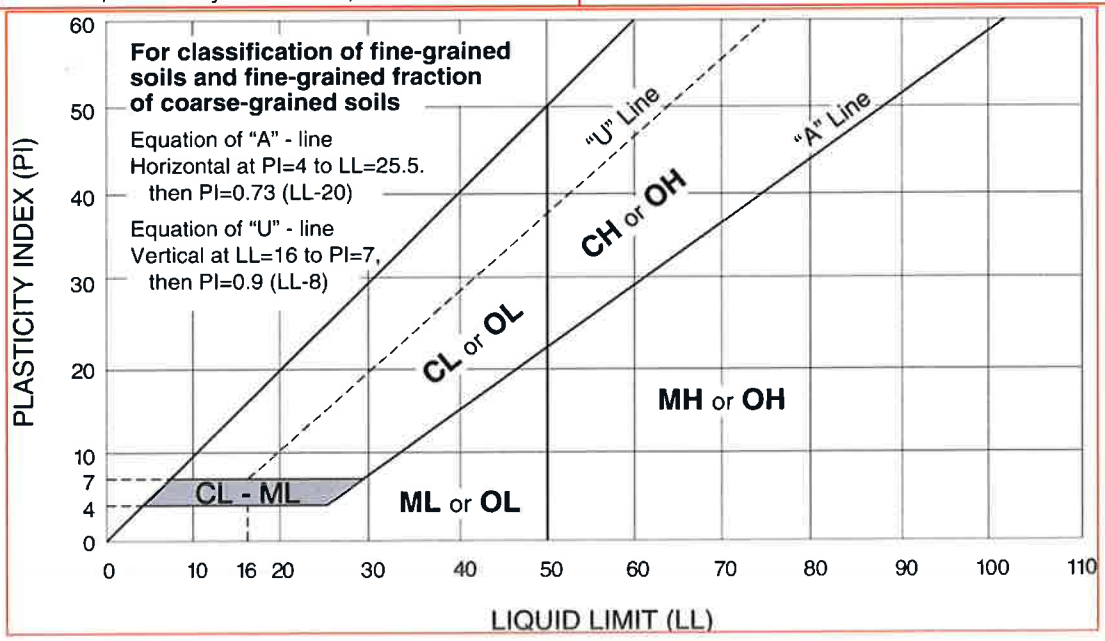
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



DESCRIPTION OF ROCK PROPERTIES

Terracon GeoReport

WEATHERING	
Term	**Description**
Unweathered	No visible sign of rock material weathering, perhaps slight discoloration on major discontinuity surfaces.
Slightly weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering and may be somewhat weaker externally than in its fresh condition.
Moderately weathered	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a continuous framework or as corestones.
Highly weathered	More than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones.
Completely weathered	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact.
Residual soil	All rock material is converted to soil. The mass structure and material fabric are destroyed. There is a large change in volume, but the soil has not been significantly transported.

STRENGTH OR HARDNESS		
Description	**Field Identification**	**Uniaxial Compressive Strength, psi (MPa)**
Extremely weak	Indented by thumbnail	40-150 (0.3-1)
Very weak	Crumbles under firm blows with point of geological hammer, can be peeled by a pocket knife	150-700 (1-5)
Weak rock	Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer	700-4,000 (5-30)
Medium strong	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with single firm blow of geological hammer	4,000-7,000 (30-50)
Strong rock	Specimen requires more than one blow of geological hammer to fracture it	7,000-15,000 (50-100)
Very strong	Specimen requires many blows of geological hammer to fracture it	15,000-36,000 (100-250)
Extremely strong	Specimen can only be chipped with geological hammer	>36,000 (>250)

DISCONTINUITY DESCRIPTION			
Fracture Spacing (Joints, Faults, Other Fractures)		**Bedding Spacing (May Include Foliation or Banding)**	
Description	**Spacing**	**Description**	**Spacing**
Extremely close	< ¾ in (<19 mm)	**Laminated**	< ½ in (<12 mm)
Very close	¾ in – 2-1/2 in (19 - 60 mm)	**Very thin**	½ in – 2 in (12 – 50 mm)
Close	2-1/2 in – 8 in (60 – 200 mm)	**Thin**	2 in – 1 ft. (50 – 300 mm)
Moderate	8 in – 2 ft. (200 – 600 mm)	**Medium**	1 ft. – 3 ft. (300 – 900 mm)
Wide	2 ft. – 6 ft. (600 mm – 2.0 m)	**Thick**	3 ft. – 10 ft. (900 mm – 3 m)
Very Wide	6 ft. – 20 ft. (2.0 – 6 m)	**Massive**	> 10 ft. (3 m)

Discontinuity Orientation (Angle): Measure the angle of discontinuity relative to a plane perpendicular to the longitudinal axis of the core. (For most cases, the core axis is vertical; therefore, the plane perpendicular to the core axis is horizontal.) For example, a horizontal bedding plane would have a 0-degree angle.

ROCK QUALITY DESIGNATION (RQD) [1]	
Description	**RQD Value (%)**
Very Poor	0 - 25
Poor	25 – 50
Fair	50 – 75
Good	75 – 90
Excellent	90 - 100

1. The combined length of all sound and intact core segments equal to or greater than 4 inches in length, expressed as a percentage of the total core run length.

Reference: U.S. Department of Transportation, Federal Highway Administration, Publication No FHWA-NHI-10-034, December 2009
Technical Manual for Design and Construction of Road Tunnels – Civil Elements