PULLMAN & COMLEY, LLC
ATTORNEYS AT LAW

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EM-POCKET-155-081010

ORIGINAL

October 9, 2008

RECEIVED
OCT 10 2008
CONNECTICUT
SITING COUNCIL

Via Federal Express

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

Re: Notice of Exempt Modification
Crown Castle USA, Inc. Telecommunications Facility
7 Berkshire Road/1358 New Britain Avenue, West Hartford, Connecticut

Dear Mr. Phelps:

Youghiogheny Communications-Northeast, LLC, doing business as Pocket Communications ("Pocket"), intends to install antennas and appurtenant equipment at the existing 120-foot monopole facility owned by Crown Castle USA, Inc. and located at 7 Berkshire Road/1358 New Britain Avenue, West Hartford, Connecticut ("Facility"). Pocket Communications provides prepaid, flat rate wireless voice and data services to more than a quarter of a million subscribers. Pocket is licensed by the Federal Communications Commission (FCC) to provide PCS wireless telecommunications service in the State of Connecticut, which includes the area to be served by the proposed installation. This installation constitutes an exempt modification pursuant to the Public Utility Environmental Standards Act, Connecticut General Statutes Section 16-50g et. seq. (PUESA), and Section 16-50j-72(b)(2) of the Regulations of the Connecticut State Agencies adopted pursuant to PUESA. In accordance with R.C.S.A. Section 16-50j-73, a copy of this notice has been sent to Scott Slifka, Mayor, Town of West Hartford.

The existing Facility consists of a 120-foot self-supporting monopole tower capable of supporting multiple carriers within a fenced compound. The coordinates for the Facility are **Lat: 41°-43'-50" and Long: 72°–45'-13".** The tower is located in the southwest corner of west Hartford, approximately feet north of New Britain Avenue, roughly 100 feet east of the on-ramp merge with Interstate 84 (see Site Map, attached as Exhibit A). The tower currently supports Verizon antennas at the one hundred five foot (105') level centerline AGL (above ground level), and Sprint Nextel antennas at the one hundred seventeen foot level (117') AGL. As explained in the structural analysis report, AT&T has abandoned their place on this tower at the ninety five foot level (95') AGL and Pocket will assume their location. T-Mobile has also removed antennas from the tower at the eighty five foot level (85') AGL. Nextel has relocated some of their equipment from the one hundred twenty eight foot level (128') and collocated it with Sprint at the one hundred seventeen foot (117') level AGL. As is also mentioned in the structural report, modifications will be made in accordance to the structural report plans to insure the structural integrity and proper capacity for the tower. Pocket proposes to install three Kathrein 742-213 flush mount antennas on the tower at the ninety six foot centerline (96') AGL, and a Nortel CDMA Micro BTS 3231 cabinet, mounted on an "H-Frame," contained within a six foot by six foot (6'-0" x 6'-0") lease area. A small GPS antenna will be mounted to an ice bridge will run from the lease area to the tower. Utilities will be run via a proposed underground conduit from an existing utility backboard, within the compound (See Design Drawings and Equipment Specifications, attached as Exhibits B and C respectively).

For the following reasons, the proposed modifications to the Berkshire Road/New Britain Avenue Facility meet the exempt modification criteria set forth in R.C.S.A. Section 16-50j-72(b)(2):

1. The proposed modification will not increase the height of the tower as Pocket's antennas will be installed at a center line height of approximately 96 feet.

2. The installation of Pocket's equipment and shelter will not require an extension of the site boundaries.

3. The proposed modifications will not increase the noise levels at the existing Facility by six decibels or more.

4. The operation of the additional antennas will not increase the total radio frequency (RF) power density, measured at the site boundary, to a level at or above the standard adopted by the Connecticut Department of Environmental Protection as set forth in Section 22a-162 of the Connecticut General Statutes and MPE limits established by the Federal Communications Commission. The worst-case RF power density calculations for the proposed Pocket antennas would be 36.66% of the FCC standard (see general power density calculations table, attached as Exhibit D).

Also attached, Exhibit E, is a structural analysis confirming that the tower can support the existing and proposed antennas and associated equipment.

For the foregoing reasons, Pocket respectfully submits that the proposed antenna installation and equipment at the West Hartford Facility constitutes an exempt modification under R.C.S.A. Section 16-50j-72(b)(2).

Respectfully Submitted,

Carrie L. Larson

cc: Scott Slifka, Mayor
West Hartford United Methodist, underlying property owner

Exhibit A

Site Map

Pocket Site HFCT0379B

7 Berkshire Road/1358 New Britain Avenue

West Hartford, Connecticut

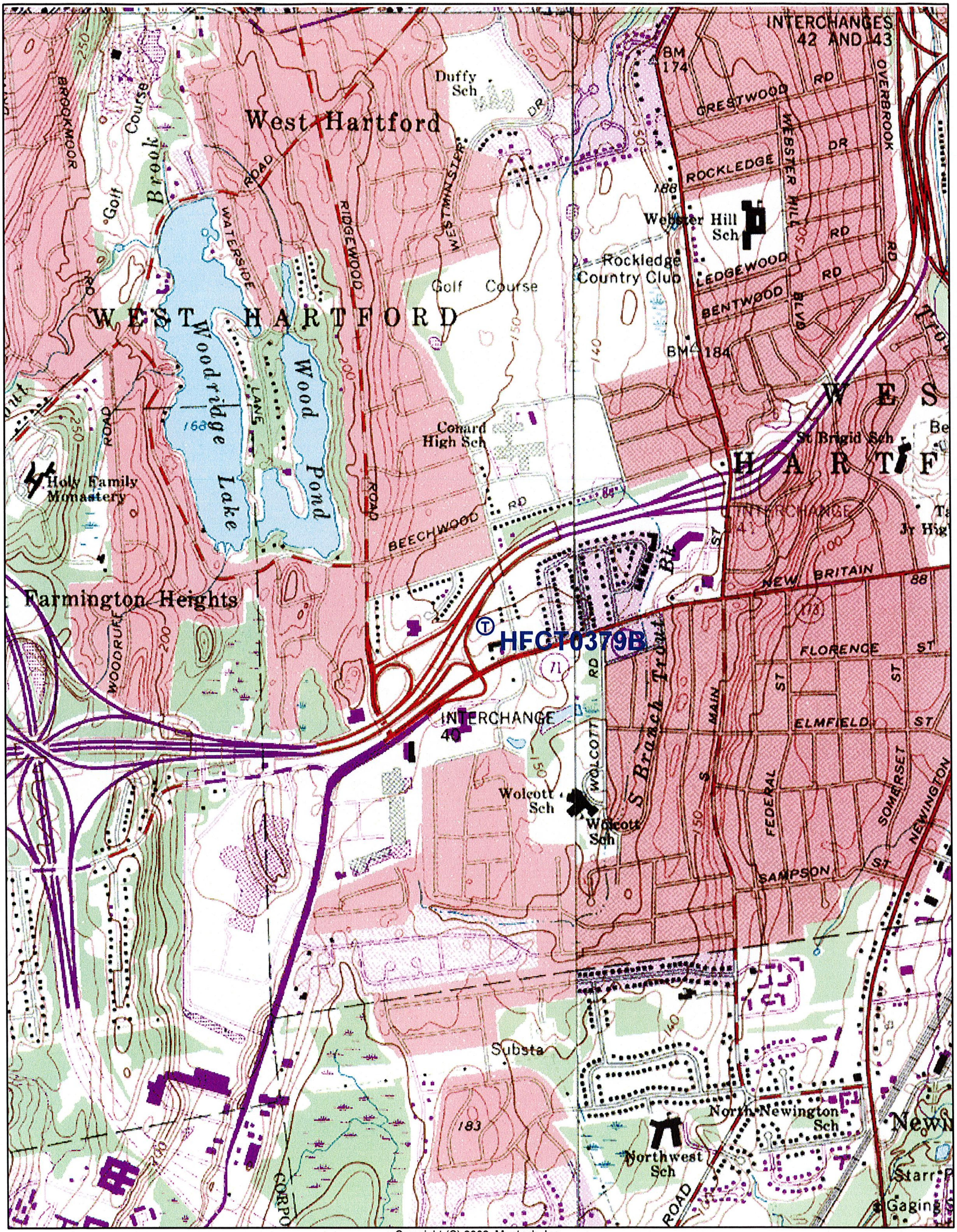

West Hartford
WEST HARTFORD
Duffy Sch
Golf Course
Brook
BROOKMOOR
WATERSIDE
ROAD
RIDGEWOOD
WESTMINSTER
DR
Woodridge Lake
Wood Pond
LANE
Conard High Sch
Holy Family Monastery
Farmington Heights
WOODRUFF
BEECHWOOD
RD
INTERCHANGE 40
INTERCHANGES 42 AND 43
BM 174
CRESTWOOD RD
ROCKLEDGE DR
WEBSTER HILL
OVERBROOK RD
Webster Hill Sch
Rockledge Country Club
LEDGEWOOD RD
BENTWOOD RD
BLVD
BM 184
WEST HARTF
St Brigid Sch
INTERCHANGE 41
Jr High
NEW BRITAIN
FLORENCE ST
ELMFIELD ST
HFCT0379B
WOLCOTT RD
Wolcott Sch
S Branch Trout Bk
S MAIN ST
FEDERAL ST
SOMERSET ST
NEWINGTON
SAMPSON ST
Substa
183
North Newington Sch
Northwest Sch
ROAD
CORPO
Newi
Starr
Gaging

Exhibit B

Design Drawings

Pocket Site HFCT0379B

7 Berkshire Road/1358 New Britain Avenue

West Hartford, Connecticut

pocket™ COMMUNICATIONS

HFCT0379B
CCI 876324
120' MONOPOLE

SITE INFORMATION

OWNER:	CCI 5000 WEST CUMMINGS PARK WOBURN, MA 01801 TARA KATHLEEN RAND 781-970-0060
OWNER SITE ID#:	876324
APPLICANT:	YOUGHIOGHENY COMMUNICATIONS–NORTHEAST LLC 2819 NW LOOP 410 SAN ANTONIO, TX 78230
SITE ADDRESS:	1358 NEW BRITAIN AVE. W. HARTFORD, CT 06110
COUNTY:	HARTFORD
LATITUDE:	N 41° 43' 50.37"
LONGITUDE:	W 72° 45' 13.17"
ZONING CLASSIFICATION:	N/A
ZONING JURISDICTION:	CONNECTICUT SITING COUNCIL
POWER COMPANY:	CL&P 1-860-947-2121
TELEPHONE COMPANY:	AT&T 1-888-727-8368
DESIGN FIRM:	TRIVIS 180 CHANDALAR PLACE DRIVE PELHAM, AL 35124 PHONE: (205) 621-0106

DRAWING INDEX

1	TITLE SHEET	
2	SITE PLAN	
3	TOWER, ANTENNA, H-FRAME DESIGN	
4	GROUNDING PLAN & DETAILS	
5	COAX SUPPORT STRUCTURE DETAIL & GROUNDING DETAILS	
6	ELECTRICAL SITE PLAN & DETAILS	

APPROVALS

__________ REAL ESTATE

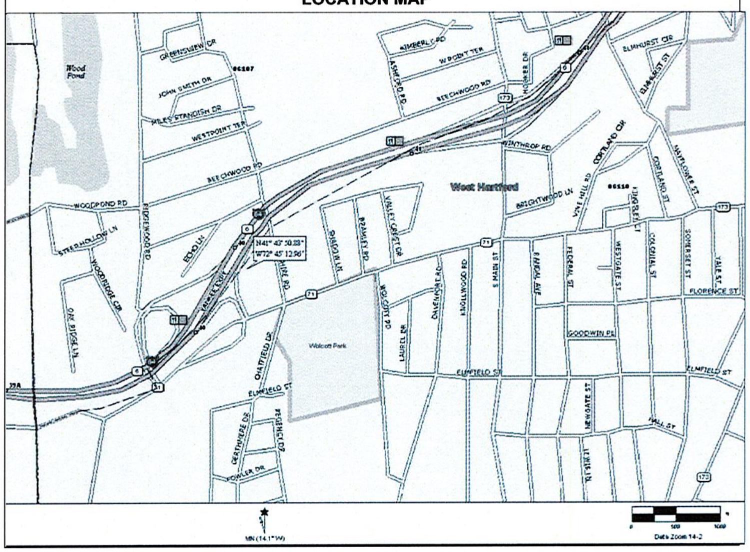
__________ RF

__________ OPS/CONSTRUCTION

__________ LEGAL/COMPLIANCE

__________ NET DESIGN

LOCATION MAP



DRIVING DIRECTIONS

I-84 W TO EXIT 40, THEN L ON RIDGEWOOD ON L TO NEW BRITAIN AVE. TO L ON BERKSHIRE RD. TO L INTO CHURCH PARKING LOT. TOWER IS IN REAR OF CHURCH PARKING LOT.

SITE INFORMATION

CONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.
2005 NEC NFPA 70-/; 2000 IECC CODES AND THE 2004 CITY PUBLIC SERVICE ELECTRICAL SERVICE STANDARDS.

BUILDING CODE:
INTERNATIONAL BUILDING CODE (IBC), 2006

ELECTRICAL CODE:
[NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 70 – 2005, NATIONAL ELECTRICAL CODE
LIGHTNING PROTECTION CODE:
[NFPA 780 – 2005, LIGHTNING PROTECTION CODE]

CONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS.

AMERICAN CONCRETE INSTITUTE (ACI) 318, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), MANUAL OF STEEL CONSTRUCTION, ASD, NINTH EDITION
TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-F, STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES:
TIA 607, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS

INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) 81, GUIDE FOR MEASURING EARTH RESISTIVITY, GROUND IMPEDANCE, AND EARTH SURFACE POTENTIALS OF A GROUND SYSTEM
IEEE 1100 (1999) RECOMMENDED PRACTICE FOR POWERING AND GROUNDING OF ELECTRONIC EQUIPMENT

IEEE C62.41, RECOMMENDED PRACTICES ON SURGE VOLTAGES IN LOW VOLTAGE AC POWER CIRCUITS (FOR LOCATION CATEGORY "C3" AND "HIGH SYSTEM EXPOSURE")

TELCORDIA GR-1275, GENERAL INSTALLATION REQUIREMENTS

TELCORDIA GR-1503, COAXIAL CABLE CONNECTIONS

ANSI T1.311, FOR TELECOM – DC POWER SYSTEMS – TELECOM, ENVIRONMENTAL PROTECTION

FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN

SITE INFORMATION

1. THIS SITE IS UNMANNED AND IS RESTRICTED TO OUTDOOR EQUIPMENT. IT WILL BE USED FOR THE TRANSMISSION OR RADIO SIGNALS FOR THE PURPOSE OF PROVIDING PUBLIC CELLULAR SERVICE.
2. POCKET COMMUNICATIONS CERTIFIES THAT THIS TELEPHONE EQUIPMENT FACILITY WILL BE SERVICED ONLY BY POCKET COMMUNICATIONS EMPLOYEES AND THE WORK ASSOCIATED WITH ANY EQUIPMENT CANNOT BEPERFORMED BY HANDICAPPED PERSONS. THIS FACILITY WILL BE FREQUENTED ONLY BY SERVICE PERSONNEL FOR REPAIR PURPOSES ONLY. THIS FACILITY IS EXEMPT FROM THE REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT (ADA), APPENDIX B, SECTION 4.11.(5)(B).
3. NO POTABLE WATER SUPPLY IS TO BE PROVIDED AT THIS LOCATION.
4. NO WASTE WATER WILL BE GENERATED AT THIS LOCATION.
5. NO SOLID WASTE WILL BE GENERATED AT THIS LOCATION.
6. POCKET COMMUNICATIONS MAINTENANCE CREW (TYPICALLY ONE PERSON) WILL MAKE AN AVERAGE OF ONE TRIP PER MONTH AT ONE HOUR PER VISIT.

CALL before you DIG
FOR CT 1-800-922-4455

NO.	DATE	REVISIONS	INT.
0	08/12/08	ISSUED FOR CONSTRUCTION	RCS

pocket COMMUNICATIONS

PROJECT NAME: CCI 876324
SHEET DESC: TITLE SHEET

TRIVIS
The Complete Solutions Provider
180 CHANDALAR PLACE DR.
PELHAM, AL 35124
(205) 621-0106

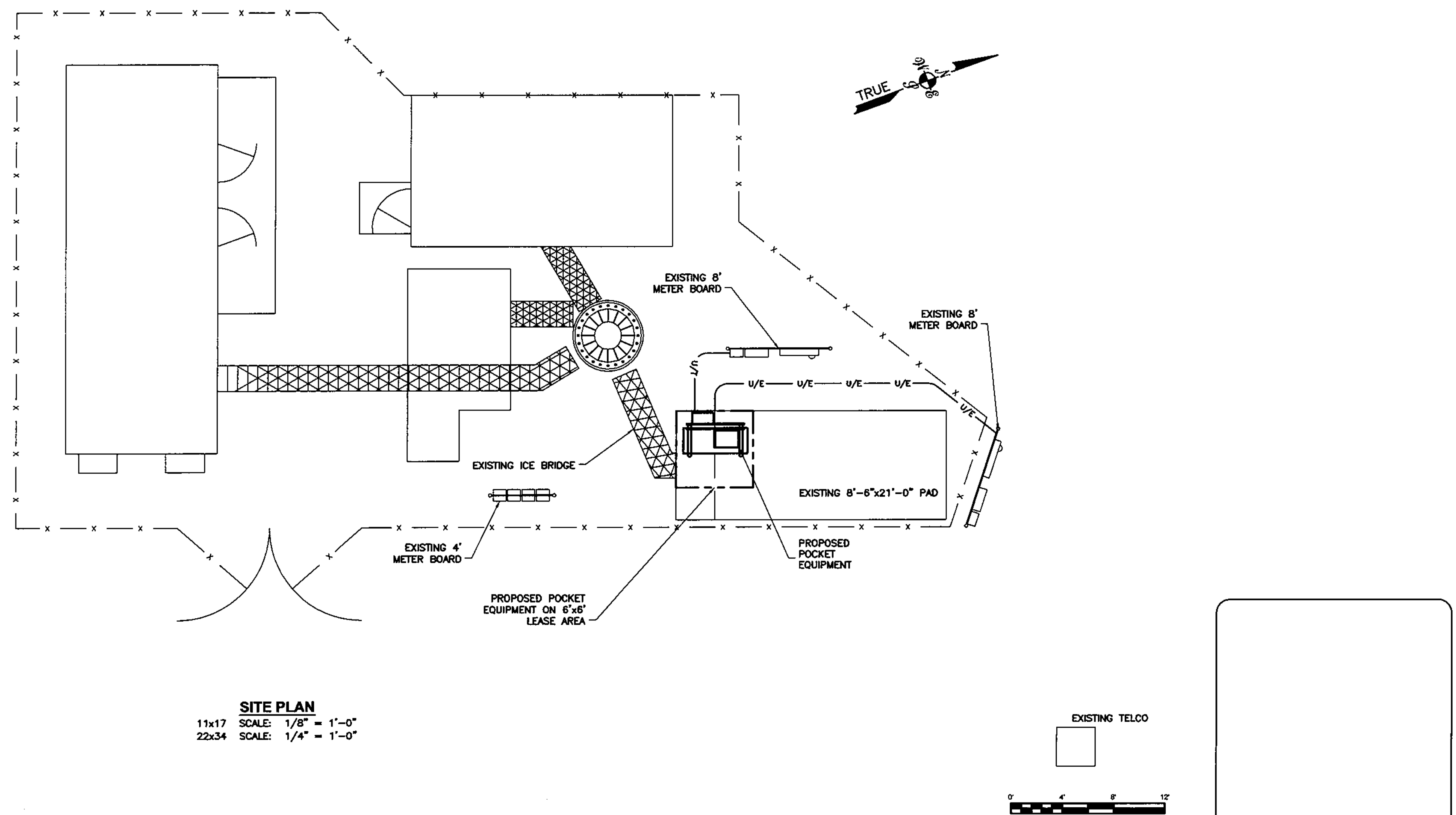
CHECKED BY:	JSW
DRAWN BY:	RCS
DATE:	07/31/08
JOB NO.	08449
DWG. NO.	01

CONSTRUCTION NOTES

1. FIELD VERIFICATION: CONTRACTOR SHALL FIELD VERIFY SCOPE OF WORK, POCKET COMMUNICATIONS ANTENNA MOUNT LOCATION AND ANTENNAS TO BE INSTALLED.
2. COORDINATION OF WORK: CONTRACTOR SHOULD COORDINATE RF WORK AND PROCEDURES WITH POCKET COMMUNICATIONS.
3. GRAVEL SURFACE IN AREAS OF COMPOUND THAT ARE DISTURBED DURING CONSTRUCTION SHALL BE REPLACED TO ORIGINAL CONDITION BY CONTRACTOR.

GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – POCKET COMMUNICATIONS
   OEM – ORIGINAL EQUIPMENT MANUFACTURER
2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
4. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED EQUIPMENT, ON THE DRAWINGS.
5. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
6. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL.
7. CONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING.
8. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, GROUNDING CABLES AS SHOWN ON THE ELECTRICAL PLAN.
9. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
10. CONTRACTOR TO OBTAIN REQUIRED NOTICE TO PROCEED DOCUMENTS FROM THE TOWER OWNER BEFORE COMMENCING CONSTRUCTION.



SITE PLAN
11x17 SCALE: 1/8" = 1'-0"
22x34 SCALE: 1/4" = 1'-0"

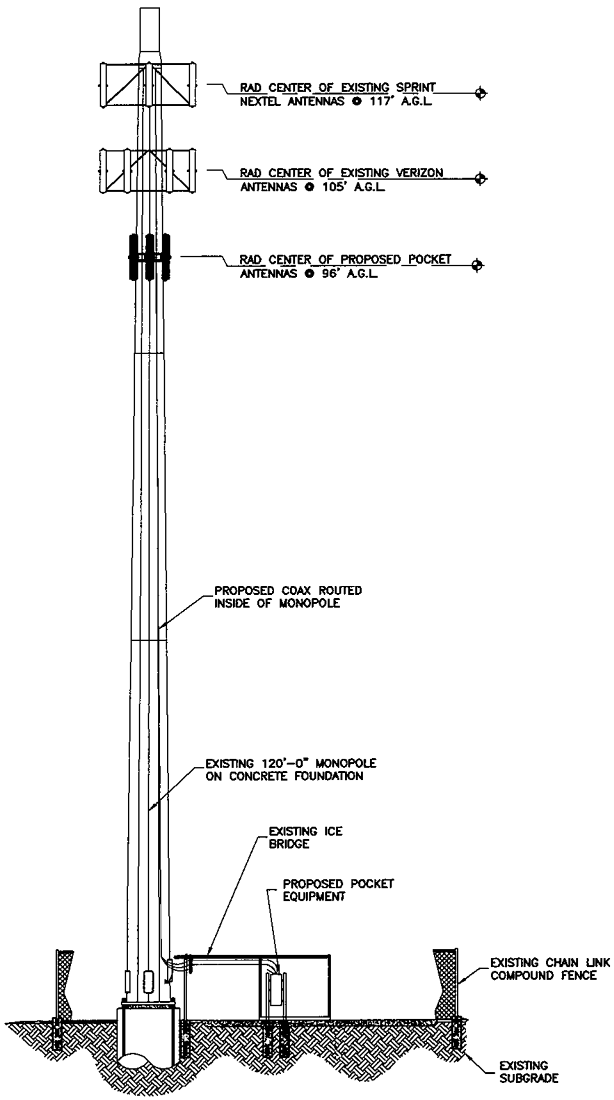
NO.	DATE	REVISIONS	INT.
0	08/12/08	ISSUED FOR CONSTRUCTION	RCS

pocket COMMUNICATIONS

PROJECT NAME: CCI 876324
SHEET DESC: SITE PLAN

TRIVIS
The Complete Solutions Provider
180 CHANDALAR PLACE DR.
PELHAM, AL 35124
(205) 621-0106

CHECKED BY: JSW
DRAWN BY: RCS
DATE: 07/31/08
JOB NO. 08449
DWG. NO. 02



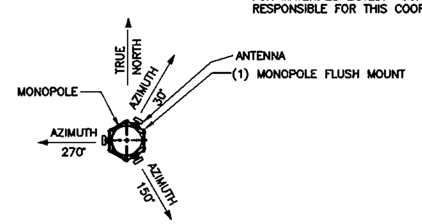
TOWER ELEVATION
N.T.S.

ANTENNA KEY

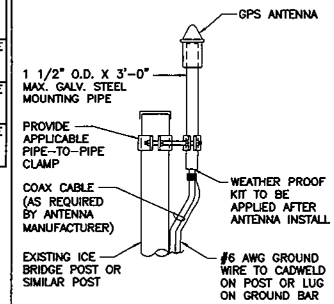
☐	# ANTENNAS PER SECTOR	ANTENNA NUMBER	COAX COLOR CODE	ANTENNA VENDOR	MODEL NUMBER	AZIMUTH	C/L HEIGHT	MECHANICAL DOWNTILT	COAX SIZE	# COAX PER ANTENNA	COAX MODEL NUMBER
ALPHA FACE	1	A-1	(1)-RED BAND	KATHREIN	N/A	30°	96'-0"	0°	1 5/8"	2	COMMSCOPE
BETA FACE	1	B-1	(1)-GREEN BAND	KATHREIN	N/A	150°	96'-0"	0°	1 5/8"	2	COMMSCOPE
GAMMA FACE	1	C-1	(1)-BROWN BAND	KATHREIN	N/A	270°	96'-0"	0°	1 5/8"	2	COMMSCOPE

TOWER NOTES
1. FOR DETAILED TOWER INFORMATION, REFER TO TOWER ERECTION DRAWINGS BY OTHERS. THE TOWER ON THIS SHEET IS SHOWN FOR GENERAL CONFIGURATION PURPOSES ONLY.
2. ANTENNA CONFIGURATION IS SUBJECT TO CHANGE. VERIFY ANTENNA HEIGHT, DOWN-TILT, AND AZIMUTH WITH PROJECT MANAGER PRIOR TO CONSTRUCTION.

ANTENNA NOTES
1. ALL COAX SHALL BE COLOR-CODED AT (3) PLACES EACH: AT ANTENNA, EXTERIOR OF SHELTER, AND THE INTERIOR OF SHELTER.
2. (2) COLOR BANDS DENOTES TRANSMIT.
3. PRIOR TO ORDERING ANY ANTENNAS OR COAX, CONTRACTOR SHALL CONTACT POCKET'S CONSTRUCTION MANAGER AND OBTAIN APPROVAL FOR MATERIALS LISTED. CONTRACTOR IS SOLELY RESPONSIBLE FOR THIS COORDINATION.

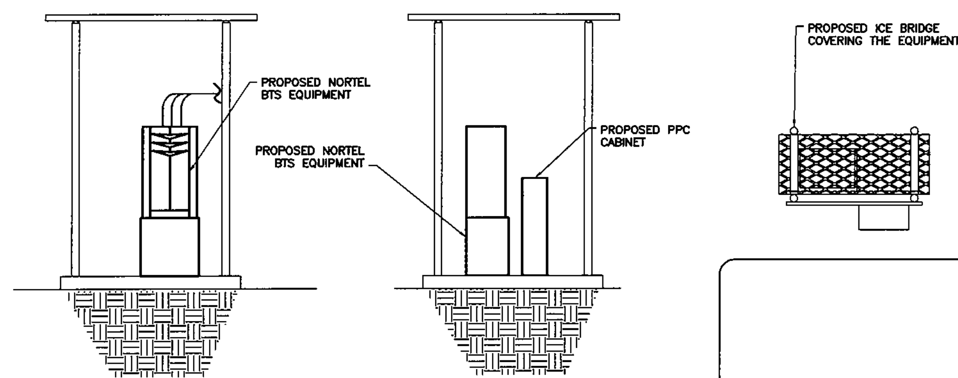


PLAN VIEW



NOTES:
1. LOCATION OF ANTENNA MUST HAVE CLEAR VIEW OF SOUTHERN SKY AND CANNOT HAVE ANY BLOCKAGES EXCEEDING 25% OF THE SURFACE AREA OF A HEMISPHERE AROUND THE GPS ANTENNA.
2. ALL GPS ANTENNA LOCATIONS MUST BE ABLE TO RECEIVE CLEAR SIGNALS FROM A MINIMUM OF FOUR (4) SATELLITES. VERIFY WITH HANDHELD GPS BEFORE FINAL LOCATION OF GPS ANTENNA.

GPS ANTENNA PIPE MOUNT
SCALE: N.T.S.



PROPOSED MOUNTING FOR BTS CABINET
SCALE: N.T.S.

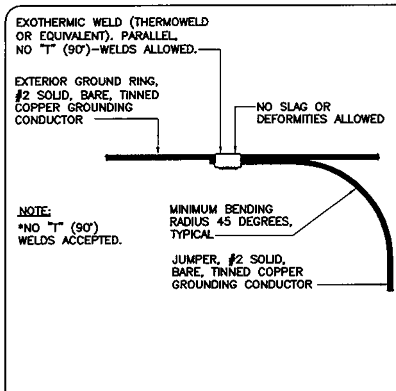
NO.	DATE	REVISIONS	INT.
0	08/12/08	ISSUED FOR CONSTRUCTION	RCS

pocket COMMUNICATIONS

PROJECT NAME: CCI 876324
SHEET DESC: TOWER, ANTENNA, H-FRAME

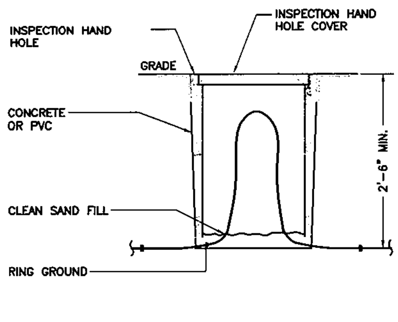
TRIVIS
The Complete Solutions Provider
180 CHANDALAR PLACE DR.
PELHAM, AL 35124
(205) 621-0106

CHECKED BY: JSW
DRAWN BY: rcs
DATE: 07/31/08
JOB NO. 08449
DWG. NO. 03



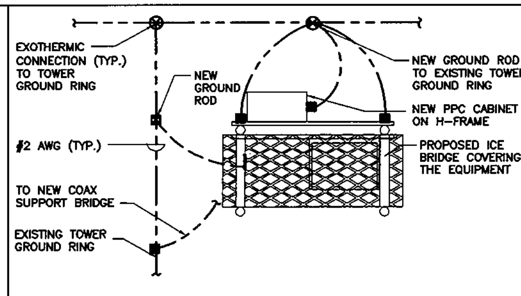
NOTE:
*NO "T" (90°) WELDS ACCEPTED.

TYPICAL GROUNDING CONNECTION



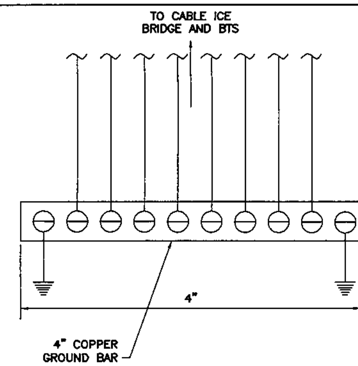
NOTE: INSPECTION HAND HOLE MAY BE CONCRETE OR PVC AND SHALL BE A MINIMUM OF 8" IN WIDTH/DIAMETER

GROUND ROD WITH ACCESS AREA

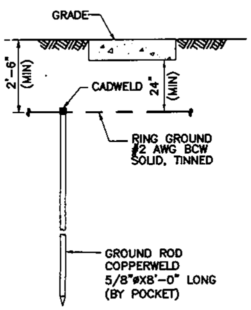


THE CONTRACTOR SHALL PERFORM IEEE FALL–OF–POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.

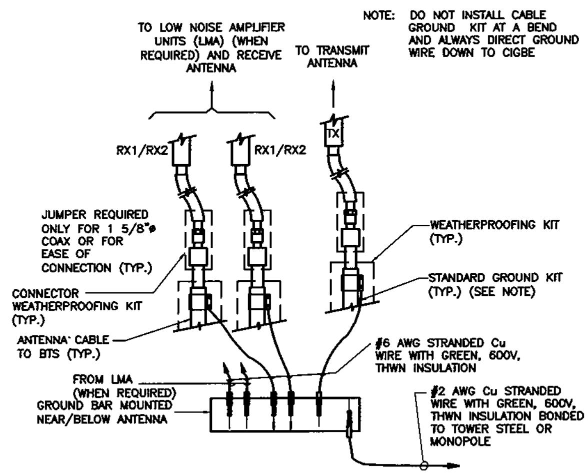
TYPICAL CABINET AND PLATFORM GROUNDING



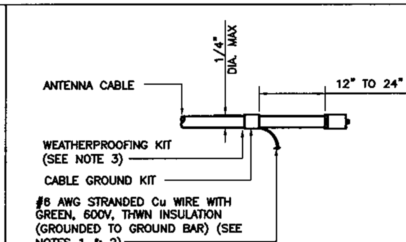
LOWER 4" GROUND BAR
SCALE: N.T.S.



GROUNDING - STANDARD DETAIL GROUND ROD
SCALE: N.T.S.



CONNECTION OF GROUND WIRE TO GROUNDING BAR (CIGBE) TOWER/MONOPOLE

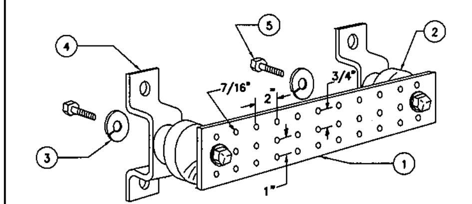


CONNECTION OF CABLE GROUND KIT TO ANTENNA CABLE

NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
2. GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
3. WEATHER PROOFING SHALL BE (TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.)

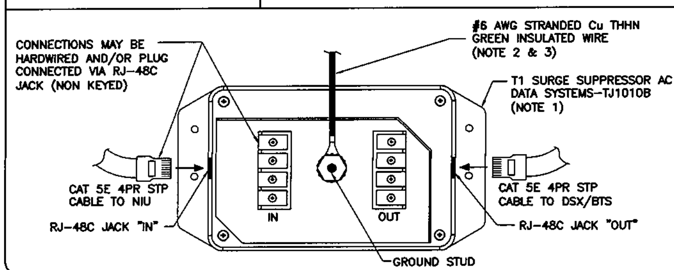
CONNECTION OF CABLE GROUND KIT TO ANTENNA CABLE
SCALE: N.T.S.



LEGEND

1– COPPER GROUND BAR, 1/4"X 4"X 20", NEWTON INSTRUMENT CO. CAT. NO. B–6142 OR EQUAL. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION
2– INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061–4
3– 5/8" LOCKWASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015–8
4– WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A–6056
5– 5/8–11 X 1" HHCS BOLTS, NEWTON INSTRUMENT CO. CAT NO. 3012–1
6– SECTOR CIGBE GROUND BAR TO BE SIZED FOR (4) ANTENNAS AND (4) BRACKETS OR MASTS ALL OTHER GROUND BARS SHALL BE SIZED TO ACCOMMODATE ALL GROUNDING CONNECTIONS REQUIRED PLUS PROVIDE 50% SPARE CAPACITY.

GROUND BAR (TYP.)
SCALE: N.T.S.



T1 SURGE SUPPRESSOR
SCALE: N.T.S.

NOTES:

1. MOUNT T1–TVSS UNIT ON EQUIPMENT FRAME HOUSING THE DSX UNIT. USE APPROPRIATE STAINLESS STEEL BOLTS WITH FLAT WASHERS AND A LOCK WASHER ON THE NUT SIDE. THE TVSS MAY BE LOCATED ON THE TELCO BACKBOARD. REFER TO MANUFACTURER'S INSTRUCTIONS.
2. ATTACH RING TERMINAL FROM SUPPLIED GROUND CONDUCTOR TO TVSS GROUND STUD SECURELY FASTEN WITH SUPPLIED WASHER AND NUT. REFER TO MANUFACTURER'S INSTRUCTIONS. FOR PROPER PERFORMANCE, THE GROUND CONDUCTOR LENGTH SHOULD BE LIMITED WITH NO SHARP BENDS ON COILS.
3. WHEN TVSS IS MOUNTED ON EQUIPMENT FRAME, BOND THE GROUND CONDUCTOR TO THE EQUIPMENT FRAME GROUND. ENSURE PROPER GROUNDING SURFACES. WHEN TVSS IS MOUNTED ON THE TELCO BACK BOARD, BOND THE GROUND CONDUCTOR TO THE TELCO (BOARD) GROUND BAR OR NEAREST GROUND BAR.

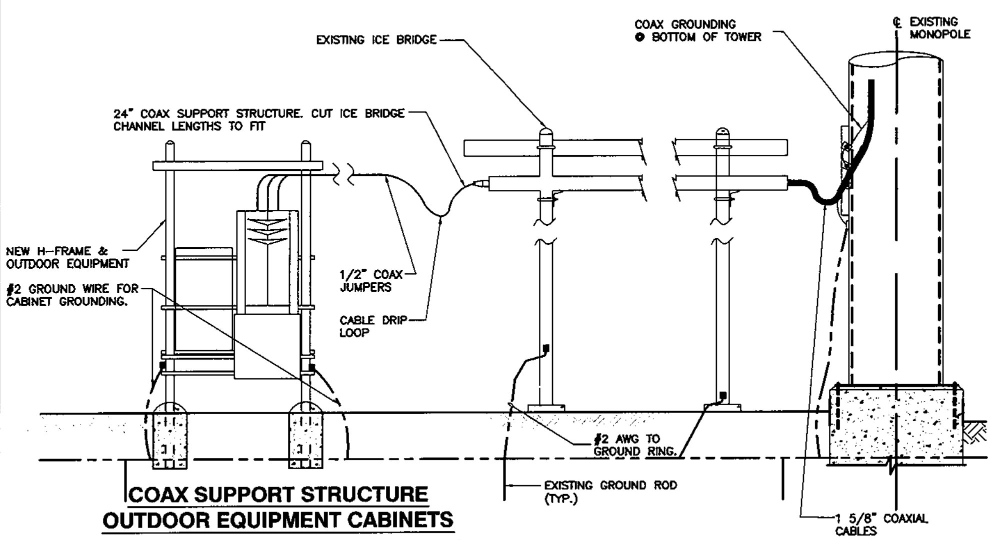
NO.	DATE	REVISIONS	INT.
0	08/12/08	ISSUED FOR CONSTRUCTION	RCS

pocket COMMUNICATIONS

PROJECT NAME: CCI 876324
SHEET DESC: GROUNDING PLAN & DETAILS

TRIVIS
The Complete Solutions Provider
180 CHANDALAR PLACE DR.
PELHAM, AL 35124
(205) 621-0106

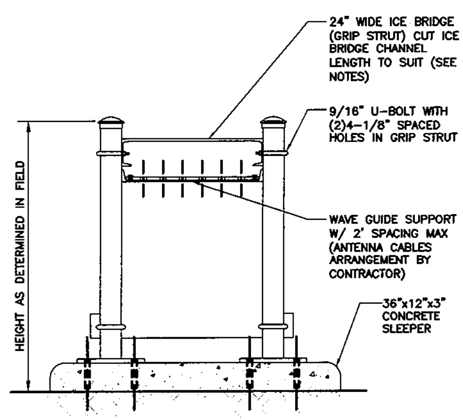
CHECKED BY: JSW
DRAWN BY: RCS
DATE: 07/31/08
JOB NO. 08449
DWG. NO. 04



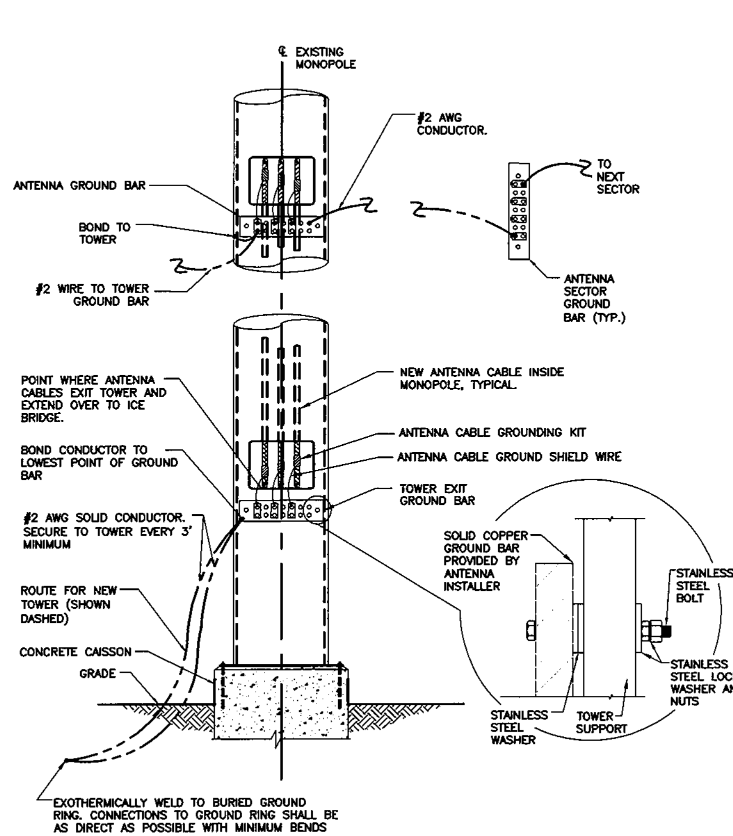
COAX SUPPORT STRUCTURE
OUTDOOR EQUIPMENT CABINETS

NOTES:

1. WHEN USING COMPONENTS AS SHOWN IN STANDARD DETAILS, MAXIMUM ALLOWABLE SPAN BETWEEN SUPPORTS ON A CONTINUOUS SINGLE SECTION OF BRIDGE CHANNEL SHALL BE 8 FEET FOR 10 FEET BRIDGE CHANNEL.
2. WHEN USING COMPONENTS FOR SPLICING BRIDGE CHANNEL SECTIONS, THE SPLICE SHOULD BE PROVIDED AT THE SUPPORT, IF POSSIBLE, OR AT A MAXIMUM OF 2 FEET FROM THE SUPPORT.
3. WHEN USING COMPONENTS, SUPPORT SHOULD BE PROVIDED AS CLOSE AS POSSIBLE TO THE ENDS OF ICE BRIDGES, WITH A MAXIMUM CANTILEVER DISTANCE OF 2 FEET FROM THE SUPPORT TO THE FREE END OF THE ICE BRIDGE.
4. CUT BRIDGE CHANNEL SECTIONS SHALL HAVE RAW EDGES TREATED WITH A MATERIAL TO RESTORE THESE EDGES TO THE ORIGINAL CHANNEL, OR EQUIVALENT, FINISH.
5. ICE BRIDGES MAY BE CONSTRUCTED WITH COMPONENTS FROM OTHER MANUFACTURERS, PROVIDED THE MANUFACTURER'S INSTALLATION GUIDELINES ARE FOLLOWED.
6. DEVIATIONS FROM STANDARDS FOR COMPONENT INSTALLATIONS ARE PERMITTED WITH THE RESPECTIVE MANUFACTURER'S APPROVAL.
7. DEVIATIONS FROM ICE BRIDGE FOUNDATIONS REQUIRE ENGINEERING APPROVAL.
8. THE DESIGN IS BASED ON ASCE 7-98, 3 SECOND GUST WIND SPEED OF 110 MPH, EXPOSURE C, ELEVATION AT GRADE.
9. THIS DESIGN IS BASED ON 24" WIDE ICE BRIDGE AND (12) 1 5/8" DIA COAX CABLES AND MAX. POST SUPPORT SPACING OF 10'-0".



DETAIL
NTS



MONOPOLE GROUNDING DETAIL

NO.	DATE	REVISIONS	INT.
0	08/12/08	ISSUED FOR CONSTRUCTION	RCS

pocket COMMUNICATIONS

PROJECT NAME: CCI 876324
SHEET DESC: COAX SUPPORT STRUCTURE

TRIVIS
The Complete Solutions Provider
180 CHANDALAR PLACE DR.
PELHAM, AL 35124
(205) 621-0106

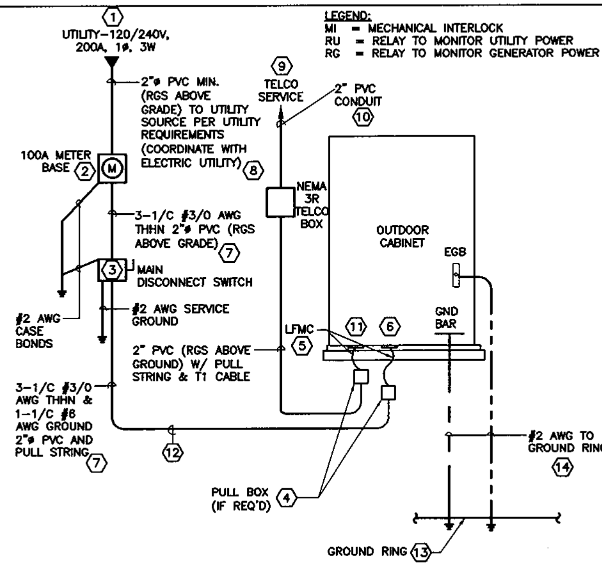
CHECKED BY: JSW
DRAWN BY: RCS
DATE: 07/31/08
JOB NO. 08449
DWG. NO.
05

PANEL "SSC"

LOAD DESCRIPTION	LOAD (kVA)	BRKR SIZE	CCT NO.	PHASE A B	CCT NO.	BRKR SIZE	LOAD (kVA)	LOAD DESCRIPTION
BTS CABINET	2.5	30/2	1		2	30/2	2.2	TVSS
	2.5		3		4		2.2	
LIGHTING	.9	10/1	5		6	–	–	SPACE
SPACE	–	–	7		8	–	–	SPACE
SPACE	–	–	9		10	–	–	SPACE
SPACE	–	–	11		12	–	–	SPACE
SPACE	–	–	13		14	–	–	SPACE
SPACE	–	–	15		16	–	–	SPACE
SPACE	–	–	17		18	–	–	SPACE
SPACE	–	–	19		20	–	–	SPACE
SPACE	–	–	21		22	–	–	SPACE
SPACE	–	–	23		24	–	–	SPACE
LOAD SUB-TOTAL	5.6	LOAD TOTAL		10.3 kVA			4.4	LOAD SUB-TOTAL

100A MCB, 120/240V, 1Ø, 3W, 65,000 AIC		
TOTAL CONNECTED LOAD	10.3 KW	
25% OF LARGEST CONT. LOAD	1250 W	
TOTAL LOADS	11.5 KW	47.9 AMPS
NOTE: ALL NON-OPTIONAL BREAKERS PROVIDED BY SSC MFR		

PANEL SCHEDULE



POWER, TELCO & GROUND SINGLE LINE DIAGRAM FOR OUTDOOR CABINET

REFERENCE NOTES

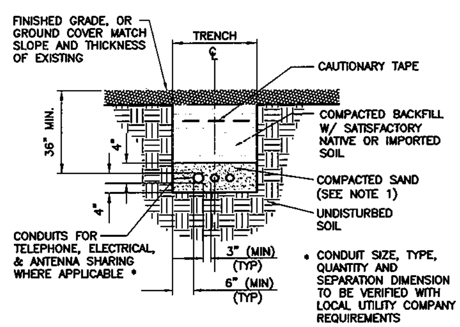
1. ELECTRICAL DEMARCATION POINT. ELECTRICAL CONTRACTOR TO COORDINATE WITH LOCAL POWER FOR SERVICE TO METER.
2. CONTRACTOR TO SUPPLY AND INSTALL A 100A, 120/208/240V 1Ø, 3W METER BASE. METER BASE TO BE NEMA 3R RATED AND ACCEPTABLE TO LOCAL UTILITY. PROVIDE WITH MECHANICALLY ATTACHED ENGRAVED IDENTIFICATION LABEL INDICATING "POCKET COMMUNICATIONS METER".
3. CONTRACTOR TO SUPPLY AND INSTALL NEMA 3R 100A FUSIBLE DISCONNECT SWITCH WITH LOCKABLE HANDLE. PROVIDE WITH 100A FUSES, AIC RATING TO COORDINATE WITH LOCAL UTILITY REQUIREMENTS. PROVIDE WITH MECHANICALLY ATTACHED ENGRAVED IDENTIFICATION LABEL INDICATING "POCKET COMMUNICATIONS SERVICE DISCONNECT".
4. WEATHER TIGHT JUNCTION BOX (IF REQUIRED). SIZE TO NEC CODE FOR APPLICATION.
5. LIQUID TIGHT FLEXIBLE METALLIC CONDUIT W/W WEATHER TIGHT FITTINGS AND SUPPORTS. SIZE AND CONTENTS TO MATCH ASSOCIATED USE (POWER OR TELCO)
6. UTILITY POWER ENTRY INTO CABINET. COORDINATE TERMINATION WITH CABINET MANUFACTURER.
7. CONTRACTOR SUPPLY AND INSTALL 2" GRC. AFG AND PVC 24" BFG C/W #3/0 AWG THHN & (1) #6 GRND FOR UTILITY SERVICE
8. CONTRACTOR SUPPLY AND INSTALL 4" GRC. AFG AND PVC 24" BFG C/W #3/0 AWG THHN FOR UTILITY SERVICE
9. TELCO DEMARCATION POINT. ELECTRICAL CONTRACTOR TO COORDINATE WITH LOCAL TELCO FOR SERVICE TO TELCOBOX OR CABINET.
10. CONTRACTOR TO SUPPLY AND INSTALL (1) 2" GRC AFG AND PVC 24" BFG C/W PULL CORDS FOR TELCO SERVICE TO CABINET TERMINATION POINT.
11. TELCO SERVICE ENTRY INTO CABINET. COORDINATE TERMINATION IN WITH CABINET MANUFACTURER.
12. CONTRACTOR TO ARRANGE AND PAY FOR UNDERGROUND UTILITY LOCATION SURVEYS FOR ALL TRENCHING. REUSE NATIVE BACKFILL AND RE-INSTATE TO ORIGINAL CONDITION. INSTALL 6" WIDE METALLIC LINED RED PLASTIC MARKER TAPE 8" ABOVE ALL BURIED CONDUIT.
13. PART OF CABINET BURIED GROUND RING.
14. (1) #2 SOLID BARE TINNED CU GEC BONDED TO 5/8"x10' COPPER CLAD STEEL GROUNDING ELECTRODES. LOCATE GROUNDING ELECTRODE ADJACENT TO "CABINET". BOND GROUNDING ELECTRODE SYSTEM TO CABINET GROUND RING.

NOTES

1. CONTRACTOR SHALL PROVIDE 100AMP, SINGLE PHASE, 120/240 VAC, 60HZ SERVICE FOR SITE.
2. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY BEFORE THE START OF CONSTRUCTION. POWER AND TELCO CONDUIT SHALL BE PROVIDED AND INSTALLED PER UTILITY REQUIREMENTS.
3. FOR COMPLETE INTERNAL WIRING AND ARRANGEMENT REFER TO DRAWINGS PROVIDED BY AC OR TELCO PANEL MANUFACTURER.
4. ALL SERVICE EQUIPMENT AND INSTALLATIONS SHALL COMPLY WITH THE N.E.C. AND UTILITY COMPANY AND LOCAL CODE REQUIREMENTS.
5. CONTRACTOR SHALL INSTALL SUFFICIENT LENGTHS OF LFMC INCLUDING ALL CONDUIT FITTINGS (NUTS, REDUCING BUSHINGS, ELBOWS, COUPLINGS, ETC) NECESSARY FOR CONNECTION FROM IMC CONDUIT TO THE PURCELL POWER CABINET.
6. CONTRACTOR SHALL PROVIDE ELECTRICAL SERVICE EQUIPMENT WITH FAULT CURRENT RATINGS GREATER THAN THE AVAILABLE FAULT CURRENT FROM THE POWER UTILITY.
7. CONTRACTOR SHALL VERIFY THAT THE MAIN BONDING JUMPER AND GROUNDING ELECTRODE CONDUCTOR IS INSTALLED PROPERLY IN MAIN DISCONNECT SWITCH.

GENERAL ELECTRICAL NOTES:

1. ALL ELECTRICAL AND GROUNDING WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.
2. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL VERIFY ROUTING AND LENGTHS PRIOR TO CONSTRUCTION.
3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.
4. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
5. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.



NOTES: 1. LEAN CONCRETE, RED-COLORED TOP, MAY BE USED IN PLACE OF COMPACTED SAND.

DIRECT BURIED CONDUIT

NTS

NO.	DATE	REVISIONS	INT.
0	08/12/08	ISSUED FOR CONSTRUCTION	RCS

pocket COMMUNICATIONS

PROJECT NAME: CCI 876324

SHEET DESC: ELECTRICAL PLAN & DETAILS

TRIVIS
The Complete Solutions Provider
180 CHANDALAR PLACE DR.
PELHAM, AL 35124
(205) 621-0106

CHECKED BY: JSW
DRAWN BY: RCS
DATE: 07/31/08
JOB NO. 08449
DWG. NO.

06

Exhibit C

Equipment Specifications

Pocket Site HFCT0379B

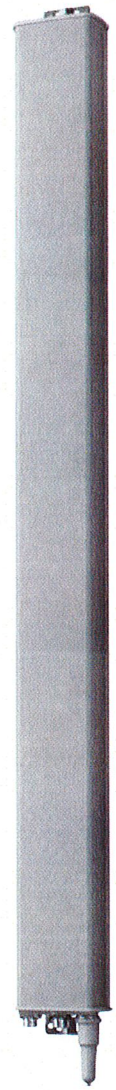
7 Berkshire Road/1358 New Britain Avenue

West Hartford, Connecticut

KATHREIN
SCALA DIVISION

742 213

65° Panel Antenna



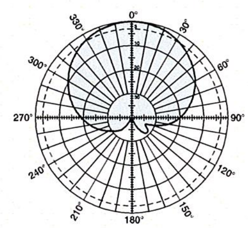
Kathrein's X-polarized adjustable electrical downtilt antennas offer the wireless carrier the ability to tailor polarization diversity sites for optimum performance. Using variable downtilt, only a few models need be procured to accommodate the needs of widely varying conditions. Remotely controlled downtilt is available as a retrofitable option.

- 0-6° downtilt range.
- UV resistant pulltruded fiberglass radome.
- DC Grounded metallic parts for impulse suppression.
- No moving electrical connections.
- Wideband vector dipole technology.
- Optional remote downtilt Control.
- Will accomodate future 3G / UMTS applications.

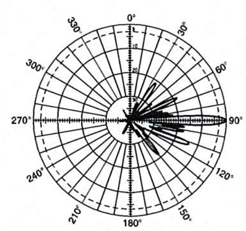
General specifications:

Frequency range	1710–2170 MHz
VSWR	< 1.5:1
Impedance	50 ohms
Intermodulation (2x20w)	IM3: <-150 dBc
Polarization	+45° and -45°
Front-to-back ratio (180°±30°)	>30 dB (co-polar) >25 dB (total power)
Maximum input power	300 watts per input (at 50°C)
Electrical downtilt continuously adjustable	0–6 degrees
Connector	2 x 7/16 DIN female
Isolation	>30 dB
Cross polar ratio Main direction 0° Sector ±60°	 25 dB (typical) >10 dB
Weight	22 lb (10 kg)
Dimensions	76.5 x 6.1 x 2.7 inches (1942 x 155 x 69 mm)
Equivalent flat plate area	4.62 ft² (0.429 m²)
Wind survival rating*	120 mph (200 kph)
Shipping dimensions	87.2 x 6.8 x 3.6 inches (2214 x 172 x 92 mm)
Shipping weight	24.3 lb (11 kg)
Mounting	Fixed and tilt mount options are available for 2 to 4.6 inch (50 to 115 mm) OD masts.

See reverse for order information.



Horizontal pattern
±45°- polarization



Vertical pattern
±45°- polarization

Specifications:	**1710–1880 MHz**	**1850–1990 MHz**	**1920–2170 MHz**
Gain	19 dBi	19.2 dBi	19.5 dBi
+45° and -45° polarization horizontal beamwidth	67° (half-power)	65° (half-power)	63° (half-power)
+45° and -45° polarization vertical beamwidth	4.7° (half-power)	4.5° (half-power)	4.3° (half-power)
Vertical Pattern–sidelobe suppression for first side-lobe above main beam	0° 2° 4° 6° T 18 17 15 15 dB	0° 2° 4° 6° T 18 18 17 15 dB	0° 2° 4° 6° T 18 18 17 15 dB

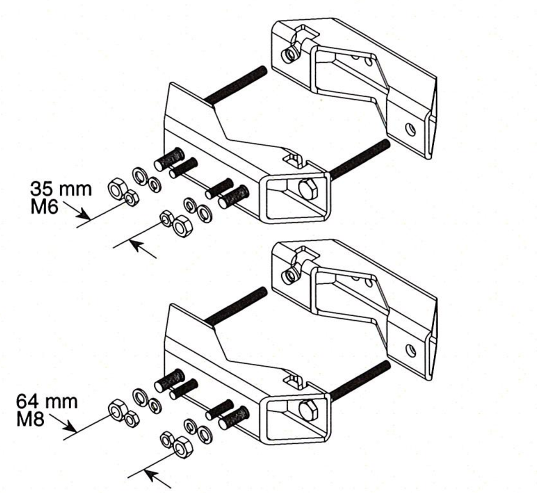
10642-H
936.2074/h

*Mechanical design is based on environmental conditions as stipulated in EIA-222-F (June 1996) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

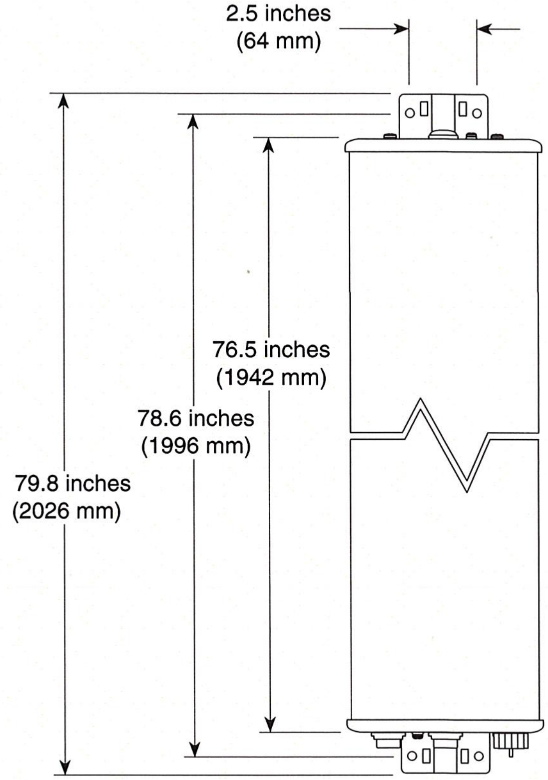
Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com

742 213

65° Panel Antenna

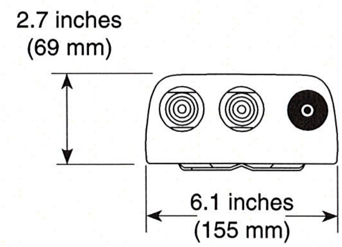


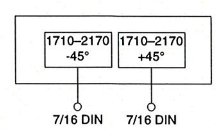
2 x 738 546 Mounting Kit



Mounting Options:

Model	Description
2 x 738 546	Mounting Kit for 2 to 4.6 inch (50 to 115 mm) OD mast.
737 978	Tilt Kit for use with the above mounting kit, 0–11 degrees downtilt angle. (requires 2 x 738 546 Mounting Kit)
742 263	Three-panel Sector Mounting Kit (120 deg. ea.) for 3.5 inch (89 mm) OD mast.



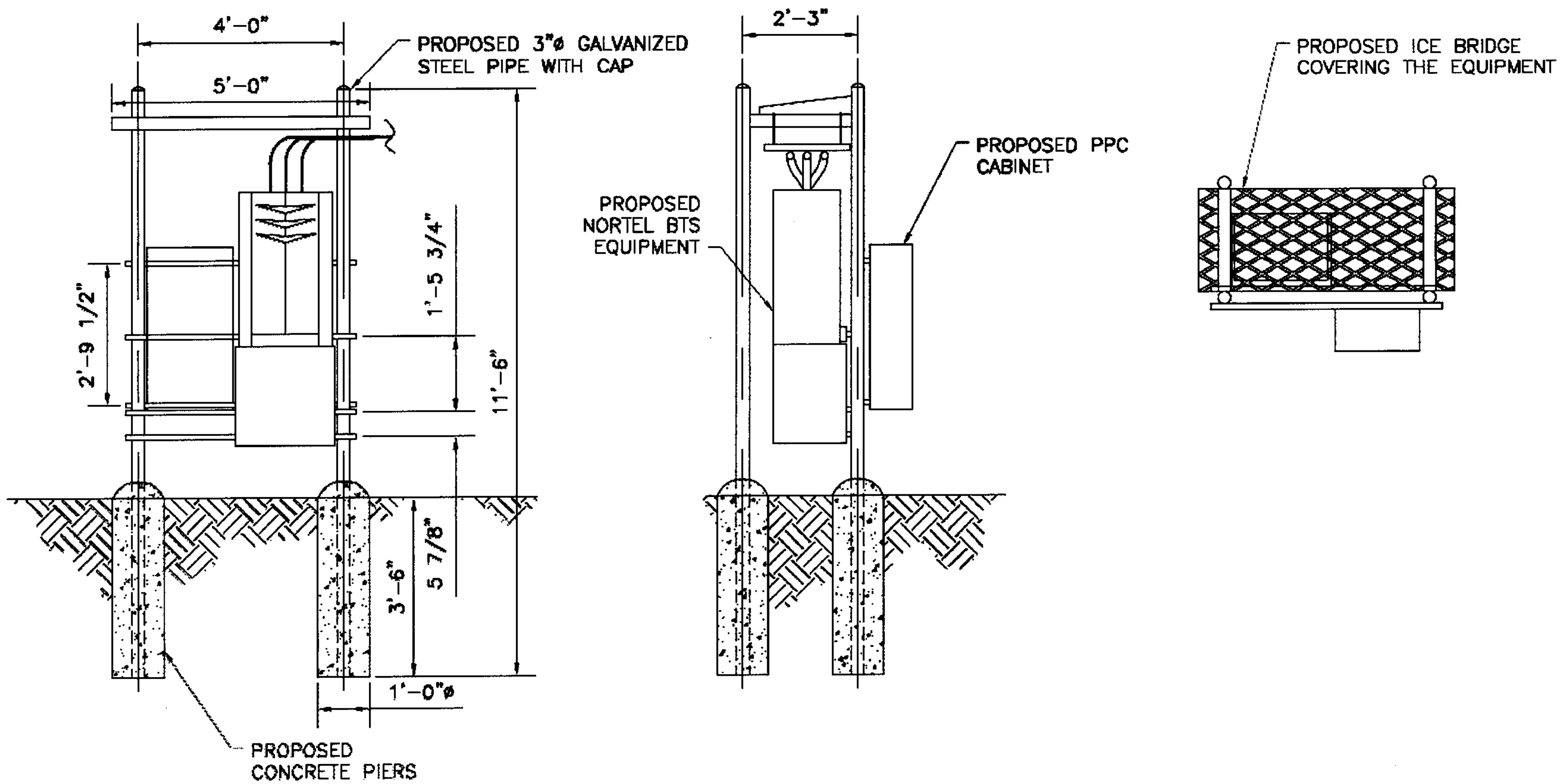


Order Information:

Model	Description
742 213	Antenna with 7/16 DIN connectors 0°–6° adjustable electrical downtilt

All specifications are subject to change without notice. The latest specifications are available at www.kathrein-scala.com.

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com



Pocket/Youghiogheny Communications – Northeast, LLC

Rack Detail

>BUSINESS MADE **SIMPLE**

NORTEL

CDMA BTS 3231 AWS 1.7/2.1 GHz (Outdoor/Indoor)

CDMA BTS 3231

Industry's Highest Capacity AWS Micro BTS

The CDMA BTS 3231 is the latest extension to Nortel Networks BTS (Base Transceiver Station) portfolio providing the ideal solution for urban, sub-urban and rural deployments. The CDMA BTS 3231 is a 3-carrier, 3-sector outdoor/indoor BTS operating at the AWS band of 1.7/2.1 GHz supporting IS-95, 1XRTT and 1xEV-DO simultaneously. BTS 3231 provides flexible deployments solutions including floor, rack, and wall mount options. The power consumption of BTS3231 is industry leading consuming only 630W for 3C3S. The BTS 3231 is also very light at 240lbs making it easy to transport to hard to reach locations such as the top of a high rise building.

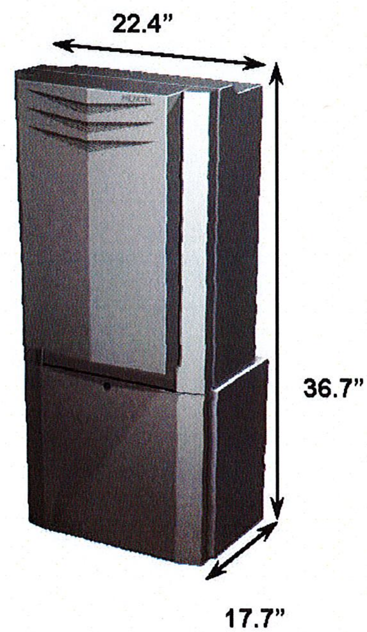


Exhibit D

Power Density Calculations

Pocket Site HFCT0379B

7 Berkshire Road/1358 New Britain Avenue

West Hartford, Connecticut

C Squared Systems, LLC
920 Candia Road
Manchester, NH 03109
Phone: (603) 657 9702
E-mail:
support@csquaredsystems.com

Calculated Radio Frequency Emissions

CT-0379B

7 Berkshire Rd/1358 New Britain Ave

West Hartford, CT

Table of Contents

List of Tables

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed Pocket antennas installed on the existing tower at 7 Berkshire Road/1358 New Britain Ave, West Hartford, CT.

These calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are much more conservative (higher) than the actual signal levels will be from the finished installation.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter (mW/cm^2). The number of mW/cm^2 emitted is called the power density. The general population exposure limit for the cellular band is 0.567-0.593 mW/cm^2, and the general population exposure limit for the PCS/AWS band is 1.0 mW/cm^2. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

The FCC general population / uncontrolled limits set the maximum exposure to which most people may be subjected. General population / uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Higher exposure limits are permitted under the occupational / controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure (through training), and they must be able to exercise control over their exposure. General population / uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals."

The FCC describes exposure to radio frequency (RF) energy in terms of percentage of maximum permissible exposure (MPE) with 100% being the maximum allowed. Rather than the FCC presenting the user specification in terms of complex power density figures over a specified surface area, this MPE measure is particularly useful, and even more so when considering that power density limits actually vary by frequency because of the different absorptive properties of the human body at different frequencies.

MPE limits are specified as time-averaged exposure limits. This means that exposure can be averaged over 30 minutes for general population / uncontrolled exposure (or 6 minutes for occupational / controlled exposure). However, for the case of exposure of the general public, time averaging is usually not applied because of uncertainties over exact exposure conditions and difficulty in controlling time of exposure. Therefore, the typical conservative approach is to assume that any RF exposure to the general public will be continuous.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population / uncontrolled exposure and for occupational / controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include limits for Maximum Permissible Exposure (MPE) for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based on exposure limits recommended by the National Council on Radiation Protection and Measurements (NCRP), the exposure limits developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit. As shown in these excerpts, each frequency band has different exposure limits, requiring power density to be reported as a percent of Maximum Permissible Exposure (MPE) when dealing with carriers transmitting in different frequency bands.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{EIRP}{\pi \times R^2}\right) \times \text{Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna

V = Vertical Distance from bottom of antenna

Off Beam Loss is determined by the selected antenna patterns

4. Calculation Results

Table 1 below outlines the power density information for the site. All information for carriers other than Pocket was obtained from current CSC database, except where otherwise noted[1].

Carrier	Number of Trans.	Effective Radiated Power (ERP) Per Transmitter (Watts)	Antenna Height (Feet)	Operating Frequency (MHz)	Total ERP (Watts)	Power Density (mw/cm^2)	Limit	%MPE
Nextel	9	100	128	851	900	0.0198	0.5673	3.48%
AT&T	4	275	95	1900	1,100	0.0438	1.0000	4.38%
Verizon	9	200	107	880	1,800	0.0565	0.5867	9.64%
Verizon	3	285	107	1900	855	0.0269	1.0000	2.69%
Sprint	11	118	118	1900	1,298	0.0335	1.0000	3.35%
T-Mobile	4	288	85	1930	1,152	0.0573	1.0000	5.73%
Pocket	3	631	96	2130-2133.75	1,893	0.0739	1.0000	7.39%
							Total	36.66%

Table 1: Proposed Carrier Information

5. Conclusion

The above analysis verifies that emissions from the proposed site will be well below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the cumulative power density from the proposed transmit antennas at the existing facility is well below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at the base of the tower is 36.66% of the FCC limit.

As noted in the introduction, obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the finished installation.

[1] According to the structural analysis report submitted on August 11, 2008 by the engineering firm of Vertical Solutions, Inc, AT&T has abandoned this site and Pocket will assume their 95' location on this tower. T-Mobile's has also abandoned the site and have removed their antennas from the tower. Nextel has relocated their iDEN antennas from the 128' location to collocate with Sprint-Nextel PCS at the 118' location. All of the previously reported %MPE values however, have been retained in the calculation for the purpose of the composite analysis.

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.

October 7, 2008
Date

Daniel l. Goulet
C Squared Systems, LLC

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave. IEEE-SA Standards Board

Attachment B: FCC Limits For Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure

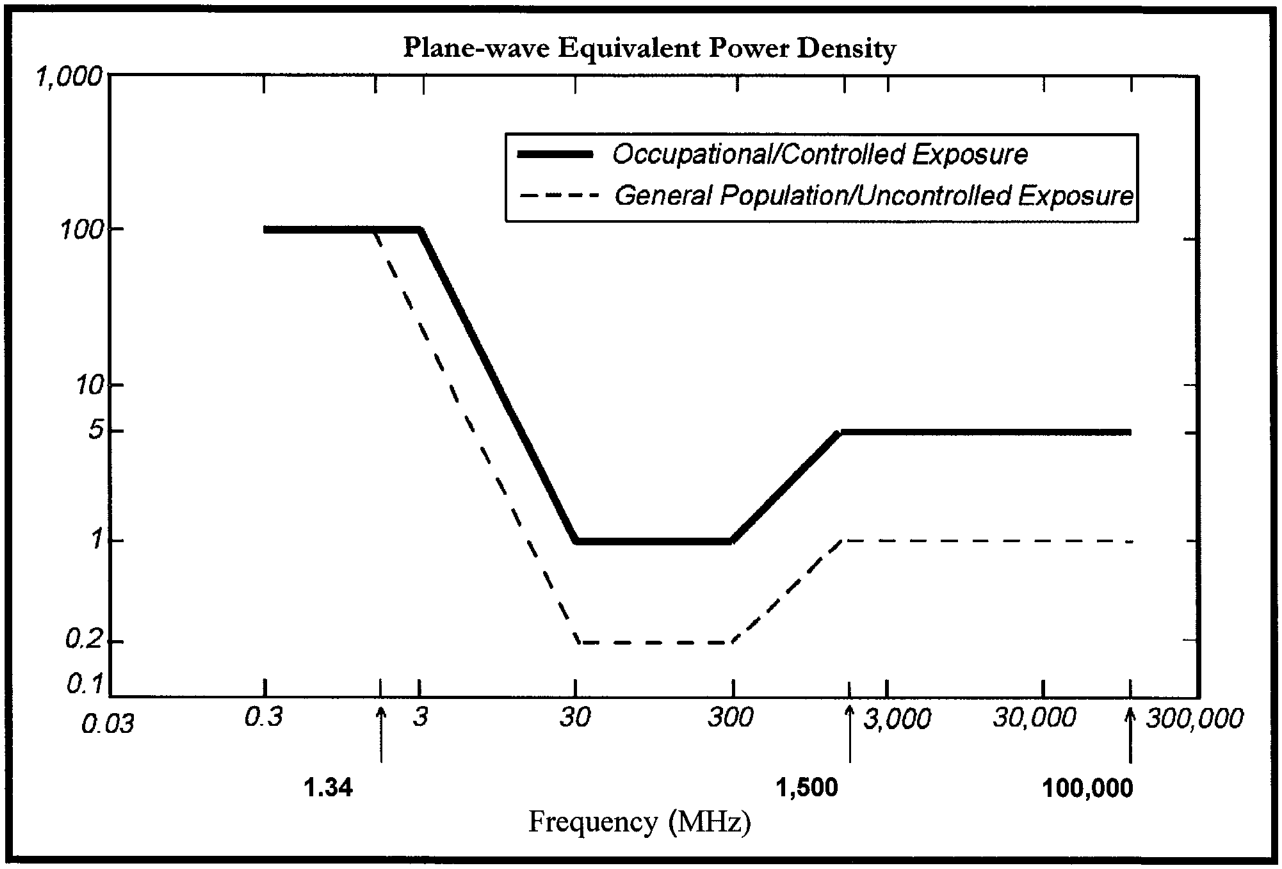
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	$(900/f^2)$*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	$(180/f^2)$*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz   * Plane-wave equivalent power density

NOTE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.



- **FCC Limits for Maximum Permissible Exposure (MPE)**

Exhibit E

Structural Analysis

Pocket Site HFCT0379B

7 Berkshire Road/1358 New Britain Avenue

West Hartford, Connecticut

August 11, 2008

Mr. Marco Morales
Crown Castle International
1200 MacArthur Blvd
Mahwah, NJ 07430
(201) 236-9032

Vertical Solutions, Inc.
2002 Production Drive
Apex, NC 27539
(888) 321-6167
mlassiter@verticalsolutions-inc.com

Subject:	**Structural Analysis Report**
Carrier Designation:	**Youghiogheny Co-Locate** **Carrier Site Number: *CT-0379B*** **Carrier Site Name: *N/A***
Crown Castle Designation:	**BU Number: *876324*** **Site Name: *West Hartford United Methodist*** ***JDE Job Number: 106955*** ***Application Number: 65396***
Engineering Firm Designation:	**Vertical Solutions Project Number: 080497.07Rev2**
Site Data:	**1358 New Britain Ave, W. Hartford, Hartford Co, CT, 06110** ***Latitude N 41° 43' 50.37, Longitude W 072° 45' 13.17'*** ***120 foot Self Supporting Pole Structure***

Dear Mr. Morales,

Vertical Solutions is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the aforementioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work'.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower and foundation stress level for the structure, under the following load case, to be:

LC1: Existing + Reserved + Proposed Equipment	**Sufficient Capacity**

Note: See Table I and Table II for the proposed and existing/reserved loading.

The analysis has been performed in accordance with the ANSI/TIA-222-F standard based upon a basic wind speed of 80-mph fastest mile and 1/2in. radial ice.

All equipment and modifications proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at Vertical Solutions appreciate the opportunity of providing our continuing professional services to you and Crown Castle International. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted,

Michael L. Lassiter, S.E., P.E., C.W.I.
Structural Engineer, Civil Engineer, Certified Weld Inspector & President

STATE OF CONNECTICUT MICHAEL L. LASSITER No. 25064 LICENSED PROFESSIONAL ENGINEER

AUG 1 1 2008

August 11, 2008

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TABLE OF CONTENTS

1) INTRODUCTION

The subject tower is a 120-ft monopole manufactured by ROHN in 1997.

2) ANALYSIS CRITERIA

Specific standards and code (analysis)

- TIA-222-F – 80-mph basic wind speed and 1/2-in radial ice

Table 1 – Proposed (P) Antenna and Cable Information

Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount	Number Of Feed Lines	Feed Line Size (in)
96	3	Kathrein	742 213	Flush Mounts	6	1 5/8

Table 2 – Existing (E) and Reserved (R) Antenna and Cable Information

Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount	Number Of Feed Lines	Feed Line Size (in)
117[1]	9	Sprint (MLA)	Sprint MLA Antenna	Platform with Handrail	9	1 5/8
	6	Decibel (E)	950F65T2E-M		15	1 1/4
	1	EMS Wireless (E)	RR90-11-05DBL			
	1		RR90-11-00DBL			
	1		RR65-12-00DBL			
	1	EMS Wireless (R)	RR90-11-05DBL			
	1		RR90-11-00DBL			
	1		RR65-12-00DBL			
105	6	Antel (E)	LPA-80090/4CF	Platform with Handrail	12 (SLA)	1 1/4
	6	Decibel (E)	950F85T2E-M			
60	2	Kathrein (E)	OG-860/1920/GPS-A	(2) Side Arm Mounts	2	1/2
47	1	Lucent (E)	KS24019-L112A	Side Arm Mount	1	1/2
	1	Lucent (R)	KS24019-L112A	Side Arm Mount	1	1/2

1 – Installed and Reserved Antenna wind area is greater than MLA. Therefore, installed and proposed antennas were used in the analysis

3) ANALYSIS PROCEDURE

3.1) Documents Reviewed

Refer to Appendix A for listing and descriptions of documents reviewed.

3.2) Analysis Method

RISA Tower (version 5.2), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various dead, live, wind, and ice load cases. All loads were computed in accordance with the ANSI/TIA-222-F or the local building code requirements. Selected output from the analysis is included in Appendix.

3.3) Assumptions

1. This structural analysis **does not** include a grouted base plate.
2. Tower and structures were built in accordance with the manufacturer's specifications.
3. The tower and structures have been maintained in accordance with manufacturer's specifications.
4. The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

If any of these assumptions are not valid or have been made in error, this analysis may be affected, and Vertical Solutions should be allowed to review any new information to determine its effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 – Tower Component Stresses vs. Capacity – LC1

Notes	Component	Elevation (ft)	% Capacity	Pass/Fail
RISA Tower Analysis Summary:				
			Summary	
Notes:	**Component**	**Elevation (ft)**	**% Capacity**	**Pass/Fail**
	L1	120-90	67	*Pass*
	L2	90-62	97	*Pass*
	L3	62-60	93	*Pass*
	L4	60-43	99	*Pass*
	L5	43-30	99	*Pass*
	L6	30-22	96	*Pass*
	L7	22-0	100	*Pass*
Individual Components:				
Notes:	**Component**	**Comments**	**% Capacity**	**Pass/Fail**
	Base Plate		98	*Pass*
	Flange Plate 30		99	*Pass*
	Flange Plate 60		100	*Pass*
	Flange Plate 90		73	*Pass*
	Anchor Bolts		98	*Pass*
	Flange Bolts 30		67	*Pass*
	Flange Bolts 60		60	*Pass*
	Flange Bolts 90		45	*Pass*
1	Base Foundation		79	*Pass*
Structure Rating (max from all components) =				**100%**

Notes:

1) See additional documentation in "Appendix E– Additional Calculations" for calculations supporting the % capacity listed.
2) Capacities up to 100% are considered acceptable based on analysis procedures used.

4.1) Recommendations

Install modifications per the drawings in Appendix E.

Appendix A

Documents Reviewed

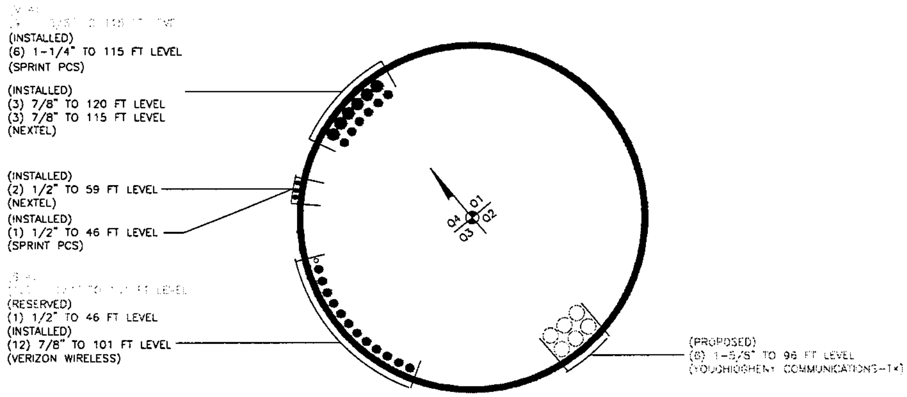
Table 1 - Project History, 080497.07Rev0, West Hartford United Methodist _CT, MR-1181, 876324

File	By: / For:	Description
19961227-GEO-1529734.pdf	SEA Consultants Inc.	Geotechnical Report
19970113-FDD-1615437.pdf	ROHN	Foundation Design Drawing
19970113-TDD-1771422.pdf	ROHN	Tower Design Drawing
20080619_SAR_876324	Vertical Solutions Inc/ Crown Castle	Structural Analysis Report

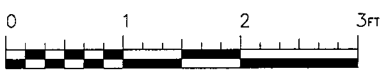
Note:
Files name format YYYYMMDD-XXX-YYYYYYYY.pdf
Where:
- YYYY=year
- MM=month
- DD=day published/issued
- XXX=file describer
  - GEO=geotechnical report
  - FDD=foundation design drawings
  - TDD=tower design drawings
  - SAR=structural analysis report
  - MDD=modification design drawings
  - PMI=post=modification inspection
- YYYYYYY=CCi Sites document ID

Appendix B

Base Level Drawing



BUSINESS UNIT: 876324 TOWER ID: C_BASELEVEL



: SCALE :

LEGEND: FEEDLINES

- ● SOLID BLUE CIRCLE DENOTES EXISTING FEEDLINE
- ○ OPEN RED CIRCLE DENOTES PROPOSED FEEDLINE
- ○ OPEN BLUE CIRCLE DENOTES RESERVED FEEDLINE
- X BLUE "X" DENOTES LOCATION NOT GIVEN

NOTE: ASSUME FEEDLINE ATTACHMENT HEIGHT TO TOWER STEEL AT 8-FEET ABOVE FINISHED GRADE UNLESS OTHERWISE SPECIFIED

CROWN CASTLE

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	14/01/08	NEW BUILD PER WORK ORDER # 162968	PSR
2	02/04/08	APPLICATION ADDED PER WORK ORDER # 203044	LAN
3	09/06/08	APPLICATION ADDED PER WORK ORDER # 214779	AJJ
4	12/06/08	APPLICATION ADDED PER WORK ORDER # 215624	ESG
5	24/07/08	AS-BUILT INFORMATION ADDED PER WORK ORDER # 222471	AAN

Appendix C

RISA Tower Output

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

- Tower is located in Hartford County, Connecticut.
- Basic wind speed of 80 mph.
- Nominal ice thickness of 0.5000 in.
- Ice density of 56 pcf.
- A wind speed of 69 mph is used in combination with ice.
- Deflections calculated using a wind speed of 50 mph.
- Weld together tower sections have flange connections..
- Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
- Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
- Welds are fabricated with ER-70S-6 electrodes..
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.333.
- Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Pole Size*	*Pole Grade*	*Socket Length* *ft*
L1	120'-90'	30'	P24x1/4	A572-42 (42 ksi)	
L2	90'-62'	28'	P24x3/8	A572-42 (42 ksi)	
L3	62'-60'	2'	P25.25x.35"	A572-50 (50 ksi)	
L4	60'-43'	17'	P30x3/8	A572-42 (42 ksi)	
L5	43'-30'	13'	P31.25x.378"	A572-50 (50 ksi)	
L6	30'-22'	8'	P36x3/8	A572-42 (42 ksi)	
L7	22'-0'	22'	P 37.25 x 0.40	A572-50 (50 ksi)	

Tower Elevation *ft*	*Gusset Area (per face)* ft^2	*Gusset Thickness* *in*	*Gusset Grade*	*Adjust. Factor* A_f	*Adjust. Factor* A_r	*Weight Mult.*	*Double Angle Stitch Bolt Spacing Diagonals* *in*	*Double Angle Stitch Bolt Spacing Horizontals* *in*
L1 120'-90'				1	1	1		
L2 90'-62'				1	1	1		
L3 62'-60'				1	1	1		
L4 60'-43'				1	1	1		

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L5 43'-30'				1	1	1		
L6 30'-22'				1	1	1		
L7 22'-0'				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
VXL6-50 (1-1/4 FOAM)	A	No	Inside Pole	115' - 8'	6	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
VXL6-50 (1-1/4 FOAM)	A	No	Inside Pole	115' - 8'	9	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
LDF6-50A (1-1/4 FOAM)	A	No	Inside Pole	101' - 8'	12	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
LDF4-50A (1/2 FOAM)	C	No	CaAa (Out Of Face)	46' - 8'	2	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
LDF4-50A (1/2 FOAM)	C	No	CaAa (Out Of Face)	59' - 8'	1	No Ice	0.06	0.00
						1/2" Ice	0.16	0.00
LDF4-50A (1/2 FOAM)	C	No	Inside Pole	46' - 8'	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
LDF7-50A (1-5/8 FOAM)	A	No	Inside Pole	96' - 8'	6	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	120'-90'	A	0.000	0.000	0.000	0.000	0.30
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	90'-62'	A	0.000	0.000	0.000	0.000	0.57
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L3	62'-60'	A	0.000	0.000	0.000	0.000	0.04
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L4	60'-43'	A	0.000	0.000	0.000	0.000	0.35
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.008	0.00
L5	43'-30'	A	0.000	0.000	0.000	0.000	0.26
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.819	0.01
L6	30'-22'	A	0.000	0.000	0.000	0.000	0.16
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.504	0.00
L7	22'-0'	A	0.000	0.000	0.000	0.000	0.28
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.882	0.01

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	*Tower Elevation* *ft*	*Face or Leg*	*Ice Thickness* *in*	A_R *ft²*	A_F *ft²*	C_AA_A *In Face* *ft²*	C_AA_A *Out Face* *ft²*	*Weight* *K*
L1	120'-90'	A	0.500	0.000	0.000	0.000	0.000	0.30
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	90'-62'	A	0.500	0.000	0.000	0.000	0.000	0.57
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L3	62'-60'	A	0.500	0.000	0.000	0.000	0.000	0.04
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L4	60'-43'	A	0.500	0.000	0.000	0.000	0.000	0.35
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.608	0.02
L5	43'-30'	A	0.500	0.000	0.000	0.000	0.000	0.26
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.119	0.03
L6	30'-22'	A	0.500	0.000	0.000	0.000	0.000	0.16
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.304	0.02
L7	22'-0'	A	0.500	0.000	0.000	0.000	0.000	0.28
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.282	0.04

Feed Line Center of Pressure

Section	*Elevation* *ft*	CP_X *in*	CP_Z *in*	CP_X *Ice* *in*	CP_Z *Ice* *in*
L1	120'-90'	0.0000	0.0000	0.0000	0.0000
L2	90'-62'	0.0000	0.0000	0.0000	0.0000
L3	62'-60'	0.0000	0.0000	0.0000	0.0000
L4	60'-43'	-0.0752	0.0434	-0.1820	0.1051
L5	43'-30'	-0.0799	0.0461	-0.1934	0.1117
L6	30'-22'	-0.0802	0.0463	-0.1957	0.1130
L7	22'-0'	-0.0514	0.0297	-0.1271	0.0734

Discrete Tower Loads

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		C_AA_A *Front* *ft²*	C_AA_A *Side* *ft²*	*Weight* *K*
*									
*									
MTS 12.5' Co-Location	C	None		0.0000	116'	No Ice	30.10	30.10	1.59
Platform w/handrails						1/2" Ice	40.80	40.80	2.03
(2) RR65-12-00DBL	A	From Face	3.00	0.0000	117'	No Ice	5.64	4.18	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
w/Mount Pipe			0' 0'			1/2" Ice	6.04	4.80	0.08
(2) 950F65T2E-M w/Mount Pipe	A	From Face	3.00 0' 0'	0.0000	117'	No Ice 1/2" Ice	6.89 7.56	5.90 7.01	0.04 0.10
(2) 950F65T2E-M w/Mount Pipe	B	From Face	3.00 0' 0'	0.0000	117'	No Ice 1/2" Ice	6.89 7.56	5.90 7.01	0.04 0.10
(2) RR90-11-05DBL w/Mount Pipe	B	From Face	3.00 0' 0'	0.0000	117'	No Ice 1/2" Ice	6.31 7.02	4.93 6.02	0.05 0.10
(2) 950F65T2E-M w/Mount Pipe	C	From Face	3.00 0' 0'	0.0000	117'	No Ice 1/2" Ice	6.89 7.56	5.90 7.01	0.04 0.10
(2) RR90-11-00DBL w/Mount Pipe	C	From Face	3.00 0' 0'	0.0000	117'	No Ice 1/2" Ice	6.31 7.02	4.93 6.02	0.05 0.10
*									
(2) 950F85T2E-M w/Mount Pipe	A	From Face	3.00 0' 0'	30.0000	105'	No Ice 1/2" Ice	3.25 3.83	5.90 7.01	0.04 0.08
(2) LPA-80090/4CF w/Mount Pipe	A	From Face	3.00 0' 0'	30.0000	105'	No Ice 1/2" Ice	3.35 3.97	5.98 7.08	0.04 0.08
(2) 950F85T2E-M w/Mount Pipe	B	From Face	3.00 0' 0'	30.0000	105'	No Ice 1/2" Ice	3.25 3.83	5.90 7.01	0.04 0.08
(2) LPA-80090/4CF w/Mount Pipe	B	From Face	3.00 0' 0'	30.0000	105'	No Ice 1/2" Ice	3.35 3.97	5.98 7.08	0.04 0.08
(2) 950F85T2E-M w/Mount Pipe	C	From Face	3.00 0' 0'	30.0000	105'	No Ice 1/2" Ice	3.25 3.83	5.90 7.01	0.04 0.08
(2) LPA-80090/4CF w/Mount Pipe	C	From Face	3.00 0' 0'	0.0000	105'	No Ice 1/2" Ice	3.35 3.97	5.98 7.08	0.04 0.08
MTS 12.5' Co-Location Platform w/handrails	C	None		0.0000	105'	No Ice 1/2" Ice	30.10 40.80	30.10 40.80	1.59 2.03
*									
OG-860/1920/GPS-A	B	From Face	3.00 0' 0'	30.0000	60'	No Ice 1/2" Ice	0.33 0.43	0.40 0.51	0.00 0.01
OG-860/1920/GPS-A	C	From Face	3.00 0' 0'	90.0000	60'	No Ice 1/2" Ice	0.33 0.43	0.40 0.51	0.00 0.01
Side Arm Mount	B	From Face	3.00 0' 0'	0.0000	59'	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	0.05 0.09
Side Arm Mount	C	From Face	3.00 0' 0'	0.0000	59'	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	0.05 0.09
*									
KS24019-L112A	C	From Face	3.00 0' 0'	90.0000	47'	No Ice 1/2" Ice	0.10 0.18	0.10 0.18	0.01 0.01
Side Arm Mount	C	From Face	3.00 0'	0.0000	46'	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	0.05 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert (ft ft ft)	Azimuth Adjustment (°)	Placement (ft)		C_AA_A Front (ft^2)	C_AA_A Side (ft^2)	Weight (K)
KS24019-L112A	A	From Face	0' 3.00 0' 0'	30.0000	47'	No Ice 1/2" Ice	0.10 0.18	0.10 0.18	0.01 0.01
Side Arm Mount	A	From Face	3.00 0' 0'	0.0000	46'	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	0.05 0.09
*									
Kathrein 742-213 w/MP	A	From Face	3.00 0' 0'	30.0000	96'	No Ice 1/2" Ice	5.14 5.61	2.87 3.48	0.02 0.05
Kathrein 742-213 w/MP	B	From Face	3.00 0' 0'	30.0000	96'	No Ice 1/2" Ice	5.14 5.61	2.87 3.48	0.02 0.05
Kathrein 742-213 w/MP	C	From Face	3.00 0' 0'	30.0000	96'	No Ice 1/2" Ice	5.14 5.61	2.87 3.48	0.02 0.05

Compression Checks

Pole Design Data

Section No.	Elevation (ft)	Size	L (ft)	L_u (ft)	Kl/r	F_a (ksi)	A (in^2)	Actual P (K)	Allow. P_a (K)	Ratio $\frac{P}{P_a}$
L1	120 - 118.5	P24x1/4	30'	0'	0.0	23.696	18.6532	-0.13	442.00	0.000
	118.5 - 117					23.696	18.6532	-0.21	442.00	0.000
	117 - 115.5					23.696	18.6532	-2.10	442.00	0.005
	115.5 - 114					23.696	18.6532	-2.21	442.00	0.005
	114 - 112.5					23.696	18.6532	-2.31	442.00	0.005
	112.5 - 111					23.696	18.6532	-2.42	442.00	0.005
	111 - 109.5					23.696	18.6532	-2.52	442.00	0.006
	109.5 - 108					23.696	18.6532	-2.63	442.00	0.006
	108 - 106.5					23.696	18.6532	-2.74	442.00	0.006
	106.5 - 105					23.696	18.6532	-2.84	442.00	0.006
	105 - 103.5					23.696	18.6532	-4.74	442.00	0.011
	103.5 - 102					23.696	18.6532	-4.85	442.00	0.011
	102 - 100.5					23.696	18.6532	-4.96	442.00	0.011
	100.5 - 99					23.696	18.6532	-5.07	442.00	0.011
	99 - 97.5					23.696	18.6532	-5.18	442.00	0.012
	97.5 - 96					23.696	18.6532	-5.29	442.00	0.012
	96 - 94.5					23.696	18.6532	-5.43	442.00	0.012
	94.5 - 93					23.696	18.6532	-5.54	442.00	0.013
	93 - 91.5					23.696	18.6532	-5.65	442.00	0.013
	91.5 - 90					23.696	18.6532	-5.77	442.00	0.013
L2	90 - 88.6	P24x3/8	28'	0'	0.0	25.200	27.8325	-5.93	701.38	0.008
	88.6 - 87.2					25.200	27.8325	-6.10	701.38	0.009
	87.2 - 85.8					25.200	27.8325	-6.26	701.38	0.009

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
	85.8 - 84.4					25.200	27.8325	-6.43	701.38	0.009
	84.4 - 83					25.200	27.8325	-6.59	701.38	0.009
	83 - 81.6					25.200	27.8325	-6.76	701.38	0.010
	81.6 - 80.2					25.200	27.8325	-6.92	701.38	0.010
	80.2 - 78.8					25.200	27.8325	-7.09	701.38	0.010
	78.8 - 77.4					25.200	27.8325	-7.26	701.38	0.010
	77.4 - 76					25.200	27.8325	-7.43	701.38	0.011
	76 - 74.6					25.200	27.8325	-7.60	701.38	0.011
	74.6 - 73.2					25.200	27.8325	-7.77	701.38	0.011
	73.2 - 71.8					25.200	27.8325	-7.94	701.38	0.011
	71.8 - 70.4					25.200	27.8325	-8.11	701.38	0.012
	70.4 - 69					25.200	27.8325	-8.28	701.38	0.012
	69 - 67.6					25.200	27.8325	-8.45	701.38	0.012
	67.6 - 66.2					25.200	27.8325	-8.63	701.38	0.012
	66.2 - 64.8					25.200	27.8325	-8.80	701.38	0.013
	64.8 - 63.4					25.200	27.8325	-8.98	701.38	0.013
	63.4 - 62					25.200	27.8325	-9.15	701.38	0.013
L3	62 - 61	P25.25x.35"	2'	0'	0.0	29.176	27.3790	-9.28	798.82	0.012
	61 - 60					29.176	27.3790	-9.40	798.82	0.012
L4	60 - 59	P30x3/8	17'	0'	0.0	25.075	34.9011	-9.56	875.15	0.011
	59 - 58					25.075	34.9011	-9.79	875.15	0.011
	58 - 57					25.075	34.9011	-9.94	875.15	0.011
	57 - 56					25.075	34.9011	-10.08	875.15	0.012
	56 - 55					25.075	34.9011	-10.23	875.15	0.012
	55 - 54					25.075	34.9011	-10.37	875.15	0.012
	54 - 53					25.075	34.9011	-10.52	875.15	0.012
	53 - 52					25.075	34.9011	-10.66	875.15	0.012
	52 - 51					25.075	34.9011	-10.81	875.15	0.012
	51 - 50					25.075	34.9011	-10.96	875.15	0.013
	50 - 49					25.075	34.9011	-11.10	875.15	0.013
	49 - 48					25.075	34.9011	-11.25	875.15	0.013
	48 - 47					25.075	34.9011	-11.40	875.15	0.013
	47 - 46					25.075	34.9011	-11.55	875.15	0.013
	46 - 45					25.075	34.9011	-11.80	875.15	0.013
	45 - 44					25.075	34.9011	-11.94	875.15	0.014
	44 - 43					25.075	34.9011	-12.09	875.15	0.014
L5	43 - 42	P31.25x.378"	13'	0'	0.0	28.008	36.6612	-12.25	1026.79	0.012
	42 - 41					28.008	36.6612	-12.40	1026.79	0.012
	41 - 40					28.008	36.6612	-12.55	1026.79	0.012
	40 - 39					28.008	36.6612	-12.71	1026.79	0.012
	39 - 38					28.008	36.6612	-12.86	1026.79	0.013
	38 - 37					28.008	36.6612	-13.02	1026.79	0.013
	37 - 36					28.008	36.6612	-13.17	1026.79	0.013
	36 - 35					28.008	36.6612	-13.33	1026.79	0.013
	35 - 34					28.008	36.6612	-13.48	1026.79	0.013
	34 - 33					28.008	36.6612	-13.64	1026.79	0.013
	33 - 32					28.008	36.6612	-13.80	1026.79	0.013
	32 - 31					28.008	36.6612	-13.95	1026.79	0.014
	31 - 30					28.008	36.6612	-14.11	1026.79	0.014
L6	30 - 29	P36x3/8	8'	0'	0.0	23.696	41.9697	-14.28	994.51	0.014
	29 - 28					23.696	41.9697	-14.45	994.51	0.015
	28 - 27					23.696	41.9697	-14.62	994.51	0.015
	27 - 26					23.696	41.9697	-14.80	994.51	0.015
	26 - 25					23.696	41.9697	-14.97	994.51	0.015
	25 - 24					23.696	41.9697	-15.14	994.51	0.015
	24 - 23					23.696	41.9697	-15.31	994.51	0.015
	23 - 22					23.696	41.9697	-15.48	994.51	0.016
L7	22 - 20.9	P 37.25 x 0.40	22'	0'	0.0	27.109	46.3071	-15.68	1255.33	0.012
	20.9 - 19.8					27.109	46.3071	-15.87	1255.33	0.013
	19.8 - 18.7					27.109	46.3071	-16.07	1255.33	0.013

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
	18.7 - 17.6					27.109	46.3071	-16.27	1255.33	0.013
	17.6 - 16.5					27.109	46.3071	-16.46	1255.33	0.013
	16.5 - 15.4					27.109	46.3071	-16.66	1255.33	0.013
	15.4 - 14.3					27.109	46.3071	-16.86	1255.33	0.013
	14.3 - 13.2					27.109	46.3071	-17.05	1255.33	0.014
	13.2 - 12.1					27.109	46.3071	-17.25	1255.33	0.014
	12.1 - 11					27.109	46.3071	-17.45	1255.33	0.014
	11 - 9.9					27.109	46.3071	-17.65	1255.33	0.014
	9.9 - 8.8					27.109	46.3071	-17.84	1255.33	0.014
	8.8 - 7.7					27.109	46.3071	-18.04	1255.33	0.014
	7.7 - 6.6					27.109	46.3071	-18.24	1255.33	0.015
	6.6 - 5.5					27.109	46.3071	-18.44	1255.33	0.015
	5.5 - 4.4					27.109	46.3071	-18.64	1255.33	0.015
	4.4 - 3.3					27.109	46.3071	-18.84	1255.33	0.015
	3.3 - 2.2					27.109	46.3071	-19.04	1255.33	0.015
	2.2 - 1.1					27.109	46.3071	-19.24	1255.33	0.015
	1.1 - 0					27.109	46.3071	-19.44	1255.33	0.015

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	120 - 118.5	P24x1/4	0.05	0.005	23.696	0.000	0.00	0.000	23.696	0.000
	118.5 - 117		0.23	0.025	23.696	0.001	0.00	0.000	23.696	0.000
	117 - 115.5		5.52	0.605	23.696	0.026	0.00	0.000	23.696	0.000
	115.5 - 114		12.16	1.331	23.696	0.056	0.00	0.000	23.696	0.000
	114 - 112.5		18.92	2.071	23.696	0.087	0.00	0.000	23.696	0.000
	112.5 - 111		25.78	2.823	23.696	0.119	0.00	0.000	23.696	0.000
	111 - 109.5		32.77	3.587	23.696	0.151	0.00	0.000	23.696	0.000
	109.5 - 108		39.87	4.364	23.696	0.184	0.00	0.000	23.696	0.000
	108 - 106.5		47.08	5.154	23.696	0.217	0.00	0.000	23.696	0.000
	106.5 - 105		54.40	5.956	23.696	0.251	0.00	0.000	23.696	0.000
	105 - 103.5		67.10	7.346	23.696	0.310	0.00	0.000	23.696	0.000
	103.5 - 102		79.97	8.755	23.696	0.369	0.00	0.000	23.696	0.000
	102 - 100.5		92.95	10.176	23.696	0.429	0.00	0.000	23.696	0.000
	100.5 - 99		106.05	11.610	23.696	0.490	0.00	0.000	23.696	0.000
	99 - 97.5		119.25	13.055	23.696	0.551	0.00	0.000	23.696	0.000
	97.5 - 96		132.56	14.512	23.696	0.612	0.00	0.000	23.696	0.000
	96 - 94.5		146.66	16.056	23.696	0.678	0.00	0.000	23.696	0.000
	94.5 - 93		160.87	17.612	23.696	0.743	0.00	0.000	23.696	0.000
	93 - 91.5		175.19	19.179	23.696	0.809	0.00	0.000	23.696	0.000
	91.5 - 90		189.61	20.758	23.696	0.876	0.00	0.000	23.696	0.000
L2	90 - 88.6	P24x3/8	203.17	15.063	27.720	0.543	0.00	0.000	27.720	0.000
	88.6 - 87.2		216.81	16.074	27.720	0.580	0.00	0.000	27.720	0.000
	87.2 - 85.8		230.55	17.093	27.720	0.617	0.00	0.000	27.720	0.000
	85.8 - 84.4		244.38	18.118	27.720	0.654	0.00	0.000	27.720	0.000
	84.4 - 83		258.29	19.149	27.720	0.691	0.00	0.000	27.720	0.000
	83 - 81.6		272.29	20.188	27.720	0.728	0.00	0.000	27.720	0.000
	81.6 - 80.2		286.38	21.232	27.720	0.766	0.00	0.000	27.720	0.000
	80.2 - 78.8		300.56	22.283	27.720	0.804	0.00	0.000	27.720	0.000
	78.8 - 77.4		314.82	23.340	27.720	0.842	0.00	0.000	27.720	0.000
	77.4 - 76		329.16	24.404	27.720	0.880	0.00	0.000	27.720	0.000
	76 - 74.6		343.58	25.473	27.720	0.919	0.00	0.000	27.720	0.000
	74.6 - 73.2		358.09	26.549	27.720	0.958	0.00	0.000	27.720	0.000
	73.2 - 71.8		372.68	27.630	27.720	0.997	0.00	0.000	27.720	0.000

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	71.8 - 70.4		387.35	28.718	27.720	1.036	0.00	0.000	27.720	0.000
	70.4 - 69		402.10	29.811	27.720	1.075	0.00	0.000	27.720	0.000
	69 - 67.6		416.92	30.910	27.720	1.115	0.00	0.000	27.720	0.000
	67.6 - 66.2		431.82	32.014	27.720	1.155	0.00	0.000	27.720	0.000
	66.2 - 64.8		446.79	33.124	27.720	1.195	0.00	0.000	27.720	0.000
	64.8 - 63.4		461.84	34.240	27.720	1.235	0.00	0.000	27.720	0.000
	63.4 - 62		476.95	35.361	27.720	1.276	0.00	0.000	27.720	0.000
L3	62 - 61	P25.25x.35"	487.79	34.821	29.176	1.193	0.00	0.000	29.176	0.000
	61 - 60		498.67	35.597	29.176	1.220	0.00	0.000	29.176	0.000
L4	60 - 59	P30x3/8	509.62	23.954	25.075	0.955	0.00	0.000	25.075	0.000
	59 - 58		520.90	24.484	25.075	0.976	0.00	0.000	25.075	0.000
	58 - 57		532.12	25.012	25.075	0.997	0.00	0.000	25.075	0.000
	57 - 56		543.38	25.541	25.075	1.019	0.00	0.000	25.075	0.000
	56 - 55		554.70	26.073	25.075	1.040	0.00	0.000	25.075	0.000
	55 - 54		566.06	26.607	25.075	1.061	0.00	0.000	25.075	0.000
	54 - 53		577.46	27.143	25.075	1.082	0.00	0.000	25.075	0.000
	53 - 52		588.92	27.682	25.075	1.104	0.00	0.000	25.075	0.000
	52 - 51		600.41	28.222	25.075	1.125	0.00	0.000	25.075	0.000
	51 - 50		611.96	28.765	25.075	1.147	0.00	0.000	25.075	0.000
	50 - 49		623.55	29.309	25.075	1.169	0.00	0.000	25.075	0.000
	49 - 48		635.18	29.856	25.075	1.191	0.00	0.000	25.075	0.000
	48 - 47		646.86	30.405	25.075	1.213	0.00	0.000	25.075	0.000
	47 - 46		658.56	30.955	25.075	1.235	0.00	0.000	25.075	0.000
	46 - 45		670.46	31.514	25.075	1.257	0.00	0.000	25.075	0.000
	45 - 44		682.44	32.078	25.075	1.279	0.00	0.000	25.075	0.000
	44 - 43		694.46	32.643	25.075	1.302	0.00	0.000	25.075	0.000
L5	43 - 42	P31.25x.378"	706.53	30.326	28.008	1.083	0.00	0.000	28.008	0.000
	42 - 41		718.63	30.846	28.008	1.101	0.00	0.000	28.008	0.000
	41 - 40		730.78	31.367	28.008	1.120	0.00	0.000	28.008	0.000
	40 - 39		742.97	31.890	28.008	1.139	0.00	0.000	28.008	0.000
	39 - 38		755.19	32.415	28.008	1.157	0.00	0.000	28.008	0.000
	38 - 37		767.45	32.941	28.008	1.176	0.00	0.000	28.008	0.000
	37 - 36		779.76	33.469	28.008	1.195	0.00	0.000	28.008	0.000
	36 - 35		792.09	33.999	28.008	1.214	0.00	0.000	28.008	0.000
	35 - 34		804.47	34.530	28.008	1.233	0.00	0.000	28.008	0.000
	34 - 33		816.88	35.063	28.008	1.252	0.00	0.000	28.008	0.000
	33 - 32		829.33	35.597	28.008	1.271	0.00	0.000	28.008	0.000
	32 - 31		841.82	36.133	28.008	1.290	0.00	0.000	28.008	0.000
	31 - 30		854.34	36.671	28.008	1.309	0.00	0.000	28.008	0.000
L6	30 - 29	P36x3/8	866.90	28.120	23.696	1.187	0.00	0.000	23.696	0.000
	29 - 28		879.51	28.529	23.696	1.204	0.00	0.000	23.696	0.000
	28 - 27		892.16	28.939	23.696	1.221	0.00	0.000	23.696	0.000
	27 - 26		904.85	29.351	23.696	1.239	0.00	0.000	23.696	0.000
	26 - 25		917.59	29.764	23.696	1.256	0.00	0.000	23.696	0.000
	25 - 24		930.37	30.179	23.696	1.274	0.00	0.000	23.696	0.000
	24 - 23		943.19	30.595	23.696	1.291	0.00	0.000	23.696	0.000
	23 - 22		956.06	31.012	23.696	1.309	0.00	0.000	23.696	0.000
L7	22 - 20.9	P 37.25 x 0.40	970.27	27.586	27.109	1.018	0.00	0.000	27.109	0.000
	20.9 - 19.8		984.52	27.991	27.109	1.033	0.00	0.000	27.109	0.000
	19.8 - 18.7		998.83	28.398	27.109	1.048	0.00	0.000	27.109	0.000
	18.7 - 17.6		1013.20	28.806	27.109	1.063	0.00	0.000	27.109	0.000
	17.6 - 16.5		1027.62	29.216	27.109	1.078	0.00	0.000	27.109	0.000
	16.5 - 15.4		1042.08	29.628	27.109	1.093	0.00	0.000	27.109	0.000
	15.4 - 14.3		1056.61	30.041	27.109	1.108	0.00	0.000	27.109	0.000
	14.3 - 13.2		1071.18	30.455	27.109	1.123	0.00	0.000	27.109	0.000
	13.2 - 12.1		1085.80	30.871	27.109	1.139	0.00	0.000	27.109	0.000
	12.1 - 11		1100.47	31.288	27.109	1.154	0.00	0.000	27.109	0.000
	11 - 9.9		1115.20	31.706	27.109	1.170	0.00	0.000	27.109	0.000
	9.9 - 8.8		1129.97	32.126	27.109	1.185	0.00	0.000	27.109	0.000
	8.8 - 7.7		1144.79	32.548	27.109	1.201	0.00	0.000	27.109	0.000

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	7.7 - 6.6		1159.66	32.970	27.109	1.216	0.00	0.000	27.109	0.000
	6.6 - 5.5		1174.58	33.395	27.109	1.232	0.00	0.000	27.109	0.000
	5.5 - 4.4		1189.54	33.820	27.109	1.248	0.00	0.000	27.109	0.000
	4.4 - 3.3		1204.55	34.247	27.109	1.263	0.00	0.000	27.109	0.000
	3.3 - 2.2		1219.61	34.675	27.109	1.279	0.00	0.000	27.109	0.000
	2.2 - 1.1		1234.71	35.104	27.109	1.295	0.00	0.000	27.109	0.000
	1.1 - 0		1249.85	35.535	27.109	1.311	0.00	0.000	27.109	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	120 - 118.5	P24x1/4	0.06	0.007	16.800	0.000	0.00	0.000	11.901	0.000
	118.5 - 117		0.15	0.017	16.800	0.001	0.00	0.000	11.901	0.000
	117 - 115.5		4.39	0.471	16.800	0.028	0.00	0.000	11.901	0.000
	115.5 - 114		4.47	0.479	16.800	0.029	0.00	0.000	11.901	0.000
	114 - 112.5		4.54	0.487	16.800	0.029	0.00	0.000	11.901	0.000
	112.5 - 111		4.62	0.495	16.800	0.029	0.00	0.000	11.901	0.000
	111 - 109.5		4.70	0.503	16.800	0.030	0.00	0.000	11.901	0.000
	109.5 - 108		4.77	0.512	16.800	0.030	0.00	0.000	11.901	0.000
	108 - 106.5		4.85	0.520	16.800	0.031	0.00	0.000	11.901	0.000
	106.5 - 105		4.92	0.528	16.800	0.031	0.00	0.000	11.901	0.000
	105 - 103.5		8.55	0.916	16.800	0.055	0.56	0.031	11.901	0.003
	103.5 - 102		8.62	0.924	16.800	0.055	0.56	0.031	11.901	0.003
	102 - 100.5		8.69	0.932	16.800	0.055	0.56	0.031	11.901	0.003
	100.5 - 99		8.77	0.940	16.800	0.056	0.56	0.031	11.901	0.003
	99 - 97.5		8.84	0.948	16.800	0.056	0.56	0.031	11.901	0.003
	97.5 - 96		8.91	0.956	16.800	0.057	0.56	0.031	11.901	0.003
	96 - 94.5		9.44	1.012	16.800	0.060	0.56	0.031	11.901	0.003
	94.5 - 93		9.51	1.020	16.800	0.061	0.56	0.031	11.901	0.003
	93 - 91.5		9.58	1.028	16.800	0.061	0.56	0.031	11.901	0.003
	91.5 - 90		9.65	1.035	16.800	0.062	0.56	0.031	11.901	0.003
L2	90 - 88.6	P24x3/8	9.72	0.698	16.800	0.042	0.56	0.021	16.800	0.001
	88.6 - 87.2		9.78	0.703	16.800	0.042	0.56	0.021	16.800	0.001
	87.2 - 85.8		9.85	0.708	16.800	0.042	0.56	0.021	16.800	0.001
	85.8 - 84.4		9.91	0.712	16.800	0.042	0.56	0.021	16.800	0.001
	84.4 - 83		9.97	0.717	16.800	0.043	0.56	0.021	16.800	0.001
	83 - 81.6		10.04	0.721	16.800	0.043	0.56	0.021	16.800	0.001
	81.6 - 80.2		10.10	0.726	16.800	0.043	0.56	0.021	16.800	0.001
	80.2 - 78.8		10.16	0.730	16.800	0.043	0.56	0.021	16.800	0.001
	78.8 - 77.4		10.22	0.734	16.800	0.044	0.56	0.021	16.800	0.001
	77.4 - 76		10.28	0.739	16.800	0.044	0.56	0.021	16.800	0.001
	76 - 74.6		10.34	0.743	16.800	0.044	0.56	0.021	16.800	0.001
	74.6 - 73.2		10.40	0.747	16.800	0.044	0.56	0.021	16.800	0.001
	73.2 - 71.8		10.46	0.751	16.800	0.045	0.56	0.021	16.800	0.001
	71.8 - 70.4		10.51	0.755	16.800	0.045	0.56	0.021	16.800	0.001
	70.4 - 69		10.57	0.759	16.800	0.045	0.56	0.021	16.800	0.001
	69 - 67.6		10.62	0.763	16.800	0.045	0.56	0.021	16.800	0.001
	67.6 - 66.2		10.68	0.767	16.800	0.046	0.56	0.021	16.800	0.001
	66.2 - 64.8		10.73	0.771	16.800	0.046	0.56	0.021	16.800	0.001
	64.8 - 63.4		10.78	0.775	16.800	0.046	0.56	0.021	16.800	0.001
	63.4 - 62		10.83	0.778	16.800	0.046	0.56	0.021	16.800	0.001
L3	62 - 61	P25.25x.35"	10.87	0.794	20.000	0.040	0.56	0.020	18.268	0.001
	61 - 60		10.90	0.796	20.000	0.040	0.56	0.020	18.268	0.001
L4	60 - 59	P30x3/8	10.97	0.629	16.800	0.037	0.60	0.014	15.644	0.001

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	59 - 58		11.20	0.642	16.800	0.038	0.94	0.022	15.644	0.001
	58 - 57		11.25	0.645	16.800	0.038	0.94	0.022	15.644	0.001
	57 - 56		11.30	0.647	16.800	0.039	0.94	0.022	15.644	0.001
	56 - 55		11.34	0.650	16.800	0.039	0.94	0.022	15.644	0.001
	55 - 54		11.39	0.653	16.800	0.039	0.94	0.022	15.644	0.001
	54 - 53		11.44	0.655	16.800	0.039	0.94	0.022	15.644	0.001
	53 - 52		11.48	0.658	16.800	0.039	0.94	0.022	15.644	0.001
	52 - 51		11.53	0.661	16.800	0.039	0.94	0.022	15.644	0.001
	51 - 50		11.57	0.663	16.800	0.039	0.94	0.022	15.644	0.001
	50 - 49		11.62	0.666	16.800	0.040	0.94	0.022	15.644	0.001
	49 - 48		11.66	0.668	16.800	0.040	0.94	0.022	15.644	0.001
	48 - 47		11.70	0.671	16.800	0.040	0.93	0.022	15.644	0.001
	47 - 46		11.75	0.674	16.800	0.040	0.93	0.022	15.644	0.001
	46 - 45		11.97	0.686	16.800	0.041	0.93	0.022	15.644	0.001
	45 - 44		12.01	0.688	16.800	0.041	0.93	0.022	15.644	0.001
	44 - 43		12.05	0.691	16.800	0.041	0.93	0.022	15.644	0.001
L5	43 - 42	P31.25x.378"	12.09	0.660	20.000	0.033	0.93	0.020	14.892	0.001
	42 - 41		12.13	0.662	20.000	0.033	0.93	0.020	14.892	0.001
	41 - 40		12.17	0.664	20.000	0.033	0.93	0.020	14.892	0.001
	40 - 39		12.21	0.666	20.000	0.033	0.93	0.020	14.892	0.001
	39 - 38		12.25	0.668	20.000	0.033	0.93	0.020	14.892	0.001
	38 - 37		12.29	0.670	20.000	0.034	0.93	0.020	14.892	0.001
	37 - 36		12.33	0.672	20.000	0.034	0.93	0.020	14.892	0.001
	36 - 35		12.36	0.674	20.000	0.034	0.93	0.020	14.892	0.001
	35 - 34		12.40	0.677	20.000	0.034	0.93	0.020	14.892	0.001
	34 - 33		12.44	0.679	20.000	0.034	0.93	0.020	14.892	0.001
	33 - 32		12.47	0.680	20.000	0.034	0.93	0.020	14.892	0.001
	32 - 31		12.51	0.682	20.000	0.034	0.93	0.020	14.892	0.001
	31 - 30		12.54	0.684	20.000	0.034	0.93	0.020	14.892	0.001
L6	30 - 29	P36x3/8	12.59	0.600	16.800	0.036	0.93	0.015	12.523	0.001
	29 - 28		12.63	0.602	16.800	0.036	0.93	0.015	12.523	0.001
	28 - 27		12.68	0.604	16.800	0.036	0.93	0.015	12.523	0.001
	27 - 26		12.72	0.606	16.800	0.036	0.93	0.015	12.523	0.001
	26 - 25		12.76	0.608	16.800	0.036	0.93	0.015	12.523	0.001
	25 - 24		12.81	0.610	16.800	0.036	0.93	0.015	12.523	0.001
	24 - 23		12.85	0.612	16.800	0.036	0.93	0.015	12.523	0.001
	23 - 22		12.89	0.614	16.800	0.037	0.93	0.015	12.523	0.001
L7	22 - 20.9	P 37.25 x 0.40	12.94	0.559	20.000	0.028	0.93	0.013	13.232	0.001
	20.9 - 19.8		12.99	0.561	20.000	0.028	0.93	0.013	13.232	0.001
	19.8 - 18.7		13.04	0.563	20.000	0.028	0.93	0.013	13.232	0.001
	18.7 - 17.6		13.09	0.565	20.000	0.028	0.93	0.013	13.232	0.001
	17.6 - 16.5		13.14	0.567	20.000	0.028	0.93	0.013	13.232	0.001
	16.5 - 15.4		13.18	0.569	20.000	0.028	0.93	0.013	13.232	0.001
	15.4 - 14.3		13.23	0.571	20.000	0.029	0.93	0.013	13.232	0.001
	14.3 - 13.2		13.28	0.573	20.000	0.029	0.93	0.013	13.232	0.001
	13.2 - 12.1		13.32	0.575	20.000	0.029	0.93	0.013	13.232	0.001
	12.1 - 11		13.37	0.577	20.000	0.029	0.93	0.013	13.232	0.001
	11 - 9.9		13.41	0.579	20.000	0.029	0.93	0.013	13.232	0.001
	9.9 - 8.8		13.46	0.581	20.000	0.029	0.93	0.013	13.232	0.001
	8.8 - 7.7		13.50	0.583	20.000	0.029	0.93	0.013	13.232	0.001
	7.7 - 6.6		13.55	0.585	20.000	0.029	0.93	0.013	13.232	0.001
	6.6 - 5.5		13.59	0.587	20.000	0.029	0.93	0.013	13.232	0.001
	5.5 - 4.4		13.63	0.589	20.000	0.029	0.93	0.013	13.232	0.001
	4.4 - 3.3		13.67	0.591	20.000	0.030	0.93	0.013	13.232	0.001
	3.3 - 2.2		13.72	0.592	20.000	0.030	0.93	0.013	13.232	0.001
	2.2 - 1.1		13.76	0.594	20.000	0.030	0.93	0.013	13.232	0.001
	1.1 - 0		13.80	0.596	20.000	0.030	0.93	0.013	13.232	0.001

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 118.5	0.000	0.000	0.000	0.000	0.000	0.001 ✔	1.333	H1-3+VT ✔
	118.5 - 117	0.000	0.001	0.000	0.001	0.000	0.002 ✔	1.333	H1-3+VT ✔
	117 - 115.5	0.005	0.026	0.000	0.028	0.000	0.031 ✔	1.333	H1-3+VT ✔
	115.5 - 114	0.005	0.056	0.000	0.029	0.000	0.062 ✔	1.333	H1-3+VT ✔
	114 - 112.5	0.005	0.087	0.000	0.029	0.000	0.093 ✔	1.333	H1-3+VT ✔
	112.5 - 111	0.005	0.119	0.000	0.029	0.000	0.125 ✔	1.333	H1-3+VT ✔
	111 - 109.5	0.006	0.151	0.000	0.030	0.000	0.158 ✔	1.333	H1-3+VT ✔
	109.5 - 108	0.006	0.184	0.000	0.030	0.000	0.191 ✔	1.333	H1-3+VT ✔
	108 - 106.5	0.006	0.217	0.000	0.031	0.000	0.225 ✔	1.333	H1-3+VT ✔
	106.5 - 105	0.006	0.251	0.000	0.031	0.000	0.259 ✔	1.333	H1-3+VT ✔
	105 - 103.5	0.011	0.310	0.000	0.055	0.003	0.324 ✔	1.333	H1-3+VT ✔
	103.5 - 102	0.011	0.369	0.000	0.055	0.003	0.384 ✔	1.333	H1-3+VT ✔
	102 - 100.5	0.011	0.429	0.000	0.055	0.003	0.444 ✔	1.333	H1-3+VT ✔
	100.5 - 99	0.011	0.490	0.000	0.056	0.003	0.505 ✔	1.333	H1-3+VT ✔
	99 - 97.5	0.012	0.551	0.000	0.056	0.003	0.566 ✔	1.333	H1-3+VT ✔
	97.5 - 96	0.012	0.612	0.000	0.057	0.003	0.628 ✔	1.333	H1-3+VT ✔
	96 - 94.5	0.012	0.678	0.000	0.060	0.003	0.694 ✔	1.333	H1-3+VT ✔
	94.5 - 93	0.013	0.743	0.000	0.061	0.003	0.760 ✔	1.333	H1-3+VT ✔
	93 - 91.5	0.013	0.809	0.000	0.061	0.003	0.826 ✔	1.333	H1-3+VT ✔
	91.5 - 90	0.013	0.876	0.000	0.062	0.003	0.893 ✔	1.333	H1-3+VT ✔
L2	90 - 88.6	0.008	0.543	0.000	0.042	0.001	0.554 ✔	1.333	H1-3+VT ✔
	88.6 - 87.2	0.009	0.580	0.000	0.042	0.001	0.590 ✔	1.333	H1-3+VT ✔
	87.2 - 85.8	0.009	0.617	0.000	0.042	0.001	0.627 ✔	1.333	H1-3+VT ✔
	85.8 - 84.4	0.009	0.654	0.000	0.042	0.001	0.665 ✔	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	84.4 - 83	0.009	0.691	0.000	0.043	0.001	0.702 ✓	1.333	H1-3+VT ✓
	83 - 81.6	0.010	0.728	0.000	0.043	0.001	0.740 ✓	1.333	H1-3+VT ✓
	81.6 - 80.2	0.010	0.766	0.000	0.043	0.001	0.778 ✓	1.333	H1-3+VT ✓
	80.2 - 78.8	0.010	0.804	0.000	0.043	0.001	0.816 ✓	1.333	H1-3+VT ✓
	78.8 - 77.4	0.010	0.842	0.000	0.044	0.001	0.854 ✓	1.333	H1-3+VT ✓
	77.4 - 76	0.011	0.880	0.000	0.044	0.001	0.893 ✓	1.333	H1-3+VT ✓
	76 - 74.6	0.011	0.919	0.000	0.044	0.001	0.932 ✓	1.333	H1-3+VT ✓
	74.6 - 73.2	0.011	0.958	0.000	0.044	0.001	0.971 ✓	1.333	H1-3+VT ✓
	73.2 - 71.8	0.011	0.997	0.000	0.045	0.001	1.010 ✓	1.333	H1-3+VT ✓
	71.8 - 70.4	0.012	1.036	0.000	0.045	0.001	1.050 ✓	1.333	H1-3+VT ✓
	70.4 - 69	0.012	1.075	0.000	0.045	0.001	1.089 ✓	1.333	H1-3+VT ✓
	69 - 67.6	0.012	1.115	0.000	0.045	0.001	1.129 ✓	1.333	H1-3+VT ✓
	67.6 - 66.2	0.012	1.155	0.000	0.046	0.001	1.169 ✓	1.333	H1-3+VT ✓
	66.2 - 64.8	0.013	1.195	0.000	0.046	0.001	1.210 ✓	1.333	H1-3+VT ✓
	64.8 - 63.4	0.013	1.235	0.000	0.046	0.001	1.250 ✓	1.333	H1-3+VT ✓
	63.4 - 62	0.013	1.276	0.000	0.046	0.001	1.291 ✓	1.333	H1-3+VT ✓
L3	62 - 61	0.012	1.193	0.000	0.040	0.001	1.207 ✓	1.333	H1-3+VT ✓
	61 - 60	0.012	1.220	0.000	0.040	0.001	1.234 ✓	1.333	H1-3+VT ✓
L4	60 - 59	0.011	0.955	0.000	0.037	0.001	0.968 ✓	1.333	H1-3+VT ✓
	59 - 58	0.011	0.976	0.000	0.038	0.001	0.989 ✓	1.333	H1-3+VT ✓
	58 - 57	0.011	0.997	0.000	0.038	0.001	1.010 ✓	1.333	H1-3+VT ✓
	57 - 56	0.012	1.019	0.000	0.039	0.001	1.032 ✓	1.333	H1-3+VT ✓
	56 - 55	0.012	1.040	0.000	0.039	0.001	1.053 ✓	1.333	H1-3+VT ✓
	55 - 54	0.012	1.061	0.000	0.039	0.001	1.075 ✓	1.333	H1-3+VT ✓
	54 - 53	0.012	1.082	0.000	0.039	0.001	1.096 ✓	1.333	H1-3+VT ✓
	53 - 52	0.012	1.104	0.000	0.039	0.001	1.118 ✓	1.333	H1-3+VT ✓

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	52 - 51	0.012	1.125	0.000	0.039	0.001	1.140 ✔	1.333	H1-3+VT ✔
	51 - 50	0.013	1.147	0.000	0.039	0.001	1.161 ✔	1.333	H1-3+VT ✔
	50 - 49	0.013	1.169	0.000	0.040	0.001	1.183 ✔	1.333	H1-3+VT ✔
	49 - 48	0.013	1.191	0.000	0.040	0.001	1.205 ✔	1.333	H1-3+VT ✔
	48 - 47	0.013	1.213	0.000	0.040	0.001	1.227 ✔	1.333	H1-3+VT ✔
	47 - 46	0.013	1.235	0.000	0.040	0.001	1.249 ✔	1.333	H1-3+VT ✔
	46 - 45	0.013	1.257	0.000	0.041	0.001	1.272 ✔	1.333	H1-3+VT ✔
	45 - 44	0.014	1.279	0.000	0.041	0.001	1.295 ✔	1.333	H1-3+VT ✔
	44 - 43	0.014	1.302	0.000	0.041	0.001	1.317 ✔	1.333	H1-3+VT ✔
L5	43 - 42	0.012	1.083	0.000	0.033	0.001	1.096 ✔	1.333	H1-3+VT ✔
	42 - 41	0.012	1.101	0.000	0.033	0.001	1.115 ✔	1.333	H1-3+VT ✔
	41 - 40	0.012	1.120	0.000	0.033	0.001	1.133 ✔	1.333	H1-3+VT ✔
	40 - 39	0.012	1.139	0.000	0.033	0.001	1.152 ✔	1.333	H1-3+VT ✔
	39 - 38	0.013	1.157	0.000	0.033	0.001	1.171 ✔	1.333	H1-3+VT ✔
	38 - 37	0.013	1.176	0.000	0.034	0.001	1.190 ✔	1.333	H1-3+VT ✔
	37 - 36	0.013	1.195	0.000	0.034	0.001	1.209 ✔	1.333	H1-3+VT ✔
	36 - 35	0.013	1.214	0.000	0.034	0.001	1.228 ✔	1.333	H1-3+VT ✔
	35 - 34	0.013	1.233	0.000	0.034	0.001	1.247 ✔	1.333	H1-3+VT ✔
	34 - 33	0.013	1.252	0.000	0.034	0.001	1.266 ✔	1.333	H1-3+VT ✔
	33 - 32	0.013	1.271	0.000	0.034	0.001	1.286 ✔	1.333	H1-3+VT ✔
	32 - 31	0.014	1.290	0.000	0.034	0.001	1.305 ✔	1.333	H1-3+VT ✔
	31 - 30	0.014	1.309	0.000	0.034	0.001	1.324 ✔	1.333	H1-3+VT ✔
L6	30 - 29	0.014	1.187	0.000	0.036	0.001	1.202 ✔	1.333	H1-3+VT ✔
	29 - 28	0.015	1.204	0.000	0.036	0.001	1.220 ✔	1.333	H1-3+VT ✔
	28 - 27	0.015	1.221	0.000	0.036	0.001	1.237 ✔	1.333	H1-3+VT ✔
	27 - 26	0.015	1.239	0.000	0.036	0.001	1.255 ✔	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	26 - 25	0.015	1.256	0.000	0.036	0.001	1.273 ✔	1.333	H1-3+VT ✔
	25 - 24	0.015	1.274	0.000	0.036	0.001	1.290 ✔	1.333	H1-3+VT ✔
	24 - 23	0.015	1.291	0.000	0.036	0.001	1.308 ✔	1.333	H1-3+VT ✔
	23 - 22	0.016	1.309	0.000	0.037	0.001	1.326 ✔	1.333	H1-3+VT ✔
L7	22 - 20.9	0.012	1.018	0.000	0.028	0.001	1.031 ✔	1.333	H1-3+VT ✔
	20.9 - 19.8	0.013	1.033	0.000	0.028	0.001	1.046 ✔	1.333	H1-3+VT ✔
	19.8 - 18.7	0.013	1.048	0.000	0.028	0.001	1.061 ✔	1.333	H1-3+VT ✔
	18.7 - 17.6	0.013	1.063	0.000	0.028	0.001	1.076 ✔	1.333	H1-3+VT ✔
	17.6 - 16.5	0.013	1.078	0.000	0.028	0.001	1.092 ✔	1.333	H1-3+VT ✔
	16.5 - 15.4	0.013	1.093	0.000	0.028	0.001	1.107 ✔	1.333	H1-3+VT ✔
	15.4 - 14.3	0.013	1.108	0.000	0.029	0.001	1.122 ✔	1.333	H1-3+VT ✔
	14.3 - 13.2	0.014	1.123	0.000	0.029	0.001	1.138 ✔	1.333	H1-3+VT ✔
	13.2 - 12.1	0.014	1.139	0.000	0.029	0.001	1.153 ✔	1.333	H1-3+VT ✔
	12.1 - 11	0.014	1.154	0.000	0.029	0.001	1.169 ✔	1.333	H1-3+VT ✔
	11 - 9.9	0.014	1.170	0.000	0.029	0.001	1.185 ✔	1.333	H1-3+VT ✔
	9.9 - 8.8	0.014	1.185	0.000	0.029	0.001	1.200 ✔	1.333	H1-3+VT ✔
	8.8 - 7.7	0.014	1.201	0.000	0.029	0.001	1.216 ✔	1.333	H1-3+VT ✔
	7.7 - 6.6	0.015	1.216	0.000	0.029	0.001	1.232 ✔	1.333	H1-3+VT ✔
	6.6 - 5.5	0.015	1.232	0.000	0.029	0.001	1.247 ✔	1.333	H1-3+VT ✔
	5.5 - 4.4	0.015	1.248	0.000	0.029	0.001	1.263 ✔	1.333	H1-3+VT ✔
	4.4 - 3.3	0.015	1.263	0.000	0.030	0.001	1.279 ✔	1.333	H1-3+VT ✔
	3.3 - 2.2	0.015	1.279	0.000	0.030	0.001	1.295 ✔	1.333	H1-3+VT ✔
	2.2 - 1.1	0.015	1.295	0.000	0.030	0.001	1.311 ✔	1.333	H1-3+VT ✔
	1.1 - 0	0.015	1.311	0.000	0.030	0.001	1.327 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	*Elevation ft*	*Component Type*	*Size*	*Critical Element*	*P K*	*SF*P_{allow} K*	*% Capacity*	*Pass Fail*
L1	120 - 90	Pole	P24x1/4	1	-5.77	589.19	67.0	Pass
L2	90 - 62	Pole	P24x3/8	2	-9.15	934.94	96.8	Pass
L3	62 - 60	Pole	P25.25x.35"	3	-9.40	1064.82	92.5	Pass
L4	60 - 43	Pole	P30x3/8	4	-12.09	1166.57	98.8	Pass
L5	43 - 30	Pole	P31.25x.378"	5	-14.11	1368.71	99.3	Pass
L6	30 - 22	Pole	P36x3/8	6	-15.48	1325.68	99.5	Pass
L7	22 - 0	Pole	P 37.25 x 0.40	7	-19.44	1673.35	99.6	Pass
							Summary	
						Pole (L7)	99.6	Pass
						RATING =	**99.6**	**Pass**

Appendix D

Additional Calculations

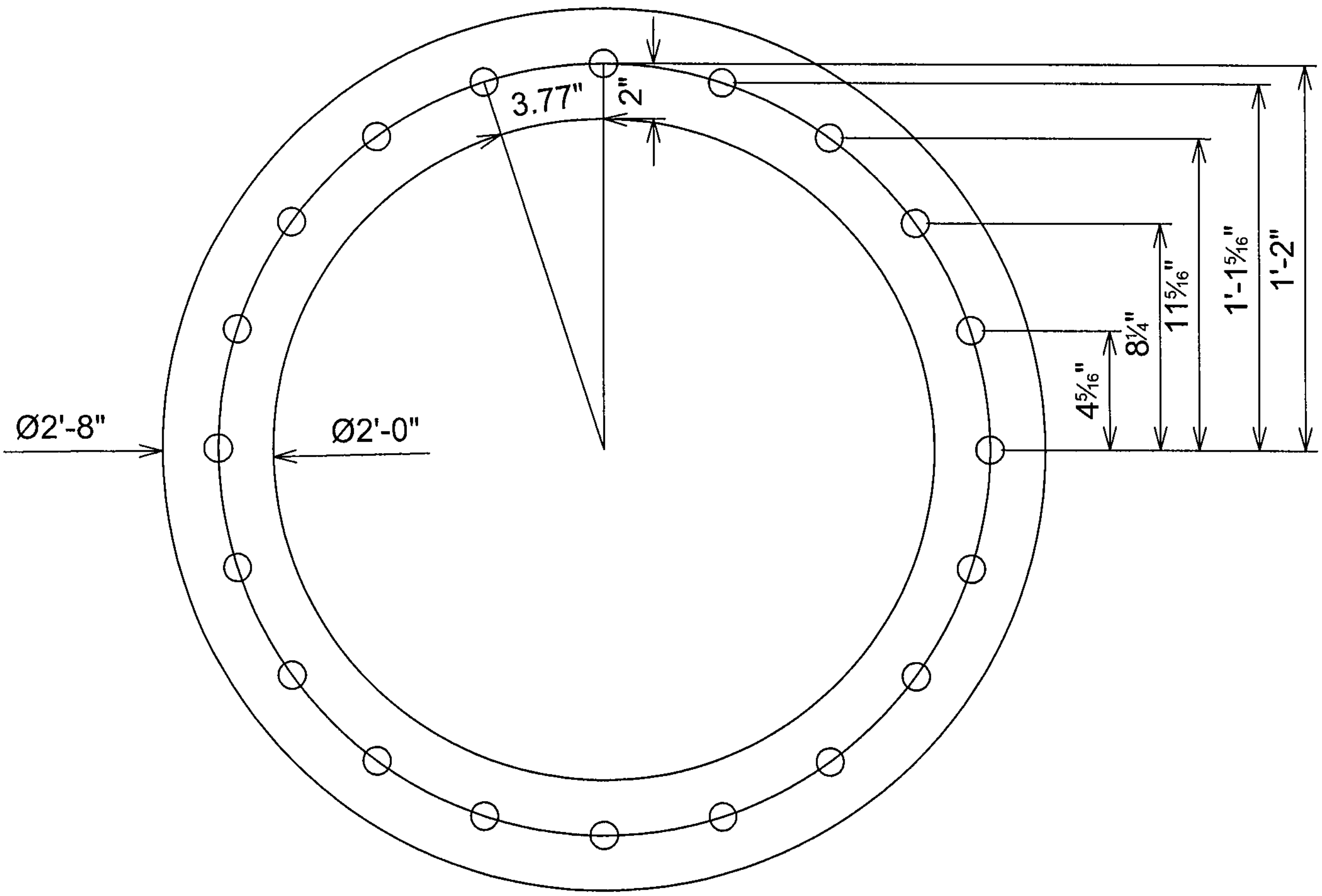
SELF-SUPPORTING POLE STRUCTURE REINFORCEMENT DESIGN, TIA-222-F

Bar Reinforcement														MR-1181 / 876324			080497.05
Section Letter	Elevation (ft)	Moment (kip-ft)	Section #	Bar # (3,4)	Bar Width (in)	Bar Thickness (in)	Bar Length (in)	OS Number	r_{max}	L_{weld} (in)	L_{plate} (in)	t Model (in)	F_y Model (ksi)	r_I	D_o Model (in)	t_A Model (in)
F	62	483.82	2	3	3.00	1.25	24	4	87%	4	19	0.41	42	87%	25.25	0.38
E	60	516.87	2	3	3.00	1.25	24	4	93%	4	19	0.44	42	93%	25.25	0.41
D	43	708.56	3	3	3.13	1.25	24	4	88%	4	19	0.40	42	88%	31.25	0.41
C	30	875.47	3	3	3.13	1.25	24	5	99%	5	23	0.45	42	99%	31.25	0.47
B	22	971.35	4	3	3.25	1.25	24	4	90%	4	19	0.40	42	90%	37.25	0.44
A	0	1251.78	4	3	3.25	1.25	24	5	99%	5	23	0.44	42	99%	37.25	0.48

vertical solutions
"execute & deliver"

Site Name West Hartford United Methodist
VSI # 080497.07
Client# 876324
Date 07/28/08
Page 1 of 4

FLANGE PLATE AT 90 FT.



vertical solutions

VSi Job No.: 080497
Date: 07/28/2008
Calculated by: ESS

FLANGE PLATE DESIGN, DEFORMATION METHOD (DIFFERENT AREAS)

Input -

$M := 203.07 \cdot kip \cdot ft$ = moment at top of flange plate

$P := 5.93 \cdot kip$ = axial load (use zero if base plate is grouted)

$F_y := 36 \cdot ksi$ = yield stress of flange plate

$b_{eff} := 3.75 \cdot in$ = effective width of flange plate in flexure

$t := 1.5 \cdot in$ = thickness of flange plate

$ASI := 133 \cdot \%$ = allowable stress increase

CONSTANTS:

$psi \equiv \frac{lb}{in^2}$

$ksi \equiv 1000 \cdot psi$

$kip \equiv 1000 \cdot lb$

$$Q := \begin{pmatrix} 2 \\ 4 \\ 4 \\ 4 \\ 4 \\ 2 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \quad d := \begin{pmatrix} 1 \cdot 12 + 2 \\ 1 \cdot 12 + 1 + \frac{5}{16} \\ 11 + \frac{5}{16} \\ 8 + \frac{1}{4} \\ 4 + \frac{5}{16} \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \cdot in \quad A_{stiff} := \begin{pmatrix} .785 \\ .785 \\ .785 \\ .785 \\ .785 \\ .785 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} in^2 \quad A_{stress} := \begin{pmatrix} .785 \\ .785 \\ .785 \\ .785 \\ .785 \\ .785 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} in^2 \quad F_t := \begin{pmatrix} 0.33 \cdot 120 \\ 0.33 \cdot 120 \\ 0.33 \cdot 120 \\ 0.33 \cdot 120 \\ 0.33 \cdot 120 \\ 0.33 \cdot 120 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \cdot ksi$$

$\sum \overrightarrow{(Q)} = 20$ $\quad sumQAd := \sum \overrightarrow{\left(Q \cdot d^2 \cdot A_{stiff}\right)}$ $\quad sumQAd = 1538\, in^4$

$$R := \frac{M \cdot \overrightarrow{\left(d \cdot A_{stiff}\right)}}{sumQAd} + \frac{P \cdot A_{stiff}}{\sum \overrightarrow{\left(A_{stiff}\right)}}$$

$$f_t := \overrightarrow{\left(\frac{R}{A_{stress}}\right)} \qquad r := \overrightarrow{\left(\frac{f_t}{ASI \cdot F_t}\right)}$$

$$R = \begin{pmatrix} 18.4 \\ 17.5 \\ 15.1 \\ 11.2 \\ 6.4 \\ 1.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \end{pmatrix} kip \quad f_t = \begin{pmatrix} 23.4 \\ 22.3 \\ 19.2 \\ 14.3 \\ 8.1 \\ 1.3 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \end{pmatrix} ksi \quad r = \begin{pmatrix} 45 \\ 42 \\ 36 \\ 27 \\ 15 \\ 2 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \%$$

Q = quantity of fasteners

d = distance from center

A = area of fastener

Ft = allowable tension stress

$$m := \begin{pmatrix} 2 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \cdot in \qquad M_{PL} := \overrightarrow{\left[\left(\frac{Q}{2}\right) \cdot R \cdot m\right]} \qquad M_{PL} = \begin{pmatrix} 3.1 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \end{pmatrix} kip \cdot ft \qquad \sum M_{PL} = 36.8\,kip \cdot in$$

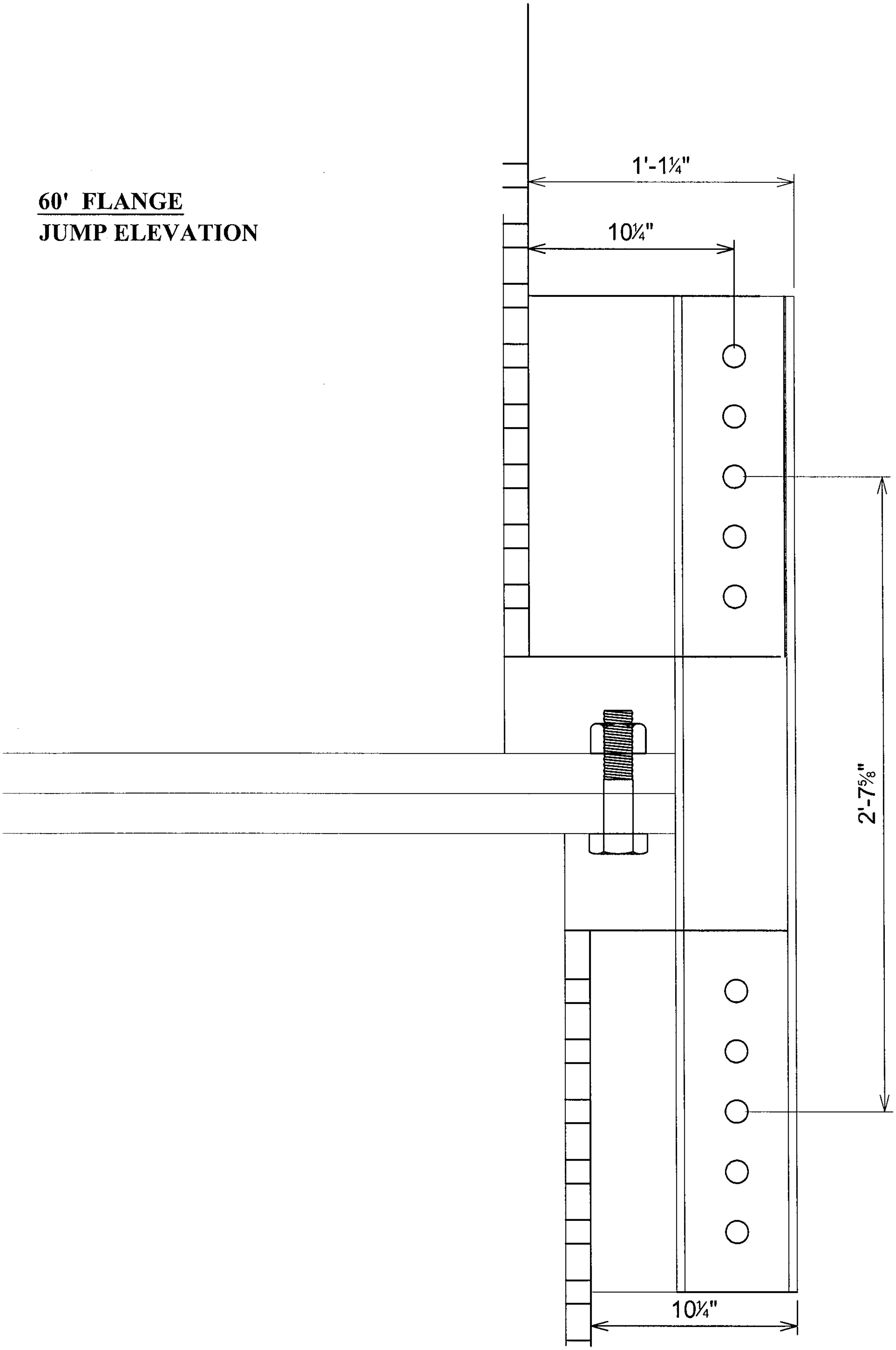
$$f_b := \frac{\sum M_{PL}}{\left(\frac{b_{eff} \cdot t^2}{6}\right)} \qquad f_b = 26.2\,ksi$$

$$F'_b := ASI \cdot 0.75 \cdot F_y$$

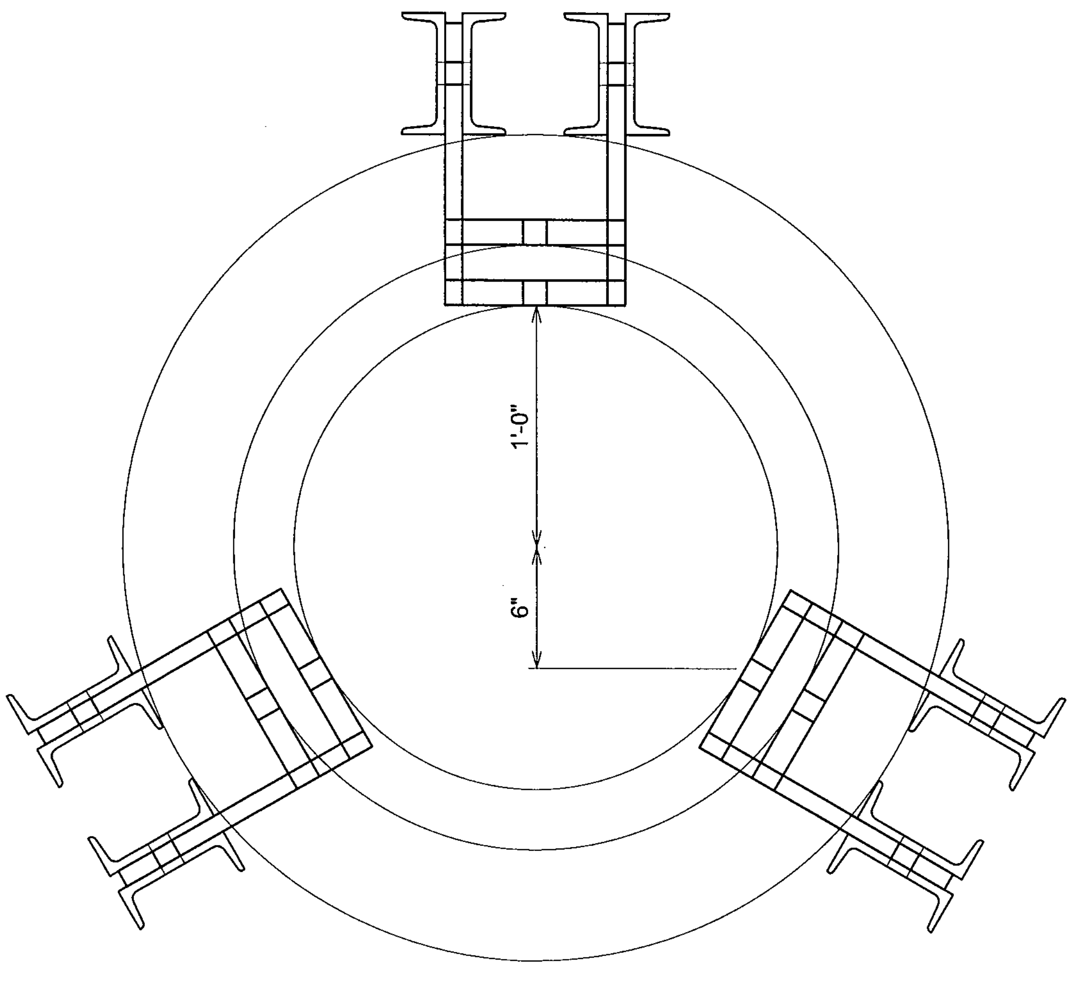
$$r_b := \frac{f_b}{F'_b}$$

$$r_b = 73\,\%$$

60' FLANGE
JUMP ELEVATION



60' FLANGE
JUMP PLAN



vertical solutions

Job No.: 080497
Date: 8/04/08
Calculated by: ESS

SELF-SUPPORTING POLE STRUCTURE REINFORCEMENT DESIGN, TIA-222-F

CONSTANTS: $kip \equiv 1000 \cdot lbf$ $ksi \equiv \frac{kip}{in^2}$ $G \equiv 11200 \cdot ksi$ $E \equiv 29000 \cdot ksi$ $\Psi \equiv 1$ $N \equiv kg \cdot \frac{m}{sec^2}$ $kN \equiv 1000 \cdot N$

Input - Pole ROUND 42.00x0.375

$D_o := 24 \cdot in$ = outside diameter of pole section

= thickness of pole section

= minimum specified yield stress of pole section

= minimum specified tensile stress of pole section 34565

$M_{max} := 498.67 \cdot kip \cdot ft$ = maximum moment on cross section

Input - Reinforcement MR-06-18

$b_{bar} := 6 \cdot in$ = width of reinforcement

$t_{bar} := 1.25 \cdot in$ = thickness of bar reinforcement

$F_{yBar} := 65 \cdot ksi$ = minimum specified yield stress of reinforcement

$F_{uBar} := 80 \cdot ksi$ = minimum specified tensile stress of reinforcement

$K_{bar} := 1.00$ = effective buckling length factor of reinforcement [Table C-C2.1, LRFD-99]

$L_{bar} := 3 \cdot in$ = maximum spacing between ONESIDE AJAX bolts

$d := 20 \cdot mm$ = diameter of ONESIDE AJAX bolts

$d_{sleeve} := 29 \cdot mm$ = outer diameter of sleeve for ONESIDE AJAX bolts

$d_{hole} := 31 \cdot mm$ = diameter of hole for ONESIDE AJAX bolts

$n := 12$ = number of ONESIDE AJAX bolts at termination

$s := 3 \cdot in$ = spacing of termination bolts

$V_{all} := 20.9 \cdot kip$ = allowable load of ONESIDE AJAX PC8.8

$A_{gBar} := b_{bar} \cdot t_{bar}$

$r_{bar} := \frac{t_{bar}}{\sqrt{12}}$

$A_{gBar} = 7.50\, in^2$

$t_{sleeve} := \frac{d_{sleeve} - d}{2}$

$t_{sleeve} = 0.18\, in$

$V_{all} = 20.9\, kip$

$A_{gBar} = 7.5\, in \cdot in$

Output - Calculate Section Properties of Reinforced Pole Section:

$$I_{bar} := \frac{b_{bar} \cdot t_{bar}^3}{12} + b_{bar} \cdot t_{bar} \cdot \left(\frac{D_o}{2} + \frac{t_{bar}}{2}\right)^2 + 2 \cdot \left[\frac{\left(\frac{b_{bar}^3 \cdot t_{bar}}{4} + \frac{3}{4} \cdot b_{bar} \cdot t_{bar}^3\right)}{12} + b_{bar} \cdot t_{bar} \cdot \left(\frac{D_o}{4} + \frac{t_{bar}}{4}\right)^2\right] \quad I_{bar} = 1807\ in^4$$

[(3) bars]

$I_{total} := I_{bar}$ $\qquad$ $A_{total} := 3A_{gBar}$

$$S_{total} := \frac{I_{total}}{\left(\frac{D_o}{2} + \frac{t_{bar}}{2}\right)}$$

$I_{total} = 1806.84\ in^4$

$S_{total} = 143.1\ in^3$

Output - Calculate Allowable Combined Bending and Axial Stress of Pole Section [Table 5 TIA-222-F]:

Output - Calculate Allowable Compressive Bending Stress of Bar Reinforcement [AISC 9th Chapter E]:

$$C_{cBar} := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_{yBar}}} \qquad C_{cBar} = 93.8$$

$$KLr_{bar} := \frac{K_{bar} \cdot L_{bar}}{r_{bar}} \qquad KLr_{bar} = 8.3$$

$$F_{a1} := \frac{\left[1 - \frac{(KLr_{bar})^2}{2 \cdot C_{cBar}^2}\right] \cdot F_{yBar}}{\frac{5}{3} + \frac{3}{8} \cdot \left(\frac{KLr_{bar}}{C_{cBar}}\right) - \frac{(KLr_{bar})^3}{8 \cdot C_{cBar}^3}} \qquad F_{a1} = 38.1\ ksi$$

$$F_{a2} := \frac{12 \cdot \pi^2 \cdot E}{23 \cdot (KLr_{bar})^2} \qquad F_{a2} = 2.2 \times 10^3\ ksi$$

$$F_{aBar} := \text{if}(KLr_{bar} < C_{cBar}, F_{a1}, F_{a2}) \qquad F_{aBar} = 38.1\ ksi$$

Output - Check Compressive Bending Stresses in Reinforced Pole

$$f_{bPole} := \frac{M_{max} \cdot \left(\frac{D_o}{2}\right)}{I_{total}}$$

$f_{bPole} = 39.7\,ksi$

$$f_{bBar} := \frac{M_{max} \cdot \left(\frac{D_o}{2} + \frac{t_{bar}}{2}\right)}{I_{total}} \qquad r_{bBar} := \frac{f_{bBar}}{F_{aBar}}$$

$f_{bBar} = 41.8\,ksi$

$r_{bBar} = 110\,\%$

mode = mode

Check tensile stresses in Bar Reinforcement [AISC 9th, Chapter D, J]:

Tension on Gross, Bar Reinforcement, D1

$f_{tGross} := f_{bBar}$

$F_{tGross} := 0.6 \cdot F_{yBar}$

$$r_{tGross} := \frac{f_{tGross}}{F_{tGross}} \qquad result_{tGross} := if\left(r_{tGross} > 133\%, \text{"NG"}, \text{"OK"}\right)$$

$f_{tGross} = 41.8\,ksi$

$F_{tGross} = 39.0\,ksi$

$r_{tGross} = 107\,\%$

$result_{tGross} = \text{"OK"}$

Tension on Net, Bar Reinforcement, D1

$A_g := A_{gBar}$

$U := 1.00$

$$A_n := \left[b_{bar} - \left(d_{hole} + \frac{1}{16} \cdot in\right)\right] \cdot t_{bar}$$

$$A_e := U \cdot A_n \qquad r_{ABar} := \frac{A_g}{A_e}$$

$A_e = 5.90\,in^2$

$r_{ABar} = 127\,\%$

$$f_{tNet} := f_{bBar} \cdot \frac{A_g}{A_e}$$

$F_{tNet} := 0.5 \cdot F_{uBar}$

$$r_{tNet} := \frac{f_{tNet}}{F_{tNet}} \qquad result_{tNet} := if\left(r_{tNet} > 133\%, \text{"NG"}, \text{"OK"}\right)$$

$f_{tNet} = 53.2\,ksi$

$F_{tNet} = 40.0\,ksi$

$r_{tNet} = 133\,\%$

$result_{tNet} = \text{"OK"}$

Block Shear Rupture, Bar Reinforcement, J4

$$A_{nv} := \left[n \cdot s - d_{hole} \cdot (n - 0.5)\right] \cdot t_{bar} \qquad F_{vBS} := 0.30 \cdot F_{uBar} \qquad C_{max} := f_{bBar} \cdot A_{gBar}$$

$C_{max} = 314\,\text{kip}$

$$A_{nt} := \frac{(b_{bar} - d_{hole})}{2} \cdot t_{bar} \qquad F_{tBS} := 0.50 \cdot F_{uBar} \qquad T_{all} := A_{nv} \cdot F_{vBS} + A_{nt} \cdot F_{tBS}$$

$T_{all} = 778\,\text{kip}$

$$r_{BS} := \frac{C_{max}}{T_{all}} \qquad result_{BS} := \text{if}(r_{BS} > 133\%, \text{"NG"}, \text{"OK"})$$

$r_{BS} = 40\%$

Bearing Stresses, Bar Reinforcement, J7

$result_{BS} = \text{"OK"}$

$$F_p := 1.2 \cdot F_{uBar}$$

$$f_p := \frac{C_{max}}{n \cdot t_{bar} \cdot d_{sleeve}} \qquad r_p := \frac{f_p}{F_p} \qquad result_p := \text{if}(r_p > 133\%, \text{"NG"}, \text{"OK"})$$

$r_p = 19\%$

Bearing Stresses, Pole, J7

$result_p = \text{"OK"}$

$$F_{pPole} := 1.2 \cdot F_u$$

$$f_{pPole} := \frac{C_{max}}{n \cdot t \cdot d_{sleeve}} \qquad r_{pPole} := \frac{f_{pPole}}{F_{pPole}} \qquad result_{pPole} := \text{if}(r_p > 133\%, \text{"NG"}, \text{"OK"})$$

$r_{pPole} = \blacksquare\,\%$

Connector Shear Stresses, Bar Reinforcement, J3

$result_{pPole} = \text{"OK"}$

$$A_{bolt} := \frac{\pi}{4} \cdot d^2$$

$A_{bolt} = 0.49\,\text{in}^2$

$$t_{sleeve} := \frac{d_{sleeve} - d}{2}$$

$t_{sleeve} = 0.18\,\text{in}$

$$A_{sleeve} := \frac{\pi}{4} \cdot \left[d_{sleeve}^{\,2} - (d_{sleeve} - 2 \cdot t_{sleeve})^2\right]$$

$A_{sleeve} = 0.54\,\text{in}^2$

$$A_{assembly} := A_{sleeve} + A_{bolt}$$

$A_{assembly} = 1.02\,\text{in}^2$

$$F_v := \frac{V_{all}}{A_{assembly}} \qquad f_v := \frac{C_{max}}{n\,A_{assembly}} \qquad r_v := \frac{f_v}{F_v} \qquad f_v = 25.525\,\text{ksi}$$

$F_v = 20.4\,\text{ksi}$

$r_v = 125\%$

$$result_v := \text{if}(r_v > 133\%, \text{"NG"}, \text{"OK"})$$

$result_v = \text{"OK"}$

Required Weld Length, (2) 5/8-in E80XX, Bar Reinforcement:

$$L_{req'd} := \frac{C_{max}}{1.33 \cdot 0.30 \cdot 80 \cdot \text{ksi} \cdot 2 \cdot 0.707 \cdot 0.625 \cdot \text{in}} \qquad L_{req'd} := L_{req'd} + 1 \cdot \text{in}$$

$L_{req'd} = 12\,\text{in}$

$$L_{PL} := L_{req'd} + (n + 1) \cdot s$$

$L_{PL} = 51\,\text{in}$

Output - Design Summary:

$$r := \begin{pmatrix} r_{bBar} \\ r_{tGross} \\ r_{tNet} \\ r_{BS} \\ r_p \\ 0 \\ r_v \end{pmatrix} \qquad r' := \frac{r}{\text{[illegible]}} \qquad r = \begin{pmatrix} 110 \\ 107 \\ 133 \\ 40 \\ 19 \\ 0 \\ 125 \end{pmatrix} \% \qquad r' = \begin{pmatrix} 82 \\ 80 \\ 100 \\ 30 \\ 14 \\ 0 \\ 94 \end{pmatrix} \%$$

$$r'_{bPole} := \frac{r_{bPole}}{\text{[illegible]}}$$

$$r'_{bPole} = \blacksquare \ \%$$

vertical *solutions*

VSi Job No.: 080497.07
Date: 08/04/2008
Calculated by: ESS

JUMP KIT CALCULATIONS & DESIGN

ELEVATION OF FLANGE PLATE: 60 ft.

INPUT:

$Mmax := 498.67 \cdot kip \cdot ft$

$Dia := 24 \cdot in$

$tshaft := .375 \cdot in$

$Fy := 50 \cdot ksi$

$n_{AJAX} := 12$

$E := 10.25 \cdot in$

$Lsplice := 13.25 \cdot in$

$Lchannel := \left(2 \cdot 12 + 7 + \frac{5}{8}\right) \cdot in$

CONSTANTS:

$psi \equiv \frac{lb}{in^2}$

$ksi \equiv 1000 \cdot psi$

$kip \equiv 1000 \cdot lb$

OUTPUT:

$D := Dia - tshaft$ $\qquad D = 23.625\,in$

$b := 6 \cdot in$ CONSTANT

$tbar := 1.25 \cdot in$ $\qquad Abar := b \cdot tbar$ $\qquad Abar = 7.5\,in^2$

$Ishaft := .393 \cdot D^3 \cdot tshaft$ $\qquad Ishaft = 1.943 \times 10^3\,in^4$

$$I3bar := \left[b \cdot \frac{tbar^3}{12} + b \cdot tbar \cdot \left(\frac{D}{2} + \frac{tbar}{2}\right)^2 + \left(2 \cdot b^3 \cdot \frac{tbar}{4}\right) + \frac{\frac{3}{4} \cdot b \cdot tbar^3}{12} + b \cdot tbar \cdot \left(\frac{D}{4} + \frac{tbar}{4}\right)^2\right]$$

$I3bar = 1.587 \times 10^3\,in^4$

$Itotal := Ishaft + I3bar$ $\qquad Itotal = 3.53 \times 10^3\,in^4$

$Stotal := \frac{Itotal}{\frac{D}{2} + \frac{tshaft}{2}}$ $\qquad Stotal = 294.187\,in^3$

$fb := \frac{Mmax}{Stotal}$ $\qquad fb = 20.341\,ksi$

$Cmax1 := fb \cdot Abar$

$C_{AJAX} := n_{AJAX} \cdot 20.9 \cdot kip$

$Cmax := if\left(Cmax1 > C_{AJAX}, Cmax1, C_{AJAX}\right)$

DESIGN OF SPLICE PLATE

$P := \frac{314 \cdot kip \cdot 1.3}{4}$ $P = 102.05\,kip$

$bolts1 := \frac{P}{22 \cdot kip}$ $bolts := ceil(bolts1)$ $bolts = 5$

$length := bolts \cdot 3 \cdot in + 3 \cdot in$ $length = 18\,in$

$Fb := \frac{4}{3} \cdot .6 \cdot Fy$ $Fb = 40\,ksi$

$tplate1 := \frac{\frac{P \cdot E}{Fb}}{\frac{length^2}{6}}$ $tplate1 = 0.484\,in$ $tplate := .5 \cdot in$

$Asplice := Lsplice \cdot tplate$ $Asplice = 6.625\,in^2$

$rsplice := \frac{tplate}{\sqrt[2]{12}}$ $rsplice = 0.14\,in$

$k := .65$

$klr := \frac{k \cdot Lsplice}{rsplice}$ $klr = 60$

$Cc := \sqrt[2]{\frac{19.739 \cdot 29000ksi}{Fy}}$ $Cc = 107$

$klr < Cc$

$$Fa := \frac{\left(1 - \frac{klr^2}{2 \cdot Cc^2}\right) \cdot Fy}{\frac{5}{3} + \frac{3 \cdot klr}{8 \cdot Cc} - \frac{klr^3}{8 \cdot Cc^3}}$$ $Fa = 23\,ksi$

$Fa1 := \frac{4}{3} \cdot Fa \cdot Asplice$ $Fa1 = 201\,kip$

<u>SPLICE PLATE - TENSION (GROSS)</u>

$Tg := \frac{4}{3} \cdot .6 \cdot Fy \cdot Lsplice \cdot tplate$ $Tg = 265\,kip$

<u>SPLICE PLATE - TENSION (NET)</u>

$An := (Lsplice - 1.125 \cdot in) \cdot tplate$ $An = 6.06\,in^2$

$Tn := \frac{4}{3} \cdot .5 \cdot 65 \cdot ksi \cdot An$ $Tn = 263\,kip$

SPLICE PLATE - BEARING

$\text{Fbearing} := \frac{4}{3} \cdot 1.2 \cdot 65 \cdot \text{ksi}$ — $\text{Fbearing} = 104\,\text{ksi}$

$\text{fbearing} := \text{bolts} \cdot 1 \cdot \text{in} \cdot \text{tplate} \cdot \text{Fbearing}$ — $\text{fbearing} = 260\,\text{kip}$

SPLICE PLATE - BLOCK SHEAR

$\text{Fv} := \frac{4}{3} \cdot .33 \cdot 65 \cdot \text{ksi}$ — $\text{Fv} = 29\,\text{ksi}$

$\text{Ft} := \frac{4}{3} \cdot 0.5 \cdot 65 \cdot \text{ksi}$ — $\text{Ft} = 43\,\text{ksi}$

$$\text{fball} := \text{tplate} \cdot \left[\text{Fv} \cdot [3 \cdot \text{in} + (\text{bolts} - 1) \cdot 3 \cdot \text{in} - (\text{bolts} - .5) \cdot 1.125 \cdot \text{in}] + \text{Ft} \cdot \left(\frac{\text{Lsplice}}{2} - .5 \cdot 1.125 \cdot \text{in} \right) \right]$$

$\text{fball} = 273\,\text{kip}$

CHANNEL- CHECK ALLOWABLE COMPRESSION

C 6 x 137 Channel

$\text{Achannel} := 3.81 \cdot \text{in}^2$

$\text{rchannel} := .524 \cdot \text{in}$

$\text{tchannel} := .437 \cdot \text{in}$

$\text{kchannel} := 1$

$$\text{klrchannel} := \frac{\text{kchannel} \cdot \text{Lchannel}}{\text{rchannel}}$$

$\text{klrchannel} = 60$

$\text{Cc} = 107$

$\text{klrchannel} < \text{Cc} = 1$

0 means use FaB 1 means use FaA

$$\text{FaA} := \frac{\left(1 - \frac{\text{klrchannel}^2}{2 \cdot \text{Cc}^2}\right) \cdot \text{Fy}}{\frac{5}{3} + \frac{3 \cdot \text{klrchannel}}{8 \cdot \text{Cc}} - \frac{\text{klrchannel}^3}{8 \cdot \text{Cc}^3}}$$

$\text{FaA} = 23\,\text{ksi}$

$$\text{FaB} := \frac{12 \cdot 3.14^2 \cdot 29000 \cdot \text{ksi}}{23 \cdot \text{klrchannel}^2}$$

$\text{FaB} = 41\,\text{ksi}$

$\text{FaC} := \frac{4}{3} \cdot \text{FaA} \cdot \text{Achannel}$ — $\text{FaC} = 115\,\text{kip}$

CHANNEL- CHECK ALLOWABLE TENSION

$\text{TgC} := \frac{4}{3} \cdot .6 \cdot \text{Fy} \cdot \text{Achannel}$ — $\text{TgC} = 152\,\text{kip}$

$\text{AnC} := \text{Achannel} - (1.125 \cdot \text{in} \cdot \text{tchannel})$ — $\text{AnC} = 3.32\,\text{in}^2$

$\text{TnC} := \frac{4}{3} \cdot .5 \cdot 65 \cdot \text{AnC} \cdot \text{ksi}$ — $\text{TnC} = 144\,\text{kip}$

$FbearingC := \frac{4}{3} \cdot 1.2 \cdot 65 \cdot ksi$ $FbearingC = 104\,ksi$

$fbearingC := bolts \cdot 1 \cdot tchannel \cdot FbearingC$ $fbearingC = 19\,ft\,ksi$

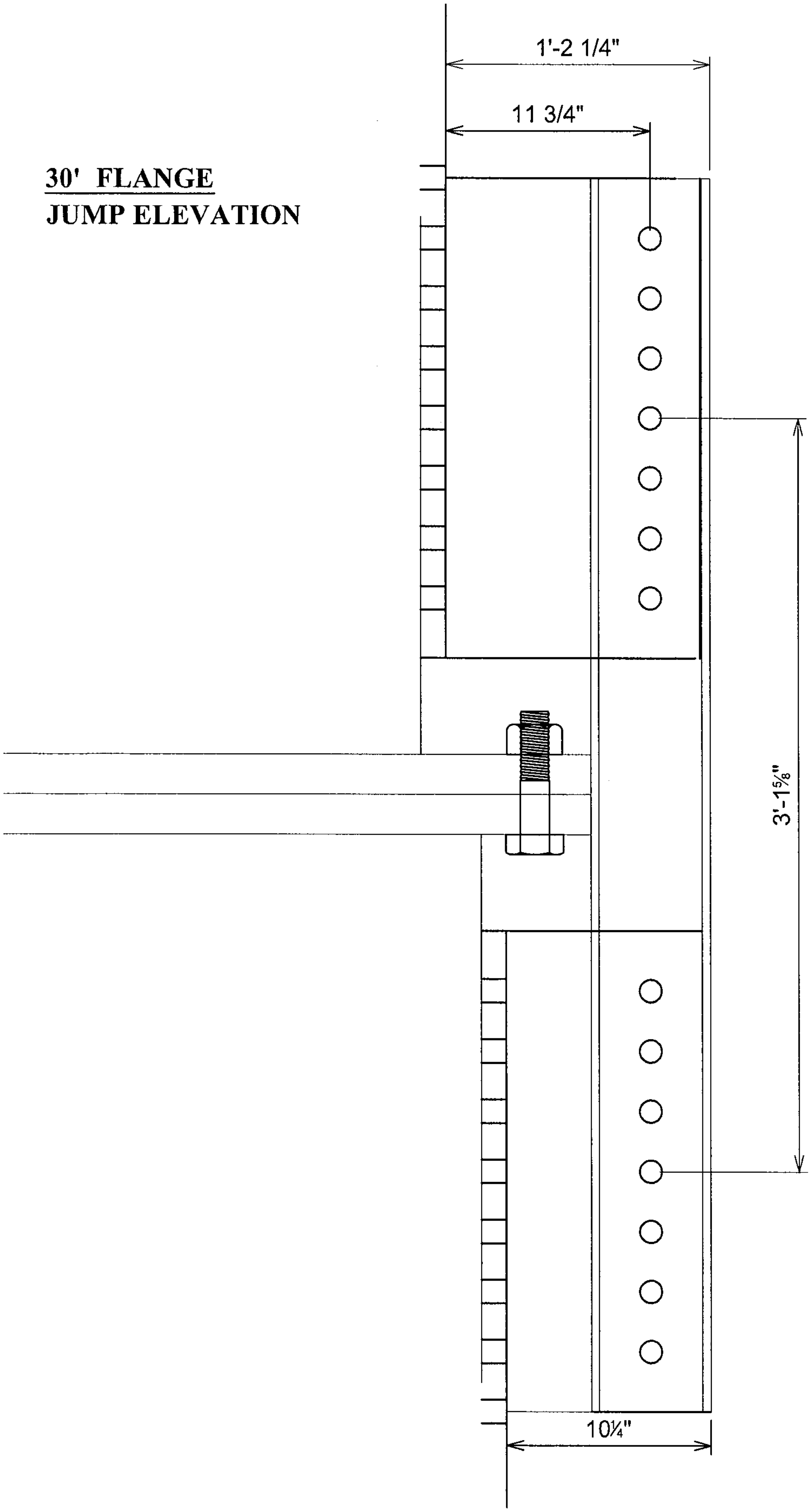
$FvC := \frac{4}{3} \cdot .33 \cdot 65 \cdot ksi$ $FvC = 29\,ksi$

$FtC := \frac{4}{3} \cdot .5 \cdot 65 \cdot ksi$ $FtC = 43\,ksi$

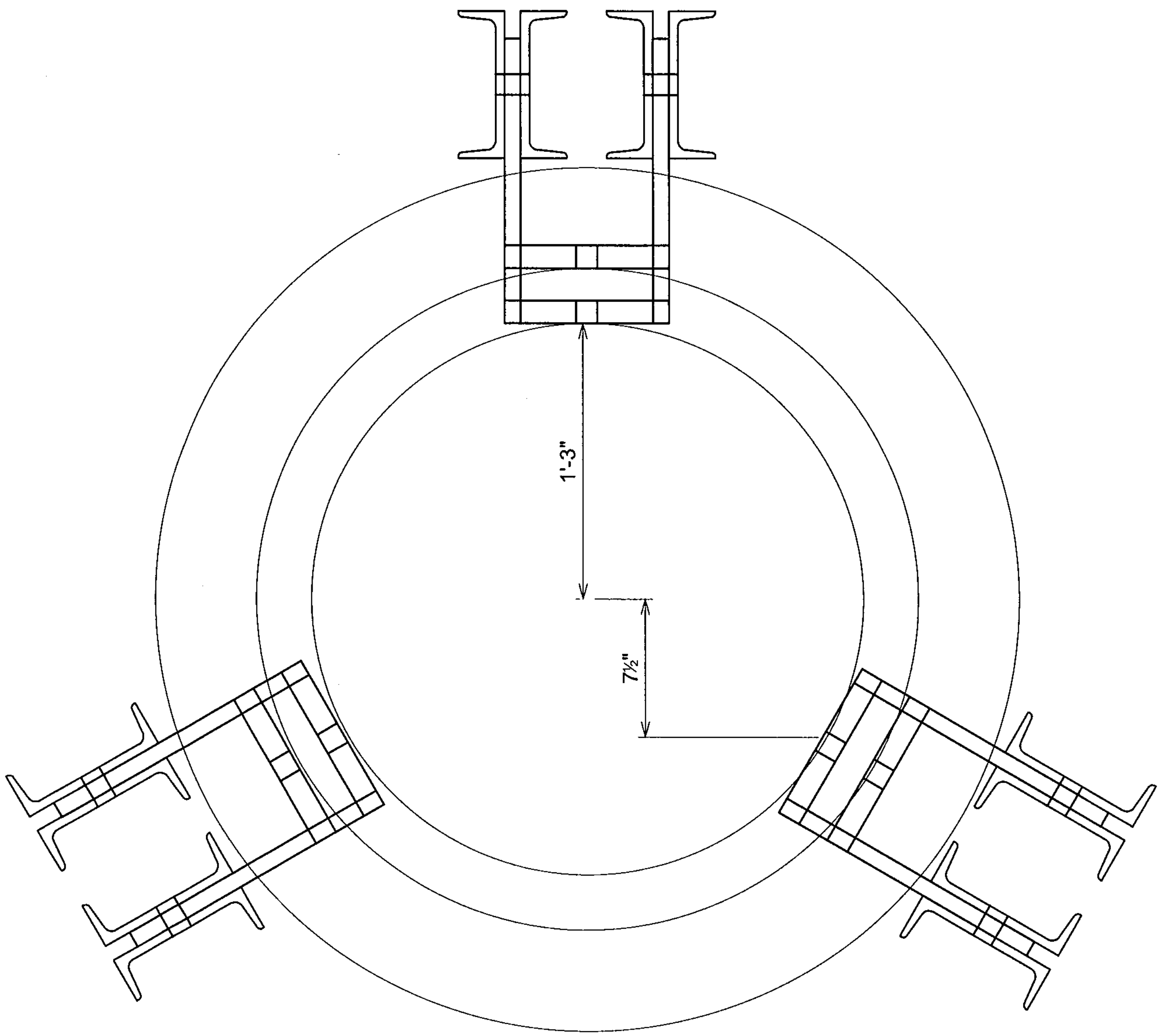
$$fballC := tchannel \cdot \left[FvC \cdot [3 \cdot in + (bolts - 1) \cdot 3 \cdot in - (bolts - .5) \cdot 1.125 \cdot in] + FtC \cdot \left(\frac{Lchannel}{2} - .5 \cdot 1.125 \cdot in \right) \right]$$

$fballC = 412.985\,kip$

30' FLANGE
JUMP ELEVATION



30' FLANGE
JUMP PLAN



vertical solutions

Job No.: 080497
Date: 8/04/08
Calculated by: ESS

SELF-SUPPORTING POLE STRUCTURE REINFORCEMENT DESIGN, TIA-222-F

CONSTANTS: $kip \equiv 1000 \cdot lbf$ $ksi \equiv \frac{kip}{in^2}$ $G \equiv 11200 \cdot ksi$ $E \equiv 29000 \cdot ksi$ $\Psi \equiv 1$ $N \equiv kg \cdot \frac{m}{sec^2}$ $kN \equiv 1000 \cdot N$

Input - Pole ROUND 42.00x0.375

$D_o := 30 \cdot in$ = outside diameter of pole section

= thickness of pole section

= minimum specified yield stress of pole section

= minimum specified tensile stress of pole section 34565

$M_{max} := 866.9 \cdot kip \cdot ft$ maximum moment on cross section

Input - Reinforcement MR-06-18

$b_{bar} := 9 \cdot in$ = width of reinforcement

$t_{bar} := 1.25 \cdot in$ = thickness of bar reinforcement

$F_{yBar} := 65 \cdot ksi$ = minimum specified yield stress of reinforcement

$F_{uBar} := 80 \cdot ksi$ = minimum specified tensile stress of reinforcement

$K_{bar} := 1.00$ = effective buckling length factor of reinforcement [Table C-C2.1, LRFD-99]

$L_{bar} := 3 \cdot in$ = maximum spacing between ONESIDE AJAX bolts

$d := 20 \cdot mm$ = diameter of ONESIDE AJAX bolts

$d_{sleeve} := 29 \cdot mm$ = outer diameter of sleeve for ONESIDE AJAX bolts

$d_{hole} := 31 \cdot mm$ = diameter of hole for ONESIDE AJAX bolts

$n := 16$ = number of ONESIDE AJAX bolts at termination

$s := 3 \cdot in$ = spacing of termination bolts

$V_{all} := 20.9 \cdot kip$ = allowable load of ONESIDE AJAX PC8.8

$A_{gBar} := b_{bar} \cdot t_{bar}$

$r_{bar} := \frac{t_{bar}}{\sqrt{12}}$

$A_{gBar} = 11.25\ in^2$

$t_{sleeve} := \frac{d_{sleeve} - d}{2}$

$t_{sleeve} = 0.18\ in$

$V_{all} = 20.9\ kip$

$A_{gBar} = 11.25\ in \cdot in$

Output - Calculate Section Properties of Reinforced Pole Section:

[(3) bars]

$$I_{bar} := \frac{b_{bar} \cdot t_{bar}^3}{12} + b_{bar} \cdot t_{bar} \cdot \left(\frac{D_o}{2} + \frac{t_{bar}}{2}\right)^2 + 2 \cdot \left[\frac{\left(\frac{b_{bar}^3 \cdot t_{bar}}{4} + \frac{3}{4} \cdot b_{bar} \cdot t_{bar}^3\right)}{12} + b_{bar} \cdot t_{bar} \cdot \left(\frac{D_o}{4} + \frac{t_{bar}}{4}\right)^2\right] \qquad I_{bar} = 4162\ in^4$$

$$I_{total} := I_{bar} \qquad A_{total} := 3A_{gBar}$$

$$S_{total} := \frac{I_{total}}{\left(\frac{D_o}{2} + \frac{t_{bar}}{2}\right)}$$

$I_{total} = 4161.5\ in^4$

$S_{total} = 266.3\ in^3$

Output - Calculate Allowable Combined Bending and Axial Stress of Pole Section [Table 5 TIA-222-F]:

Output - Calculate Allowable Compressive Bending Stress of Bar Reinforcement [AISC 9th Chapter E]:

$$C_{cBar} := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_{yBar}}} \qquad C_{cBar} = 93.8$$

$$KLr_{bar} := \frac{K_{bar} \cdot L_{bar}}{r_{bar}} \qquad KLr_{bar} = 8.3$$

$$F_{a1} := \frac{\left[1 - \frac{(KLr_{bar})^2}{2 \cdot C_{cBar}^2}\right] \cdot F_{yBar}}{\frac{5}{3} + \frac{3}{8} \cdot \left(\frac{KLr_{bar}}{C_{cBar}}\right) - \frac{(KLr_{bar})^3}{8 \cdot C_{cBar}^3}} \qquad F_{a1} = 38.1\ ksi$$

$$F_{a2} := \frac{12 \cdot \pi^2 \cdot E}{23 \cdot (KLr_{bar})^2} \qquad F_{a2} = 2.2 \times 10^3\ ksi$$

$$F_{aBar} := if(KLr_{bar} < C_{cBar}, F_{a1}, F_{a2}) \qquad F_{aBar} = 38.1\ ksi$$

Output - Check Compressive Bending Stresses in Reinforced Pole

$$f_{bPole} := \frac{M_{max} \cdot \left(\frac{D_o}{2}\right)}{I_{total}}$$

$f_{bPole} = 37.5\ ksi$

$$f_{bBar} := \frac{M_{max} \cdot \left(\frac{D_o}{2} + \frac{t_{bar}}{2}\right)}{I_{total}} \qquad r_{bBar} := \frac{f_{bBar}}{F_{aBar}}$$

$f_{bBar} = 39.1\ ksi$

$r_{bBar} = 103\ \%$

mode = mode

Check tensile stresses in Bar Reinforcement [AISC 9th, Chapter D, J]:

Tension on Gross, Bar Reinforcement, D1

$f_{tGross} := f_{bBar}$

$F_{tGross} := 0.6 \cdot F_{yBar}$

$$r_{tGross} := \frac{f_{tGross}}{F_{tGross}} \qquad result_{tGross} := if\left(r_{tGross} > 133\%, \text{"NG"}, \text{"OK"}\right)$$

$f_{tGross} = 39.1\ ksi$

$F_{tGross} = 39.0\ ksi$

$r_{tGross} = 100\ \%$

$result_{tGross} = \text{"OK"}$

Tension on Net, Bar Reinforcement, D1

$A_g := A_{gBar}$

$U := 1.00$

$$A_n := \left[b_{bar} - \left(d_{hole} + \frac{1}{16} \cdot in\right)\right] \cdot t_{bar}$$

$$A_e := U \cdot A_n \qquad r_{ABar} := \frac{A_g}{A_e}$$

$A_e = 9.65\ in^2$

$r_{ABar} = 117\ \%$

$$f_{tNet} := f_{bBar} \cdot \frac{A_g}{A_e}$$

$F_{tNet} := 0.5 \cdot F_{uBar}$

$$r_{tNet} := \frac{f_{tNet}}{F_{tNet}} \qquad result_{tNet} := if\left(r_{tNet} > 133\%, \text{"NG"}, \text{"OK"}\right)$$

$f_{tNet} = 45.6\ ksi$

$F_{tNet} = 40.0\ ksi$

$r_{tNet} = 114\ \%$

$result_{tNet} = \text{"OK"}$

Block Shear Rupture, Bar Reinforcement, J4

$A_{nv} := \left[n \cdot s - d_{hole} \cdot (n - 0.5)\right] \cdot t_{bar}$ $F_{vBS} := 0.30 \cdot F_{uBar}$ $C_{max} := f_{bBar} \cdot A_{gBar}$

$C_{max} = 439\,\text{kip}$

$A_{nt} := \dfrac{(b_{bar} - d_{hole})}{2} \cdot t_{bar}$ $F_{tBS} := 0.50 \cdot F_{uBar}$ $T_{all} := A_{nv} \cdot F_{vBS} + A_{nt} \cdot F_{tBS}$

$T_{all} = 1067\,\text{kip}$

$r_{BS} := \dfrac{C_{max}}{T_{all}}$ $result_{BS} := \text{if}(r_{BS} > 133\%, \text{"NG"}, \text{"OK"})$

$r_{BS} = 41\,\%$

Bearing Stresses, Bar Reinforcement, J7

$result_{BS} = \text{"OK"}$

$F_p := 1.2 \cdot F_{uBar}$

$f_p := \dfrac{C_{max}}{n \cdot t_{bar} \cdot d_{sleeve}}$ $r_p := \dfrac{f_p}{F_p}$ $result_p := \text{if}(r_p > 133\%, \text{"NG"}, \text{"OK"})$

$r_p = 20\,\%$

Bearing Stresses, Pole, J7

$result_p = \text{"OK"}$

$F_{pPole} := 1.2 \cdot F_u$

$f_{pPole} := \dfrac{C_{max}}{n \cdot t \cdot d_{sleeve}}$ $r_{pPole} := \dfrac{f_{pPole}}{F_{pPole}}$ $result_{pPole} := \text{if}(r_p > 133\%, \text{"NG"}, \text{"OK"})$

$r_{pPole} =$ [illegible] %

Connector Shear Stresses, Bar Reinforcement, J3

$result_{pPole} = \text{"OK"}$

$A_{bolt} := \dfrac{\pi}{4} \cdot d^2$

$A_{bolt} = 0.49\,\text{in}^2$

$t_{sleeve} := \dfrac{d_{sleeve} - d}{2}$

$t_{sleeve} = 0.18\,\text{in}$

$A_{sleeve} := \dfrac{\pi}{4} \cdot \left[d_{sleeve}^{\,2} - (d_{sleeve} - 2 \cdot t_{sleeve})^2\right]$

$A_{sleeve} = 0.54\,\text{in}^2$

$A_{assembly} := A_{sleeve} + A_{bolt}$

$A_{assembly} = 1.02\,\text{in}^2$

$F_v := \dfrac{V_{all}}{A_{assembly}}$ $f_v := \dfrac{C_{max}}{n\,A_{assembly}}$ $r_v := \dfrac{f_v}{F_v}$ $f_v = 26.825\,\text{ksi}$

$F_v = 20.4\,\text{ksi}$

$result_v := \text{if}(r_v > 133\%, \text{"NG"}, \text{"OK"})$

$r_v = 131\,\%$

$result_v = \text{"OK"}$

Required Weld Length, (2) 5/8-in E80XX, Bar Reinforcement:

$L_{req'd} := \dfrac{C_{max}}{1.33 \cdot 0.30 \cdot 80 \cdot \text{ksi} \cdot 2 \cdot 0.707 \cdot 0.625 \cdot \text{in}}$ $L_{req'd} := L_{req'd} + 1 \cdot \text{in}$

$L_{req'd} = 17\,\text{in}$

$L_{PL} := L_{req'd} + (n + 1) \cdot s$

$L_{PL} = 68\,\text{in}$

Output - Design Summary:

$$r := \begin{pmatrix} r_{bBar} \\ r_{tGross} \\ r_{tNet} \\ r_{BS} \\ r_{p} \\ 0 \\ r_{v} \end{pmatrix} \qquad r' := \frac{r}{[illegible]} \qquad r'_{bPole} := \frac{r_{bPole}}{[illegible]}$$

$$r = \begin{pmatrix} 103 \\ 100 \\ 114 \\ 41 \\ 20 \\ 0 \\ 131 \end{pmatrix} \% \qquad r' = \begin{pmatrix} 77 \\ 75 \\ 85 \\ 31 \\ 15 \\ 0 \\ 99 \end{pmatrix} \%$$

$r'_{bPole} =$ [illegible] %

vertical solutions

VSi Job No.: 0800497.07
Date: 08/04/2008
Calculated by: ESS

JUMP KIT CALCULATIONS & DESIGN

ELEVATION OF FLANGE PLATE: 30 ft.

INPUT:

$Mmax := 886.9 \cdot kip \cdot ft$

$Dia := 30 \cdot in$

$tshaft := .375 \cdot in$

$Fy := 50 \cdot ksi$

$n_{AJAX} := 16$

$E := 11.75 \cdot in$

$Lsplice := 14.25 \cdot in$

$Lchannel := \left(3 \cdot 12 + 1 + \frac{3}{8}\right) \cdot in$

CONSTANTS:

$psi \equiv \frac{lb}{in^2}$

$ksi \equiv 1000 \cdot psi$

$kip \equiv 1000 \cdot lb$

OUTPUT:

$D := Dia - tshaft$ $\qquad D = 29.625\,in$

$b := 9 \cdot in$ CONSTANT

$tbar := 1.25 \cdot in$ $\qquad Abar := b \cdot tbar$ $\qquad Abar = 11.25\,in^2$

$Ishaft := .393 \cdot D^3 \cdot tshaft$ $\qquad Ishaft = 3.832 \times 10^3\,in^4$

$$I3bar := \left[b \cdot \frac{tbar^3}{12} + b \cdot tbar \cdot \left[\frac{D}{2} + \frac{tbar}{2}\right]^2 + \left(2 \cdot b^3 \cdot \frac{tbar}{4}\right) + \frac{\frac{3}{4} \cdot b \cdot tbar^3}{12} + b \cdot tbar \cdot \left(\frac{D}{4} + \frac{tbar}{4}\right)^2\right]$$

$I3bar = 3.81 \times 10^3\,in^4$

$Itotal := Ishaft + I3bar$ $\qquad Itotal = 7.641 \times 10^3\,in^4$

$Stotal := \frac{Itotal}{\frac{D}{2} + \frac{tshaft}{2}}$ $\qquad Stotal = 509.419\,in^3$

$fb := \frac{Mmax}{Stotal}$ $\qquad fb = 20.892\,ksi$

$Cmax1 := fb \cdot Abar$

$C_{AJAX} := n_{AJAX} \cdot 20.9 \cdot kip$

$Cmax := if\left(Cmax1 > C_{AJAX}, Cmax1, C_{AJAX}\right)$

DESIGN OF SPLICE PLATE

$P := \frac{439 \cdot kip \cdot 1.3}{4}$ $\quad P = 142.675\,kip$

$bolts1 := \frac{P}{22 \cdot kip}$ $\quad bolts := ceil(bolts1)$ $\quad bolts = 7$

$length := bolts \cdot 3 \cdot in + 3 \cdot in$ $\quad length = 24\,in$

$Fb := \frac{4}{3} \cdot .6 \cdot Fy$ $\quad Fb = 40\,ksi$

$tplate1 := \frac{\frac{P \cdot E}{Fb}}{\frac{length^2}{6}}$ $\quad tplate1 = 0.437\,in$ $\quad tplate := .5 \cdot in$

$Asplice := Lsplice \cdot tplate$ $\quad Asplice = 7.125\,in^2$

$rsplice := \frac{tplate}{\sqrt[2]{12}}$ $\quad rsplice = 0.14\,in$

$k := .65$

$klr := \frac{k \cdot Lsplice}{rsplice}$ $\quad klr = 64$

$Cc := \sqrt[2]{\frac{19.739 \cdot 29000ksi}{Fy}}$ $\quad Cc = 107$

$klr < Cc$

$Fa := \frac{\left(1 - \frac{klr^2}{2 \cdot Cc^2}\right) \cdot Fy}{\frac{5}{3} + \frac{3 \cdot klr}{8 \cdot Cc} - \frac{klr^3}{8 \cdot Cc^3}}$ $\quad Fa = 22\,ksi$

$Fa1 := \frac{4}{3} \cdot Fa \cdot Asplice$ $\quad Fa1 = 209\,kip$

SPLICE PLATE - TENSION (GROSS)

$Tg := \frac{4}{3} \cdot .6 \cdot Fy \cdot Lsplice \cdot tplate$ $\quad Tg = 285\,kip$

SPLICE PLATE - TENSION (NET)

$An := (Lsplice - 1.125 \cdot in) \cdot tplate$ $\quad An = 6.56\,in^2$

$Tn := \frac{4}{3} \cdot .5 \cdot 65 \cdot ksi \cdot An$ $\quad Tn = 284\,kip$

SPLICE PLATE - BEARING

$Fbearing := \frac{4}{3} \cdot 1.2 \cdot 65 \cdot ksi$ $\qquad Fbearing = 104\,ksi$

$fbearing := bolts \cdot 1 \cdot in \cdot tplate \cdot Fbearing$ $\qquad fbearing = 364\,kip$

SPLICE PLATE - BLOCK SHEAR

$Fv := \frac{4}{3} \cdot .33 \cdot 65 \cdot ksi$ $\qquad Fv = 29\,ksi$

$Ft := \frac{4}{3} \cdot 0.5 \cdot 65 \cdot ksi$ $\qquad Ft = 43\,ksi$

$$fball := tplate \cdot \left[Fv \cdot [3 \cdot in + (bolts - 1) \cdot 3 \cdot in - (bolts - .5) \cdot 1.125 \cdot in] + Ft \cdot \left(\frac{Lsplice}{2} - .5 \cdot 1.125 \cdot in \right) \right]$$

$fball = 338\,kip$

CHANNEL- CHECK ALLOWABLE COMPRESSION

C 8 x 18.7 Channel

$Achannel := 5.51 \cdot in^2$ $\qquad kchannel := 1$

$rchannel := .598 \cdot in$

$tchannel := .487 \cdot in$

$$klrchannel := \frac{kchannel \cdot Lchannel}{rchannel}$$

$klrchannel = 63$

$Cc = 107$

$klrchannel < Cc = 1$

0 means use FaB 1 means use FaA

$$FaA := \frac{\left(1 - \frac{klrchannel^2}{2 \cdot Cc^2}\right) \cdot Fy}{\frac{5}{3} + \frac{3 \cdot klrchannel}{8 \cdot Cc} - \frac{klrchannel^3}{8 \cdot Cc^3}}$$

$FaA = 22\,ksi$

$$FaB := \frac{12 \cdot 3.14^2 \cdot 29000 \cdot ksi}{23 \cdot klrchannel^2}$$

$FaB = 38\,ksi$

$FaC := \frac{4}{3} \cdot FaA \cdot Achannel$ $\qquad FaC = 163\,kip$

CHANNEL- CHECK ALLOWABLE TENSION

$TgC := \frac{4}{3} \cdot .6 \cdot Fy \cdot Achannel$ $\qquad TgC = 220\,kip$

$AnC := Achannel - (1.125 \cdot in \cdot tchannel)$ $\qquad AnC = 4.96\,in^2$

$TnC := \frac{4}{3} \cdot .5 \cdot 65 \cdot AnC \cdot ksi$ $\qquad TnC = 215\,kip$

$FbearingC := \frac{4}{3} \cdot 1.2 \cdot 65 \cdot ksi$ $\quad$ $FbearingC = 104\,ksi$

$fbearingC := bolts \cdot 1 \cdot tchannel \cdot FbearingC$ $\quad$ $fbearingC = 30\,ft\,ksi$

$FvC := \frac{4}{3} \cdot .33 \cdot 65 \cdot ksi$ $\quad$ $FvC = 29\,ksi$

$FtC := \frac{4}{3} \cdot .5 \cdot 65 \cdot ksi$ $\quad$ $FtC = 43\,ksi$

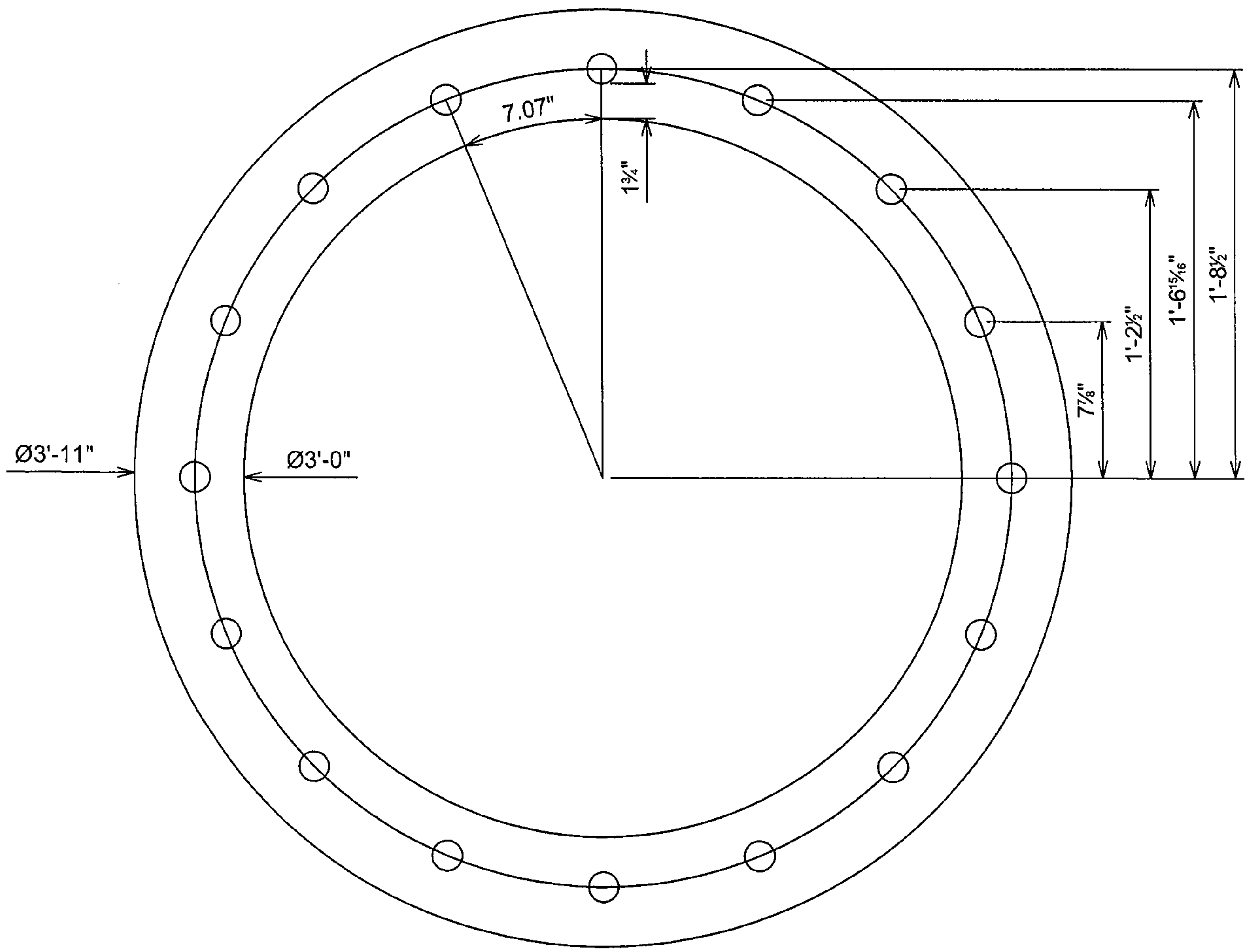
$$fballC := tchannel \cdot \left[FvC \cdot [3 \cdot in + (bolts - 1) \cdot 3 \cdot in - (bolts - .5) \cdot 1.125 \cdot in] + FtC \cdot \left(\frac{Lchannel}{2} - .5 \cdot 1.125 \cdot in \right) \right]$$

$fballC = 575.778\,kip$

vertical solutions
"execute & deliver"

Site Name West Hartford United Methodist
VSI # 080497.07
Client# 876324
Date 07/28/08

BASE PL AND ANCHOR RODS PLAN



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vertical solutions

VSi Job No.: 080497
Date: 07/28/2008
Calculated by: ESS

FLANGE PLATE DESIGN, DEFORMATION METHOD (DIFFERENT AREAS)

CONSTANTS:

$psi \equiv \frac{lb}{in^2}$

$ksi \equiv 1000 \cdot psi$

$kip \equiv 1000 \cdot lb$

Input -

$M := 1250 \cdot kip \cdot ft$	= moment at top of flange plate
$P := 19 \cdot kip$	= axial load (use zero if base plate is grouted)
$F_y := 36 \cdot ksi$	= yield stress of flange plate
$b_{eff} := 7.07 \cdot in$	= effective width of flange plate in flexure
$t := 2.0 \cdot in$	= thickness of flange plate
$ASI := 133 \cdot \%$	= allowable stress increase

$$Q := \begin{pmatrix} 2 \\ 4 \\ 4 \\ 4 \\ 2 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \quad d := \begin{pmatrix} 1 \cdot 12 + 8 + \frac{1}{2} \\ 1 \cdot 12 + 6 + \frac{15}{16} \\ 1 \cdot 12 + 2 + \frac{1}{2} \\ 7 + \frac{7}{8} \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \cdot in \quad A_{stiff} := \begin{pmatrix} 1.767 \\ 1.767 \\ 1.767 \\ 1.767 \\ 1.767 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} in^2 \quad A_{stress} := \begin{pmatrix} 1.767 \\ 1.767 \\ 1.767 \\ 1.767 \\ 1.767 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} in^2 \quad F_t := \begin{pmatrix} .33 \cdot 125 \\ .33 \cdot 125 \\ .33 \cdot 125 \\ .33 \cdot 125 \\ .33 \cdot 125 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \cdot ksi$$

$\sum \overrightarrow{(Q)} = 16 \qquad sumQAd := \sum \overrightarrow{\left(Q \cdot d^2 \cdot A_{stiff}\right)}$

$sumQAd = 5944\, in^4$

$$R := \frac{M \cdot \overrightarrow{\left(d \cdot A_{stiff}\right)}}{sumQAd} + \frac{P \cdot A_{stiff}}{\sum \overrightarrow{\left(A_{stiff}\right)}}$$

$$f_t := \overrightarrow{\left(\frac{R}{A_{stress}}\right)} \qquad r := \overrightarrow{\left(\frac{f_t}{ASI \cdot F_t}\right)}$$

$$R = \begin{pmatrix} 95.2 \\ 88.2 \\ 68.5 \\ 38.9 \\ 3.8 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \end{pmatrix} kip \qquad f_t = \begin{pmatrix} 53.9 \\ 49.9 \\ 38.7 \\ 22.0 \\ 2.2 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \end{pmatrix} ksi \qquad r = \begin{pmatrix} 98 \\ 91 \\ 71 \\ 40 \\ 4 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \%$$

Q = quantity of fasteners

d = distance from center

A = area of fastener

Ft = allowable tension stress

$$m := \begin{pmatrix} 1.75 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \cdot in \qquad M_{PL} := \overrightarrow{\left[\left(\frac{\phi}{2}\right) \cdot R \cdot m\right]} \qquad M_{PL} = \begin{pmatrix} 13.9 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \end{pmatrix} kip \cdot ft \qquad \sum M_{PL} = 166.6\, kip \cdot in$$

$$f_b := \frac{\sum M_{PL}}{\left(\frac{b_{eff} \cdot t^2}{6}\right)} \qquad f_b = 35.3\, ksi$$

$$F'_b := ASI \cdot 0.75 \cdot F_y$$

$$r_b := \frac{f_b}{F'_b}$$

$r_b = 98\,\%$

CAISSON Version 4.91 3:49:15 PM Monday, July 28, 2008
Vertical Solutions Inc.

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******************************************************************************
*                                                                            *
*  PIER FOUNDATIONS ANALYSIS AND DESIGN - (C) 1995,2002 POWER LINE SYSTEMS, INC.*
*                                                                            *
******************************************************************************
```

*** ANALYSIS IDENTIFICATION : West Hartford United Methodist
NOTES : 080497.03

*** PIER PROPERTIES CONCRETE STRENGTH (ksi) = 3.00 STEEL STRENGTH (ksi) = 60.00

DIAMETER (ft) = 5.500 DISTANCE FROM TOP OF PIER TO GROUND LEVEL (ft) = 0.50

*** SOIL PROPERTIES

LAYER	TYPE	THICKNESS (ft)	DEPTH AT TOP OF LAYER (ft)	DENSITY (pcf)	CU (psf)	KP	PHI (degrees)
1	C	5.00	0.00	125.0	0.0		
2	C	2.00	5.00	125.0	2267.0		
3	C	17.00	7.00	63.0	2267.0		

*** DESIGN (FACTORED) LOADS AT TOP OF PIER MOMENT (ft-k) = 1625.0 VERTICAL (k) = 24.7 SHEAR (k) = 18.2
ADDITIONAL SAFETY FACTOR AGAINST SOIL FAILURE = 1.54

*** CALCULATED PIER LENGTH (ft) = 16.500

*** CHECK OF SOILS PROPERTIES AND ULTIMATE RESISTING FORCES ALONG PIER

TYPE	TOP OF LAYER BELOW TOP OF PIER (ft)	THICKNESS (ft)	DENSITY (pcf)	CU (psf)	KP	FORCE (k)	ARM (ft)
C	0.50	5.00	125.0	0.0		0.00	3.00
C	5.50	2.00	125.0	2267.0		199.50	6.50
C	7.50	3.64	63.0	2267.0		363.48	9.32
C	11.14	5.36	63.0	2267.0		-534.25	13.82

*** SHEAR AND MOMENTS ALONG PIER

	WITH THE ADDITIONAL SAFETY FACTOR		WITHOUT ADDITIONAL SAFETY FACTOR	
DISTANCE BELOW TOP OF PIER (ft)	SHEAR (k)	MOMENT (ft-k)	SHEAR (k)	MOMENT (ft-k)
0.00	28.7	2699.4	18.6	1752.9
1.65	28.7	2746.8	18.6	1783.6
3.30	28.7	2794.2	18.6	1814.4
4.95	28.7	2841.6	18.6	1845.2
6.60	-81.0	2828.6	-52.6	1836.8
8.25	-245.6	2559.2	-159.5	1661.8
9.90	-410.2	2018.2	-266.3	1310.5
11.55	-493.8	1222.0	-320.6	793.5
13.20	-329.2	543.1	-213.7	352.7
14.85	-164.6	135.8	-106.9	88.2
16.50	0.0	0.0	0.0	0.0

*** TOTAL REINFORCEMENT PCT = 0.46 REINFORCEMENT AREA (in^2) = 15.74
*** USABLE AXIAL CAP. (k) = 24.7 USABLE MOMENT CAP. (ft-k) = 1873.4

*** US Standard Re-Bars (Select one of the following):

79	BARS #4	(AREA = 0.20 in^2	DIA = 0.500 in)	AT SPACING (in) = 2.23
51	BARS #5	(AREA = 0.31 in^2	DIA = 0.625 in)	AT SPACING (in) = 3.45
36	BARS #6	(AREA = 0.44 in^2	DIA = 0.750 in)	AT SPACING (in) = 4.89
27	BARS #7	(AREA = 0.60 in^2	DIA = 0.875 in)	AT SPACING (in) = 6.52
20	BARS #8	(AREA = 0.79 in^2	DIA = 1.000 in)	AT SPACING (in) = 8.80
16	BARS #9	(AREA = 1.00 in^2	DIA = 1.128 in)	AT SPACING (in) = 11.00
13	BARS #10	(AREA = 1.27 in^2	DIA = 1.270 in)	AT SPACING (in) = 13.53
11	BARS #11	(AREA = 1.56 in^2	DIA = 1.410 in)	AT SPACING (in) = 15.99
7	BARS #14	(AREA = 2.25 in^2	DIA = 1.693 in)	AT SPACING (in) = 25.13

*** WEIGHT OF CAISSON (kips) = 58.802
*** PRESSURE UNDER CAISSON DUE TO INPUT DESIGN AXIAL LOAD (psf) = 1039.6

Appendix E

Modification Design Drawings

PATENT PENDING

ALL MATERIALS AND INSTALLATION MUST BE PROVIDED BY TOWER REINFORCEMENT, INC.

INDEX OF SHEETS

MODIFICATION SCHEDULE

NO.	DESCRIPTION	ELEV (FT)
1	INSTALL (3) REINFORCING BARS, SEE S-2	0 TO 22
2	INSTALL (3) REINFORCING BARS, SEE S-3	30.333 TO 43
3	INSTALL (3) REINFORCING BARS, SEE S-3	30
4	INSTALL (6) REINFORCING BARS, SEE S-4	60
5	INSTALL (3) DOUBLE C-CHANNEL KITS, SEE S-3	30
6	INSTALL (3) DOUBLE C-CHANNEL KITS, SEE S-4	60

MODIFICATION DESIGN PROVISIONS

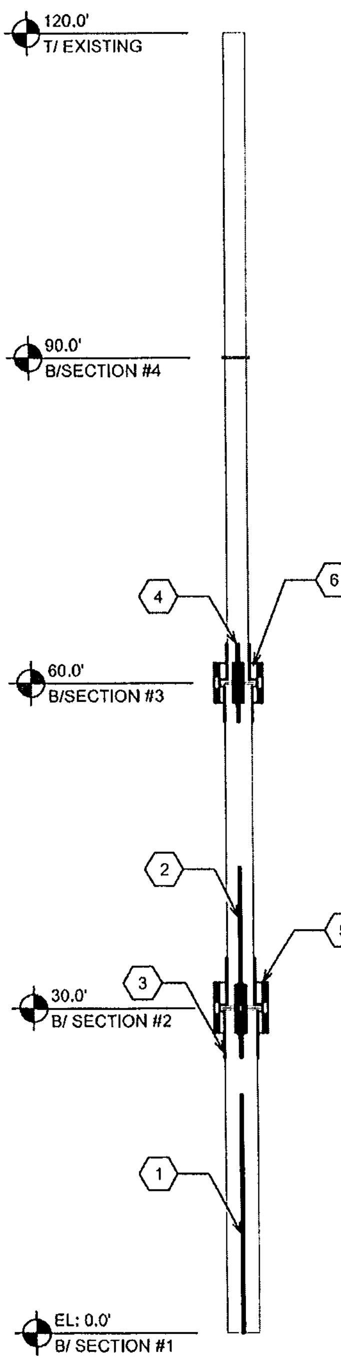
MODIFICATON DESIGN IS BASED ON STRUCTURAL ANALYSIS REPORT BY VERTICAL SOLUTIONS, INC., DATED: 07/31/2008, JOB: 080497.07 - WEST HARTFORD UNITED METHODIST, CT. THIS REPORT IS BASED ON A SPECIFIC ANTENNA AND COAX CONFIGURATION. SEE THE REPORT FOR DETAILS. ANY OTHER ANTENNA AND COAX CONFIGURATION REQUIRES REVIEW BY THE ENGINEER OF RECORD.

CONSTRUCTION INTERFERENCES

EXISTING AND PROPOSED ANTENNAS, MOUNTS, COAX, AND HAND-HOLE RIMS ARE NOT SHOWN FOR CLARITY. CONTRACTOR SHALL COORDINATE WITH TOWER OWNER WITH RESPECT TO INTERFERENCES TO REINFORCEMENT.

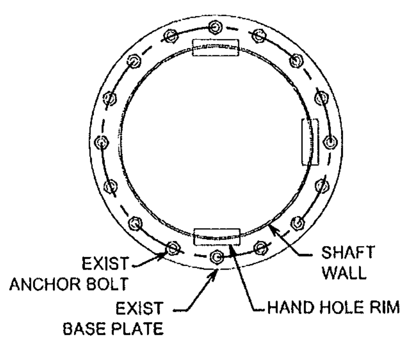
FIELD VERIFY TOWER

THE DRAWINGS PRESENTED HERE ARE BASED ON STRUCTURAL ANALYSIS REPORT AND ASSOCIATED DRAWINGS PROVIDED BY CROWN CASTLE. CONTRACTOR SHALL FIELD VERIFY TOWER DIMENSION PRIOR TO FABRICATION.



TOWER ELEVATION

SCALE: 1/16" = 1' - 0"



SECTION @ BASE 0.0'

SCALE: 3/8" = 1'-0"

August 11, 2008

Seal: STATE OF CONNECTICUT · MICHAEL L. LASSITER · No. 25064 · LICENSED PROFESSIONAL ENGINEER

DRAWN BY: JHW/BJD | CHECKED BY: MLL

SHEET NUMBER: S-1 | REVISION: 2

REV	DATE
2	08-11-08
1	08-08-08
0	07-31-08

CONFIDENTIAL – PATENT PENDING

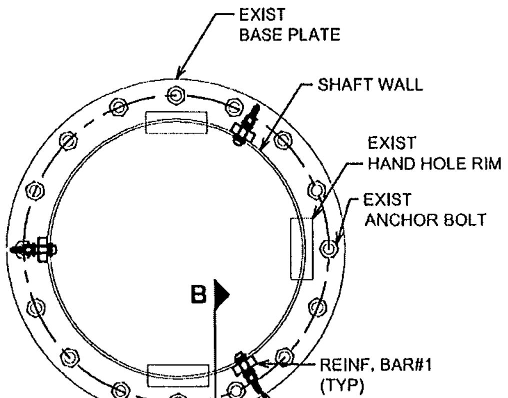
PREPARED BY: TOWER REINFORCEMENT, INC.
2301 W. Michigan St., Suite I
Evansville, IN 47712
(812) 421 - 1470

PROJECT NAME: 876324 - WEST HARTFORD UNITED METHODIST, CT

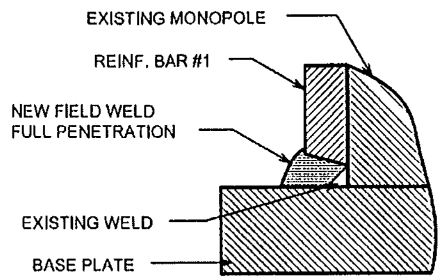
TRI JOB #: MR-1181

vertical solutions

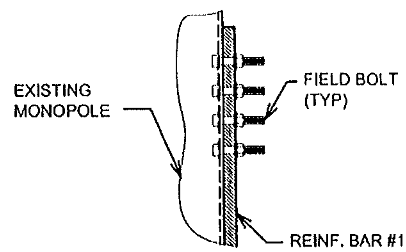
REVIEWED BY:
VSI# 080497.08



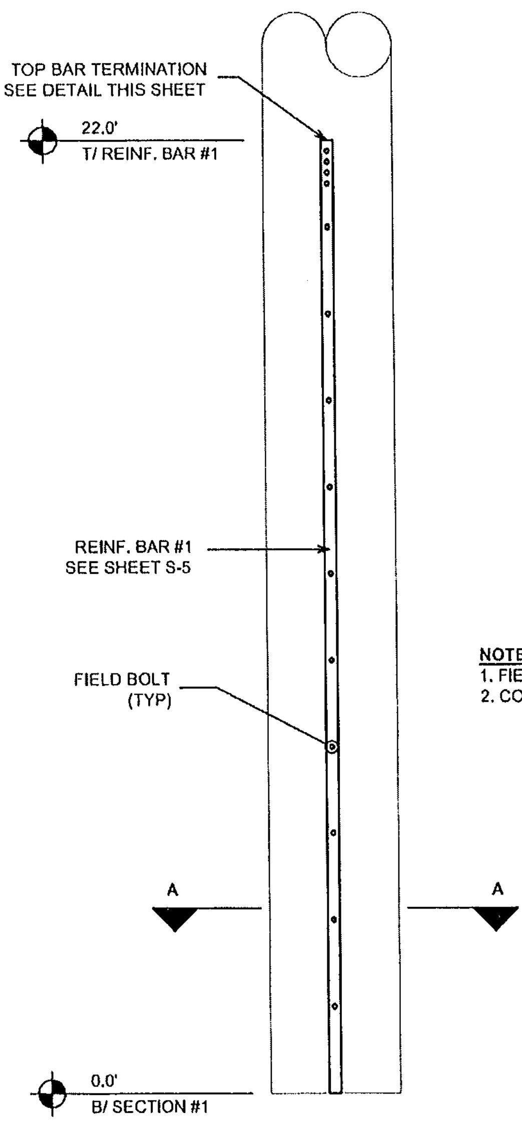
SECTION A-A
SCALE: 1/2" = 1'-0"



SECTION B
NOT TO SCALE



TOP BAR TERMINATION
NOT TO SCALE

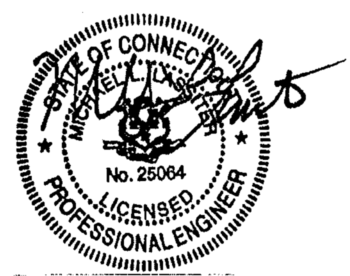


SECTION #1 ELEVATION
SCALE: 1/4" = 1'-0"

NOTES:
1. FIELD DRILL 30-MM Ø HOLE IN TOWER FOR EACH FIELD BOLT.
2. COAT EACH FIELD BOLT WITH SILICONE PRIOR TO INSTALLATION.

August 11, 2008

Seal:



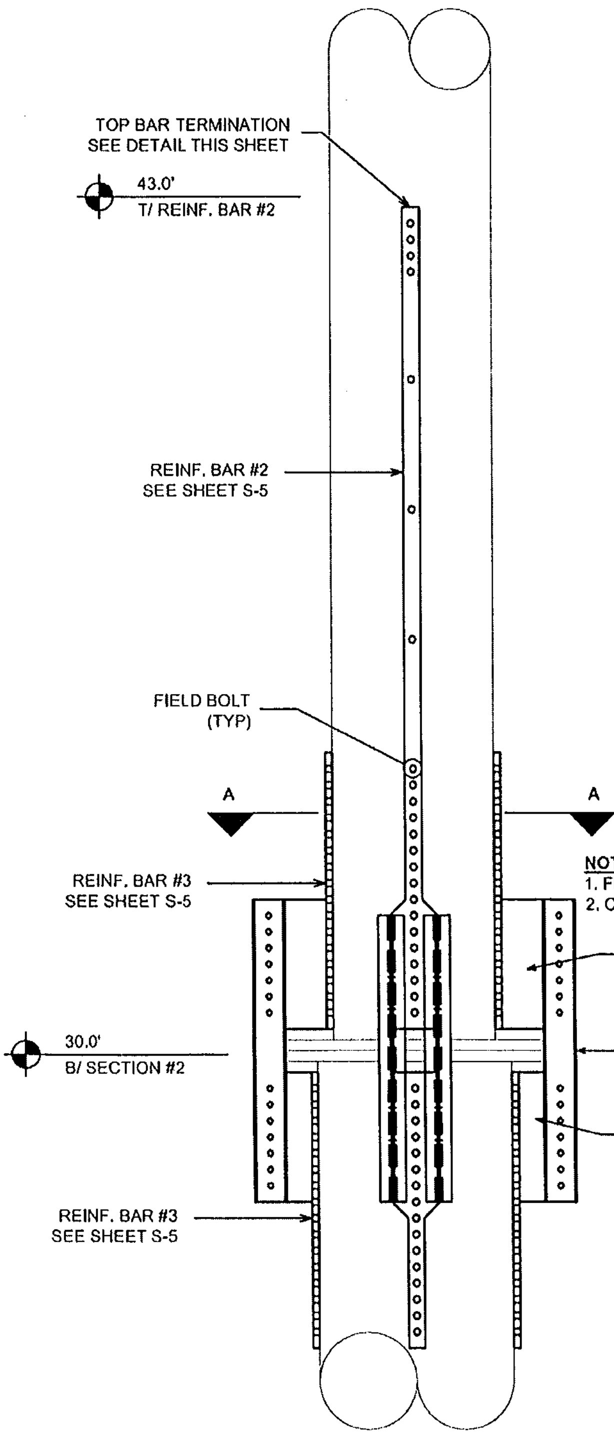
DRAWN BY: JMW/BJD | CHECKED BY: MLL
SHEET NUMBER: S-2
REVISION: 2

REV	DATE
2	08-11-08
1	08-08-08
0	07-31-08

CONFIDENTIAL – PATENT PENDING
PREPARED BY:
TOWER REINFORCEMENT, INC.
2301 W. Michigan St., Suite I
Evansville, IN 47712
(812) 421 - 1470

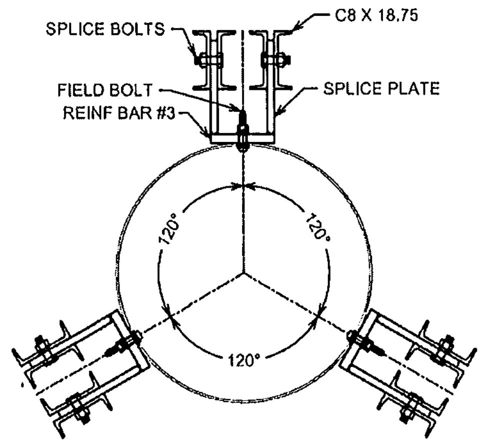
PROJECT NAME:
876324 - WEST HARTFORD UNITED METHODIST, CT
TRI JOB #: MR-1181

vertical solutions
REVIEWED BY:
VSI# 080497.08



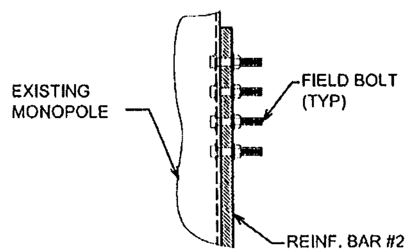
SECTION #1 & 2 ELEVATION

SCALE: 3/8" = 1'-0"



SECTION A-A

NOT TO SCALE



TOP BAR TERMINATION

NOT TO SCALE

NOTES:
1. FIELD DRILL 30-MM Ø HOLE IN TOWER FOR EACH FIELD BOLT.
2. COAT EACH FIELD BOLT WITH SILICONE PRIOR TO INSTALLATION.

August 11, 2008

Seal:

STATE OF CONNECTICUT
MICHAEL L. LASSITER
No. 25064
LICENSED
PROFESSIONAL ENGINEER

DRAWN BY: JHW/BJD | CHECKED BY: MLL

SHEET NUMBER: S-3

REVISION: 2

REV	DATE
2	08-11-08
1	08-08-08
0	07-31-08

CONFIDENTIAL – PATENT PENDING

PREPARED BY:

TOWER REINFORCEMENT, INC.
2301 W. Michigan St, Suite I
Evansville, IN 47712
(812) 421-1470

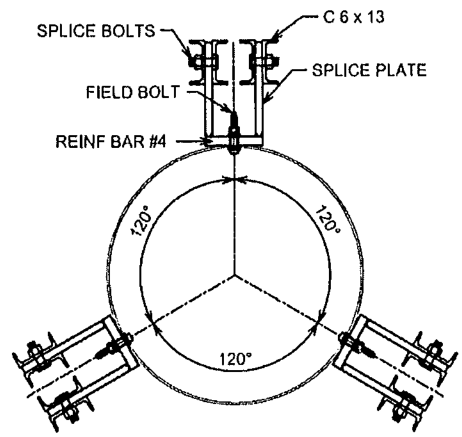
PROJECT NAME:

876324 - WEST HARTFORD
UNITED METHODIST, CT

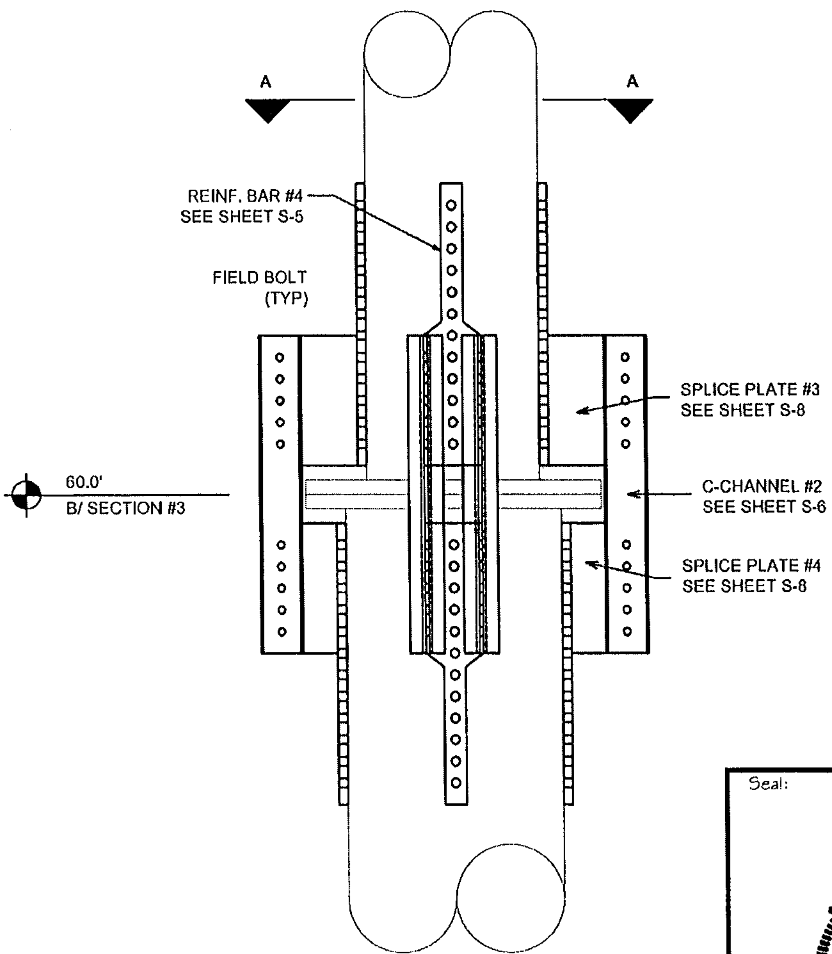
TRI JOB #: MR-1181

vertical solutions

REVIEWED BY:
VSI# 080497.08



SECTION A-A
NOT TO SCALE



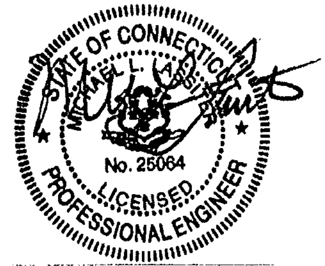
NOTES:
1. FIELD DRILL 30-MM Ø HOLE IN TOWER FOR EACH FIELD BOLT.
2. COAT EACH FIELD BOLT WITH SILICONE PRIOR TO INSTALLATION.

SECTION #2 & 3 ELEVATION

SCALE: 3/4" = 1'-0"

August 11, 2008

Seal:



DRAWN BY: JHW/BJD | CHECKED BY: MLL

SHEET NUMBER: S-4

REVISION: 2

REV	DATE
2	08-11-08
1	08-08-08
0	07-31-08

CONFIDENTIAL – PATENT PENDING

PREPARED BY:

TOWER REINFORCEMENT, INC.
2301 W. Michigan St, Suite I
Evansville, IN 47712
(812) 421 - 1470

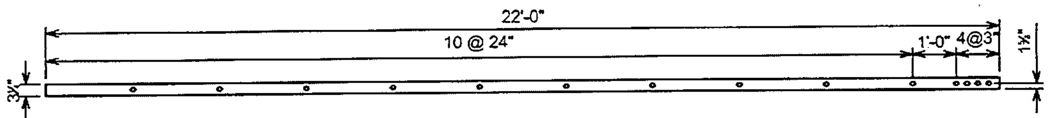
PROJECT NAME:

876324 - WEST HARTFORD UNITED METHODIST, CT

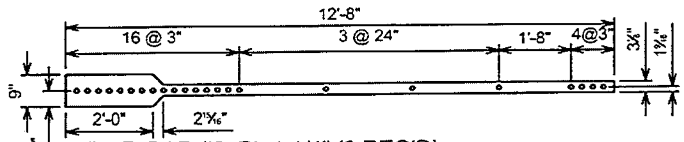
TRI JOB #: **MR-1181**

vertical solutions

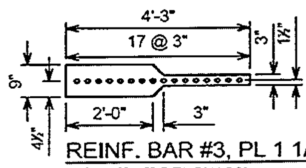
REVIEWED BY:
VSI# 080497.08



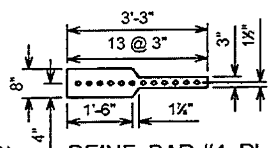
REINF. BAR #1, PL 1 1/4" (3 REQ'D)
MOUNT AT 0' TO 22.00' ELEVATION



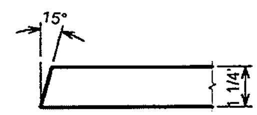
REINF. BAR #2, PL 1 1/4" (3 REQ'D)
MOUNT AT 30.333' TO 43.0' ELEVATION



REINF. BAR #3, PL 1 1/4" (3 REQ'D)
MOUNT AT BELOW 30'



REINF. BAR #4, PL 1 1/4" (6 REQ'D)
MOUNT AT ABOVE AND BELOW 60'



BEVEL DETAIL
BOTTOM OF BAR #1
FOR FULL-PEN. WELD TO BASE PL.
(NOT TO SCALE)

NOTES:
1. LABEL BARS WITH BAR #.
2. BARS ARE TO BE ASTM A572 GRADE 65 STEEL & HOT-DIP GALVANIZED.
3. HOLES IN BARS ARE 31mmØ & DIMENSIONED TO CENTERS.
4. BOTTOM OF BARS ON LEFT AS SHOWN.
5. PROJECT REQUIRES (231) 20mmØ AJAX BOLTS w/ SLEEVES.

Seal:

August 11, 2008

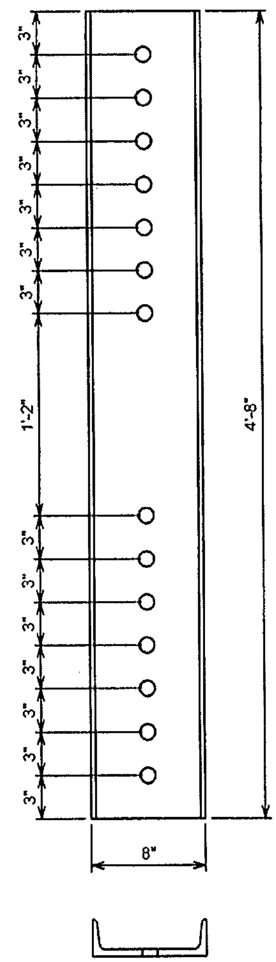
REVIEWED BY:
VSI# 080497.08
vertical solutions

PROJECT NAME:	876324 - WEST HARTFORD UNITED METHODIST, CT
TRI JOB #:	MR-1181

CONFIDENTIAL – PATENT PENDING
PREPARED BY:
TOWER REINFORCEMENT, INC.
2301 W. Michigan St., Suite I
Evansville, IN 47712
(812) 421 - 1470

REV	DATE
2	08-11-08
1	08-08-08
0	07-31-08

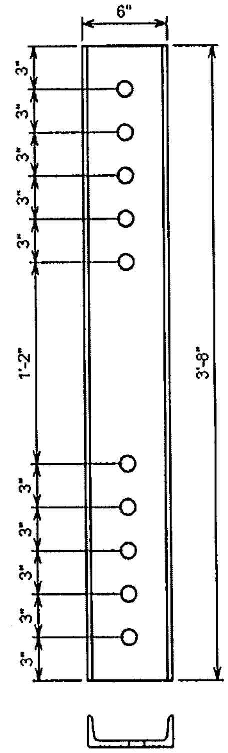
DRAWN BY: JHW/BJD	CHECKED BY: MLL
SHEET NUMBER: S-5	REVISION: 2



C-CHANNEL #1 (12) REQ'D

C8 X 18.75

MOUNT AT 30'



C-CHANNEL #2 (12) REQ'D

C6 X 13.00

MOUNT AT 60'

NOTES:
1. ALL HOLES ARE 1 1/16"Ø
2. ALL PLATES TO BE A572 GRADE 50 STEEL
3. ALL PARTS TO BE HOT-DIP GALVANIZED

August 11, 2008

Seal:

STATE OF CONNECTICUT
MICHAEL L. LASSITER
No. 25064
LICENSED
PROFESSIONAL ENGINEER

DRAWN BY: JHW/BJD | CHECKED BY: MLL

SHEET NUMBER: S-6

REVISION: 2

REV	DATE
2	08-11-08
1	08-08-08
0	07-31-08

CONFIDENTIAL – PATENT PENDING

PREPARED BY:

TOWER REINFORCEMENT, INC.
2301 W. Michigan St., Suite I
Evansville, IN 47712
(812) 421 - 1470

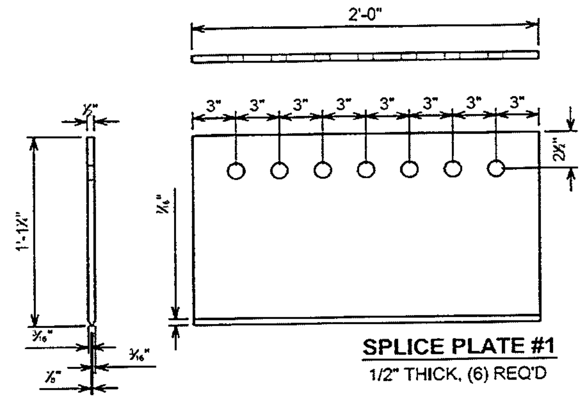
PROJECT NAME:

876324 - WEST HARTFORD UNITED METHODIST, CT

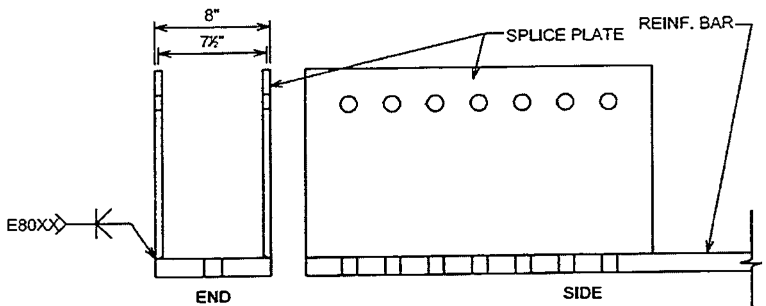
TRI JOB #: MR-1181

vertical solutions

REVIEWED BY:
VSI# 080497.08

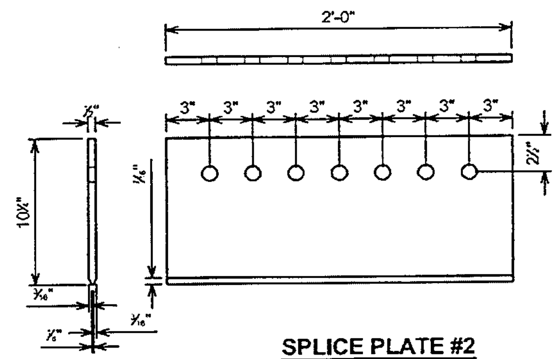


SPLICE PLATE #1
1/2" THICK, (6) REQ'D

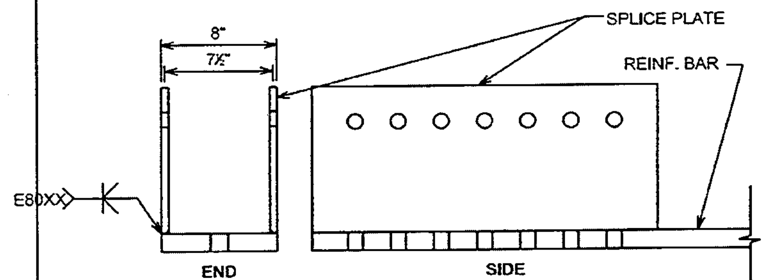


SPLICE PLATE CONNECTION
ABOVE 30', REINF. BAR #2

NOTES:
1. ALL PLATES TO BE A572 GRADE 50 STEEL
2. ALL HOLES ARE 1 1/16"Ø & DIMENSIONED TO CENTERS
3. ALL PARTS TO BE HOT-DIP GALVANIZED AFTER WELDING & GRINDING
4.(1) SET C-CHANNEL KITS REQUIRES (168) 1" Ø X 3 1/2" ASTM A325 BOLTS



SPLICE PLATE #2
1/2" THICK, (12) REQ'D



SPLICE PLATE CONNECTION
BELOW 30', REINF. BAR #3

NOTES:
1. ALL PLATES TO BE A572 GRADE 50 STEEL
2. ALL HOLES ARE 1 1/16"Ø & DIMENSIONED TO CENTERS
3. ALL PARTS TO BE HOT-DIP GALVANIZED AFTER WELDING & GRINDING
4.(1) SET C-CHANNEL KITS REQUIRES (84) 1" Ø X 3 1/2" ASTM A325 BOLTS

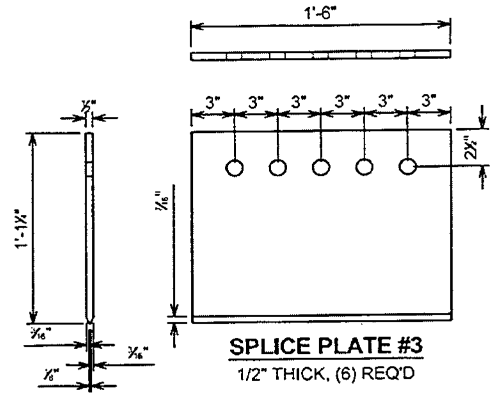
Seal: STATE OF CONNECTICUT, MICHAEL LASITER, No. 25064, LICENSED PROFESSIONAL ENGINEER

August 11, 2008

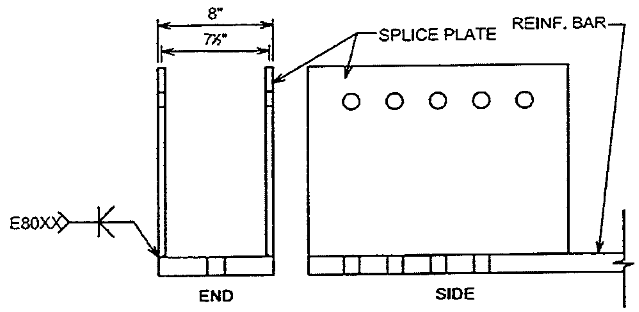
REVIEWED BY: VSI# 080497.08

vertical solutions

PROJECT NAME:	CONFIDENTIAL – PATENT PENDING	REV	DATE	DRAWN BY: JHW/BJD	CHECKED BY: MLL
876324 - WEST HARTFORD UNITED METHODIST, CT	PREPARED BY: TOWER REINFORCEMENT, INC. 2301 W. Michigan St. Suite I Evansville, IN 47712 (812) 421 - 1470	2	08-11-08	SHEET NUMBER: S-7	REVISION: 2
TRI JOB #: MR-1181		1	08-08-08		
		0	07-31-08		

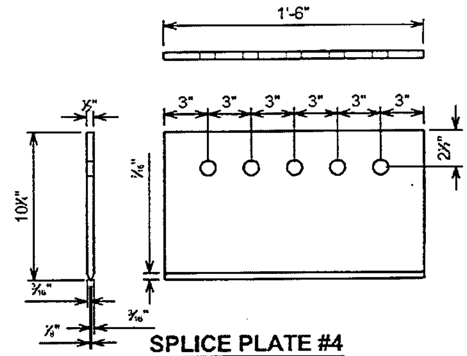


SPLICE PLATE #3
1/2" THICK, (6) REQ'D

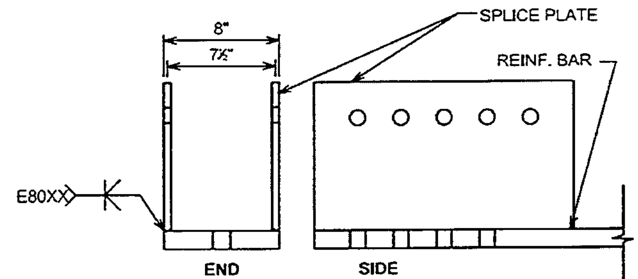


SPLICE PLATE CONNECTION
ABOVE 60', REINF. BAR #4

NOTES:
1. ALL PLATES TO BE A572 GRADE 50 STEEL
2. ALL HOLES ARE 1 1/16"Ø & DIMENSIONED TO CENTERS
3. ALL PARTS TO BE HOT-DIP GALVANIZED AFTER WELDING & GRINDING
4.(1) SET C-CHANNEL KITS REQUIRES (60) 1"Ø X 3 1/2" ASTM A325 BOLTS



SPLICE PLATE #4
1/2" THICK, (6) REQ'D



SPLICE PLATE CONNECTION
BELOW 60', REINF. BAR #4

NOTES:
1. ALL PLATES TO BE A572 GRADE 50 STEEL
2. ALL HOLES ARE 1 1/16"Ø & DIMENSIONED TO CENTERS
3. ALL PARTS TO BE HOT-DIP GALVANIZED AFTER WELDING & GRINDING
4.(1) SET C-CHANNEL KITS REQUIRES (60) 1"Ø X 3 1/2" ASTM A325 BOLTS

Seal:

August 11, 2008

REVIEWED BY:
VSI# 080497.08

vertical solutions

PROJECT NAME:	CONFIDENTIAL — PATENT PENDING	REV	DATE	
876324 - WEST HARTFORD UNITED METHODIST, CT	PREPARED BY: TOWER REINFORCEMENT, INC. 2301 W. Michigan St., Suite I Evansville, IN 47712 (812) 421 - 1470	2	08-11-08	DRAWN BY: JHW/BJD — CHECKED BY: MLL
TRI JOB #: MR-1181		1	08-08-08	SHEET NUMBER: S-8
		0	07-31-08	REVISION: 2

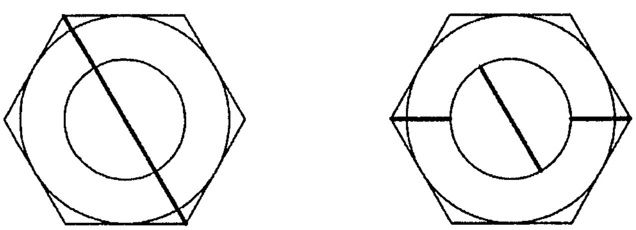
AJAX SLEEVES

AJAX BOLT SLEEVE LENGTH	# REQ'D
INCH	
1.5	195

TOTAL LENGTH REQ'D = 293"
WITH EXCESS FOR CUTS = 323" = 27'

QUALITY CONTROL OF FIELD BOLTS

FOR QUALITY CONTROL PURPOSES, CONTRACTOR SHALL MARK EACH CONNECTION WITH PERMANENT MARKER PRIOR TO " TURN BEYOND SNUG TIGHT".



BEFORE 1/3 TURN   AFTER 1/3 TURN

August 11, 2008

Seal:

DRAWN BY: JHW/BJD CHECKED BY: MLL

SHEET NUMBER: S-9 REVISION: 2

REV	DATE
2	08-11-08
1	08-08-08
0	07-31-08

CONFIDENTIAL – PATENT PENDING

PREPARED BY:

TOWER REINFORCEMENT, INC.
2301 W. Michigan St., Suite I
Evansville, IN 47712
(812) 421-1470

PROJECT NAME:
876324 - WEST HARTFORD UNITED METHODIST, CT

TRI JOB #: MR-1181

vertical solutions

REVIEWED BY:
VSI# 080497.08

GENERAL

1. ALL METHODS, MATERIAL AND WORKMANSHIP SHALL FOLLOW THE DICTATES OF GOOD CONSTRUCTION PRACTICES.

2. ALL WORK INDICATED ON THESE DRAWINGS SHALL BE PERFORMED BY QUALIFIED CONTRACTORS EXPERIENCED IN TOWER AND FOUNDATION CONSTRUCTION.

3. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF RECORD IMMEDIATELY OF ANY INSTALLATION INTERFERENCES. ALL NEW WORK SHALL ACCOMMODATE EXISTING CONDITIONS. DETAILS NOT SPECIFICALLY SHOWN ON THE DRAWINGS SHALL FOLLOW SIMILAR DETAILS FOR THIS JOB.

4. ANY SUBSTITUTIONS MUST CONFORM TO THE REQUIREMENTS OF THE NOTES AND SPECIFICATIONS AND SHOULD BE SIMILAR TO THOSE SHOWN. ALL SUBSTITUTIONS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.

5. ANY MANUFACTURED DESIGN ELEMENTS MUST CONFORM TO THE REQUIREMENTS OF THESE NOTES AND SPECIFICATIONS AND SHOULD BE SIMILAR TO THOSE SHOWN. THESE DESIGN ELEMENTS MUST BE STAMPED BY AN ENGINEER PROFESSIONALLY REGISTERED IN THE STATE OF THE PROJECT, AND SUBMITTED TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO FABRICATION.

6. ALL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL CODES AND OSHA SAFETY REGULATIONS.

7. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND EXECUTION OF ALL MISCELLANEOUS SHORING, BRACING, TEMPORARY SUPPORTS, ETC. NECESSARY TO PROVIDE A COMPLETE AND STABLE STRUCTURE AS SHOWN ON THESE DRAWINGS.

8. ANY STEEL WHICH HAS BEEN FIELD CUT OR WELDED SHALL BE COLD GALVANIZED WITH 95% ZINC RICH PAINT PER ASTM A780.

9. CONTRACTOR'S PROPOSED INSTALLATION SHALL NOT INTERFERE, NOR DENY ACCESS TO, ANY EXISTING OPERATIONAL AND SAFETY EQUIPMENT.

Seal:

August 11, 2008

BOLT TIGHTENING PROCEDURE

1. TIGHTEN FLANGE BOLTS BY AISC- "TURN OF THE NUT" METHOD, USING THE CHART BELOW:

BOLT LENGTHS UP TO AND INCLUDING FOUR DIA.

3/4"	BOLTS UP TO AND INCLUDING 4.0 LENGTH	+1/3 TURN BEYOND SNUG TIGHT
7/8"	BOLTS UP TO AND INCLUDING 3.5 LENGTH	+1/3 TURN BEYOND SNUG TIGHT
1"	BOLTS UP TO AND INCLUDING 4.0 LENGTH	+1/3 TURN BEYOND SNUG TIGHT
1-1/8"	BOLTS UP TO AND INCLUDING 4.5 LENGTH	+1/3 TURN BEYOND SNUG TIGHT
1-1/4"	BOLTS UP TO AND INCLUDING 5.0 LENGTH	+1/3 TURN BEYOND SNUG TIGHT
1-1/2"	BOLTS UP TO AND INCLUDING 6.0 LENGTH	+1/3 TURN BEYOND SNUG TIGHT

BOLT LENGTH OVER FOUR DIA. BUT NOT EXCEEDING 8 DIA.

3/4"	BOLTS 4.25 TO 6.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
7/8"	BOLTS 3.75 TO 7.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
1"	BOLTS 4.25 TO 8.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
1-1/8"	BOLTS 4.75 TO 9.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
1-1/4"	BOLTS 5.25 TO 10.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
1-1/2"	BOLTS 6.25 TO 12.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT

2. SPLICE BOLTS SUBJECT TO DIRECT TENSION SHALL BE INSTALLED AND TIGHTENED AS PER SECTION 8(d)(1) OF THE AISC MANUAL OF STEEL CONSTRUCTION. THE INSTALLATION PROCEDURE IS PARAPHRASED AS FOLLOWS:

"FASTENERS SHALL BE INSTALLED IN PROPERLY ALIGNED HOLES AND BE TIGHTENED BY
ONE OF THE METHODS DESCRIBED IN SUBSECTION 8(d)(1) THROUGH 8(d)(4).

8(d)(1) TURN-OF-THE-NUT TIGHTENING.
BOLTS SHALL BE INSTALLED IN ALL HOLES OF THE CONNECTION AND BROUGHT TO A SNUG TIGHT CONDITION. SNUG TIGHT IS DEFINED AS THE TIGHTNESS THAT EXISTS WHEN
THE PLIES OF A JOINT ARE IN FIRM CONTACT. THIS MAY BE OBTAINED BY A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL EFFORT OF A MAN USING AN ORDINARY SPUD WRENCH. SNUG TIGHTENING SHALL PROGRESS SYSTEMATICALLY...UNTIL ALL THE
BOLTS ARE SIMULTANEOUSLY SNUG TIGHT AND THE CONNECTION IS FULLY COMPACTED.
FOLLOWING THIS INITIAL OPERATION ALL BOLTS IN THE CONNECTION SHALL BE TIGHTENED FURTHER BY THE APPLICABLE AMOUNT OF ROTATION SPECIFIED ABOVE. DURING THE TIGHTENING OPERATION THERE SHALL BE NO ROTATION OF THE PART NOT TURNED BY THE WRENCH. TIGHTENING SHALL PROGRESS SYSTEMATICALLY.

SPECIAL INSPECTION

1. A QUALIFIED INDEPENDENT TESTING LABORATORY, EMPLOYED BY THE OWNER, SHALL PERFORM INSPECTION AND TESTING IN ACCORDANCE WITH IBC 2000, SECTION 1704 AS REQUIRED BY PROJECT SPECIFICATIONS FOR THE FOLLOWING CONSTRUCTION WORK:
   a) STRUCTURAL WELDING
   b) HIGH STRENGTH BOLTS

2. THE INSPECTION AGENCY SHALL SUBMIT INSPECTION AND TEST REPORTS TO THE BUILDING DEPARTMENT, THE ENGINEER OF RECORD, AND THE OWNER IN ACCORDANCE WITH IBC 2000, SECTION 1704. UNLESS THE FABRICATOR IS APPROVED BY THE BUILDING OFFICIAL TO PERFORM SUCH WORK WITHOUT THE SPECIAL INSPECTIONS.

FIELD BOLTS

1. ALL STITCH, SPLICE & TERMINATION BOLTS ARE 20 mm ONESIDE BOLTS BY AJAX.

   a) BOLTS SHALL MEET AS 1252, PROPERTRY CLASS 8.8 (SIMILAR TO ASTM A325M)
   b) Fu = 120 ksi

2. EACH BOLT SHALL INCLUDE A 29 mm O.D. BY 20 mm I.D. SLEEVE (Fu=120 ksi)

3. BOLT HOLES SHALL BE 31 mm MAXIMUM.

APPLICABLE CODES AND STANDARDS

1. ANSI/TIA/EIA STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES, 222-F EDITION.

2. 1996 BOCA NATIONAL BUILDING CODE.

3. ACI 318: AMERICAN CONCRETE INSTITUTE, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, 318-99.

4. CRSI: CONCRETE REINFORCING STEEL INSTITUTE, MANUAL OF STANDARD PRACTICE, LATEST EDITION.

5. AISC: AMERICAN INSTITUTE OF STEEL CONSTRUCTION, MANUAL OF STEEL CONSTRUCTION, LATEST EDITION.

6. AWS: AMERICAN WELDING SOCIETY D1.1, STRUCTURAL WELDING CODE, LATEST EDITION.

STRUCTURAL STEEL

1. ALL DETAILING, FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AISC SPECIFICATIONS, LATEST EDITION.

2. ALL EXPOSED STRUCTURAL STEEL MEMBERS SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION PER ASTM A123. EXPOSED STEEL HARDWARE AND ANCHOR BOLTS SHALL BE GALVANIZED PER ASTM A153 OR B695.

3. ALL U-BOLTS SHALL BE ASTM A307 OR EQUIVALENT, WITH LOCKING DEVICE, UNLESS NOTED OTHERWISE.

WELDING

1. ALL WELDING SHALL BE PERFORMED BY WELDERS CURRENTLY STATE OR AWS CERTIFIED TO THE AWS D1.1 STRUCTURAL WELDING CODE, LATEST EDITION.

2. ALL FIELD WELDING SHALL UTILIZE LOW HYDROGEN ELECTRODES.

3. PRIOR TO FIELD WELDING, GRIND OFF GALVANIZING TO 1/2" BEYOND ALL FIELD WELD SURFACES.

4. ALL FIELD CUT, FIELD WELDED, OR DAMAGED GALVANIZING SURFACES SHALL BE REPAIRED WITH ZINC RICH PAINT (95% ZINC CONTENT) PER ASTM A780.

5. PRIOR TO FIELD WELDING, CONTRACTOR SHALL CLEAR THE INTERIOR OF
MONOPOLE OF FLAMMABLE DEBRIS. COAXIAL CABLE SHALL BE SHIFTED AWAY FROM PROXIMITY OF THE WELD AND/OR COVERED WITH A HEAT RESISTANT BLANKET.

PAINT

1. CLEAN AND PAINT PROPOSED STEEL ACCORDING TO FAA ADVISORY CIRCULAR AC 70/7460-1K.

REINFORCEMENT STEEL

1. ALL REINFORCEMENT BARS ARE ASTM A572 GRADE 65, Fy = 65 ksi, Fu = 80 ksi.

FIELD WELDS

1. ALL FIELD WELDS SHALL BE MADE WITH E80XX WELD RODS.

REVIEWED BY:
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vertical solutions

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CONFIDENTIAL – PATENT PENDING
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