ROBINSON & COLE LLP

KENNETH C. BALDWIN

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March 8, 2007

Via Hand Delivery

S. Derek Phelps
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Docket No. 318 – Cellco Partnership d/b/a Verizon Wireless**
Bristol West Telecommunications Facility
Terryville Road, Bristol, Connecticut
Development & Management Plan

Dear Mr. Phelps:

Enclosed please find the original and twenty (20) copies of the following information:

1. Final Development & Management (D&M) Plans for the approved telecommunications facility at the Pequabuck Golf Course, Terryville Road in Bristol;

2. A Geotechnical Evaluation by JGI Eastern, Incorporated; and

3. The proposed tower and foundation design calculations for the approved tower prepared by Engineered Endeavors Incorporated.

Together, this information constitutes the final D&M Plan for Cellco's approved Bristol West facility. We respectfully request that this information be reviewed and this matter be placed on the next available Siting Council agenda for approval. Thank you in advance for your anticipated cooperation.

Sincerely,

Kenneth C. Baldwin

Enclosures
cc: Sandy M. Carter

HART1-1387044-1

Cellco Partnership

d.b.a. verizon wireless

DEVELOPMENT & MANAGEMENT PLAN

BRISTOL WEST
1191 TERRYVILLE AVENUE
BRISTOL, CT

SITE INFORMATION

THE GENERAL SCOPE OF WORK SHALL INCLUDE:

1. THE CONSTRUCTION OF A 49'x55' FENCED WIRELESS COMMUNICATIONS COMPOUND WITHIN A 55'x70' LEASE AREA.
2. A TOTAL OF SIX (6) DIRECTIONAL PANEL ANTENNAS ARE PROPOSED TO BE MOUNTED WITHIN A PROPOSED 120' RF TRANSPARENT FLAGPOLE WITH RAD CENTER ELEVATIONS OF 117'-0" AND 107'-0" +/-.
3. POWER AND TELCO UTILITIES SHALL BE ROUTED UNDERGROUND FROM A PROPOSED UTILITY POLE TO THE PROPOSED UTILITY BACKBOARD LOCATED ADJACENT TO FENCED COMPOUND. UTILITIES WILL BE ROUTED FROM UTILITY BACKBOARD TO THE PROPOSED NOMINAL 12'x30' WIRELESS EQUIPMENT SHELTER LOCATED WITHIN THE COMPOUND.
4. FINAL DESIGN FOR TOWER AND ANTENNA MOUNTS SHALL BE INCLUDED IN THE FINAL CONSTRUCTION DOCUMENTS.
5. THE PROPOSED WIRELESS FACILITY INSTALLATION WILL BE DESIGNED IN ACCORDANCE WITH THE 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2005 CONNECTICUT SUPPLEMENT.
6. THERE WILL NOT BE ANY LIGHTING UNLESS REQUIRED BY THE FCC OR THE FAA.
7. THERE WILL NOT BE ANY SIGNS OR ADVERTISING ON THE ANTENNAS OR EQUIPMENT.
8. FOR ADDITIONAL NOTES AND DETAILS REFER TO THE ACCOMPANYING DRAWINGS.

GENERAL NOTES

1. PROPOSED ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY CELLCO PARTNERSHIP.

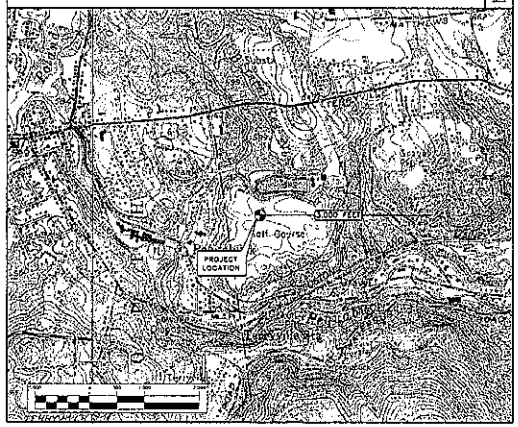
SITE DIRECTIONS

FROM: 99 EAST RIVER DRIVE, EAST HARTFORD, CONNECTICUT TO: 1191 TERRYVILLE AVENUE, BRISTOL, CONNECTICUT

1: TURN LEFT ONTO EAST RIVER DRIVE. 0.1 MILES
2: TURN LEFT (WEST) ONTO US-44. 0.2 MILES
3: TAKE RAMP ONTO I-84 W. 1.3 MILES
4: MERGE ONTO CT-72 W VIA EXIT 33 TOWARD EXIT 33 TOWARD PLAINVILLE/BRISTOL 2.8 MILES
5: TURN RIGHT ONTO CT-72/FORESTVILLE AVE. CONTINUE TO FOLLOW CT-72 W. 2.0 MILES
6: TURN RIGHT ONTO MEMORIAL BLVD/CT-72 0.2 MILES
7: TURN SLIGHT RIGHT ONTO CT-72/RIVERSIDE AVE. CONTINUE TO FOLLOW RIVERSIDE AVE 1.0 MILES
8: TURN RIGHT ONTO N MAIN STREET. 0.8 MILES
9: TURN LEFT ONTO US-6/CT-69/NORTH STREET. CONTINUE TO FOLLOW US-6. 2.2 MILES
10: END AT 1191 TERRYVILLE AVE.

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

SITE NAME:	BRISTOL WEST
SITE ADDRESS:	1191 TERRYVILLE AVENUE BRISTOL, CT 06010
PROPERTY OWNER:	PEQUABUCK GOLF CLUB OF BRISTOL C/O LAURENCE ZAHNKE P.O. BOX 218 PEQUABUCK, CT 06781
LEASOR:	PEQUABUCK GOLF CLUB OF BRISTOL
LESSEE:	CELLCO PARTNERSHIP 99 EAST RIVER DR. EAST HARTFORD, CT 06108
APPLICANT:	CELLCO PARTNERSHIP 99 EAST RIVER DR. EAST HARTFORD, CT 06108
CONTACT PERSON:	MARK GAUGER CELLCO PARTNERSHIP (203) 494-0023
TOWER COORDINATES:	LATITUDE: 41°40'27.431" LONGITUDE: 72°59'17.134" GND ELEVATION: 634'± A.M.S.L. COORDINATES ARE BASED ON FIELD SURVEY CONDUCTED BY MARTINEZ COUCH AND ASSOCIATES LLC, ON APRIL 14, 2006.

LEGEND

SYMBOL	DESCRIPTION
C-1 / C-1	SECTION OR DETAIL NUMBER SHEET WHERE DETAIL/SECTION OCCURS
1 / C-1	ELEVATION NUMBER SHEET WHERE ELEVATION OCCURS

SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	01
C-1	PARTIAL SURVEY PLAN	01
C-2	PARTIAL SITE PLAN AND ELEVATION	01
C-3	EROSION CONTROL DETAILS AND NOTES	01
C-4	SITE DETAILS	01
C-5	SITE UTILITY DETAILS AND SHELTER ELEVATIONS	01
C-6	EQUIP. SHELTER FOUNDATION DETAILS AND NOTES	01

REVISIONS		
00	02/28/07	D & M PLAN - REVIEW
01	03/23/07	D & M PLAN

Cellco Partnership d.b.a. verizon wireless

Natcomm, INC.

BRISTOL WEST
1191 TERRYVILLE AVE
BRISTOL, CT 06010

PROJECT NO:	05096
DRAWN BY:	DEB
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	12/14/06

TITLE SHEET

T-1

DWG. 1 OF 7

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. IT IS DATA ACCUMULATION PLAN AND IS BASED UPON LIMITED FIELD DATA AND REFERENCE MAPS CONFORMING TO HORIZONTAL ACCURACY CLASS TYPE D 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.

VERTICAL DATUM IS BASED ON NGVD 29.

COORDINATES REFER TO NAD 83.

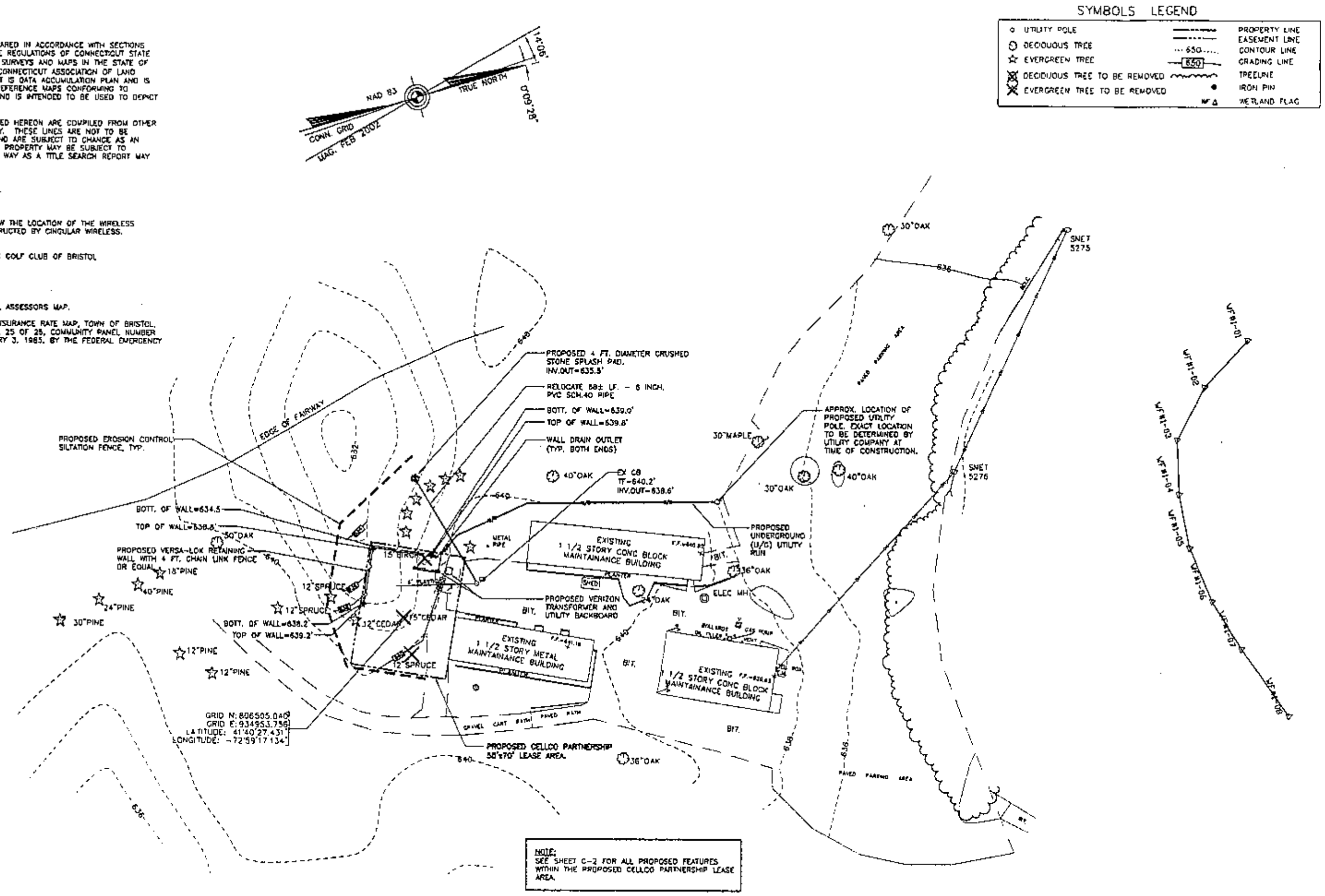
THE INTENTION OF THIS MAP IS TO SHOW THE LOCATION OF THE WIRELESS COMMUNICATIONS FACILITY TO BE CONSTRUCTED BY CINGULAR WIRELESS.

PARCEL OWNER OF RECORD: PEQUABUCK GOLF CLUB OF BRISTOL
C/O LAURENCE ZAHNKE
PO BOX 218 PEQUABUCK, CT 06781

FIELD SURVEYED ON APRIL 14, 2006.

PARCEL MAP 67 LOTS 27+29 BRISTOL ASSESSORS MAP.

PARCEL IS IN ZONE C ON THE FLOOD INSURANCE RATE MAP, TOWN OF BRISTOL, CONNECTICUT, HARTFORD COUNTY, PANEL 25 OF 25, COMMUNITY PANEL NUMBER 090173 0026 A, EFFECTIVE DATE JANUARY 3, 1985, BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.


SYMBOLS LEGEND
UTILITY POLE
DECIDUOUS TREE
EVERGREEN TREE
DECIDUOUS TREE TO BE REMOVED
EVERGREEN TREE TO BE REMOVED
PROPERTY LINE
EASEMENT LINE
CONTOUR LINE
GRADING LINE
TREELINE
IRON PIN
WETLAND FLAG
NAD 83
TRUE NORTH
CONN. GRID
MAG. FEB 2002
0°09'28"
1°4'06"
EDGE OF FAIRWAY
PROPOSED EROSION CONTROL SILTATION FENCE, TYP.
PROPOSED 4 FT. DIAMETER CRUSHED STONE SPLASH PAD. INV.OUT=635.5'
RELOCATE 58± LF. – 6 INCH. PVC SCH.40 PIPE
BOTT. OF WALL=639.0'
TOP OF WALL=639.8'
WALL DRAIN OUTLET (TYP. BOTH ENDS)
EX CB TF=640.2' INV.OUT=638.6'
BOTT. OF WALL=634.5
TOP OF WALL=638.6'
PROPOSED VERSA-LOK RETAINING WALL WITH 4 FT. CHAIN LINK FENCE OR EQUAL
BOTT. OF WALL=638.2'
TOP OF WALL=639.2'
PROPOSED VERIZON TRANSFORMER AND UTILITY BACKBOARD
EXISTING 1 1/2 STORY CONC BLOCK MAINTAINANCE BUILDING
EXISTING 1 1/2 STORY METAL MAINTAINANCE BUILDING
EXISTING 1 1/2 STORY CONC BLOCK MAINTAINANCE BUILDING
APPROX. LOCATION OF PROPOSED UTILITY POLE. EXACT LOCATION TO BE DETERMINED BY UTILITY COMPANY AT TIME OF CONSTRUCTION.
PROPOSED UNDERGROUND (U/G) UTILITY RUN
PROPOSED CELLCO PARTNERSHIP 58'x70' LEASE AREA.
GRID N: 806505.040
GRID E: 934953.756
LATITUDE: 41°40'27.43"
LONGITUDE: -72°59'17.134"
SNET 5275
SNET 5276
30"OAK
30"MAPLE
40"OAK
36"OAK
12"SPRUCE
12"CEDAR
15"CEDAR
18"PINE
40"PINE
24"PINE
30"PINE
12"PINE
ELEC MH
SHED
BIT.
PAVED PARKING AREA
GRAVEL CART PATH
WF#1-01
WF#1-02
WF#1-03
WF#1-04
WF#1-05
WF#1-06
WF#1-07
WF#1-08
NOTE:
SEE SHEET C-2 FOR ALL PROPOSED FEATURES WITHIN THE PROPOSED CELLCO PARTNERSHIP LEASE AREA.

TO MY KNOWLEDGE AND BELIEF THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON
THIS MAP IS NOT VALID WITHOUT A LIVE SIGNATURE AND SEAL

A. RAFAEL MARTINEZ LLS #18833 DATE

GRAPHIC SCALE

(IN FEET)
1 inch = 30 ft.

1 / C-1 PARTIAL SURVEY PLAN
SCALE: 1"= 30'-0"

REVISIONS		
00	02/26/07	D & M PLAN - REVIEW
01	02/28/07	D & M PLAN

Cellco Partnership
d.b.a. Verizon wireless

NATCOMM
Natcomm, INC.

BRISTOL WEST

1191 TERRYVILLE AVE
BRISTOL, CT 06010

PROJECT NO:	05096
DRAWN BY:	DEB
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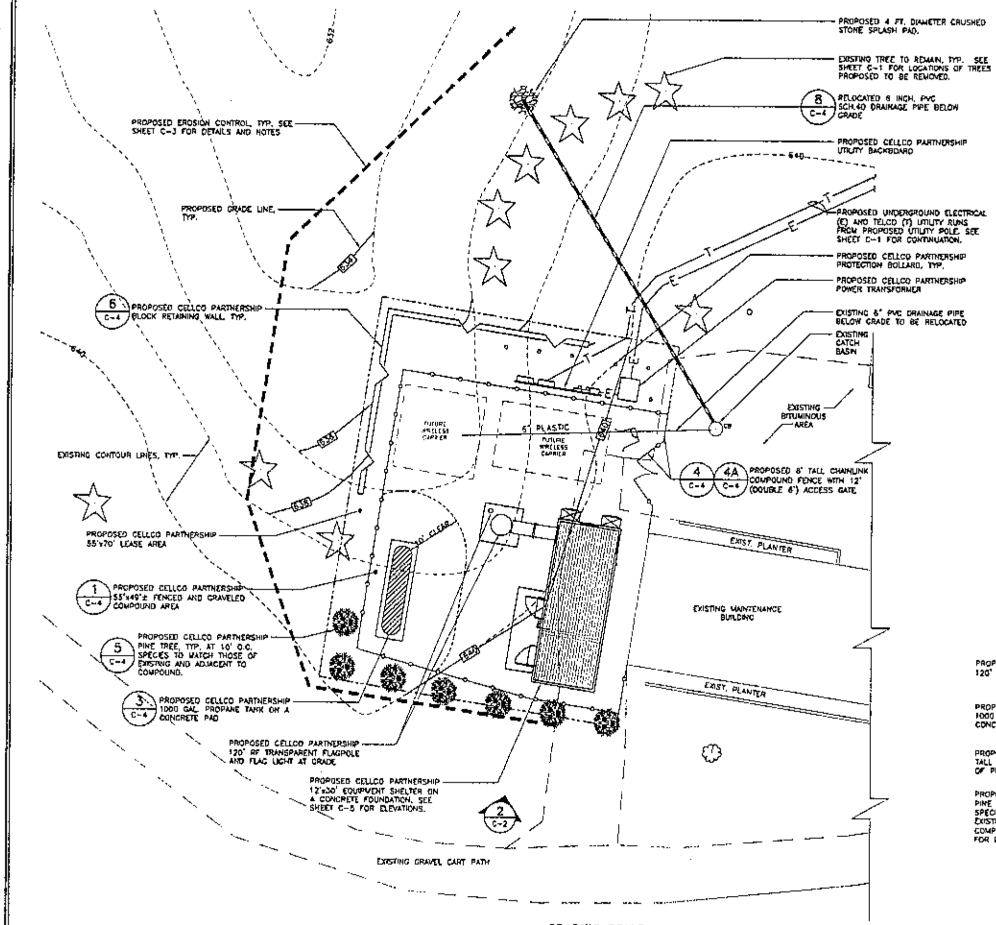
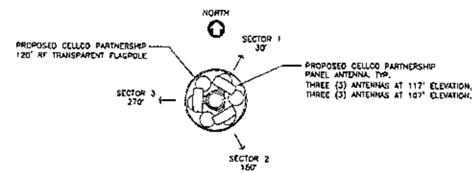
DATE:	12/14/06

PARTIAL SURVEY PLAN

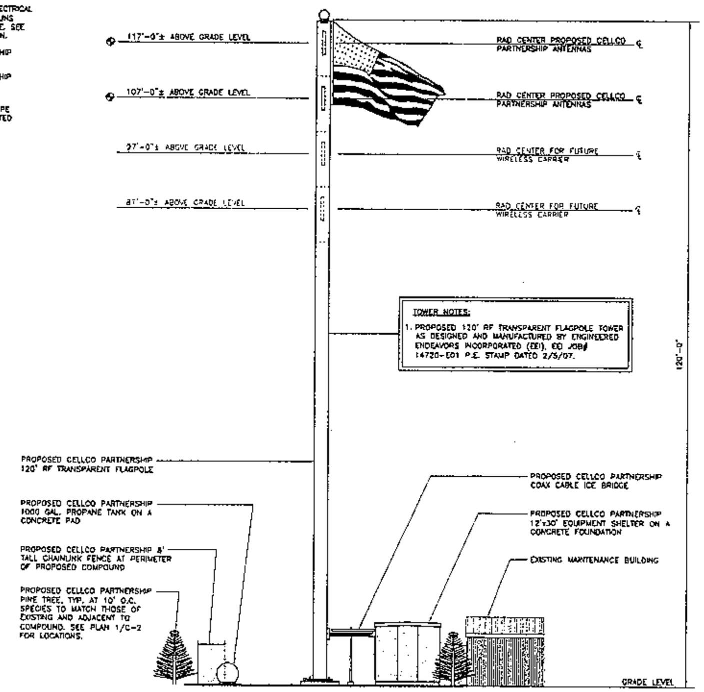
C-1

DWG. 2 OF 7


PROPOSED 4 FT. DIAMETER CRUSHED STONE SPLASH PAD.
EXISTING TREE TO REMAIN, TYP. SEE SHEET C-1 FOR LOCATIONS OF TREES PROPOSED TO BE REMOVED.
RELOCATED 6 INCH, PVC SCH.40 DRAINAGE PIPE BELOW GRADE
PROPOSED CELLCO PARTNERSHIP UTILITY BACKBOARD
PROPOSED EROSION CONTROL, TYP. SEE SHEET C-3 FOR DETAILS AND NOTES
PROPOSED GRADE LINE, TYP.
PROPOSED UNDERGROUND ELECTRICAL (E) AND TELCO (T) UTILITY RUNS FROM PROPOSED UTILITY POLE. SEE SHEET C-1 FOR CONTINUATION.
PROPOSED CELLCO PARTNERSHIP PROTECTION BOLLARD, TYP.
PROPOSED CELLCO PARTNERSHIP POWER TRANSFORMER
EXISTING 8" PVC DRAINAGE PIPE BELOW GRADE TO BE RELOCATED
EXISTING CATCH BASIN
PROPOSED CELLCO PARTNERSHIP BLOCK RETAINING WALL, TYP.
EXISTING BITUMINOUS AREA
EXISTING CONTOUR LINES, TYP.
PROPOSED 8' TALL CHAINLINK COMPOUND FENCE WITH 12' (DOUBLE 6') ACCESS GATE.
PROPOSED CELLCO PARTNERSHIP 55'x70' LEASE AREA
EXIST. PLANTER
PROPOSED CELLCO PARTNERSHIP 55'x49'± FENCED AND GRAVELED COMPOUND AREA
EXISTING MAINTENANCE BUILDING
PROPOSED CELLCO PARTNERSHIP PINE TREE, TYP. AT 10' O.C. SPECIES TO MATCH THOSE OF EXISTING AND ADJACENT TO COMPOUND.
PROPOSED CELLCO PARTNERSHIP 1000 GAL. PROPANE TANK ON A CONCRETE PAD
PROPOSED CELLCO PARTNERSHIP 120' RF TRANSPARENT FLAGPOLE AND FLAG LIGHT AT GRADE
PROPOSED CELLCO PARTNERSHIP 12'x30' EQUIPMENT SHELTER ON A CONCRETE FOUNDATION. SEE SHEET C-5 FOR ELEVATIONS.
EXISTING GRAVEL CART PATH
FUTURE WIRELESS CARRIER
6" PLASTIC
GRAPHIC SCALE
(IN FEET)
1 inch = 10 ft.
TRUE NORTH
1 C-2 PARTIAL SITE PLAN
SCALE: 1"= 10'-0"



ANTENNA ORIENTATION KEY
NOT TO SCALE


117'-0"± ABOVE GRADE LEVEL
107'-0"± ABOVE GRADE LEVEL
97'-0"± ABOVE GRADE LEVEL
87'-0"± ABOVE GRADE LEVEL
RAD CENTER PROPOSED CELLCO PARTNERSHIP ANTENNAS
RAD CENTER FOR FUTURE WIRELESS CARRIER
120'-0"
TOWER NOTES:
1. PROPOSED 120' RF TRANSPARENT FLAGPOLE TOWER AS DESIGNED AND MANUFACTURED BY ENGINEERED ENDEAVORS INCORPORATED (EEI). EEI JOB# 14720-E01 P.E. STAMP DATED 2/5/07.
PROPOSED CELLCO PARTNERSHIP 120' RF TRANSPARENT FLAGPOLE
PROPOSED CELLCO PARTNERSHIP 1000 GAL. PROPANE TANK ON A CONCRETE PAD
PROPOSED CELLCO PARTNERSHIP 8' TALL CHAINLINK FENCE AT PERIMETER OF PROPOSED COMPOUND
PROPOSED CELLCO PARTNERSHIP PINE TREE, TYP. AT 10' O.C. SPECIES TO MATCH THOSE OF EXISTING AND ADJACENT TO COMPOUND. SEE PLAN 1/C-2 FOR LOCATIONS.
PROPOSED CELLCO PARTNERSHIP COAX CABLE ICE BRIDGE
PROPOSED CELLCO PARTNERSHIP 12'x30' EQUIPMENT SHELTER ON A CONCRETE FOUNDATION
EXISTING MAINTENANCE BUILDING
GRADE LEVEL
GRAPHIC SCALE
(IN FEET)
1 inch = 10 ft.
2 C-2 COMPOUND AND TOWER ELEVATION
SCALE: 1"= 10'-0"

REVISIONS		
00	02/20/07	D & M PLAN - REVIEW
01	02/28/07	D & M PLAN

Cellco Partnership
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NATCOMM
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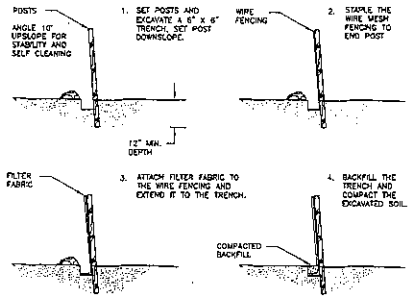
BRISTOL WEST
1191 TERRYVILLE AVE
BRISTOL, CT 06010

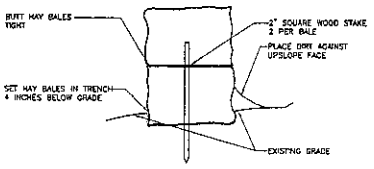
PROJECT NO:	05098
DRAWN BY:	DEB
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	12/14/06

PARTIAL SITE PLAN AND ELEVATION

C-2
DWG. 3 OF 7



1 / C-3 SEDIMENTATION CONTROL BARRIER-SILT FENCE
NOT TO SCALE



NOTE: A SECOND HAYBALE MAY BE REQUIRED WHERE SLOPE OR HEIGHT REQUIRES IT.

2 / C-3 SECTION THRU HAYBALE EROSION CONTROL BARRIOR
NOT TO SCALE

EROSION CONTROL

GENERAL CONSTRUCTION SEQUENCE

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

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

CONSTRUCTION SPECIFICATIONS - SILT FENCE

1) THE GEOTEXTILE FABRIC SHALL MEET THE DESIGN CRITERIA FOR SILT FENCES.
2) THE FABRIC SHALL BE EMBEDDED A MINIMUM OF 8 INCHES INTO THE GROUND AND THE SOIL COMPACTED OVER THE EMBEDDED FABRIC.
3) WOVEN WIRE FENCE SHALL BE FASTENED SECURELY TO THE FENCE POSTS WITH WIRE TIES OR STAPLES.
4) FILTER CLOTH SHALL BE FASTENED SECURELY TO THE WOVEN WIRE FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP, MID-SECTION AND BOTTOM.
5) WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 6 INCHES, FOLDED, AND STAPLED.
6) FENCE POSTS SHALL BE A MINIMUM OF 36 INCHES LONG AND DRIVEN A MINIMUM OF 16 INCHES INTO THE GROUND. WOOD POSTS SHALL BE OF SOUND QUALITY HARDWOOD AND SHALL HAVE A MINIMUM CROSS SECTIONAL AREA OF 3.0 SQUARE INCHES.
7) MAINTENANCE SHALL BE PERFORMED AS NEEDED TO PREVENT BURD UP IN THE SILT FENCE DUE TO DEPOSITION OF SEDIMENT.

MAINTENANCE - SILT FENCE

1) SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REPAIRS THAT ARE REQUIRED SHALL BE MADE IMMEDIATELY.
2) IF THE FABRIC ON A SILT FENCE SHOULD DECOMPOSE OR BECOME INEFFECTIVE DURING THE EXPECTED LIFE OF THE FENCE, THE FABRIC SHALL BE REPLACED PROMPTLY.
3) SEDIMENT SHOULD BE INSPECTED AFTER EVERY STORM EVENT. THE DEPOSITS SHOULD BE REMOVED WHEN THEY REACHED APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.
4) SEDIMENT DEPOSITS THAT ARE REMOVED OR LEFT IN PLACE AFTER THE FABRIC HAS BEEN REMOVED SHALL BE GRADED TO CONFORM WITH THE EXISTING TOPOGRAPHY AND VEGETATED.

TEMPORARY EROSION CONTROL MEASURES

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

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

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

SLOPE MIX (SLOPES GREATER TAN 4:1)	LBS./ACRE
CREEPING RED FESCUE	20
TALL FESCUE	20
BIRDS FOOT TREE FOIL	8
	48

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

CONSTRUCTION SPECIFICATIONS - STRAW OR HAY BALES

1) BALES SHALL BE PLACED IN A ROW WITH THE ENDS TIGHTLY ADJOINING.
2) EACH BALE SHALL BE EMBEDDED IN THE GROUND A MINIMUM OF 4 INCHES.
3) BALES SHALL BE ANCHORED IN PLACE BY AT LEAST TWO STAKES DRIVEN THROUGH THE BALE. THE STAKES SHALL BE DRIVEN AT LEAST 18 INCHES INTO THE GROUND.
4) BARRIERS SHALL BE INSPECTED AFTER EVERY RAINFALL AND PROMPTLY REPAIRED FOR REPLACED AS NECESSARY.
5) BALES SHALL BE REMOVED WHEN NO LONGER NEEDED AND THE SEDIMENT COLLECTED SHALL BE DISPOSED OF PROPERLY.

MAINTENANCE - STRAW OR HAY BALES

1) STRAW OR HAY BALES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL.
2) CLOSE ATTENTION SHALL BE PAID TO THE REPAIR OF DAMAGED BALES. UNDERCUTTING BENEATH THE BALES, AND FLOW AROUND THE END OF THE BALES.
3) NECESSARY REPAIRS OR REPLACEMENT OF BALES SHALL BE ACCOMPLISHED PROMPTLY.
4) SEDIMENT DEPOSITS SHOULD BE CHECKED AFTER EACH RAINFALL. THE DEPOSITS SHOULD BE REMOVED WHEN THE LEVEL OF DEPOSITION REACHES APPROXIMATELY ONE-HALF OF THE HEIGHT OF THE TABLE.
5) SEDIMENT DEPOSITS THAT ARE REMOVED OR LEFT IN PLACE AFTER THE BARRIER HAS BEEN DISMANTLED SHALL BE GRADED TO CONFORM WITH THE EXISTING TOPOGRAPHY AND VEGETATED USING

REVISIONS		
00	02/26/07	D & M PLAN - REVIEW
01	02/27/07	D & M PLAN

Cellco Partnership
d.b.a. Verizonwireless

NATCOMM
Natcomm, INC.
Tel: (203) 488-0580
Fax: (203) 488-8587

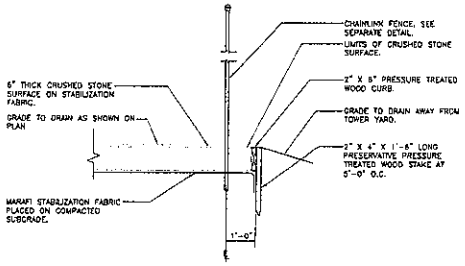
STATE OF CONNECTICUT
No.16662
REGISTERED
PROFESSIONAL ENGINEER

BRISTOL WEST
1191 TERRYVILLE AVE
BRISTOL, CT 06010

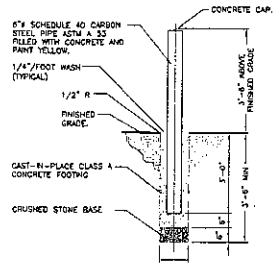
PROJECT NO:	05096
DRAWN BY:	DEB
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	12/14/06

EROSION CONTROL DETAILS AND NOTES

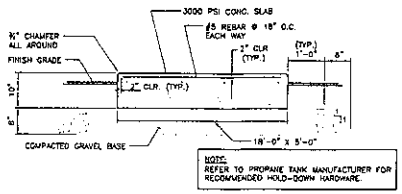
C-3
DWG. 4 OF 7



1 C-4 COMPOUND SURFACING DETAIL
NOT TO SCALE



2 C-4 BOLLARD DETAIL
NOT TO SCALE



3 C-4 PROPANE TANK PAD DETAIL
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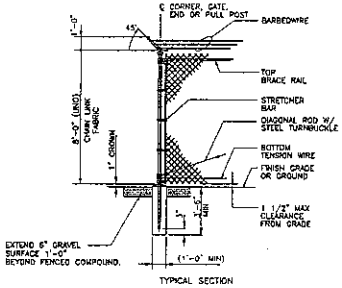
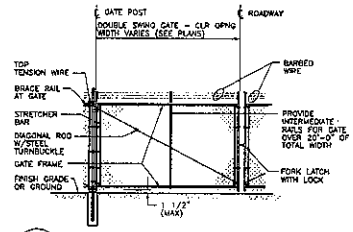


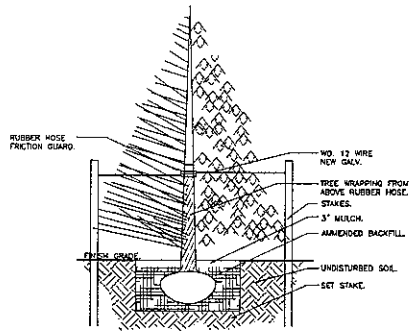
4 C-4 WOVEN WIRE FENCE DETAIL
NOT TO SCALE

WOVEN WIRE FENCE NOTES

1. GATE POST, CORNER, TERMINAL OR PULL POST 2 1/2" ø SCHEDULE 40 FOR GATE WIDTHS UP THRU 6 FEET OR 12 FEET FOR DOUBLE SWING GATE PER ASTM-F1083.
2. LINE POST: 2" ø SCHEDULE 40 PIPE PER ASTM-F1083.
3. GATE FRAME: 1 1/2" ø SCHEDULE 40 PIPE PER ASTM-F1083.
4. TOP RAIL & BRACE RAIL: 1 1/2" ø SCHEDULE 40 PIPE PER ASTM-F1083.
5. FABRIC: 12 GA. CORE WIRE SIZE 2" MESH, CONFORMING TO ASTM-A392.
6. TIE WIRE: MINIMUM 11 GA. GALVANIZED STEEL AT POSTS AND RAILS A SINGLE WRAP OF FABRIC TIE AND AT TENSION WIRE BY HOG RINGS SPACED MAX 24" INTERVALS.
7. TENSION WIRE: 7 GA. GALVANIZED STEEL.
8. BARBED WIRE: DOUBLE STRAND 12-1/2" O.C. TWISTED WIRE TO MATCH W/FABRIC 14 GA., 4 PT. BARBS SPACED ON APPROXIMATELY 5" CENTERS.
9. GATE LATCH: DROP DOWN LOCKABLE FORK LATCH AND LOCK, KEYED ALIKE FOR ALL SITES IN A GIVEN MTA.
10. LOCAL ORDINANCE OF BARBED WIRE PERMIT REQUIREMENT SHALL BE COMPLIED WITH IF REQUIRED.
11. HEIGHT = 8' VERTICAL + 1' BARBED WIRE VERTICAL DIMENSION.



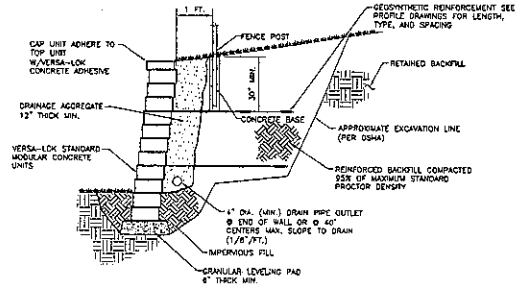
4A C-4 WOVEN WIRE SWING GATE-DOUBLE
NOT TO SCALE



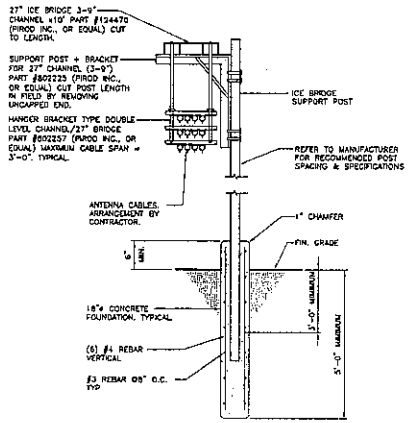
TREE & SHRUB PLANTING SPECIFICATIONS:

1. GUY WIRES (NO.12 NEW GALV.) SHALL BE REQUIRED FOR ALL TREES 3 CAL. AND LARGER.
2. SOIL MIX SHALL CONSIST OF: 3 PARTS TOP SOIL, 3 PART PEAT MOSS, 10 ONE PART COMPOSTED COW MANURE, AND 1 OZ. SOIL MOIST PER EVERY 12 SF. OF LINEAR DIA. OF ROOT BALL. COVER WITH LANDSCAPE FABRIC, AND A MINIMUM OF 3" CEDAR MULCH.
3. TREES 6" AND OVER SHALL BE STAKED WITH 2 OAK STAKES 2" X 2" X 8' AND GUY WIRE TO STAKES.
4. ALL TREES AND SHRUBS MUST MEET OR EXCEED STANDARDS SET BY THE NATIONAL ASSOCIATION OF NURSERYMEN, YEAR OF LATEST REVISION.

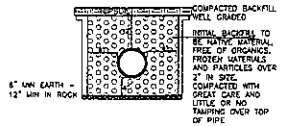
5 C-4 TYPICAL TREE PLANTING DETAIL
NOT TO SCALE



6 C-4 REINFORCED RETAINING WALL
NOT TO SCALE TYPICAL SECTION



7 C-4 ICE BRIDGE DETAIL
NOT TO SCALE



8 C-4 PVC BEDDING DETAIL
NOT TO SCALE

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01	07/26/07	D & M PLAN

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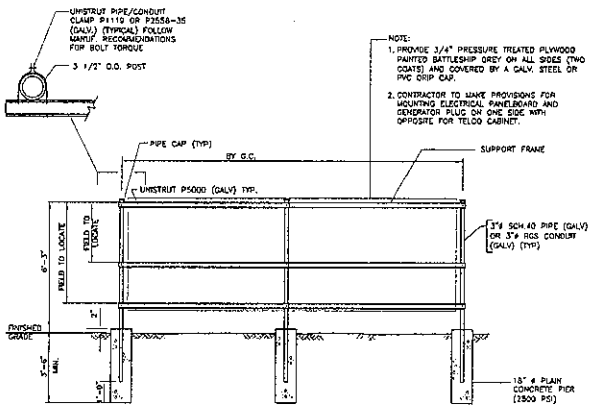
Natcomm, INC.

BRISTOL WEST
1191 TERRYVILLE AVE
BRISTOL, CT 06010

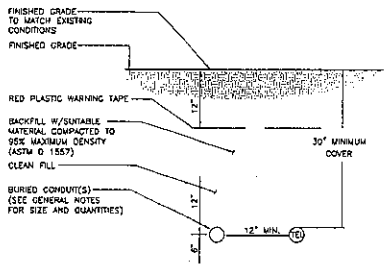
PROJECT NO:	05096
DRAWN BY:	DEB
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	12/14/06

SITE DETAILS

C-4
DWG. 5 OF 7

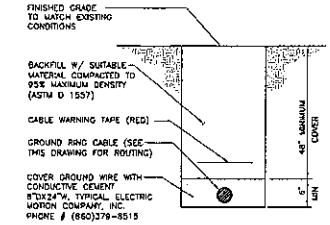


1 / C-5 UTILITY SUPPORT FRAME (TYP)
NOT TO SCALE



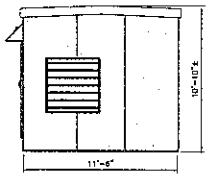
NOTES:
1. THE CLEAN FILL SHALL PASS THROUGH A 3/8" MESH SCREEN AND SHALL NOT CONTAIN SHARP STONES. OTHER BACKFILL SHALL NOT CONTAIN ASHES, CINDERS, SHELLS, FROZEN MATERIAL, LOOSE DEBRIS OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION.
2. WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR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

2 / C-5 TYPICAL ELECTRICAL/TEL TRENCH DETAIL
NOT TO SCALE

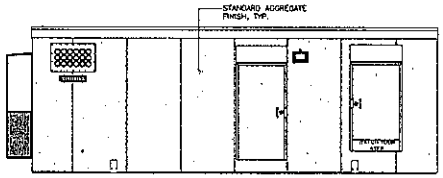


NOTES:
1. BACK FILL SHALL NOT CONTAIN ASHES, CINDERS, SHELLS, FROZEN MATERIAL, LOOSE DEBRIS OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION.
2. WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.

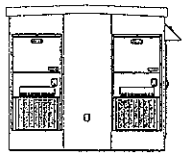
3 / C-5 TYPICAL BURIAL GROUND CABLE DETAIL
NOT TO SCALE



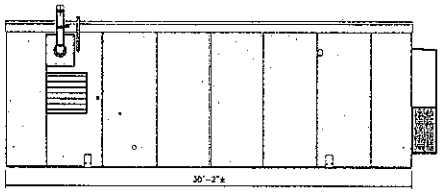
4 / C-5 SOUTHEAST SHELTER ELEVATION
SCALE: 1/4" = 1'-0"



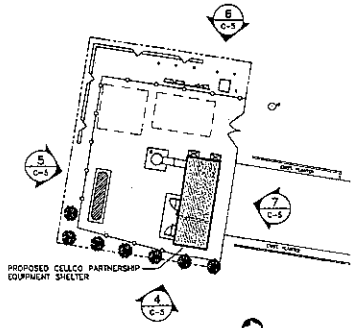
5 / C-5 SOUTHWEST SHELTER ELEVATION
SCALE: 1/4" = 1'-0"



6 / C-5 NORTHWEST SHELTER ELEVATION
SCALE: 1/4" = 1'-0"



7 / C-5 NORTHEAST SHELTER ELEVATION
SCALE: 1/4" = 1'-0"



SHELTER ELEVATION KEY PLAN
NOT TO SCALE
TRUE NORTH

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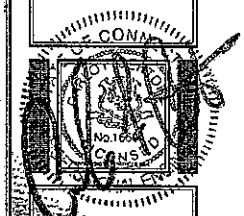
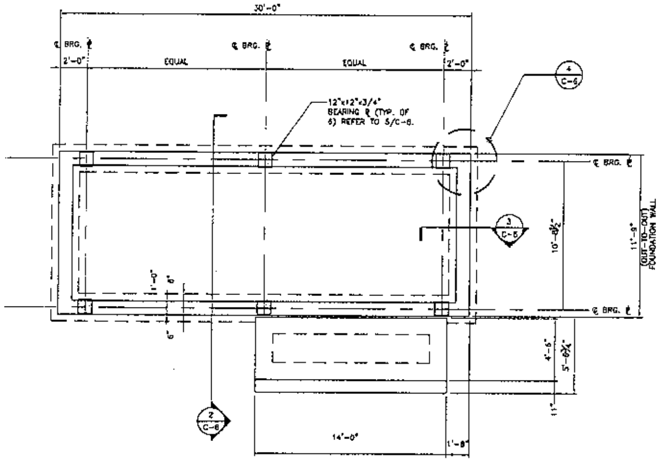


BRISTOL WEST
1191 TERRYVILLE AVE
BRISTOL, CT 06010

PROJECT NO:	05095
DRAWN BY:	OEB
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	12/14/06

SITE UTILITY DETAILS AND SHELTER ELEVATIONS

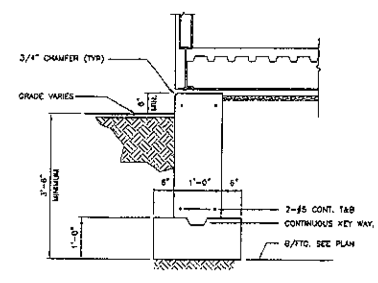
C-5
DWG. 5 OF 7



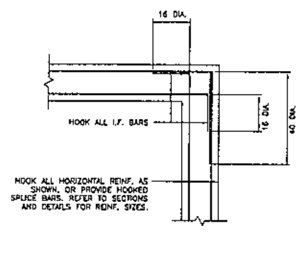
NOTE:
1. B/FTG. ELEVATION AT 3'-6" MINIMUM BELOW FINISHED GRADE. (TYP)

1 C-6 FOUNDATION PLAN
SCALE: 1/4"=1'-0"
TRUE NORTH

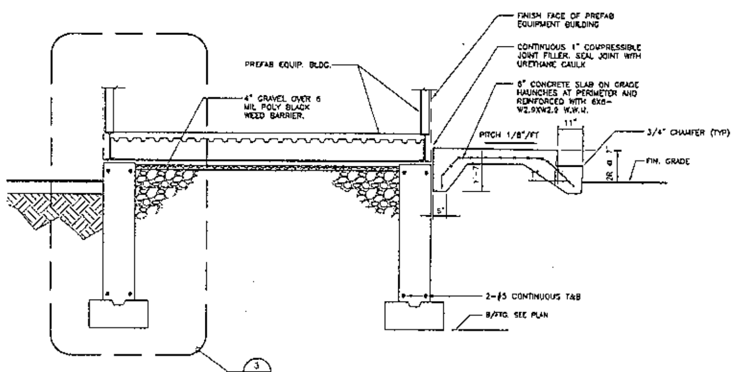
EQUIPMENT SHELTER BY VERIZON WIRELESS. VERIFY ALL SHELTER DIMENSIONS, EQUIPMENT DIMENSIONS, EQUIPMENT LOCATIONS AND UTILITY OPENINGS WITH BUILDING SHOP DRAWINGS PRIOR TO COMMENCEMENT OF WORK.



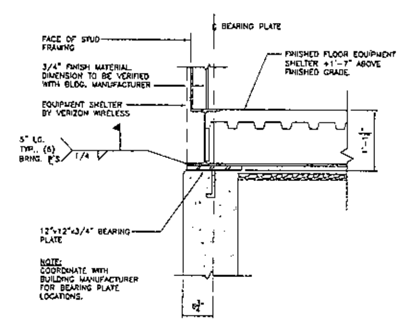
3 C-6 SECTION
SCALE: 3/4" = 1'-0"



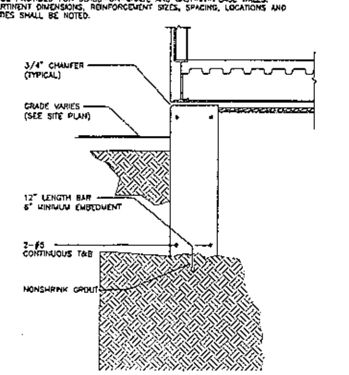
4 C-6 SECTION
NOT TO SCALE



2 C-6 TYPICAL SECTION
SCALE: 1/2"=1'-0"



5 C-6 BUILDING TIE DOWN
SCALE: 1"=1'-0"



6 C-6 FOUNDATION OVER LEDGE (TYPICAL)
SCALE: 3/4"=1'-0"

GENERAL NOTES:

GENERAL

1. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
2. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST THE PRE MANUFACTURED EQUIPMENT BUILDING SHOP DRAWINGS.
3. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
4. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

COMPACTED GRAVEL FILL

1. COMPACTED GRAVEL FILL SHALL BE FURNISHED AND PLACED AS A FOUNDATION FOR STRUCTURES. WHERE SHOWN ON THE CONTRACT DRAWINGS OR DIRECTED BY THE ENGINEER.
2. GRAVEL SHALL CONFORM TO THE REQUIREMENTS OF ARTICLE M.02.02 OF THE STANDARD SPECIFICATIONS. ADMIXTURES AND SURFACE PROTECTIVE MATERIALS USED TO PREVENT THE GRAVEL FROM FREEZING MUST MEET THE APPROVAL OF THE ENGINEER. THE LARGEST STONE SIZE SHALL BE 3-1/2 INCHES.
3. SAMPLES OF THE MATERIAL TO BE USED SHALL BE DELIVERED TO THE JOB SITE 5 DAYS PRIOR TO ITS INTENDED USE SO IT MAY BE TESTED FOR APPROVAL.
4. AFTER ALL EXCAVATION HAS BEEN COMPLETED, GRAVEL SHALL BE DEPOSITED IN LAYERS NOT EXCEEDING EIGHT (8) INCHES IN DEPTH OVER THE AREAS. IN EXCEPTIONAL CASES, THE ENGINEER MAY PERMIT THE FIRST LAYER TO BE THICKER THAN EIGHT (8) INCHES. EACH LAYER SHALL BE LEVELED OFF BY THE USE OF BLADE GRADERS OR BULLDOZERS WITH ADEQUATE POWER FOR THE WORK INVOLVED. THE ENTIRE AREA OF EACH LAYER SHALL BE COMPACTED BY USE OF APPROVED VIBRATORY, PNEUMATIC-TIRED OR TREAD-TYPE COMPACTION EQUIPMENT. COMPACTION SHALL BE CONTINUED UNTIL THE DRY DENSITY OVER THE ENTIRE AREA OF EACH LAYER IS NOT LESS THAN 95 PERCENT OF THE MAXIMUM DRY DENSITY ACHIEVED BY AASHTO T-99 METHOD C. THE MOISTURE CONTENT OF THE GRAVEL SHALL NOT VARY BY MORE THAN 3%+ FROM ITS OPTIMUM MOISTURE CONTENT. NO SUBSEQUENT LAYER SHALL BE DEPOSITED UNTIL THE SPECIFIED COMPACTION IS ACHIEVED FOR THE PREVIOUS LAYER. IF NECESSARY TO OBTAIN THE REQUIRED COMPACTION, WATER SHALL BE ADDED AND GENTLE PUDDLING PERFORMED IF AUTHORIZED. COMPACTED GRAVEL FILL SHALL BE PREVENTED FROM FREEZING BY USE OF APPROVED ADMIXTURES OR BY USE OF APPROVED PROTECTIVE MATERIALS ON THE SURFACE, OR BOTH.

FOUNDATIONS

1. ALL FOOTINGS SHALL BEAR ON UNDISTURBED NATURAL MATERIAL OR COMPACTED STRUCTURAL FILL HAVING AN ALLOWABLE BEARING CAPACITY 2 TONS PER SQUARE FOOT TOTAL LOAD PRESSURE.
2. ELEVATIONS OF BOTTOM OF FOOTING SHOWN ON THE PLANS ARE FOR BIDDING PURPOSES AND SHALL BE LOWERED TO THE REQUIRED BEARING MATERIAL AS FOUND UPON EXCAVATION. IF THE REQUIRED BEARING MATERIAL IS NOT ENCOUNTERED AT THE NOTED ELEVATIONS, NOTIFY THE ENGINEER IMMEDIATELY.

CONCRETE

1. ALL CONCRETE WORK SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTES "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS" (ACI 301).
2. ALL CONCRETE WORK IS DESIGNED BY ULTIMATE STRENGTH METHODS AND SHALL BE NORMAL WEIGHT WITH A 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI.
3. ALL REINFORCING STEEL SHALL BE HIGH STRENGTH DEFORMED BARS CONFORMING TO ASTM A615 - GRADE 60.
4. ALL DETAILING, FABRICATION AND PLACING OF REINFORCING BARS SHALL BE IN ACCORDANCE THE LATEST ACI MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCEMENT IN CONCRETE STRUCTURES (ACI 315).
5. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A-185. WIRE MESH REINFORCEMENT MUST LAP ONE FULL MESH AT SIDE AND END LAPS, AND SHALL BE WIRED TOGETHER. MESH SHALL EXTEND WITHIN 2" OF SLAB EDGES.
6. LOCATE WELDED WIRE FABRIC ONE THIRD THE SLAB THICKNESS BELOW THE TOP SURFACE. MAINTAIN LOCATION OF STEEL DURING POUR. SUPPORT MESH ON CHAIRS, BOLSTERS, OR SMALL BRICK OR STONE, NOT ON WOOD OR OTHER ORGANIC MATERIALS.
7. SHOP DRAWINGS AND CONCRETE ADMIXTURE PRODUCT DATA SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO COMMENCING CONSTRUCTION. DRAWINGS SHALL BE PROVIDED FOR SLABS-ON-GRADE AND CAST-IN-PLACE WALLS. ALL PERTINENT DIMENSIONS, REINFORCEMENT SIZES, SPACING, LOCATIONS AND QUANTITIES SHALL BE NOTED.

REVISIONS		
00	02/26/07	D & M PLAN - REVIEW
01	02/28/07	D & M PLAN

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OF CONNECTICUT
No. 16694
LICENSED

BRISTOL WEST
1191 TERRYVILLE AVE
BRISTOL, CT 06010

PROJECT NO:	05096
DRAWN BY:	DEB
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	12/14/06

EQUIP. SHELTER FOUNDATION DETAILS AND NOTES

C-6
DWG. 7 OF 7

JGI EASTERN, Inc.

SERVICES
- Geotechnical
- Environmental
- Construction Monitoring
- Materials Testing

January 22, 2007

Mr. Daniel Bolan
NATCOMM, LLC
63-2 North Branford Road
Branford, CT 06405

Advance Copy by Fax

Re: Geotechnical Evaluation
Verizon Wireless (Bristol West)
1191 Terryville Avenue
Bristol, Connecticut

JGI Project No. 06817G

Dear Mr. Bolan:

The following report, prepared by JGI EASTERN, Inc. (JGI), presents our geotechnical engineering evaluation of subsurface conditions as they relate to foundation design and earthwork construction for the proposed communications tower development. Our services, conducted in accordance with our email correspondence, dated December 15, 2006, are subject to the limitations contained in this report.

SITE AND PROJECT DESCRIPTION

The proposed tower site is located approximately 20 feet southwest of an existing maintenance building within the Pequabuck Golf Course in Bristol, Connecticut. The tower lease area is currently undeveloped and moderately wooded. The topography within the proposed lease area gradually slopes downward to the west from approximately Elevation (El) of 640 to 634 feet.

The project involves constructing a 120-foot tall, steel flagpole type communications tower within a 55-foot by 70-foot lease area. Current plans indicate that prefabricated equipment shelters and a 1,000-gallon propane above ground storage tank will be constructed within the lease area. In addition, a retaining wall with an overall height of about 4 to 6 feet is planned at the west corner of the lease area. Access to the site will be from the existing paved access drive to the maintenance building. The proposed tower development, existing conditions and exploration locations are shown on Figure 1, Subsurface Exploration Location Plan.

77 Sundial Avenue, Suite 401W
Manchester, NH 03103
(603) 647-9700 Fax 647-4432

114 Woodlawn Road
Berlin, CT 06037-1535
(860) 829-1725 Fax 829-1745

15 Holly Street, Unit 105
Scarborough, ME 04074
(207) 396-5374 Fax 396-5394

www.jgieastern.com

SUBSURFACE EXPLORATIONS AND CONDITIONS

JGI monitored the advancement of one test boring (JB-1) and four probes (JP-1 through JP-4) drilled by New England Boring Contractors Inc. of Glastonbury, Connecticut on January 19, 2007. The test boring was advanced approximately 15 feet north of the tower center with 4-inch inside diameter hollow stem augers (HSA) to a depth of 40 feet below the existing ground surface. A roller bit and drive-and-wash methods were used from 40 to 61 feet. Soil samples were obtained semi-continuously to a depth of 12 feet, and at 5-foot intervals thereafter with a standard 2.0-inch outside diameter split-barrel sampler. Standard Penetration Tests (SPTs) were performed at sampling intervals, in general accordance with ASTM D1586. The approximate exploration location is shown on Figure 1.

The subsurface profile consists of fill underlain by a glaciofluvial deposit over glacial till. The fill has a thickness of about 6 feet and consists of loose to dense, brown, medium to fine sand, some gravel, trace to little silt, occasional cobbles, with deleterious material including brick. The glaciofluvial deposit was encountered below the fill, extending to a depth of about 59 feet. The glaciofluvial deposit consists of medium dense, brown, medium to fine sand, trace to some gravel, trace to little silt. The glacial till was inferred by resistance to the roller bit at a depth of 59 feet.

Test probes were advanced with 4-inch diameter solid stem augers (SSA) to further evaluate the subsurface soil conditions near the proposed tower. The probes encountered soil conditions similar to JB-1. However, a lesser thickness of fill was encountered in the probes. The probes were terminated at a depth of 10 feet, without refusal. The approximate exploration locations are shown on Figure 1. The exploration logs are attached.

At the time of the exploration program, groundwater was not observed to a depth of 40 feet during augering. Drive and wash methods, which were utilized below a depth of 40 feet introduced water into the boring, preventing groundwater observations and measurements. Groundwater levels vary depending upon season, precipitation and other conditions that may be different from those at the time of drilling.

Following drilling, *in situ* soil resistivity testing was completed. Resistivity testing was performed in accordance with ASTM G57 by the Wenner Four Probe Method using a 16gl Earth Resistivity Meter. Two resistivity lines were completed with electrodes spaced at 5, 10, 20, 30, and 40 feet. At the time of resistivity testing, the surficial soil was relatively dry. The location and orientation of resistivity lines are shown on Figure 1. The resistivity test results are summarized below:

	Resistivity (ohm-cm)	
Electrode Spacing (ft)	**Line 1**	**Line 2**
5	380,510	457,395
10	716,975	464,385
20	985,460	1,106,485
30	1,010,545	1,290,900
40	788,215	1,319,815

FOUNDATION TYPE AND DESIGN RECOMMENDATIONS

Tower

The tower may be supported on either a monolithic mat or a pier and pad foundation bearing directly on the glaciofluvial deposit or on compacted structural fill or minus ¾-inch crushed stone placed on the glaciofluvial deposit. The tower foundation may be designed on the basis of a net allowable bearing pressure of 4.0 kips per square foot (ksf). The allowable bearing pressure may be increased by one third for transient loadings, such as wind and seismic. Bearing pressure is unlikely to govern the design, with overturning determining the size of the foundation. We estimate that settlement of the tower foundation will be about 1 inch.

An ultimate friction factor (tan δ) of 0.4 may be used for calculation of the sliding resistance between the bearing materials and concrete surfaces. A factor of safety of at least 1.5 should be applied to the sliding resistance. A total unit weight (γ) of 120 pounds per cubic foot and an ultimate passive earth pressure coefficient, K_p, of 3.0 should be used for the calculation of passive resistance provided by compacted backfill adjacent to the tower foundation. The passive pressure calculated with these parameters should be reduced by at least a factor of safety of 3, to reflect the amount of movement required to mobilize the passive resistance.

The underside of the tower foundation should be at least 3.5 feet below adjacent final grade to reduce the likelihood of frost heave. To increase the overturning resistance of the footing, the mat or pad could be located deeper and extended to the surface with a pier. This would reduce the size of the concrete foundation and utilize the mass of the fill placed above the footing to increase overturning resistance. The excavation around and above the foundation should be backfilled with compacted fill.

Control of backfill compaction above and around the foundation will be required to provide uplift and lateral resistance. Care should be exercised during excavation for the tower foundation to minimize disturbance to the soil surrounding the excavation; disturbance to the adjacent soils will influence resistance to lateral loads.

Excavations for the proposed tower should not extend into the foundation bearing zone of the footings of the existing maintenance building. The foundation bearing zone is defined as the volume below 1H:1V lines extending outward and downward from the lower edges of the footings. If the foundation bearing zone will be impacted by construction activities, temporary sheeting, shoring, and/or bracing will be required to reduce the likelihood of undermining the existing footings, which are likely spread footings founded at a depth of 3.5 feet below existing grade in accordance with the Connecticut State Building Code. As an alternative to braced excavations, the existing garage foundations along the north side of the structure could be extended to the bottom of the proposed tower foundation through the use of concrete underpinning piers. Underpinning piers should be designed by a licensed engineer. Excavation and construction of the underpinning piers should be observed by a geotechnical engineer. Specifically, the geotechnical engineer, or his delegate, should observe and monitor:

- Excavation of soil or concrete adjacent to the existing maintenance building
- Removal of soil or concrete supporting the existing footings
- Soil conditions at each underpinning pier
- Reinforcing steel installation in each underpinning pier, if required
- Concrete placement in each underpinning pier

As an alternative, the flagpole-type communications tower may be supported by a drilled shaft foundation. Soil parameters associated with the design of a drilled shaft are summarized on Table 1. We anticipate that the design length of the shaft will be primarily dependent on the embedment/lateral capacity required to resist live loading, such as the combination of wind and ice loads. An allowable deflection at the top of the drilled shaft of 0.5 inch is recommended for calculating lateral capacity.

The drilled shaft diameter should be at least the diameter of the tower base. The compression capacity of the shaft will be based on a combination of end bearing and side friction within the glaciofluvial deposit. Because of the difficulty of preparing the base of the shaft in sands potentially below the groundwater table, the allowable end bearing pressure has been reduced. The uplift capacity of the shaft will be based on side friction in the glaciofluvial deposit. The drilled shaft will be designed to resist tension loads and therefore should have reinforcing steel installed throughout the entire length of the shaft.

Technical specifications should be prepared that require:

- material and installation detail submittals
- proof of experience in drilled shaft installation
- concrete placement methods
- use and removal of temporary steel casing

We can prepare appropriate technical specifications, at your request.

Equipment Cabinet and Propane Tank

The equipment cabinet and propane tank may be supported on either concrete pier foundations or slabs-on-grade. For a heavily loaded equipment cabinet, we recommend that the foundation bear on the native glaciofluvial deposit. Footings may be designed using a maximum net allowable bearing pressure of 3.0 ksf. Settlements will be small, likely less than ½ inch, most of which will occur as load is applied. Strip footings should have a minimum width of 12 inches. Piers should have a minimum side dimension/diameter of 12 inches.

Slabs-on-grade should be underlain by a minimum 12-inch thick layer of compacted structural fill or minus ¾-inch crushed stone placed on the existing granular fill or on the glaciofluvial deposit, if the existing fill has been removed. A modulus of subgrade reaction (k_s) of 225 pounds per cubic inch may be used for design of slabs constructed in this way. Consideration should be given to using dense insulation boards (Dow Styrofoam Highload, or similar) under and adjacent to lightly loaded slabs-on-grade, to provide the equivalent of 3.5 feet of earth cover, thus reducing frost penetration. Settlements of the slabs-on-grade should be less than about ½ inch.

Air entraining admixtures should be used for concrete exposed to freezing. To reduce the likelihood of frost heave, the underside of foundation elements should be at least 3.5 feet below finish ground surface, unless adequately protected by insulation boards.

Lateral Earth Pressures

Retaining walls should be designed to resist combined lateral forces resulting from static soil pressures, surcharges, and additional pressures under seismic events. Surcharge due to water pressure may be neglected if geotextile-wrapped foundation drains are installed behind the retaining wall adjacent to the footing. Retaining walls are generally free to rotate and therefore may be designed on the basis of the "yielding" parameters, unless the top of the wall is fixed or braced. Other surcharge loads should be considered where they are located within a horizontal distance behind the wall equal to 1.5 times the height of the wall. Restrained walls, if used, should be designed on the basis of the "non-yielding" parameters. The following design criteria are recommended for yielding and non-yielding walls:

	Yielding	Non-Yielding
Static Lateral Earth Pressure (Compacted structural fill as equivalent fluid unit weight)	38 pcf (pounds per cubic foot)	60 pcf
Traffic Surcharge (Distributed uniformly over height of wall)	70 psf	110 psf
Seismic Forces	11H psf/foot (distributed as an inverse triangle)	11H psf/foot (uniform pressure distribution)

Note: H is equal to the exposed height of the wall, i.e. above the permanent ground level in front of the wall. Surcharge stresses due to point loads, line loads, and those of limited extent, such as compaction equipment, should be evaluated using elastic theory.

Retaining structures should be backfilled evenly to the extent practical. Temporary bracing should be specified if walls, that are designed to be supported by other structural elements, are permitted to be backfilled before the permanent support is in place. Lateral pressures based on the above parameters are cumulative for computing overall factors of safety. To account for effect on the wall of compaction equipment during construction, the lateral pressure should not be less than 200 psf, distributed uniformly over the height of the wall.

We recommend that a passive earth pressure coefficient, K_p, of 3.0 and a total unit weight (γ) of 120 pounds per cubic foot (pcf) should be used for calculating the passive soil resistance to lateral loading. The passive pressure calculated with these parameters should be reduced by at least a factor of safety of 3, to reflect the amount of movement required to mobilize the passive resistance.

Seismic Design Criteria

Seismic design requirements for State of Connecticut are based on the Connecticut State Building Code, which uses the Seismic Design Category approach from the 2003 International Building Code. The Seismic Design Category determination is based on:

- Building Importance (grouping based on use of building)
- Mapping factors (expected maximum considered ground motions at rock level)
- Site classification (soil type)

We consider that the site subsurface conditions match the Soil General Description of "Stiff Soil Profile". The Site Classification is therefore D. We expect that the communications tower will be classified as Category III Seismic Use Group, i.e. "designated for emergency preparedness, communication, and operation centers and other facilities required for emergency response". Based on the above, and a review of USGS National Seismic Hazard Mapping, we would consider the facility to be in Seismic Design Category C. This determination should be confirmed by the structural engineer. The site does not appear to be susceptible to liquefaction in the event of an earthquake.

EARTHWORK AND CONSTRUCTION RECOMMENDATIONS

Compacted Structural Fill

Excavated fill and glaciofluvial sands may be selectively reused as fill adjacent to and over the tower foundation, provided they can be adequately compacted. However, the glaciofluvial deposit, and possibly the existing fill, may have an elevated silt content and may therefore be difficult to compact when wet. Because of the high silt content, the glaciofluvial soils, and possibly the existing fill, will also be sensitive to moisture and lose strength quickly when wet. Consequently, the recommendation for reusing these soils is only applicable during periods when the climate and moisture are favorable for reusing silty soil as compacted fill.

Structural fill originating from an off-site source should conform to the gradation requirements for Bank or Crushed Gravel (M.2.06, Grading B) as defined by the *State of Connecticut Department of Transportation Standard Specifications*. Fill, where required, should be placed in loose lifts not exceeding 8 inches in thickness. Structural fill should be compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557.

Mat and Equipment Foundation Subgrades

The foundation bearing subgrades should be prepared by the contractor as outlined in this report and observed by the geotechnical engineer, prior to foundation construction. The existing fill is not suitable for tower foundation support and should be removed within the foundation bearing zone. Neither fill nor concrete should be placed on frozen subgrades. Frozen materials should not be used as fill.

Upon completion of the foundation excavation for the mat, spread and strip footings, and for slabs-on-grade, the subgrade, consisting of undisturbed glaciofluvial soils for the tower foundation, and likely existing granular fill for slabs-on-grade, should be proofrolled with a least 6 passes of a vibratory roller or heavy plate compactor. Unstable subgrades should be removed and replaced with compacted structural fill or minus ¾-inch crushed stone, as necessary.

Drilled Shaft/Rock Socket

The drilled shaft/socket, if utilized, should be aligned vertically. The drilling method or combination of methods selected by the contractor should be submitted for review by the geotechnical engineer. Concrete placed for the shaft/socket should have a minimum 28-day unconfined compressive strength of 4,000 pounds per square inch (psi). Concrete should be placed by tremie. Concrete should not be allowed to segregate by hitting either the reinforcing steel cage or the sides of the shaft.

The existing fill may contain large diameter boulders. Specifications should include payment provisions for removing obstructions. Provisions may include the contractor to be paid based on time and materials or by the cubic yard for obstruction removal.

Temporary Excavation and Dewatering

Excavations greater than 4 feet deep will be required for construction of the tower foundation or during underpinning of the existing structure, if required. Temporary construction slopes in the existing fill and glaciofluvial deposit should be designed in compliance with recent governing regulations. Construction slopes should be cut to a stable incline or braced, depending upon the excavation depth and encountered subsurface conditions.

Construction slopes should be reviewed for signs of mass movement. If movement/potential stability problems are observed, work should cease; the geotechnical engineer should be immediately contacted. The responsibility for excavation safety and stability of temporary construction slopes should lie solely with the contractor.

We do not anticipate significant construction dewatering. The contractor should prevent groundwater, if encountered, and surface water runoff from collecting in excavations. Subgrade soils that become unstable because of such water and/or reworking by construction activity should be replaced with compacted granular structural fill or minus ¾-inch crushed stone encapsulated within a geotextile separation fabric, as necessary.

LIMITATIONS

The analyses and recommendations submitted in this report are based upon the data obtained from a single test boring and four test probes. The nature and extent of variations from the conditions observed within the exploration may not become evident until construction. If variations then appear evident, JGI should re-evaluate the recommendations of this report.

Field resistivity test results may be influenced by boulders, concrete foundations, and underground and above ground utilities within the test area. Resistivity results will also fluctuate depending on the degree of compaction, moisture content, soil constituent solubility, and temperature. Field resistivity values may vary depending upon season, precipitation, and other conditions, which may be different from those at the time of testing.

We request the opportunity to review final design drawings and specifications to evaluate the appropriate implementation of our recommendations. In the event that changes in the nature, design, or location of the proposed areas are planned, the conclusions and recommendations contained in this report shall not be considered valid unless we review the changes, and conclusions of the report are modified or verified by us in writing.

A geotechnical engineer should be retained to provide testing and monitoring services during the earthwork phases of the project. This is to observe compliance with our design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

This report has been prepared for the exclusive use of NATCOMM, LLC in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made. This report has been prepared for preliminary design purposes and may be limited in its scope to complete an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to evaluation only.

If you have questions, please contact us. It was a pleasure working with you on this project and we look forward to working with you in the future.

Very truly yours,

JGI EASTERN, Inc.

Robert W. Olah, EIT
Engineer II

Ryan R. Roy P.E.
Principal/Senior Engineer

/dew/06817G

Attachments: Table 1 – Drilled Shaft/Rock Socket Foundation Design Criteria
Figure 1 – Subsurface Exploration Location Plan
Test Boring Log, JB-1
Test Probe Logs, JP-1 through JP-4

TABLE 1

Communications Tower
Verizon Wireless (Bristol West)
Bristol, Connecticut
Project No. 06817G

Drilled Shaft Foundation Design Criteria

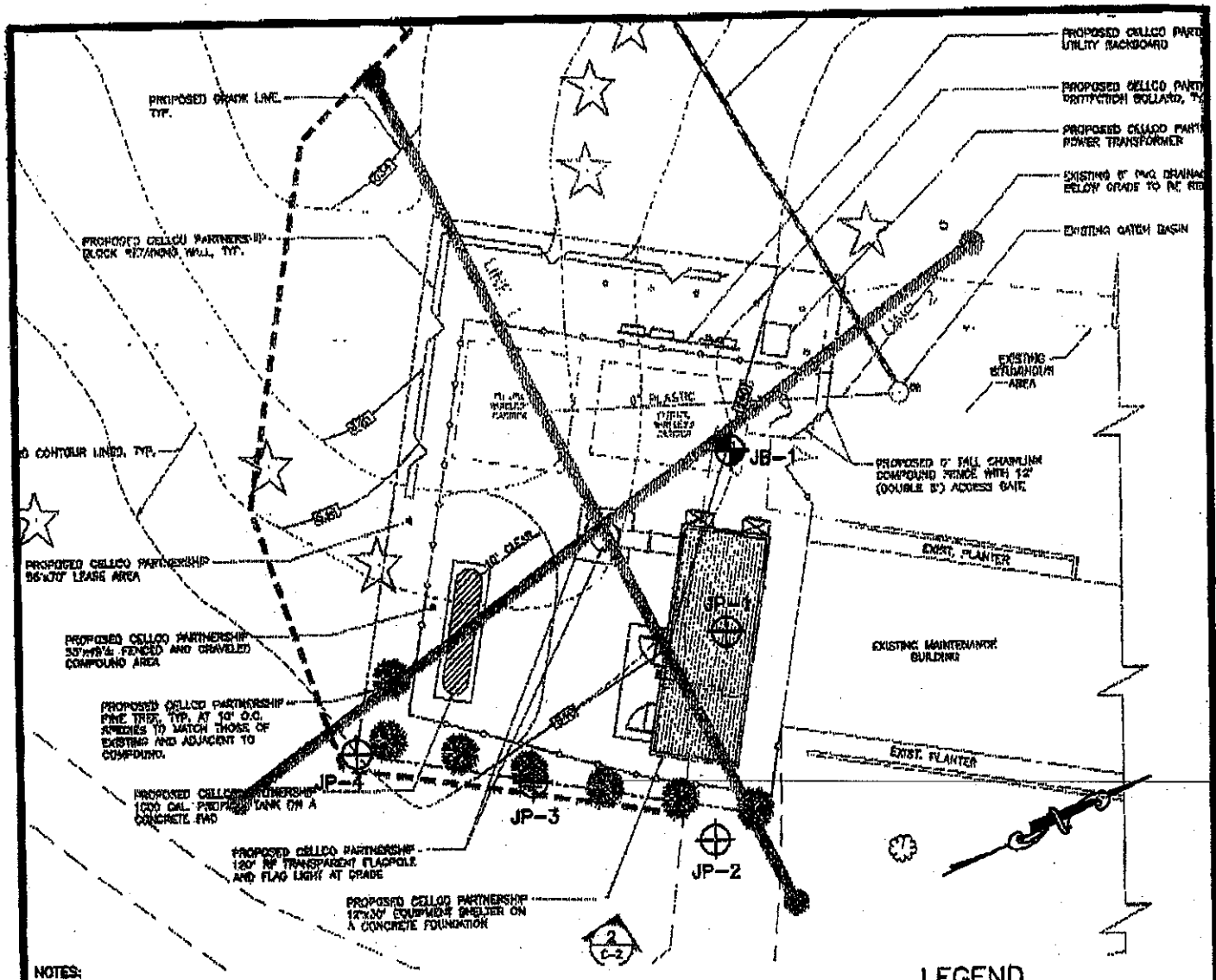
Design Parameter	Design Value
Net Allowable Bearing Capacity (ksf) Glaciofluvial Deposit	6
Ultimate Side Friction (ksf) Glaciofluvial Deposit	1.5
Coefficient of Lateral Subgrade Reaction (kcf) Glaciofluvial Deposit	20 (z/D)
Angle of Internal Friction (degrees) Glaciofluvial Deposit	32
Estimated *In situ* Soil Unit Weight (pcf) Glaciofluvial Deposit	120
Approximate Groundwater Depth on 1/19/07 (feet)	>40*

Note:

The contribution to shaft capacity from soil above a depth of 6 feet should be ignored.

z = depth below the ground surface (feet)	D = diameter of shaft (feet)
ksf = kips per square foot	kcf = kips per cubic foot
pcf = pounds per cubic foot	> greater than

* This represents the depth of augering before water was introduced into the boring to facilitate drive-and-wash methods. Groundwater may have been higher and not had time to stabilize within the boring before water was introduced.



NOTES:

1. THIS PLAN WAS PREPARED FROM NATCOMM, LLC OF BRANFORD, CONNECTICUT PROJECT NUMBER: 05098 SHEET NUMBER: C-2 TITLED: "PARTIAL SITE PLAN AND ELEVATION" DATED: 7/21/06.
2. THE SUBSURFACE EXPLORATIONS SHOWN AS JB-1 AND JP-1 THROUGH JP-4 WERE ADVANCED ON JANUARY 19, 2007 UNDER THE DIRECTION OF JGI WITH EQUIPMENT OWNED AND OPERATED BY NEW ENGLAND BORING CONTRACTORS, INC. OF GLASTONBURY, CONNECTICUT.
3. RESISTIVITY TESTING WAS PERFORMED ON JANUARY 19, 2007 BY A JGI FIELD ENGINEER.
4. THE APPROXIMATE LOCATIONS OF THE SUBSURFACE EXPLORATIONS AND RESISTIVITY TESTS WERE TAPED FROM EXISTING SITE FEATURES. THE LOCATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
5. USE OF THIS PLAN IS LIMITED TO THE ILLUSTRATION OF THE APPROXIMATE LOCATIONS OF THE SUBSURFACE EXPLORATIONS, RESISTIVITY TESTS AND OTHER PERTINENT SITE FEATURES. ANY OTHER USE OF THIS PLAN WITHOUT PERMISSION FROM JGI EASTERN INC. IS PROHIBITED.

LEGEND

JB-1 TEST BORING LOCATION

JP-1 TEST PROBE LOCATION (TYP)

LINE 1 RESISTIVITY TEST LOCATION (TYP)

GRAPHIC SCALE

-10 0 10 20 40

(IN FEET)

PROPOSED COMMUNICATIONS TOWER
VERIZON WIRELESS (BRISTOL WEST)
BRISTOL, CONNECTICUT

PREPARED FOR:
NATCOMM, LLC
63-2 NORTH BRANFORD RD
BRANFORD, CT 06405

DATE: JANUARY 2007
SCALE: 1" = 20'
PROJECT NO: 06817

FIGURE 1
SUBSURFACE EXPLORATION LOCATION PLAN

JGI EASTERN, Inc.
114 Woodlawn Road
Berlin, Connecticut 06037

06817

TEST BORING LOG

PROJ. NAME:	Verizon Wireless (Bristol West)	HAMMER	SAMPLER	CASING	SHEET 1 OF 1
LOCATION:	Bristol, Connecticut	TYPE: Safety	SS	HSA	BORING: JB-1
PROJECT NO.:	06817	SIZE: 140 lbs.	2" OD	4" ID	LOCATION: See Plan
DATE START:	January 19, 2007	FALL: 30"	Drop Method:	Winch/Cable	
DATE END:	January 19, 2007				SURF. EL.: 641' ±
BORING CO.:	New England Boring, Inc.	GROUNDWATER OBSERVATIONS			
CO. LOCATION:	Glastonbury, CT	DATE	DEPTH	CASING AT	DURATION AFTER DRILLING
FOREMAN:	Trent Roe	1/19/07	Not Encountered		
JGI REP.:	Brian Opp				

SAMPLING					Sample Description	Strata Change Depth (ft)	Notes
	No.	Depth (ft.)	Blows/ 6"	Penet./ Rec. (in)			
					Asphalt	0.1	
	SS-1	0-2	11-5	24/6	SS-1: Loose, brown, medium to fine SAND, some Gravel, little Silt.		
			3-3				
	SS-2	2-4	7-7	24/5	SS-2: Medium dense, brown, medium to fine SAND, some Gravel, trace Silt.		
			7-6				
5							
	SS-3	5-5.9	20-75/5"	11/8	SS-3: Very dense, brown, medium to fine SAND and Gravel, trace Roots, occasional Cobbles. (Fill)	6.0	
	SS-4	7-9	11-13	24/10	SS-4: Dense, brown, medium to fine SAND, little Gravel and Silt.		
			21-15				
10							
	SS-5	10-12	6-5	24/17	SS-5: Medium dense, brown, medium to fine SAND, little Gravel, trace Silt.		
			6-9				
15							
	SS-6	15-17	3-6	24/18	SS-6: Similar to SS-5.		
			4-6				
20							
	SS-7	20-22	7-6	24/18	SS-7: Medium dense, brown, medium to fine SAND, trace Gravel and Silt.		
			6-7				
25							
	SS-8	25-27	5-7	24/15	SS-8: Medium dense, brown, coarse to fine SAND, some Gravel, trace Silt.		
			7-6				
30							

Notes:

Proportions Used: trace (1-10%), little (11-20%), some (20-35%), and (35-50%).

Cohesive Consistency (Blows/ft.)		Cohesionless Relative Density (Blows/ft)	
very soft	0-2	very loose	0-4
soft	2-4	loose	4-10
medium stiff	4-8	medium dense	10-30
stiff	8-15	dense	30-50
very stiff	15-30	very dense	50+
hard	30+		

JGI EASTERN, Inc.

Boring No. JB-1

TEST BORING LOG

PROJ. NAME:	Verizon Wireless (Bristol West)	HAMMER	SAMPLER	CASING	SHEET 2 OF 2
LOCATION:	Bristol, Connecticut	TYPE: Safety	SS	H S A	BORING: JB-1
PROJECT NO.:	06817	SIZE: 140 lbs.	2" OD	4" ID	LOCATION: See Plan
DATE START:	January 19, 2007	FALL: 30"	Drop Method:	Winch/Cable	
DATE END:	January 19, 2007				SURF. EL: 641' ±
BORING CO.:	New England Boring, Inc.	GROUNDWATER OBSERVATIONS			
CO. LOCATION:	Glastonbury, CT	DATE	DEPTH	CASING AT	DURATION AFTER DRILLING
FOREMAN:	Trent Roe	1/19/07	Not Encountered		
INSPECT.:	Brian Opp				

Depth (ft)	SAMPLING No.	Depth (ft.)	Blows/ 6"	Penet./ Rec. (in)	Sample Description	Strata Change Depth (ft)	Notes
	SS-9	30-32	4-8	24/17	SS-9: Medium dense, light brown, fine SAND, trace Gravel and Silt.		
			9-12				
35	SS-10	35-37	9-10	24/20	SS-10: Medium dense, brown-gray, fine SAND, trace Gravel and Silt.		
			10-15				
40	SS-11	40-42	6-9	24/20	SS-11: Similar to SS-10.		
			11-13				
45							
50							
	SS-12	51-53	18-16	24/18	SS-12: Medium dense, brown, fine SAND, trace Gravel and Silt.		
			13-15				
55							
					(Glaciofluvial Deposit)	59.0	
60							

JGI EASTERN, Inc.

Notes:

Proportions Used: trace (1-10%), little (10-20%), some (20-35%), and (35-50%)

Cohesive Consistency (Blows/ft.)		Cohesionless Relative Density (Blows/ft)	
very soft	0-2	very loose	0-4
soft	2-4	loose	4-10
medium stiff	4-8	medium dense	10-30
stiff	8-15	dense	30-50
very stiff	15-30	very dense	50+
hard	30+		

Boring No. JB-1

TEST BORING LOG

PROJ. NAME:	Verizon Wireless (Bristol West)	HAMMER	SAMPLER	CASING	SHEET 1 OF 1
LOCATION:	Bristol, Connecticut	TYPE: Safety	SS	HSA	BORING: JB-1
PROJECT NO.:	06817	SIZE: 140 lbs.	2" OD	4" ID	LOCATION: See Plan
DATE START:	January 19, 2007	FALL: 30"	Drop Method:	Winch/Cable	
DATE END:	January 19, 2007				SURF. EL.: 641' ±
BORING CO.:	New England Boring, Inc.	GROUNDWATER OBSERVATIONS			
CO. LOCATION:	Glastonbury, CT	DATE	DEPTH	CASING AT	DURATION AFTER DRILLING
FOREMAN:	Trent Roe	1/19/07	Not Encountered		
JGI REP.:	Brian Opp				

ELEV. (ft)	SAMPLING No.	Depth (ft.)	Blows/ 6"	Penet./ Rec. (in)	Sample Description	Strata Change Depth (ft)	Notes
					Moderate effort with roller bit to advance. (Probably Glacial Till)	61.0	
					Exploration Terminated at 61.0'		
65							
70							
75							
80							
85							
90							

JGI EASTERN, Inc.

Notes:

Proportions Used: trace (1-10%), little (10-20%), some (20-35%), and (35-50%).

Cohesive Consistency (Blows/ft.)		Cohesionless Relative Density (Blows/ft)	
very soft	0-2	very loose	0-4
soft	2-4	loose	4-10
medium stiff	4-8	medium dense	10-30
stiff	8-15	dense	30-50
very stiff	15-30	very dense	50+
hard	30+		

Boring No. JB-1

TEST PROBE LOG

PROJECT NAME:	Verizon Wireless (Bristol West)	EQUIPMENT	SHEET 1 OF 1
LOCATION:	Bristol, Connecticut	TYPE: SSA	PROBE NO.: JP-1
PROJECT NO.:	06817	SIZE: 4-inch dia.	LOCATION: See Plan
DATE START:	January 19, 2007		SURFACE ELV.: 641' ±
DATE END:	January 19, 2007		
BORING CO.:	New England Boring, Inc.	GROUNDWATER OBSERVATIONS	
CO. LOCATION:	Glastonbury, CT	DATE / DEPTH / CASING AT / STABILIZATION PERIOD	
FOREMAN:	Trent Roe	1/19/07 Not Encountered	15 Minutes
INSPECTOR:	Brian Opp		

Depth (ft.)	SOIL DESCRIPTION	Strata Change Depth (ft)	Notes
1	Brown, coarse to fine SAND, some Gravel, little Silt, occasional Cobbles with Brick.		
2			
3	(Fill)	3.0	
4			
5			
6	Brown, medium to fine SAND, little Gravel and Silt.		
7			
8			
9			
10	(Glaciofluvial Deposit)		
11	Exploration Terminated at 10.0'		
12			
13			
14			
15			
16			
17			
18			
19			
20			

NOTES:

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test probes at times under conditions stated on the log. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

Proportions Used: trace (0-10%), little (10-20%), some (20-35%), and (35-50%)

JGI EASTERN, Inc.

TEST PROBE LOG

PROJECT NAME:	Verizon Wireless (Bristol West)	EQUIPMENT:	SHEET 1 OF 1
LOCATION:	Bristol, Connecticut	TYPE: SSA	PROBE NO.: TP-2
PROJECT NO.:	06817	SIZE: 4-inch dia	LOCATION: See Plan
DATE START:	January 19, 2007		SURFACE EL.: 640' ±
DATE END:	January 19, 2007		
BORING CO.:	New England Boring, Inc.	GROUNDWATER OBSERVATIONS	
CO. LOCATION:	Glastonbury, CT	DATE / DEPTH / CASING AT / STABILIZATION PERIOD	
FOREMAN:	Trent Roe	1/19/07 Not Encountered	
INSPECTION:	Brian Opp		

Depth (ft.)	SOIL DESCRIPTION	Strata Change Depth (ft)	Notes
1			
2	Brown, coarse to fine SAND, some Gravel, little Silt, occasional Cobbles.		
3	(Fill)	3.0	
4			
5			
6	Brown, medium to fine SAND, little Gravel, trace Silt.		
7			
8			
9			
10	(Glaciofluvial Deposit)		
11	Exploration Terminated at 10.0'		
12			
13			
14			
15			
16			
17			
18			
19			
20			

NOTES:

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test probes at times under conditions stated on the log. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

Proportions Used: trace (0-10%), little (10-20%), some (20-35%), and (35-50%)

JGI EASTERN, Inc.

TEST PROBE LOG

PROJECT NAME:	Verizon Wireless (Bristol West)	EQUIPMENT	SHEET 1 OF 1
LOCATION:	Bristol, Connecticut	TYPE: SSA	PROBE NO: TP-3
PROJECT NO:	06817	SIZE: 4-inch dia	LOCATION: See Plan
DATE START:	January 19, 2007		SURFACE EL: 640' ±
DATE END:	January 19, 2007	GROUNDWATER OBSERVATIONS	
BORING CO:	New England Boring, Inc.	DATE / DEPTH / CASING AT / STABILIZATION PERIOD	
EQ. LOCATION:	Glastonbury, CT	1/19/07 Not Encountered	
FOREMAN:	Trent Roe		
JGI INSPECTOR:	Brian Opp		

Depth (ft.)	SOIL DESCRIPTION	Strata Change Depth (ft)	Notes
1			
2	Brown, coarse to fine SAND, some Silt, trace Gravel, occasional Cobbles.		
3	(Fill)	3.0	
4			
5			
6	Brown, medium to fine SAND, little Gravel and Silt.		
7			
8			
9			
10	(Glaciofluvial Deposit)		
11	Exploration Terminated at 10.0'		
12			
13			
14			
15			
16			
17			
18			
19			
20			

NOTES:

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test probes at times under conditions stated on the log. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

Proportions Used: trace (0-10%), little (10-20%), some (20-35%), and (35-50%)

JGI EASTERN, Inc.

TEST PROBE LOG

PROJECT NAME:	Verizon Wireless (Bristol West)	EQUIPMENT	SHEET 1 OF 1
LOCATION:	Bristol, Connecticut	TYPE: SSA	PROBE NO.: JP-4
PROJECT NO.:	06817	SIZE: 4-inch dia	LOCATION: See Plan
DATE START:	January 19, 2007		SURFACE EL.: 640' ±
DATE END:	January 19, 2007		
BORING CO.:	New England Boring, Inc.	GROUNDWATER OBSERVATIONS	
CO. LOCATION:	Glastonbury, CT	DATE / DEPTH / CASING AT: 1/19/07 Not Encountered Removed	STABILIZATION PERIOD: 15 Minutes
FOREMAN:	Trent Roe		
INSPECTOR:	Brian Opp		

Depth (ft.)	SOIL DESCRIPTION	Strata Change Depth (ft)	Notes
		0.5	
1	Topsoil		
2			
3			
4			
5	Brown, medium to fine SAND, little Gravel and Silt.		
6			
7			
8			
9			
10	(Glaciofluvial Deposit)		
11	Exploration Terminated at 10.0'		
12			
13			
14			
15			
16			
17			
18			
19			
20			

NOTES:

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test probes at times under conditions stated on the log. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

Proportions Used: trace (0-10%), little (10-20%), some (20-35%), and (35-50%)

JGI EASTERN, Inc.

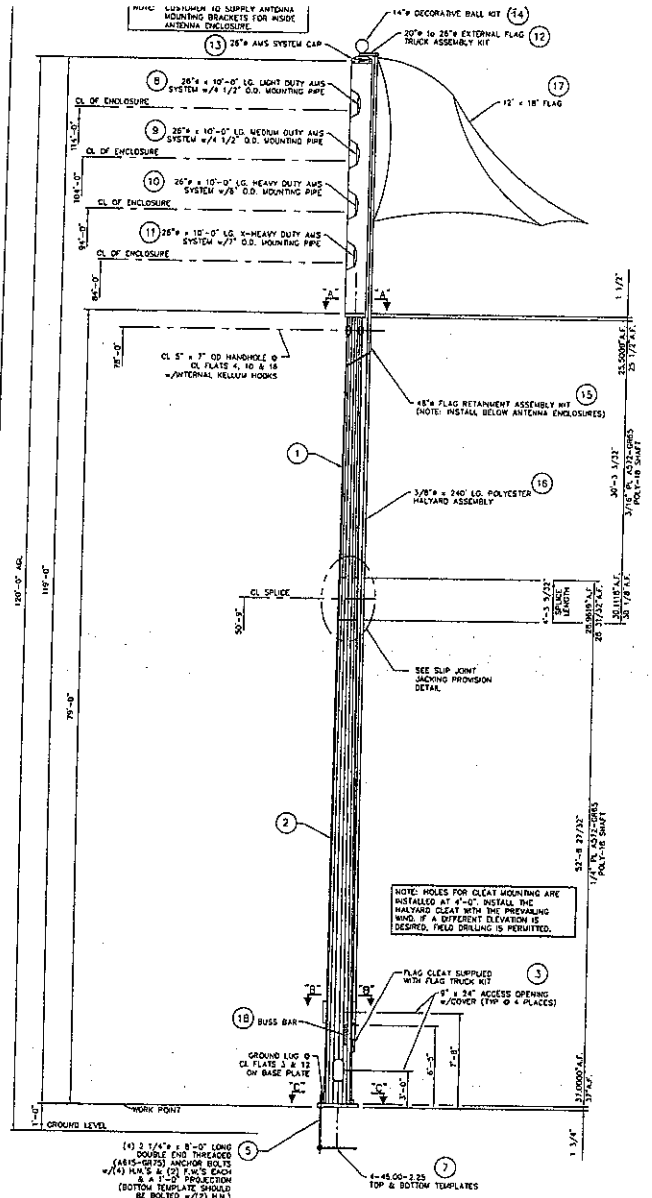
EMERSON
Network Power

ENGINEERED
ENDEAVORS
INCORPORATED
The Experienced Point of View

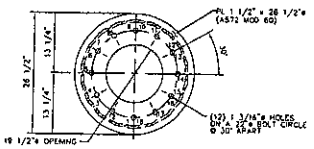
NatComm
Structure Design Calculations
120' Monopole
Site: Bristol West
EEI Job #: 14720-E01

ENGINEERED ENDEAVORS INCORPORATED

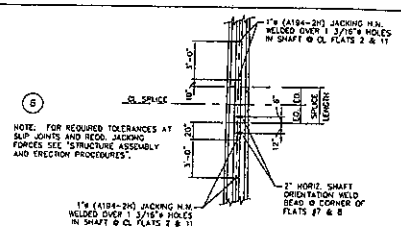
7610 Jenther Drive ■ Mentor, Ohio 44060
Telephone: (440) 918-1101 ■ Telefax: (440) 918-1108



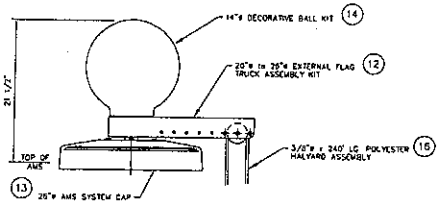
ERECTION VIEW
SCALE NONE



VIEW "A-A"
NOTE: ANS REMOVED FOR CLARITY

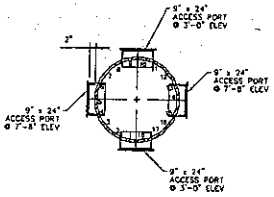


SLIP JOINT JACKING PROVISION DETAIL

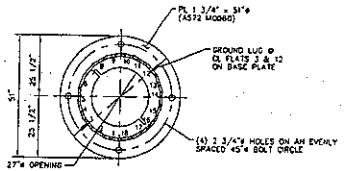


FLAG TRUCK DETAIL

NOTE: REVIEW EEI EXTERNAL FLAG POLE HALYARD SYSTEM INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING ASSEMBLY



SECTION "B-B"



SECTION "C-C"

MATERIAL REQ'D. PER ASSEMBLY

GALV. WT.	QTY.	ITEM	MK. NO.	DESCRIPTION
--	1	(1)	---	SHAFT ASSY. (TOP)
--	1	(2)	---	SHAFT ASSY. (BOTTOM)
22.74	4	(3)	K11098	9" x 24" ACCESS PORT COVER PL
		(4)		HARDWARE AS FOLLOWS:
2.69	3	(4)	K11153	5" x 7" HANDHOLE COVER PL
129.50	4	(5)	2.25-A8800E-4	2 1/4"ø x 8'-0" LG. (A615-GR75) ANCHOR BOLTS w/ (4) H.N.'S (A194-GR2H) & (2) F.W.'S. EACH
	1	(6)		STRUCTURE ASSEMBLY AND ERECTION PROCEDURES
88.32	2	(7)	4-45.00-2.25	SETTING TEMPLATE
554.80	1	(8)	K11761	26"ø x 10'-0" LG. LIGHT DUTY AMS SYSTEM w/4 1/2" O.D. MOUNTING PIPE
965.44	1	(9)	K11762	26"ø x 10'-0" LG. MEDIUM DUTY AMS SYSTEM w/4 1/2" O.D. MOUNTING PIPE
1398.04	1	(10)	K11765	26"ø x 10'-0" LG. HEAVY DUTY AMS SYSTEM w/8" O.D. MOUNTING PIPE
1830.76	1	(11)	K11769	26"ø x 10'-0" LG. X-HEAVY DUTY AMS SYSTEM w/7" O.D. MOUNTING PIPE
28.40	1	(12)	K11469	20"ø to 26"ø EXTERNAL FLAG TRUCK ASSEMBLY KIT
60.48	1	(13)	K11453	26"ø AMS SYSTEM CAP
7.04	1	(14)	K11474	14"ø DECORATIVE BALL KIT
23.45	1	(15)	K11479	48"ø FLAG RETAINMENT ASSEMBLY KIT
	1	(16)	FL-HAL-240	3/8"ø x 240' LG. POLYESTER HALYARD ASSEMBLY
	1	(17)	POLY12x18	12' x 18' AMERICAN FLAG
7.50	1	(18)	K10062	20" BUSS BAR KIT
				PAINT FINISH

TOTAL GALV. STR. & ACCES. WT. #
TOTAL ANCHOR BOLT & TEMPLATE WT. 694.64#

GENERAL NOTES

1) MONOPOLE IS DESIGNED IN ACCORDANCE WITH TIA/EIA-222F FOR 80 MPH FASTEST MILE WIND SPEED AND 1/2" RADIAL ICE (NON-SIMULTANEOUS).
2) ALL WELDS SHALL BE IN ACCORDANCE WITH AWS D1.1 (LATEST EDITION). LONGITUDINAL SEAM WELDS WITHIN SLIP-JOINT AREA IN FEMALE SECTION SHALL BE 100% PENETRATION.
3) MONOPOLE SHALL BE HOT DIP GALVANIZED PER ASTM A123 AND THEN PAINTED. (COLOR TBD) (TOUCH UP PAINT SUPPLIED BY OTHERS)
4) CONTRACTOR SHALL THOROUGHLY REVIEW EEI'S ASSEMBLY & ERECTION PROCEDURE PRIOR TO INITIATING THE ERECTION OF THE MONOPOLE.
5) THE ORIENTATION OF THE MONOPOLE SHALL BE VERIFIED PRIOR TO ERECTION OF THE POLE.
6) SECTIONS OF THE MONOPOLE SHALL BE JACKED TOGETHER WITH A MINIMUM JACKING FORCE OF 10,000 lbf APPLIED TO EACH SIDE. FOR A MAXIMUM RECOMMENDED JACKING FORCE, SPLICE LENGTH TOLERANCE, AND AIR GAP BETWEEN SECTIONS REFER TO EEI ASSEMBLY & ERECTION PROCEDURE.
7) FOR PROPER SHAFT ALIGNMENT A 2" HORIZONTAL WELD BEAD AND A MARK ARE POSITIONED ON EACH SHAFT AT EACH SPLICE. THE 2" HORIZONTAL WELD BEADS ARE ON THE MATCHING CORNERS. THE MARK NUMBER IS ON THE ADJACENT FLAT. THE CORNERS WITH WELD BEADS SHALL BE MATCHED FROM TOP TO BOTTOM OF THE POLE. MARK NUMBERS SHALL BE MATCHED FOR EACH SIDE & THE DISTANCE BETWEEN TWO WELD BEADS SHOULD BE 18" (24").
8) FIELD ASSEMBLY NUTS (5"ø) FOR JACKING SECTIONS TOGETHER ARE LOCATED ON OPPOSING SECTION FLATS ABOVE AND BELOW SPLICES.
9) GAP BETWEEN TOP OF THE FOUNDATION AND BOTTOM OF THE BASE PLATE MAY BE FILLED WITH A NON-SHRINK GROUT WITH A MINIMUM COMPRESSIVE STRENGTH OF f'c=2000 psi. WATER DRAINAGE MUST BE PROVIDED UNDERNEATH THE BASE PLATE TO ENSURE THAT MOISTURE DOES NOT COLLECT INSIDE THE MONOPOLE.
10) ALL BOLTED CONNECTIONS WITH A325 HIGH-STRENGTH BOLTS SHALL BE ASSEMBLED IN ACCORDANCE WITH SPECIFICATIONS FOR STRUCTURAL JOINTS USING A325 OR A490 BOLTS. BOLTS SHALL BE SNUGGED TO SNUG-TIGHT CONDITIONS AS RECOMMENDED BY THE FLANGE SPECIFICATIONS IN FLANGE-TYPE JOINTS AND SHOULD BE SHIMMED IF NECESSARY. THE SHIMS WILL BE SUPPLIED BY EEI.
11) ANCHOR BOLTS SHALL BE TIGHTENED AFTER THE STRUCTURE IS PLUMB. BOTH TOP & BOTTOM NUT SHALL BE TIGHTENED TO 600 ft-lbs MOMENT. FOR DETAIL ANCHOR BOLT INSTALLATION REFER TO EEI ASSEMBLY AND ERECTION PROCEDURE.
12) POLE TAPER = 0.1524in/ft.

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE MEASURED FROM THE BOTTOM OF THE BASE PLATE

ASSEMBLY MARKING PROCEDURE

EACH INDIVIDUAL ASSEMBLY SHALL HAVE A METAL TAG WELDED TO IT WHICH WILL BE ENGRAVED WITH THE ASSEMBLY MARK NO. AS SHOWN IN THE MATERIAL BLOCK. (MINIMUM OF 5/8" HIGH LETTERS)

STATE OF CONNECTICUT
MICHAEL R. MOREL
21222
LICENSED
PROFESSIONAL ENGINEER
2/5/04

REV	DESCRIPTION	DATE	DWN	APP
0	COMPLETED APPROVAL DWG	2/1/2004	RVH	

ENGINEERED ENDEAVORS INCORPORATED
The Experienced Point of View
7610 Jenther Drive * Mentor, OH 44060-4872
Ph: (440) 918-1101 * Ph: (888) 270-3655
Fx: (440) 918-1108 * www.engend.com

120'-0" FLAG POLE
NATCOMM/CT
BRISTOL WEST
BRISTOL, CT

SCALE NONE	PROJECT NO 14720
SHT 1 OF 1	DRAWING NO GS56684

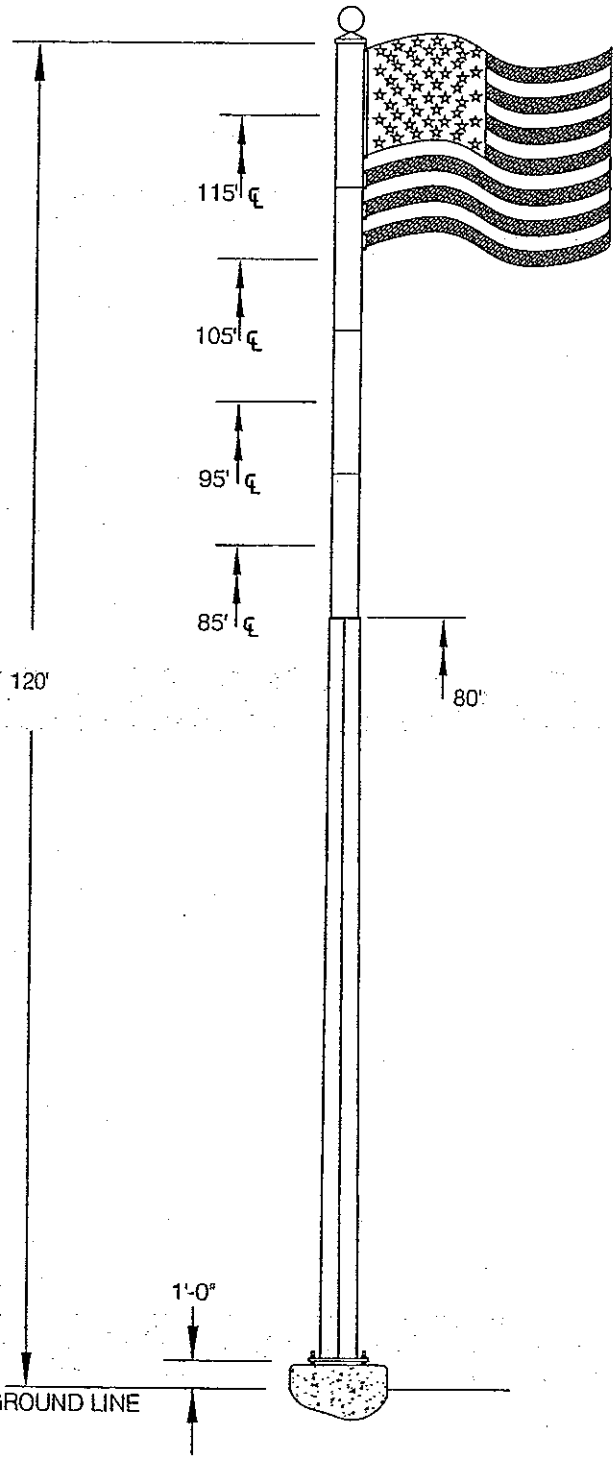
ENGINEERED ENDEAVORS INCORPORATED
The Experienced Point of View

Customer: NATCOMM/CT
Description: 120' FLAG POLE
EEI Job Number: 14720

EMERSON™ Network Power

SITE INFORMATION
Location: BRISTOL, CT
Site Name: BRISTOL WEST
Site Number: N/A

DESIGN INFORMATION
Designed By: N.PFEUTI
Design Date: 01/31/2007
Status: REVISION 0



ANTENNA LOADING

(1) 12x18 AMERICAN FLAG

(3) PANEL ANTENNAS* MOUNTED IN A 26"Ø x 10' AMS AT 115' ℄

(3) PANEL ANTENNAS* MOUNTED IN A 26"Ø x 10' AMS AT 105' ℄

(3) PANEL ANTENNAS** MOUNTED IN A 26"Ø x 10' AMS AT 95' ℄

(3) PANEL ANTENNAS** MOUNTED IN A 26"Ø x 10' AMS AT 85' ℄

* (2) BXA185085/12CF+(1) BXA185063/12

** FUTURE

DESIGN CRITERIA

DESIGNED IN ACCORDANCE WITH THE TIA/EIA 222-F FOR 80 MPH FASTEST MILE WIND SPEED AND 1/2" RADIAL ICE (NON-SIMULTANEOUS)

STATE OF CONNECTICUT
MICHAEL R. MOREL
No. 21220
LICENSED
PROFESSIONAL ENGINEER

2/5/07

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7610 Jenther Drive
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Communications Structure Nonlinear Analysis and Design Program

10:30:00 02-01-2007
Revision 1.3 - 1/22/01
Engineer: N.PFEUTI

Customer **NATCOMM/CT**
Job Name **14720**
Structure **120' FLAG POLE**
Location **BRISTOL, CT**
Site **BRISTOL WEST**

OD BOT	OD TOP	NUM. SIDES	THICK INCH	TAPER IN/FT	LENGTH FT	JOINT INCH	JOINT TYPE	YIELD KSI	WEIGHT LBS	JOINT HEIGHT
30.12	25.50	18	0.1875	0.152	30.42	52.00	SLIP	65.0	1681.	50.75
37.00	28.96	18	0.2500	0.152	52.92	0.00	BASEPL	65.0	4620.	-0.00
			TOTAL TUBE WEIGHT						6300.	POUNDS
			POLE SHAFT LENGTH						79.00	FEET

E = 29600.0 KSI
UNIT WGT = 0.283 LBS/CU IN
AISC constants are used for stress reductions.
TUBE SECTIONS HAVE 18 SIDES AND ARE TREATED AS ROUND
Internal bend radius = 3 X T
Tube diameters are measured flat to flat.
Tube diameters are increased by 1.020 for wind across points.
Drag coefficients are increase by 1.300 for steps on the pole.
AISC Tube Shape Coefficient of 1.000 is applied.
ORIGINAL DATA FILE NAME 14720
REVISED DATA FILE NAME 14720

APPURTENANCES

DESCRIPTION	NUM.	ELEV.	Kz	AREA < WITHOUT ICE	WGT	Ca >	AREA < WITH ICE	WGT	Ca >	FACTOR
; in x 10 ft LIGHT	1	114.	1.425	22.32	643.	0.8000	23.35	810.	0.8000	1.00
; in x 10 ft MEDIUM	1	104.	1.388	22.32	965.	0.8000	23.35	1127.	0.8000	1.00
; in x 10 ft HEAVY	1	94.	1.349	22.32	1449.	0.8000	23.35	1616.	0.8000	1.00
; in x 10 ft EXTRA	1	84.	1.306	22.32	1887.	0.8000	23.35	2054.	0.8000	1.00

LOAD CASE 1

BASIC LOADING

DEAD LOAD FACTOR 1.00 WIND PSF REDUCTION 1.00 RADIAL ICE 0.00 IN.

WIND VELOCITY 80 BOTTOM 16.52 PSF TOP 20.64 PSF
MAX BASE ROTATION 0.00 DEG

APPLIED APPURTENANCE FORCES

	ELEVATION FT	WEIGHT KIPS	WIND KIPS
6 in x 10 ft LIGHT AMS	114.00	0.643	0.705
6 in x 10 ft MEDIUM AMS	104.00	0.965	0.686
6 in x 10 ft HEAVY AMS	94.00	1.449	0.667
6 in x 10 ft EXTRA HEAVY AMS	84.00	1.887	0.646

ADDITIONAL FORCES - KIPS AND KIP-FEET

	ELEVATION FT	TRANS FORCE	VERT FORCE	WIND FORCE	TRAN MOMENT	VERT MOMENT	WIND MOMENT
1	119.00	0.00	-0.20	0.30	0.0	0.0	0.0

TUBE PROPERTIES			MEMBER FORCES			STRESSES			STRESS	TOTAL	
ELEV FT	DIAM IN	WALL IN	SHEAR K	BENDING K-FT	AXIAL K	AXIAL KSI	BEND. KSI	ALLOW KSI	RATIOS	DEFL IN	TILT DEG
79.00	25.50	0.1875	3.49	67.09	5.53	0.37	8.59	46.98	0.18	15.7	1.80
54.75	27.66	0.1875	3.49	116.83	5.53	0.34	12.70	46.15	0.28	10.7	1.53
50.75	29.79	0.1875	4.13	174.67	6.31	0.36	16.34	45.45	0.37	6.7	1.20
			TYPE OF JOINT: SLIP JOINT								
50.75	29.29	0.2500	4.69	174.67	7.47	0.33	12.77	48.68	0.27	6.7	1.20
40.00	30.92	0.2500	4.69	225.11	7.47	0.31	14.74	48.03	0.31	4.2	0.98
30.00	32.44	0.2500	5.14	276.52	8.33	0.33	16.43	47.48	0.35	2.4	0.75
20.00	33.96	0.2500	5.57	332.18	9.19	0.35	17.99	46.99	0.39	1.1	0.51
10.00	35.48	0.2500	6.00	392.20	10.10	0.36	19.45	46.53	0.42	0.3	0.26
0.00	37.00	0.2500	6.70	456.67	11.53	0.40	20.80	46.12	0.46	0.0	0.00

REACTION COMPONENTS (KIPS AND FT-KIPS)

TRANSVERSE SHEAR	VERTICAL FORCE	WIND SHEAR	MOMENT ABOUT TRANSVERSE	MOMENT ABOUT VERTICAL	MOMENT ABOUT WIND AXIS
0.000	11.528	-6.697	456.668	0.000	0.000

LOAD CASE 2

BASIC LOADING PLUS ICE

DEAD LOAD FACTOR 1.00 WIND PSF REDUCTION 0.75 RADIAL ICE 0.50 IN.

WIND VELOCITY 80 BOTTOM 12.39 PSF TOP 15.48 PSF
MAX BASE ROTATION 0.00 DEG

APPLIED APPURTENANCE FORCES

	ELEVATION FT	WEIGHT KIPS	WIND KIPS
6 in x 10 ft LIGHT AMS	114.00	0.810	0.553
6 in x 10 ft MEDIUM AMS	104.00	1.127	0.538
6 in x 10 ft HEAVY AMS	94.00	1.616	0.523
6 in x 10 ft EXTRA HEAVY AMS	84.00	2.054	0.507

ADDITIONAL FORCES - KIPS AND KIP-FEET

	ELEVATION FT	TRANS FORCE	VERT FORCE	WIND FORCE	TRAN MOMENT	VERT MOMENT	WIND MOMENT
1	119.00	0.00	-0.20	0.30	0.0	0.0	0.0

TUBE PROPERTIES			MEMBER FORCES			STRESSES			STRESS	TOTAL	
ELEV FT	DIAM IN	WALL IN	SHEAR K	BENDING K-FT	AXIAL K	AXIAL KSI	BEND. KSI	ALLOW KSI	RATIOS	DEFL IN	TILT DEG
79.00	25.50	0.1875	2.82	55.23	6.19	0.41	7.08	46.98	0.15	12.7	1.46
54.75	27.66	0.1875	2.82	95.44	6.19	0.38	10.37	46.15	0.23	8.6	1.24
30.75	29.79	0.1875	3.32	141.86	6.97	0.40	13.27	45.45	0.30	5.4	0.97
			TYPE OF JOINT: SLIP JOINT								
30.75	29.29	0.2500	3.75	141.86	8.14	0.36	10.37	48.68	0.22	5.4	0.97
10.00	30.92	0.2500	3.75	182.14	8.14	0.34	11.93	48.03	0.25	3.4	0.79
30.00	32.44	0.2500	4.09	223.06	8.99	0.36	13.26	47.48	0.29	1.9	0.60
20.00	33.96	0.2500	4.42	267.24	9.86	0.37	14.48	46.99	0.31	0.9	0.41
10.00	35.48	0.2500	4.75	314.74	10.76	0.39	15.61	46.53	0.34	0.2	0.21
0.00	37.00	0.2500	5.28	365.65	12.19	0.42	16.66	46.12	0.37	0.0	0.00

REACTION COMPONENTS (KIPS AND FT-KIPS)

TRANSVERSE SHEAR	VERTICAL FORCE	WIND SHEAR	MOMENT ABOUT TRANSVERSE	MOMENT ABOUT VERTICAL	MOMENT ABOUT WIND AXIS
0.000	12.191	-5.283	365.646	0.000	0.000

SUMMARY TABLE

ELEV	STRESS RATIO	AXIAL	BENDING	LOADING
79.00	0.18	5.53	67.1	1 BASIC LOADING
64.75	0.28	5.53	116.8	1 BASIC LOADING
50.75	0.37	6.31	174.7	1 BASIC LOADING
40.00	0.31	7.47	225.1	1 BASIC LOADING
30.00	0.35	8.33	276.5	1 BASIC LOADING
20.00	0.39	9.19	332.2	1 BASIC LOADING
10.00	0.42	10.10	392.2	1 BASIC LOADING
0.00	0.46	11.53	456.7	1 BASIC LOADING

MAXIMUM SUPPORT MOMENT K-FT	456.67
CORRESPONDING AXIAL FORCE KIPS	11.53
CORRESPONDING SHEAR FORCE KIPS	6.70

BASE PLATE AT ELEVATION 0.00 FEET

TUBE DIAMETER	37.00	INCHES
DESIGN MOMENT	456.7	KIP FT
DESIGN MOMENT IS 0. DEGREES FROM THE WIND DIRECTION		
BOLTS ARE ON THE KNUCKLES OF THE TUBE		
APPLIED AXIAL FORCE	11.5	KIPS
APPLIED SHEAR	6.70	KIPS

BOLT DATA

BOLT TYPE	A615 GR75	
BOLTS ARE EVENLY SPACED		
DIAMETER	2.250	INCHES
EFFECTIVE AREA	3.250	SQ IN
TOTAL LENGTH	8.0	FEET
MINIMUM EMBEDMENT	6.4	FEET
NUMBER OF BOLTS	4	
BOLT CIRCLE DIAMETER	45.00	INCHES
ALLOWABLE STRESS	60.0	KSI
APPLIED AXIAL STRESS	38.4	KSI
MAX BOLT FORCE	124.7	KIPS
BOLT BENDING STRESS	2.4	KSI
COMBINED BOLT STRESS	40.8	KSI
CLEARANCE UNDER PLATE	3.25	INCHES
BOLT WEIGHT	451.2	POUNDS

PLATE DATA

DIAMETER OF PLATE	51.00	INCHES
MATERIAL	A871 GR60	
PROVIDED THICKNESS	1.750	INCHES
REQUIRED THICKNESS	1.192	INCHES
BOLT HOLE DIAMETER	2.625	INCHES
CENTER HOLE SIZE	27.00	INCHES
NET WEIGHT	717.4	POUNDS
RAW STOCK WEIGHT	1288.1	POUNDS
SURFACE AREA	20.12	SQ FT
ALLOWABLE STRESS	59.99	KSI
MAX APPLIED STRESS	27.83	KSI

CONCRETE STRENGTH	3000.	PSI

Base Plate - use 51.00 inch ROUND x 1.750 inch A871 GR60
with (4) 2.250 diameter x 8.00 foot caged A615 GR75 bolts
on a 45.00 inch bolt circle.

LOADING DEVELOPMENT AND AMS SELECTION
PER ANSI TIA/EIA 222-F AND AISC ASD 9th EDITION

ENGINEERED ENDEAVORS INCORPORATED
The Experienced Point of View

EMERSON. Network Power

CUSTOMER: NATCOMM/CT

DATE: 01/31/07

LOCATION: BRISTOL, CT

STRUCTURE: 120' FLAG POLE

SITE NAME: BRISTOL WEST

JOB NUMBER: 14720

SITE NUMBER: N/A

STATUS: Revision 0

GENERAL INFORMATION

AMS DIAMETER:	26 in
Ca FACTOR:	0.80
DESIGN WIND SPEED:	80 mph
ICE THICKNESS:	0.50 in
FLAG SIZE:	12 ft by 18 ft
FLAG WIND AREA:	216 ft^2
FLAG LOAD:	0.301 kips

AMS INFORMATION

				WIND AREA		WEIGHT		
DESCRIPTION	LENGTH *ft*	HEIGHT *ft*	Kz FACTOR	WITHOUT ICE ft^2	WITH ICE ft^2	WITHOUT ICE *lbs*	WITH ICE *lbs*	WIND FORCE *kips*
26 in x 0 ft AMS								
26 in x 0 ft AMS								
26 in x 0 ft AMS								
26 in x 0 ft AMS								
26 in x 10 ft AMS	10	115.00	1.429	22.32	23.35	643	810	0.706
26 in x 10 ft AMS	10	105.00	1.392	22.32	23.35	960	1127	0.688
26 in x 10 ft AMS	10	95.00	1.353	22.32	23.35	1449	1616	0.669
26 in x 10 ft AMS	10	85.00	1.310	22.32	23.35	1887	2054	0.648

AMS SELECTION

	BASE REACTIONS					
DESCRIPTION	MOMENT *in-kips*	SHEAR *kips*	AXIAL *kips*	KIT	AMS RATING	COMMENTS
26 in x 0 ft AMS						
26 in x 0 ft AMS						
26 in x 0 ft AMS						
26 in x 0 ft AMS						
26 in x 10 ft AMS	78.5	1.007	0.643	K11334	LIGHT	
26 in x 10 ft AMS	240.6	1.696	1.603	K11335	MEDIUM	
26 in x 10 ft AMS	484.2	2.364	3.052	K11668	HEAVY	
26 in x 10 ft AMS	806.8	3.012	4.939	K11665	EXTRA HEAVY	

FOUNDATION DESIGN CALCULATIONS FOR A SPREAD FOOTER FOUNDATION

ENGINEERED ENDEAVORS INCORPORATED

ENGINEERED ENDEAVORS INCORPORATED
*7610 Jenther Drive * Mentor, Ohio 44060*
*Tel:(440)918-1101 * Fax:(440)918-1108*

CUSTOMER: NATCOMM/CT
STRUCTURE: 120' FLAG POLE
JOB NUMBER: 14720
LOCATION: BRISTOL, CT
SITE NAME: BRISTOL WEST

SERVICE LOADS AT BASE OF THE MONOPOLE

DESIGN LOADING	
MOMENT	456.7 ft-kips
SHEAR	6.7 kips
AXIAL	11.5 kips

ANCHOR BOLTS

QUANTITY	4.0
LENGTH	8.0 ft
BOLT CIRCLE	45.0 in
PROJECTION	12.0 in

FOUNDATION PARAMETERS

MINIMUM PEDESTAL WIDTH	65.0 in
PEDESTAL PROJECTION	12.0 in
MINIMUM FOUNDATION HEIGHT	7.5 ft

	HEIGHT	WIDTH		
FOOTING	3.00 ft	12.00 ft	SOIL UNIT WEIGHT	120 pcf
PEDESTAL	5.00 ft	6.00 ft	CONCRETE WEIGHT	150 pcf
			ANGLE OF FRICTION	32 degrees

FOUNDATION WEIGHT	91.80 kips	
CONCRETE VOLUME	22.67 yds^3	
SOIL WEIGHT	84.63 kips	H= 4.00
TOTAL VERTICAL LOAD	187.96 kips	B= 17.00
KERN OF ECCENTRICITY	2.00 ft	
ACTUAL ECCENTRICITY	2.71 ft	
OVERTURNING MOMENT	510.3 ft-kips	
RESISTING MOMENT	1127.8 ft-kips	
ALLOWABLE GROSS SOIL PRESSURE	0.0 ksf	
ALLOWABLE NET SOIL PRESSURE	6.0 ksf	

		GROSS	NET
SOIL PRESSURE	MAXIMUM q=	3.18 ksf	1.95 ksf
	MINIMUM q=	0.00 ksf	

SAFETY FACTOR **Sf = 2.21**

ULTIMATE STRENGTH DESIGN OF FOOTING

CONCRETE, psi	4000
STEEL, KSI	60

SHEAR IN FOOTING

1. CASE I -DEAD LOAD, TWO-WAY SHEAR — U= 1.4*D

Ultimate Vertical Load, kips	263.15	
Ultimate Pressure, ksf	1.83	
Ultimate shear V, kips		**131.12**
Design shear Vn, kips		**2632.03** O.K.

2. CASE II - WIND LOAD, ONE-WAY SHEAR — U=0.9*D+1.6*W

Ultimate Moment, kip-ft		816.43	
Ultimate Vertical Load, kips		169.17	
Eccentricity, ft		4.83	
Ultimate Pressure, ksf	qult=	8.01	
Dist. from edge to critical sect., ft		0.50	
Pressure distance ft	c=	3.52	
Pressure @ critical section, ksf		6.87	
Ultimate Shear, kips		**44.63**	
Design Shear, kips		**464.48**	O.K.

FLEXURE STRENGTH DESIGN

Ultimate Moment, kip-ft		Case I	98.68		
		Case II	555.14	q1=	1.19
Coefficient of Resistance		Rn=	57.1		
Reinforcement Ratio		r=	0.00096		
Min. Reinforcement Ratio		r min	0.00180		
Min. Steel Area, sq.in.		A1	7.78		
Type of Bars		#	8		
		Ab,in^2=	0.79		
BOTTOM	Min. Number of Bars		9.84		
	Actual Number of Bars		10.00		
	Actual Steel Area, sq.in.		7.90		
	Steel Ratio Actual	ra=	0.00183		
	Revised Coef. of Resist	Rn=	109.71		
	Design Moment, kip-ft		**1066.42**		
	Horizontal Spacing, in	shor=	15.33		
TOP	Min. Steel Area, sq.in		7.78		
	Min. Number of Bars		9.84		
	Actual Number of Bars		10.00		
	Top Steel Area, sq.in		7.90		
	Horizontal Spacing, in	shor=	15.33		

PEDESTAL DESIGN

Pedestal Width, in		72	Ultim. Moment	784.3	
Concrete, ksi		4			
Reinforcement, ksi		60			
Rebars , #8	Q-ty	36	Area, sq.in	0.79	
Design Rebars	Q-ty	12	Area, sq.in	2.37	
Minimum reinforcement ratio		0.0050	Rebar space, ir	5.41	
Actual reinforcement ratio		0.0055			
Concrete cover , in		4.5			
Rebar layout radius, in		31.00			

Bending about the major axis

No.	Angle, deg	Coord., in	Edge Dist., in	No.	Angle, deg	Coord., in	Edge Dist., in
1	0	31.00	5.00	7	180	-31.00	67.00
2	30	26.85	9.15	8	210	-26.85	62.85
3	60	15.50	20.50	9	240	-15.50	51.50
4	90	0.00	36.00	10	270	0.00	36.00
5	120	-15.50	51.50	11	300	15.50	20.50
6	150	-26.85	62.85	12	330	26.85	9.15

Location of neutral axis c=, ir **6.6759**
Compression zone, a= **5.67**

	No.	e	Force *kips*	Tension zone		No.	e	Force *kips*
	1	0.0008	43.70			2	0.0011	76.51
eu=	0.003			ey=	0.00207	3	0.0062	142.20
						4	0.0132	142.20
						5	0.0201	142.20
						6	0.0252	142.20
						7	0.0271	142.20
						8	0.0252	142.20
						9	0.0201	142.20
						10	0.0132	142.20
	Concrete, kips		1389.12			11	0.0062	142.20
						12	0.0011	76.51
	Total compression		**1432.82**		**Total tension, kips**			**1432.83**

Moment due to compression

Rebars	Force *kips*	Mom. Arm. *in*	Moment *k-ft*
1	43.70	31.00	112.90
Concrete	1389.12	33.16	3838.92
Total in compressior			**3951.82**

Moment due to tension

Rebars	Force *kips*	Mom. Arm. *in*	Moment *k-ft*
2	76.51	26.85	-171.18
3	142.20	15.50	-183.68
4	142.20	0.00	0.00
5	142.20	-15.50	183.68
6	142.20	-26.85	318.13
7	142.20	-31.00	367.35
8	142.20	-26.85	318.13
9	142.20	-15.50	183.68
10	142.20	0.00	0.00
11	142.20	15.50	-183.68
12	76.51	26.85	-171.18
Total in tension			**661.26**

Design moment about the major axis, kip-I **4151.78**

Bending about the diagonal

No.	Angle, deg phi	Coord., in c1	Edge Dist., in di
1	0	31.00	19.91
2	30	26.85	24.06
3	60	15.50	35.41
4	90	0.00	50.91
5	120	-15.50	66.41
6	150	-26.85	77.76
7	180	-31.00	81.91
8	210	-26.85	77.76
9	240	-15.50	66.41
10	270	0.00	50.91
11	300	15.50	35.41
12	330	26.85	24.06

Location of neutral axis c=, in 22.509
Compression zone, a= 19.13

	No.	e	Force kips
	1	0.00034617	15.73
eu= 0.003	2		
	12		

Concrete, kips 1244.60

Total compression **1260.33**

Tension zone	No.	e	Force kips
	2	0.0002	14.25
	3	0.0017	118.19
ey= 0.00207	4	0.0038	142.20
	5	0.0059	142.20
	6	0.0074	142.20
	7	0.0079	142.20
	8	0.0074	142.20
	9	0.0059	142.20
	10	0.0038	142.20
	11	0.0017	118.19
	12	0.0002	14.25

Total tension, kips **1260.291**

Moment due to compression

Rebars	Force kips	Mom. Arm. in	Moment k-ft
1	15.73	31.00	40.65
2	0.00	26.85	0.00
12	0.00	26.85	0.00
Concrete	1244.60	44.53	4618.93

Total in compressior **4659.57**

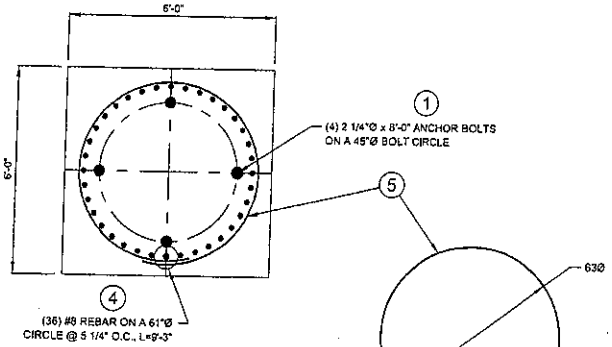
Moment due to tension

Rebars	Force kips	Mom. Arm. in	Moment k-ft
3	118.19	15.50	-152.67
4	142.20	15.50	-183.68
5	142.20	0.00	0.00
6	142.20	-15.50	183.68
7	142.20	-31.00	367.35
8	142.20	-26.85	318.13
9	142.20	-15.50	183.68
10	142.20	0.00	0.00
11	118.19	15.50	-152.67

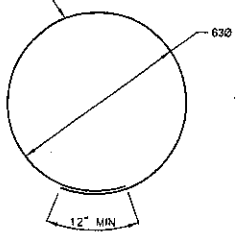
Total in tension **563.83**

Design Moment, kip-ft **4701.06**

Pedestal Design Moment, kip-ft **4151.78**



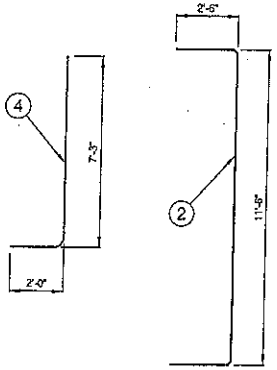
SECTION "A-A"



FOUNDATION LOADING	
MOMENT	458.7 kip-ft
SHEAR	6.7 kips
AXIAL	11.5 kips

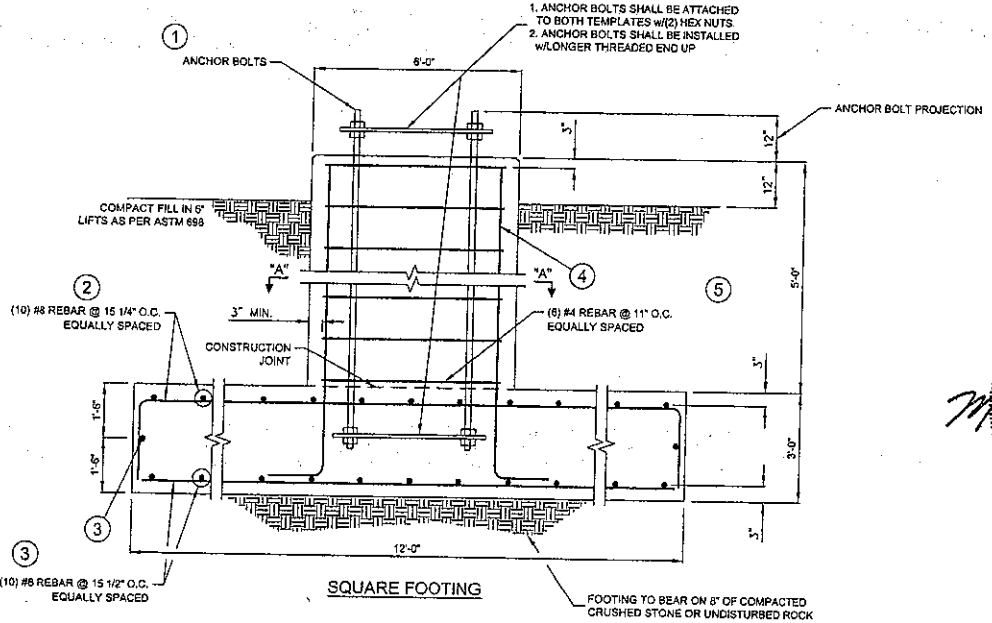
MATERIAL LIST		
ITEM	QTY.	DESCRIPTION
1	4	2 1/4"Ø x 8'-0" (A615-GR.75) ANCHOR BOLTS
2	20	#8 REBAR x 16'-6" (ASTM A615-GR.60)
3	24	#8 REBAR x 11'-6" (ASTM A615-GR.60)
4	36	#8 REBAR x 9'-3" (ASTM A615-GR.60)
5	6	#4 REBAR x 16'-6" (ASTM A615-GR.60)

VOL. CONCRETE @ 4000 psi (TYPE II CEMENT)	22.7 yd³
STEEL (ASTM A615-GR.60)	3030.2 lbs



GENERAL NOTES:

1. FOUNDATION DESIGN IS BASE ON THE FOLLOWING: EEI JOB# 14720, DRAWING# GS56684
   SOIL REPORT BY JGI EASTERN, INC., REPORT NO. 05617G - 1/22/07
2. FOUNDATION EMBEDMENT IS SHOWN FROM THE GROUND LEVEL AT THE TIME OF SOIL INVESTIGATION AS DEPICTED IN THE SOIL REPORT, SHOULD THE ACTUAL SOIL CONDITIONS DIFFER FROM THOSE IN THE REPORT, THE GEOTECHNICAL ENGINEER AND FOUNDATION DESIGNER SHOULD BE NOTIFIED IN ORDER TO RE-EVALUATE THE FOUNDATION DESIGN.
3. SOIL REPORT SHOULD BE CONSULTED PRIOR TO CONSTRUCTION. STEEL CASING OR SLURRY METHOD MAY BE REQUIRED TO PREVENT SOIL FROM CAVING DURING CONSTRUCTION. THE CASING SHOULD BE REMOVED AFTER COMPLETION OF CONCRETING OR, IF LEFT IN THE GROUND, ALL VOIDS AROUND THE CASING SHALL BE FILLED WITH PRESSURIZED GROUT. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES.
4. FOUNDATION EXCAVATION SHALL BE INSPECTED PRIOR TO PLACEMENT OF REINFORCEMENT AND ANCHOR BOLTS.
5. SPECIAL INSPECTION OF REINFORCEMENT, ANCHOR BOLT INSTALLATION, AND CONCRETE IS REQUIRED PER 2003/2005 IBC. FOUNDATION REINFORCEMENT AND ANCHOR BOLTS SHALL BE INSPECTED PRIOR TO PLACEMENT.
6. REINFORCING STEEL SHALL COMFORM TO ASTM A615-97, F_y=60 ksi. REINFORCEMENT SHALL BE ASSEMBLED USING STEEL WIRE. WELDING IS NOT PERMITTED. MINIMUM SPLICE LENGTH: FOR No. 6 BARS AND SMALLER - 44 x Øbar; FOR No. 7 BARS AND LARGER - 55 x Øbar. HORIZONTAL TIES SHALL BE STAGGERED WITH NO MORE THAN 50% OF SPLICES IN ONE PLACE.
7. CONCRETE MIX DESIGN AND CONSTRUCTION PROCEDURE SHALL BE IN COMPLIANCE WITH ACI 318-02, ACI 336.3R-93, AND ALL APPLICABLE STATE AND LOCAL CODES.
   a. MINIMUM COMPRESSIVE STRENGTH - 4000 psi AT 28 DAYS. USE TYPE II CEMENT UNLESS STATED OTHERWISE.
   b. CONCRETE MIX SHOULD HAVE A SLUMP OF 7" (±1") FOR DRILLED PIER AND 3" (±1") FOR MAT FOUNDATIONS.
   c. FOR DRILLED PIERS ONLY THE CONCRETE OVER THE ENTIRE LENGTH OF ANCHOR BOLTS SHALL BE VIBRATED. FOR MAT FOUNDATIONS ALL CONCRETE SHALL BE VIBRATED.
8. ANCHOR BOLT ORIENTATION REQUIRED PRIOR TO CONCRETE PLACEMENT. THE CONTRACTOR SHOULD CONSULT THE SITE PLAN AND MONOPOLE DRAWING FOR PROPER ACCESS PORT ORIENTATION.



SQUARE FOOTING

REV	DESCRIPTION	DATE	DWN	CHK
0	COMPLETED DRAWING	2/5/2007	N.P.	

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120'-0" MONOPOLE
BRISTOL WEST
BRISTOL, CT

SCALE: N.T.S.	PROJECT NO.	14720	
SHEET 1 of 1	DRAWING NO.	14720S-120.0	