

**TAB 9**

## Flexent® Modular Cell 4.0

### Description

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The *Flexent*® Modular Cell 4.0 builds on our vast experience in spread spectrum to deliver the most flexible, future-focused base station on the market. This base station introduces the *Flexent*® *OneBTS*™ common platform digital shelf into CDMA networks. This shelf, with a field upgrade, will eventually support both CDMA and UMTS in the frame.

The *Flexent* Modular Cell 4.0 packs 6 carriers/3 sectors into an outdoor cabinet that is the same size as the *Flexent* Modular Cell 3.0. The smaller indoor cabinet will support 4 carriers/3 sectors. In addition to capacity gains, this digital shelf will support additional enhancements as we bring them to market.

Our Bell Labs developers are working on Intelligent Antennas, Transmit Diversity, and BLAST technologies. These technologies will enhance the capacities and capabilities of the *Flexent* Modular Cell 4.0. Each of the features can be added to the *Flexent* Modular Cell 4.0 in the field - in a single maintenance window. This means that you can deploy the *Flexent* Modular Cell 4.0 today and add capacity and capabilities whenever they are available and when you need them. It means that the future is available on your timetable, when your business plan calls for them, no matter what your business plan might be.

### Value description

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The *Flexent* Modular Cell 4.0, with its future-proof design, enables easy and cost-effective network upgrades to:

- Add additional capacity, when needed, to support network growth
- Support additional functionality and advanced capabilities

### Features

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#### Investment Protection

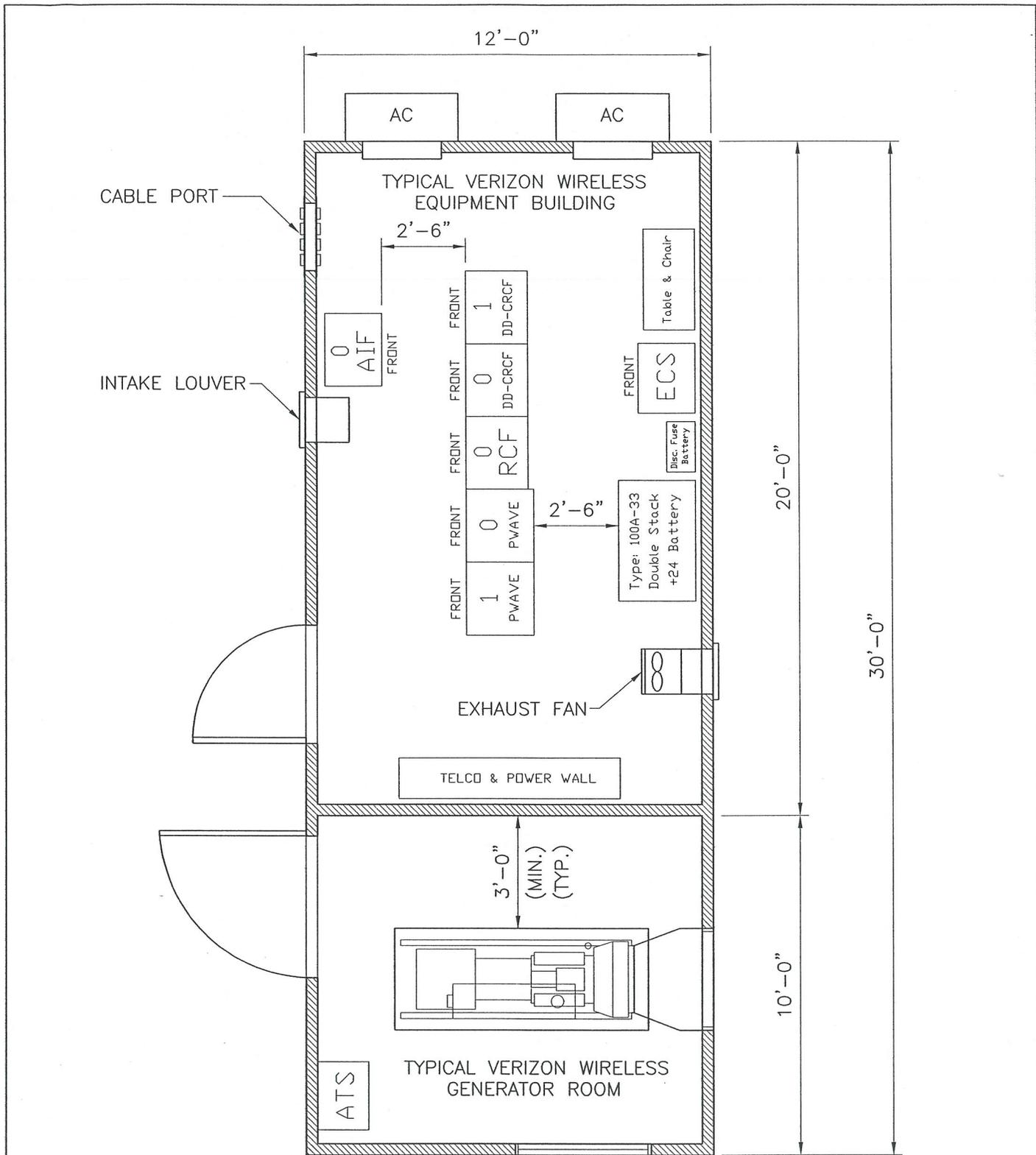
- Increase capacity, when you need it, to grow your network
- Add advanced features and capabilities, with quick and easy installation

#### Scalability

- Support up to 6 carriers/3 sectors in a single outdoor cabinet
- Support up to 4 carriers/3 sectors in the indoor cabinet

#### Reduced Footprint

- Provides additional capacity and functionality — in the same footprint as the *Flexent* Modular Cell 3.0



1 TYPICAL EQUIPMENT BUILDING FLOOR PLAN  
 SK-1 SCALE: 1/4"=1'-0"

SITE ID NO:  
 Designed by:  
 Drawn by: CRS  
 Checked by:  
 Approved by:

**URS CORPORATION AES**  
 795 BROOK STREET, BLDG 5  
 ROCKY HILL, CONNECTICUT  
 1-(860)-529-8882

CELLCO PARTNERSHIP DBA  
 VERIZON WIRELESS  
 WIRELESS COMMUNICATIONS FACILITY

REV.	DATE:	DESCRIPTION

Scale: AS NOTED Date: 12-03-02

Job No. File No. SK-1

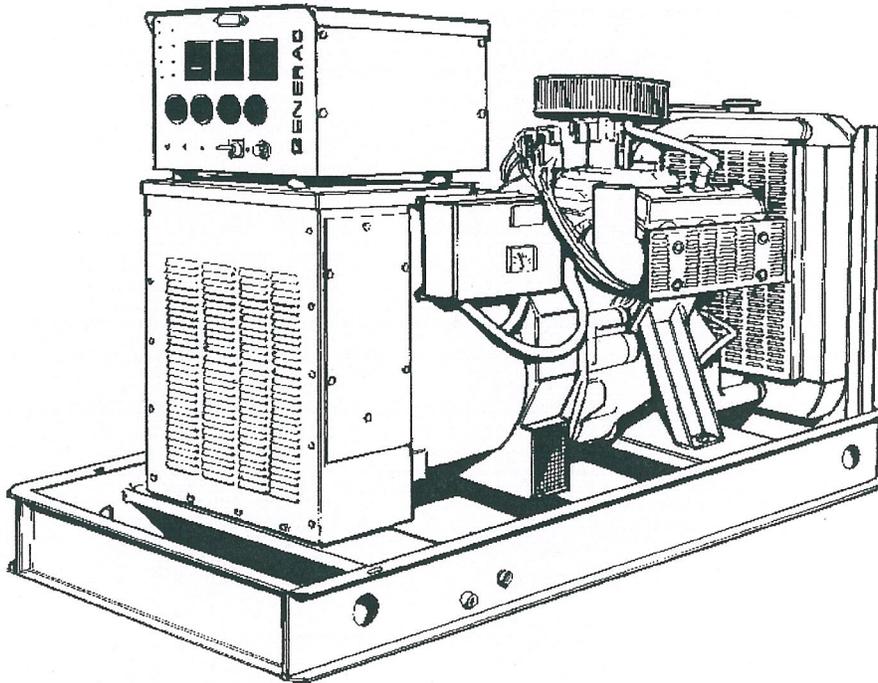
Dwg. No.  
**SK-1**  
 Dwg. 1 of 1

# SG050 SG060

## Liquid Cooled Gas Engine Generator Sets

Continuous Standby Power Rating  
50KW 60 Hz / 50KVA 50 Hz  
60KW 60 Hz / 60KVA 50 Hz

Prime Power Rating  
40KW 60 Hz / 40KVA 50 Hz  
40KW 60 Hz / 45KVA 50 Hz



Power Matched  
**GENERAC 5.7GN ENGINE**  
Naturally Aspirated

## FEATURES

- **INNOVATIVE DESIGN & PROTOTYPE TESTING** are key components of GENERAC'S success in "IMPROVING POWER BY DESIGN." But it doesn't stop there. Total commitment to component testing, reliability testing, environmental testing, destruction and life testing, plus testing to applicable CSA, NEMA, EGSA, and other standards, allows you to choose GENERAC POWER SYSTEMS with the confidence that these systems will provide superior performance.
- **TEST CRITERIA:**
  - ✓ PROTOTYPE TESTED
  - ✓ SYSTEM TORSIONAL TESTED
  - ✓ ELECTRO-MAGNETIC INTERFERENCE
  - ✓ NEMA MG1-22 EVALUATION
  - ✓ MOTOR STARTING ABILITY
  - ✓ SHORT CIRCUIT TESTING
  - ✓ UL 2200 COMPLIANCE AVAILABLE
- **SOLID-STATE, FREQUENCY COMPENSATED VOLTAGE REGULATION.** This state-of-the-art power maximizing regulation system is standard on all Generac models. It provides optimized FAST RESPONSE to changing load conditions and MAXIMUM MOTOR STARTING CAPABILITY by electronically torque-matching the surge loads to the engine.
- **SINGLE SOURCE SERVICE RESPONSE** from Generac's dealer network provides parts and service know-how for the entire unit, from the engine to the smallest electronic component. You are never on your own when you own an GENERAC POWER SYSTEM.
- **GENERAC TRANSFER SWITCHES, SWITCHGEAR AND ACCESSORIES.** Long life and reliability is synonymous with GENERAC POWER SYSTEMS. One reason for this confidence is that the GENERAC product line includes its own transfer systems, accessories, switchgear and controls for total system compatibility.

# GENERAC®

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## POWER SYSTEMS, INC.

# APPLICATION & ENGINEERING DATA

SG050 / 060

## GENERATOR SPECIFICATIONS

TYPE ..... Four-pole, revolving field  
ROTOR INSULATION ..... Class H  
STATOR INSULATION ..... Class H  
TOTAL HARMONIC DISTORTION ..... <3%  
TELEPHONE INTERFERENCE FACTOR (TIF) ..... <50  
ALTERNATOR ..... Self-ventilated and drip-proof  
BEARINGS (PRE-LUBED & SEALED) ..... 1  
COUPLING ..... Direct, Flexible Disc  
LOAD CAPACITY (STANDBY) ..... 100%  
LOAD CAPACITY (PRIME) ..... 110%

**NOTE: Emergency loading in compliance with NFPA 99, NFPA 110, paragraph 5-13.2.6. Generator rating and performance in accordance with ISO8528-5, BS5514, SAE J1349, ISO3046 and DIN6271.**

### EXCITATION SYSTEM

BRUSHLESS ..... Magnetically coupled DC current ✓  
Eight-pole exciter w/ battery-driven field boost ✓  
Mounted outboard of main bearing ✓  
 PERMANENT MAGNET EXCITER ..... Eighteen pole exciter ✓  
Magnetically coupled DC current ✓  
Mounted outboard of main bearing ✓  
REGULATION ..... Solid-state ✓  
±1% regulation ✓

## GENERATOR FEATURES

- Four pole, revolving field generator, directly connected to the engine shaft through a heavy-duty, flexible disc for permanent alignment.
- Generator meets temperature rise standards for class "F" insulation as defined by NEMA MG1-22.4 and NEMA MG1-1.65.
- Rotor and stator and other insulation is impregnated twice with class "H" varnish.
- All models have passed a three-phase symmetrical short circuit test to assure system protection and reliability.
- Unit tested for motor-starting ability by measuring instantaneous voltage dip with an oscillograph.
- All models utilize an advanced wire harness design for reliable interconnection within the circuitry.
- Magnetic circuit, including amortisseur windings, tooth and skewed stator design, provides a minimal level of waveform distortion and an electromagnetic interference level which meets accepted requirements for standard AM radio, TV, and marine radio telephone applications.
- Voltage waveform deviation, total harmonic content of the AC waveform, and T.I.F. (Telephone Influence Factor) have been evaluated to acceptable standards in accordance with NEMA MG1-22.
- Alternator is self-ventilated and drip-proof constructed.
- Fully life-tested protective systems, including "field circuit and thermal overload protection" and optional main-line circuit breakers capable of handling full output capacity.
- System Torsional acceptability confirmed during Prototype Testing.

Rating definitions - Standby: Applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. (All ratings in accordance with BS5514, ISO3046 and DIN6271). Prime (Unlimited Running Time): Applicable for supplying electric power in lieu of commercially purchased power. Prime power is the maximum power available at variable load. A 10% overload capacity is available for 1 hour in 12 hours. (All ratings in accordance with BS5514, ISO3046, ISO8528 and DIN6271).

## ENGINE SPECIFICATIONS

MAKE ..... GENERAC  
MODEL ..... 5.7GN  
CYLINDERS ..... V-8  
DISPLACEMENT ..... 5.7 Liter (350 cu. in.)  
BORE ..... 101.6 mm (4.00 in.)  
STROKE ..... 88 mm (3.48 in.)  
COMPRESSION RATIO ..... 9.4:1  
INTAKE AIR ..... Naturally Aspirated  
NUMBER OF MAIN BEARINGS ..... 5  
CONNECTING RODS ..... 8 PM Steel  
CYLINDER HEAD ..... Cast Iron  
PISTONS ..... 8-Notched Head, Aluminum Alloy  
CRANKSHAFT ..... Cast

### VALVE TRAIN

LIFTER TYPE ..... Hydraulic Roller  
INTAKE VALVE MATERIAL ..... Stainless Steel  
EXHAUST VALVE MATERIAL ..... Stellite Faced  
HARDENED VALVE SEATS ..... Yes

### ENGINE GOVERNOR

ELECTRONIC ..... Standard  
FREQUENCY REGULATION, NO-LOAD TO FULL LOAD . ±0.5%  
STEADY STATE REGULATION ..... ±0.25%

### LUBRICATION SYSTEM

TYPE OF OIL PUMP ..... Gear  
OIL FILTER ..... Full flow, cartridge  
CRANKCASE CAPACITY Lit. (qts.) ..... 4.7 (5.0)

### COOLING SYSTEM

TYPE OF SYSTEM ..... Pressurized, closed recovery  
WATER PUMP ..... Pre-lubed, self-sealing  
TYPE OF FAN ..... Pusher  
NUMBER OF FAN BLADES ..... 10  
DIAMETER OF FAN mm(in.) ..... 559 (22.0)  
COOLANT HEATER ..... 120V, 1000 W

### FUEL SYSTEM

FUEL  
 Natural Gas or L.P. Vapor ..... Standard  
 L.P. Liquid Withdrawal ..... Optional  
CARBURETOR ..... Down draft  
SECONDARY FUEL REGULATOR .. Nat. Gas or L.P. Vapor System  
HOT WATER VAPORIZER ..... L.P. Liquid Withdrawal System  
AUTOMATIC FUEL LOCKOFF SOLENOID ..... Standard  
OPERATING FUEL PRESSURE VAPOR SYSTEMS ..... 7" to 14" H<sub>2</sub>O

### ELECTRICAL SYSTEM

BATTERY CHARGE ALTERNATOR ..... 15 Amps @ 12V  
STARTER MOTOR ..... 12 V  
RECOMMENDED BATTERY ..... (1) - 12 V, 90 A.H., 27F  
GROUND POLARITY ..... Negative

SG050 / 060

**OPERATING DATA**

	STANDBY						PRIME							
	SG050			SG060			SG050			SG060				
	kW	AMP		NG kW	AMP	LP kW	AMP	kW	AMP		NG kW	AMP	LP kW	AMP
<b>GENERATOR OUTPUT VOLTAGE/KW—60Hz,</b>														
120/240 1-phase, 1.0 pf	50	208		54	225	59	246	40	167		40	167	50	208
120/208V, 3-phase, 0.8 pf	50	173		60	208	65	226	40	139		40	139	50	173
120/240V, 3-phase, 0.8 pf	50	150		60	180	65	196	40	120		40	120	50	150
277/480V, 3-phase, 0.8 pf	50	75		60	90	65	96	40	60		40	60	50	75
	NOTE: Consult your Generac dealer for additional voltages.													
<b>GENERATOR OUTPUT VOLTAGE/KVA-50Hz</b>	<b>KVA</b>	<b>AMP</b>		<b>NG kW</b>	<b>AMP</b>	<b>LP kW</b>	<b>AMP</b>	<b>KVA</b>	<b>AMP</b>		<b>KVA</b>	<b>AMP</b>		
110/220V, 1-phase, 1.0 pf	40	181		48	218	52	236	32	145		36	163		
115/200V, 3-phase, 0.8 pf	50	144		60	173	65	188	40	115		45	130		
100/200V, 3-phase, 0.8 pf	50	144		60	173	65	188	40	115		45	130		
231/400V, 3-phase, 0.8 pf	50	72		60	87	65	94	40	58		45	65		
	NOTE: Consult your Generac dealer for additional voltages.													
<b>MOTOR STARTING</b>	<b>208/240V</b>	<b>480V</b>		<b>208/240V</b>	<b>480V</b>			<b>208/240V</b>	<b>480V</b>		<b>208/240V</b>	<b>480V</b>		
60Hz - KVA	100	113		120	141			100	113		120	141		
Maximum at 35% instantaneous voltage dip														
<b>FUEL</b>	<b>50%</b>	<b>75%</b>	<b>100%</b>	<b>50%</b>	<b>75%</b>	<b>100%</b>		<b>50%</b>	<b>75%</b>	<b>100%</b>	<b>50%</b>	<b>75%</b>	<b>100%</b>	
Natural Gas—60 Hz	413	515	655	495	625	785		340	420	530	415	490	625	
Liquid Propane—60 Hz	161	201	255	193	244	305		133	164	207	162	191	244	
Load	4.6	5.7	7.2	5.5	6.9	8.6		3.8	4.6	5.9	4.6	5.4	6.9	
	m <sup>3</sup> /hr.													
	ft <sup>3</sup> /hr.													
<b>COOLING</b>														
Coolant capacity System - lit. (US gal.)	18.9 (5)			18.9 (5)				18.9 (5)			18.9 (5)			
Coolant flow/min. 60 Hz - lit. (US gal.)	90.8 (24)			90.8 (24)				90.8 (24)			90.8 (24)			
50 Hz - lit. (US gal.)	75.6 (20)			75.6 (20)				75.6 (20)			75.6 (20)			
Heat rejection to coolant 60 Hz - BTU/hr.	213,000			255,000				175,000			192,000			
Inlet air 60 Hz - m <sup>3</sup> /min. (cfm)	207.6 (7330)			207.6 (7330)				207.6 (7330)			207.6 (7330)			
50 Hz - m <sup>3</sup> /min. (cfm)	184 (6500)			184 (6500)				184 (6500)			184 (6500)			
Max. inlet air temperature °F	110			110				110			110			
<b>COMBUSTION AIR REQUIREMENTS</b>														
Flow at rated power 60 Hz - m <sup>3</sup> /min. (cfm)	4.1 (145)			4.9 (173)				3.25 (115)			3.48 (123)			
50 Hz - m <sup>3</sup> /min. (cfm)	3.3 (116)			4.1 (148)				2.63 (93)			2.75 (97)			
<b>EXHAUST</b>														
Exhaust flow at rated output 60 Hz - m <sup>3</sup> /min. (cfm)	13.56 (479)			16.7 (590)				9.7 (342)			11.2 (395)			
Max recommended back pressure - "Hg	1.5			1.5				1.5			1.5			
Exhaust temp at rated output 60 Hz - C° (°F)	677 (1250)			732 (1350)				621 (1150)			660 (1220)			
Exhaust outlet size N.P.T. (female)	(2) - 2.5"			(2) - 2.5"				(2) - 2.5"			(2) - 2.5"			
<b>ENGINE</b>				<b>NG</b>		<b>LP</b>					<b>NG</b>		<b>LP</b>	
Rated RPM 60 Hz	1800			1800				1800			1800			
50 Hz	1500			1500				1500			1500			
HP at rated KW 60 Hz	80			91				66			73			78
50 Hz	63			72				51			57			62
Piston speed - m/min (ft/min) 60 Hz	318 (1044)			318 (1044)				318 (1044)			318 (1044)			
50 Hz	265 (870)			265 (870)				265 (870)			265 (870)			
BMEP - psi 60 Hz	101			116				83			92			99
50 Hz	95			109				77			87			94
<b>DERATION FACTORS</b>														
Temperature														
-5% for every 10°C above - °C	43			25				43			25			
-2.77% for every 10°F above - °F	110			77				110			77			
Altitude														
-1.1% for every 100 m above - m	150			150				150			150			
-3.5% for every 1000 ft. above - ft.	500			500				500			500			

# STANDARD ENGINE & SAFETY FEATURES

SG050 / 060

- High Coolant Temperature Automatic Shutdown
- Low Coolant Level Automatic Shutdown
- Low Oil Pressure Automatic Shutdown
- Overspeed Automatic Shutdown (Solid-state)
- Crank Limiter (Solid-state)
- Oil Drain Extension
- Radiator Drain Extension
- Factory-Installed Cool Flow Radiator
- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Rubber-Booted Engine Electrical Connections
- Fuel Lockoff Solenoid
- Secondary Fuel Regulator (N.G. and L.P.)
- Battery Charge Alternator
- Battery Cables
- Battery Tray
- Vibration Isolation of Unit to Mounting Base
- 12 Volt, Solenoid-Activated Starter Motor
- Air Cleaner
- Fan Guard
- Control Console
- Isochronous Governor

## OPTIONS

### OPTIONAL COOLING SYSTEM ACCESSORIES

- Radiator Duct Adapter
- 208/240V Coolant Heater

### OPTIONAL FUEL ACCESSORIES

- Flexible Fuel Lines

### OPTIONAL EXHAUST ACCESSORIES

- Critical Exhaust Silencer
- Single Exhaust Kit for Indoor Installations

### OPTIONAL ELECTRICAL ACCESSORIES

- Battery, 12 Volt, 90 A.H., 27F
- Battery Heater
- 2A Battery Charger
- 10A Dual Rate Battery Charger
- Main Line Circuit Breaker

### OPTIONAL ALTERNATOR ACCESSORIES

- Alternator Upsizing to 125kW
- Alternator Strip Heater
- Alternator Tropicalization
- Voltage Changeover Switch

### CONTROL CONSOLE OPTIONS

- See control console specification sheet

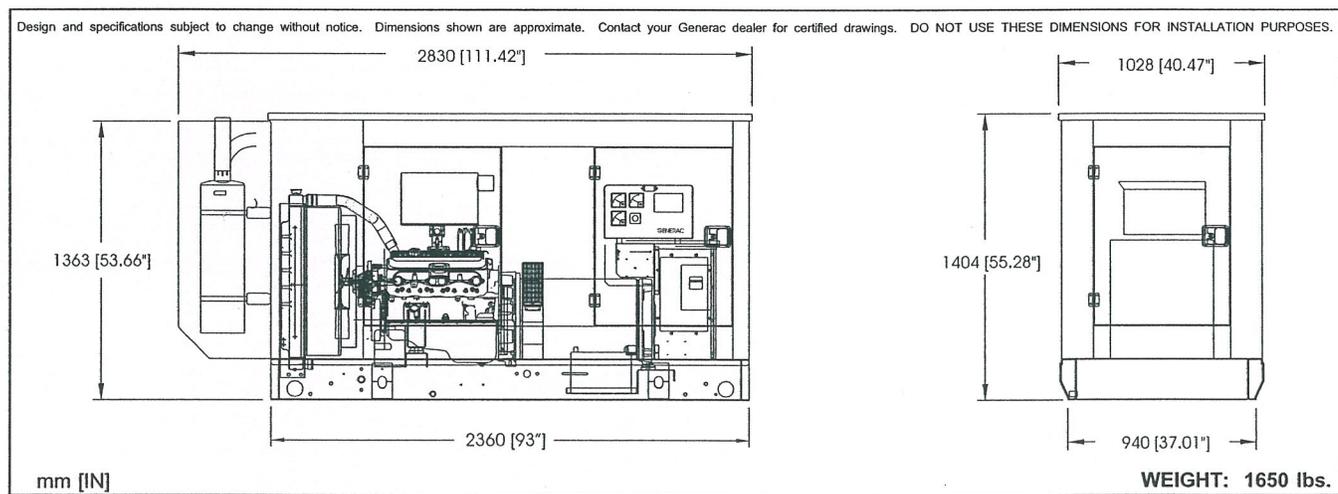
### ADDITIONAL OPTIONAL EQUIPMENT

- Automatic Transfer Switch
- 3 Light Remote Annunciator
- 5 Light Remote Annunciator
- 20 Light Remote Annunciator
- Remote Relay Panel
- Unit Vibration Isolators
- Oil Make-Up System
- Oil Heater
- 5 Year Warranties
- Export Boxing
- GenLink® Communications Software

### OPTIONAL ENCLOSURES

- Weather Protective
- Sound Attenuating
- Aluminum and Stainless Steel
- Enclosed Muffler

Distributed by:



**GENERAC** POWER SYSTEMS, INC. • P.O. BOX 8 • WAUKESHA, WI 53187

262/544-4811 • FAX 262/544-4851

## Site Search Summary

Section 16-50j-74(j) of the Regulations of Connecticut State Agencies requires the submission of a statement that describes “the narrowing process by which other possible sites were considered and eliminated.” In accordance with this requirement, descriptions of the general site search process, the identification of the applicable search area and the alternative locations considered for development of the proposed telecommunications facility in Barkhamsted are provided below.

### Site Search Process

To initiate its site selection process in an area where a coverage or capacity problem has been identified, Cellco first establishes a “site search ring” or “site search area.” In any search ring or area, Cellco seeks to avoid the unnecessary proliferation of towers and to reduce the potential adverse environmental effects of the cell site, while at the same time maximizing the quality of service provided from a particular facility. These objectives are achieved by initially locating existing towers and other sufficiently tall structures within and near the site search area. If any are found, they are evaluated to determine whether they are capable of supporting Cellco's telecommunications equipment at a location and elevation that satisfies its technical requirements.

Cellco maintains six (6) existing communications facilities all located within approximately four (4) miles of the Bristol West search area. These existing facilities, however, cannot provide the coverage needed in the identified problem areas, along Routes 6 and 72 and local roads in the area. (See Attachment 7).

	<u>OWNER/OPERATOR</u>	<u>FACILITY TYPE</u>	<u>LOCATION</u>	<u>ANTENNA HEIGHT</u>
1.	Carpenter Realty (Bristol)	Rooftop	32 Valley Street Bristol, CT	88'
2.	Graziano Partners (Wolcott N)	Lattice Tower	192 Wolcott Road Wolcott, CT	135'
3.	SBA, Inc. (Plymouth NW)	Monopole	297 North Adams Street Plymouth, CT	165'
4.	SBA, Inc. (Plymouth W)	Monopole	42 South Street Plymouth, CT	169'
5.	Omnipoint (Plymouth)	Monopole	171 Town Hill Road Plymouth, CT	135'

<u>OWNER/OPERATOR</u>	<u>FACILITY TYPE</u>	<u>LOCATION</u>	<u>ANTENNA HEIGHT</u>
6. Cingular (Bristol West 2)	Monopole	371 Terryville Avenue Bristol, CT	140'

If existing towers or structures are not available or technically feasible, other locations are investigated where the construction of a new tower is required to provide adequate elevation to satisfy Cellco's requirements. The list of available locations may be further reduced if, after preliminary negotiations, the property owners withdraw a site from further consideration. From among the remaining locations, the proposed sites are selected by eliminating those that have greater potential for adverse environmental effects and fewer benefits to the public (i.e., those requiring taller towers, possibly with lights; those with substantial adverse impacts on densely populated residential areas; and those with limited ability to share space with other public or private telecommunications entities). It should be noted that in any given site search, the weight afforded to factors considered in the selection process will vary depending upon the availability and nature of sites within the search area.

#### Identification of the Bristol West Search Area

The purpose of the proposed Bristol West facility is to provide quality coverage for coverage gaps or holes that have been identified in certain westerly portions of the City of Bristol and easterly portions of the Town of Plymouth, particularly and primarily along the heavily-traveled Routes 6 and 72. The proposed Bristol West facility will also provide additional traffic handling capacity in the Bristol/Plymouth area by off-loading traffic from Cellco's existing Bristol West 2, Bristol and Plymouth facilities. The coverage gaps were identified using best server propagation modeling.

The descriptions of the individual sites investigated, which are set forth below, include sites both inside and outside the Bristol West search area that were analyzed and found to be technically unworkable. This is due either to the topography in the area or the overall distance from the investigated site to the search area.

#### Sites Investigated in the Bristol Area

In addition to the existing communications facilities listed above, Cellco identified and investigated sites in the westerly portion of Bristol. These sites are described below.

#### Sites Investigated

1. CL&P Transmission Line Towers – Cellco investigated the use of several existing CL&P transmission line structures in the area. In particular, Cellco evaluated the transmission line tower located at the southern end of Clark Road. The use of this structure would have left significant gaps in

coverage along Routes 6 and 72. Cellco also evaluated the transmission tower located to the south of Terryville Road (Route 72), on Waterbury Road. The use of this structure also resulted in significant gaps in coverage along Route 6 and the surrounding areas. Cellco also investigated two wooden transmission towers located west of the intersection of Waterbury Road and Tower Road. Use of these structures left significant gaps in coverage along Routes 6 and 72.

2. Town of Plymouth Town Hall – Cellco investigated the use of the existing 100-foot tower is located at the Plymouth Town Hall. Cellco explored extending this tower to a height of 120 feet. Even at 120 feet significant gaps in coverage existed along Route 72.
3. City of Bristol Water Department – Cellco investigated the City of Bristol’s Water Reservoir No. 1 property located adjacent to the proposed Pequabuck Golf Club facility. This potential site would satisfy Cellco’s coverage objectives, but would require a taller structure due to its lower ground elevation. For this reason, this alternative site location was not pursued.

**TAB 10**

# *Proposed Wireless Telecommunications Facility*

Bristol West  
1191 Terryville Road (Route 6)  
Bristol, Connecticut

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Prepared for



Prepared by **VHB**/Vanasse Hangen Brustlin, Inc.  
54 Tuttle Place  
Middletown, CT 06457

June 2006

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## Visual Resource Evaluation

Cellco Partnership, dba Verizon Wireless, seeks approval from the Connecticut Siting Council for a Certificate of Environmental Compatibility and Public Need to construct a wireless telecommunications facility (Facility") to be located within the City of Bristol, Connecticut. This "Visual Resource Evaluation" was conducted to approximate the visibility of the proposed Facility within a two-mile radius of the Site ("Study Area").

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### Project Introduction

The proposed Facility includes the construction of a 120-foot tall stealth flagpole and associated ground equipment to be located within a fenced enclosure at the base of the tower. The flagpole will be partially constructed of a radio frequency transparent material within which the proposed antenna panels will be encased. Based on information provided by the project engineer, Natcomm, LLC, the proposed project area is located at approximately 637 feet Above Mean Sea Level (AMSL). Access to the proposed Facility will be achieved via the existing parking area located on the host property.

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### Site Description and Setting

The proposed Facility is situated on the Pequabuck Golf Club located at 1191 Terryville Road ("host property") within the City of Bristol, Connecticut. The host property consists of approximately 65 acres of land and is identified in the City of Bristol records as Map 67/Lots 27 and 29 (see Photolog Documentation map contained in Attachment A). The host property is currently occupied by the Pequabuck Golf course, several out-buildings that operate in support of activities at the golf course and an associated parking area. The out-buildings include a club house/restaurant and three small maintenance buildings. The proposed Facility is located on the northern portion of the host property adjacent to the southern-most maintenance building. Land uses within the general vicinity of the host property is comprised of the Bristol Reservoir No.1, medium-density residential parcels, small-scale commercial establishments located along Terryville Road (Route 6 ), industrial facilities located to the south, rail line rights-of-way, and overhead utility infrastructure. Portions of Route 6 and Route 72, key regional state-numbered routes, are also contained within the Study Area. In total, the Study Area contains roughly 108 linear miles of roadways.

The topography in the Study Area is generally characterized by rolling hills that range in ground elevation from approximately 350 feet AMSL to approximately 900 feet AMSL. The tree cover within the Study Area consists mainly of mixed deciduous hardwood species. The tree canopy occupies approximately 4,575 acres of the 8,042-acre study area (57%). During the in-field activities associated with this analysis, an infrared laser range finder was used to accurately determine the average tree canopy height throughout the Study Area. Numerous

trees were selected for measurement and the average tree canopy established, in this case 65 feet. In total, the Study Area features approximately 121 acres of surface water.

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## METHODOLOGY

To estimate the visibility associated with the proposed Facility, VHB incorporates a two-fold approach utilizing both a predictive computer model and in-field analysis. The predictive model is employed to assess potential visibility throughout the entire Study Area, including private property and/or otherwise inaccessible areas for field verification. A "balloon float" and Study Area drive-through reconnaissance are also conducted to obtain locational and height representations, back-check the initial computer model results and provide photographic documentation from publicly accessible areas. Results of both activities are analyzed and incorporated into the final viewshed map. A description of the methodologies used in the analysis is provided below.

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### Visibility Analysis

Using ESRI's ArcView® Spatial Analyst, a computer modeling tool, the areas from where the proposed Facility is expected to be visible are calculated. This is based on information entered into the computer model, including Facility height, its ground elevation, the surrounding topography, existing vegetation and any significant structures/objects that may act to obstruct potential views. Data incorporated in the model includes 7.5 minute digital elevation models (DEMs) and a digital forest layer for the Study Area. The DEMs were produced by the United States Geological Survey (USGS) in 1982 at a 30 meter resolution. The forest layer was derived through on-screen digitizing in ArcView® GIS from 2004 digital orthophotos with a 0.5-foot pixel resolution.

Once the data are entered, a series of constraints are applied to the computer model to achieve an estimate of where the Facility will be visible. Initially, only topography was used as a visual constraint; the tree canopy is omitted to evaluate all areas of potential visibility without any vegetative screening. Although this is an overly conservative prediction, the initial omission of these layers provides a reference for comparison once the tree canopy is established and also assists in the evaluation of potential seasonal visibility of the proposed Facility. A conservative tree canopy height of 50 feet is then used to prepare a preliminary viewshed map for use during the Study Area reconnaissance. The average height of the tree canopy is determined in the field using a hand-held infra-red laser range finder. The average tree canopy height is incorporated into the final viewshed map; in this case, 65 feet was identified as the average tree canopy height. The forested areas within the Study Area were then overlaid on the DEM with a height of 65 feet added and the visibility calculated. The forested areas are then extracted from the areas of visibility, with the assumption that a person standing among the trees will not be able to view the Facility beyond a distance of

approximately 500 feet. Depending on the density of the vegetation in these areas, it is assumed that some locations within this range will provide visibility of at least portions of the Facility based on where one is standing. Lastly, this analysis was conducted in 20-foot increments from 120 feet down to 40 feet and the results consolidated into a single thematic layer in order to determine the approximate amount of the tower structure that would be visible from any given location.

Also included on the map is a data layer, obtained from the Connecticut State Department of Environmental Protection (CTDEP), which depicts various land and water resources such as state parks and forests, recreational facilities, dedicated open space and CTDEP boat launches among other categories. This layer is useful in identifying potential visual impacts to any sensitive receptors that may be located within the Study Area. Lastly, based on a review of available data published by the Connecticut Department of Transportation and discussions with town staff in Bristol and Plymouth, it was determined that there are no state or locally designated scenic roadways contained within the Study Area.

A preliminary viewshed map is generated for use during the in-field activity in order to confirm that no significant land use changes have occurred since the 2004 aerial photographs used in this analysis were produced and to verify the results of the model in comparison to the balloon float. Information obtained during the reconnaissance is then incorporated into the final visibility map.

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### Balloon Float and Study Area Reconnaissance

On June 6, 2006 Vanasse Hangen Brustlin Inc., (VHB) conducted a balloon float at the proposed Facility in order to evaluate the potential viewshed within the Study Area. The balloon float consisted of raising and maintaining a helium-filled weather balloon at the proposed Site location tethered with 120 feet of string (for a total height of approximately 123 feet above ground level). Once the balloon was aloft, VHB personnel drove the public road system in the Study Area to inventory those areas where the balloon was visible. During the balloon float, weather conditions were sunny. The temperature was approximately 75 degrees with calm winds.

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### Photographic Documentation

During the balloon float, VHB staff conducted a drive-by reconnaissance along the roads located within the Study Area with an emphasis on nearby residential areas and other potential sensitive receptors in order to evaluate and refine the results of the preliminary viewshed map and to verify where the balloon was, and was not, visible above and/or through the tree canopy. The balloon was photographed from a number of different vantage points to document the actual view towards the proposed Facility. The locations and orientations of the photos are described below:

1. View from Route 6 at Bristol Reservoir No. 1, looking south.
2. View from Makara Street adjacent to house #40, looking southeast.
3. View from William Street at Kearney Street, looking southeast.
4. View from Route 72, looking northeast.
5. View from Tower Road at Waterbury Road, looking northwest.
6. View from Waterbury Road adjacent to house #503, looking north.
7. View from Kearney Street adjacent to house #44, looking southeast.

Photographs of the balloon from the view points listed above were taken with a Nikon Digital Camera COOLPIX 5700, which has a lens focal length equivalent to a 35 mm camera with a 38 to 115 mm zoom. "The lens that most closely approximates the view of the unaided human eye is known as the normal focal-length lens. For the 35 mm camera format, which gives a 24x36 mm image, the normal focal length is about 50 mm." The optical zoom lens for the Nikon COOLPIX was set at a range of 50 mm to 70 mm for the purposes of this Visual Resource Evaluation.

The locations of the photographic points are recorded in the field using a hand held GPS receiver and are subsequently plotted on the maps contained in the attachments to this document.

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## Photographic Simulation

Photographic Simulations were generated for the seven locations identified above. The Photographic Simulations represent a scaled depiction of the proposed flagpole from these locations. The height of the Facility is determined based on the location of the balloon in the photographs and a proportional flagpole image is simulated into the photographs. The simulations are contained in Attachment B.

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## CONCLUSIONS

Based on this analysis, areas from where the proposed 120-foot flagpole would be visible above the tree canopy comprise approximately 69 acres, or less than one percent of the 8,042-acre Study Area. This includes approximately 18 acres of visibility that occurs on the host property and approximately 16 acres of visibility that occurs on open water over the Bristol Reservoir No.1 located to the north of the proposed Facility. Other areas from where the proposed flagpole is expected to be visible are mainly located within approximately 0.50 mile of the Facility along select portions of Route 6, Route 72, Makara Street, William Street, Kearney Street, Tower Road and Waterbury Road. The viewshed map also depicts several

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<sup>1</sup> Warren, Bruce. *Photography*, West Publishing Company, Eagan, MN, c. 1993, (page 70).

additional areas of visibility located to the north and east of the proposed Facility located on private property. As such, these areas could not be field verified during the balloon float. VHB estimates that approximately 12 residences within the Study Area will have partial year round views of the proposed flagpole above the existing tree line. As evidenced by both the results of the in-field photographic documentation and computer generated viewshed model, views of the proposed flagpole would generally be limited to upper portions of the Facility with the exception of some views from the host property where the flagpole and associated equipment compound may be visible. The topographic relief and existing landscaping (specimen trees and shrubbery) found within the adjacent residential areas serve to significantly minimize anticipated views. Moreover, the design of the proposed Facility (a 120-foot tall flagpole) will also minimize potential visual impacts from within the Study Area. The viewshed map also depicts several additional areas where seasonal (i.e. during "leaf off" conditions) views through the trees are anticipated. These areas comprise approximately 43 additional acres and are mostly limited to the periphery of the host property.

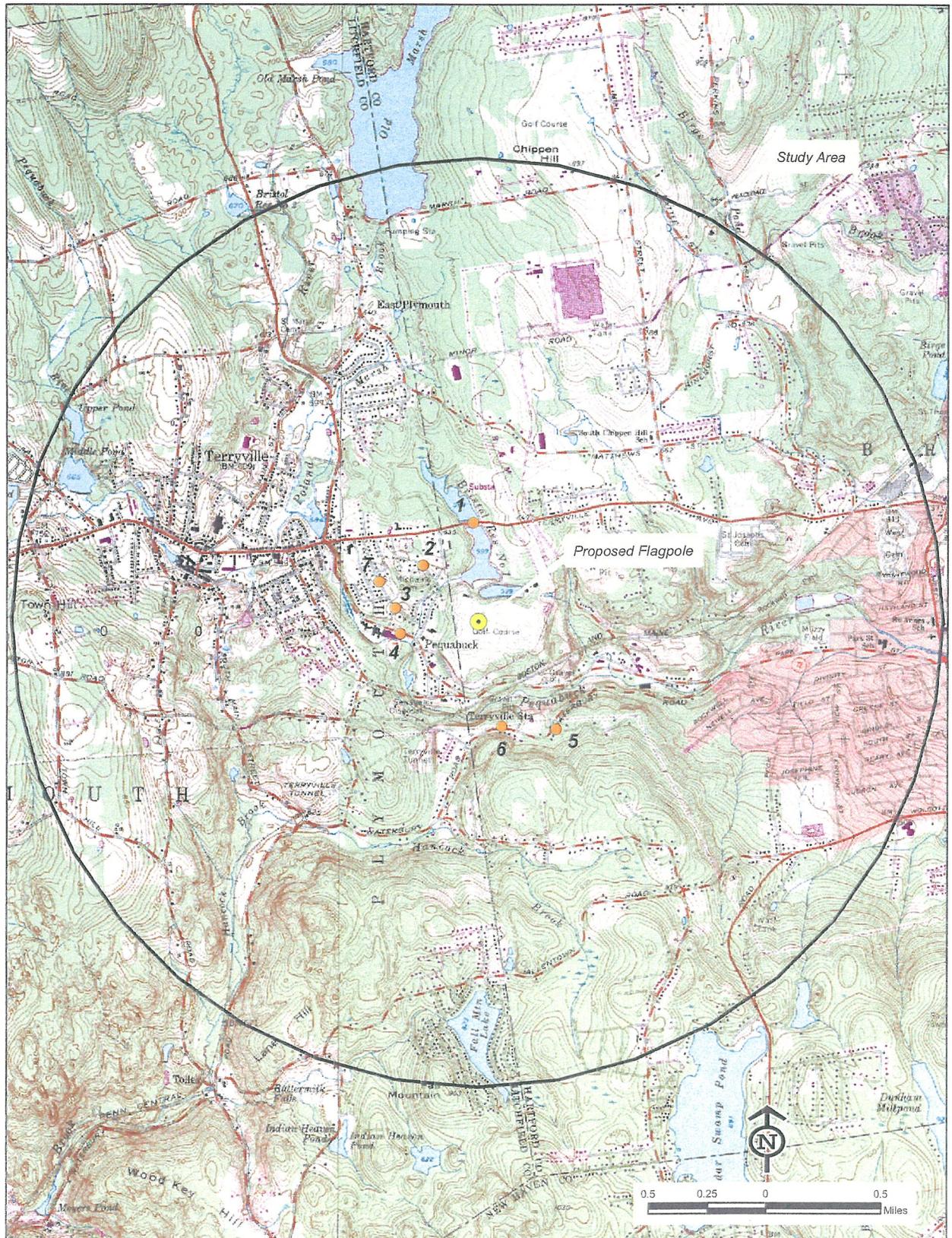
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# Attachment A

## Photolog Documentation Map, Balloon Float Photographs and Photographic Simulations

# Photolog Documentation

Town of  
Bristol  
Connecticut



# Photographic Documentation and Simulation View 1



Bristol West  
1191 Terryville Road  
Bristol, CT

Flagpole installation  
with flag



*Balloon Test Photo*

**PHOTO TAKEN FROM ROUTE 6 AT BRISTOL RESERVOIR NO. 1, LOOKING SOUTH**  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.42 MILE +/-

# Photographic Documentation and Simulation View 2

Town of  
Bristol  
Connecticut



Bristol West  
1191 Terryville Road  
Bristol, CT

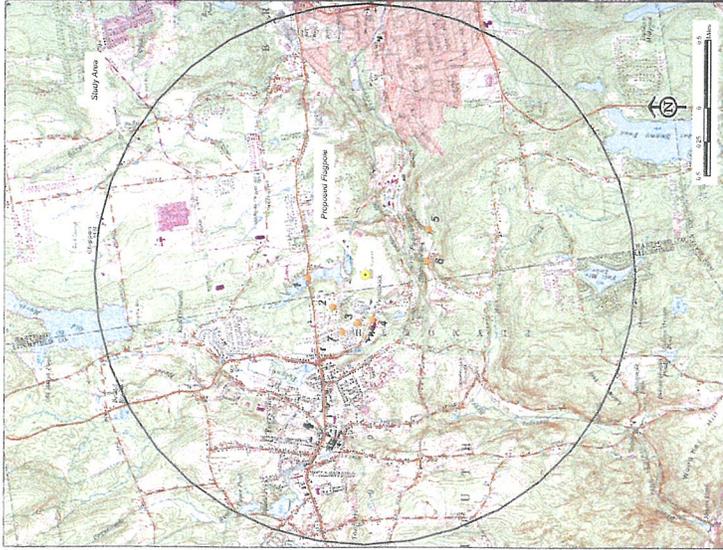
Flagpole installation  
with flag



PHOTO TAKEN FROM MAKARA STREET ADJACENT TO HOUSE #40, LOOKING SOUTHEAST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.32 MILE +/-



# Photographic Documentation and Simulation View 3



Bristol West  
1191 Terryville Road  
Bristol, CT

Flagpole installation  
with flag

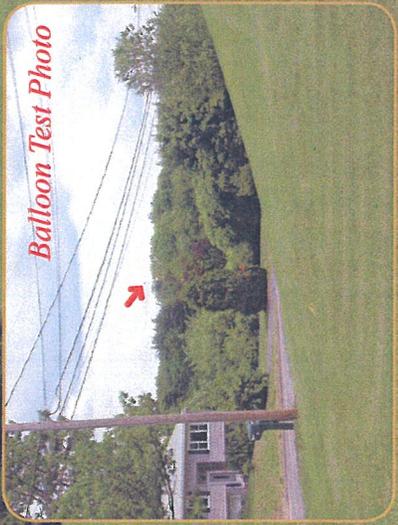


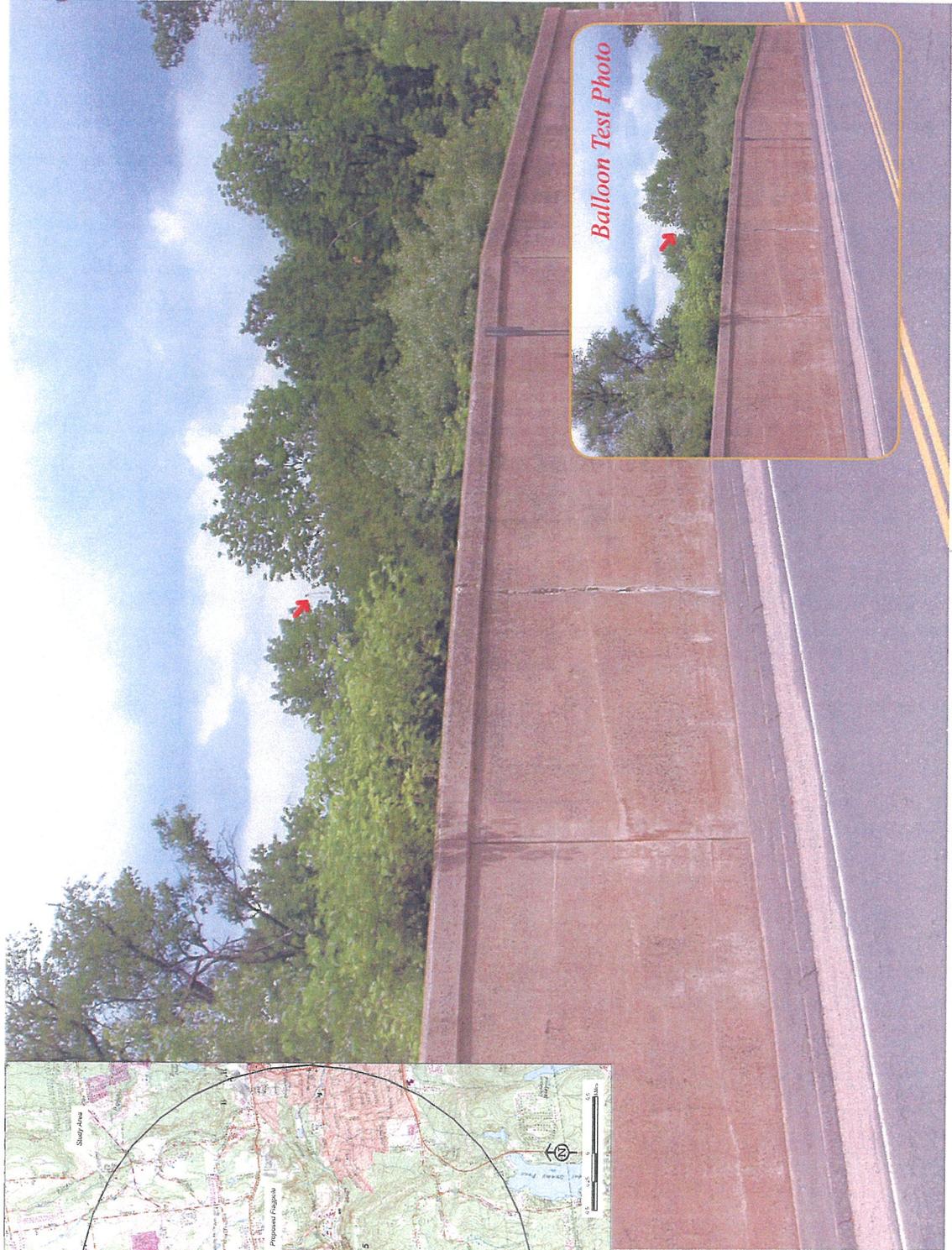
PHOTO TAKEN FROM WILLIAM STREET AT KEARNEY STREET, LOOKING SOUTHEAST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.36 MILE +/-

# Photographic Documentation and Simulation *View 4*



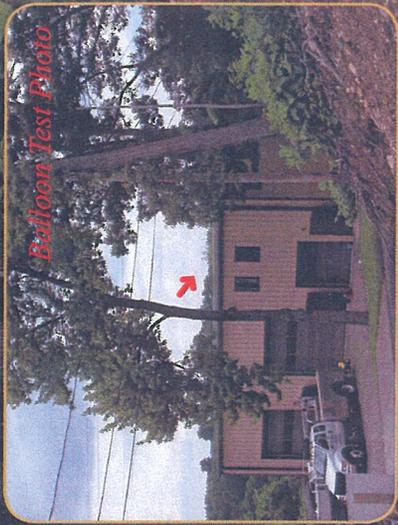
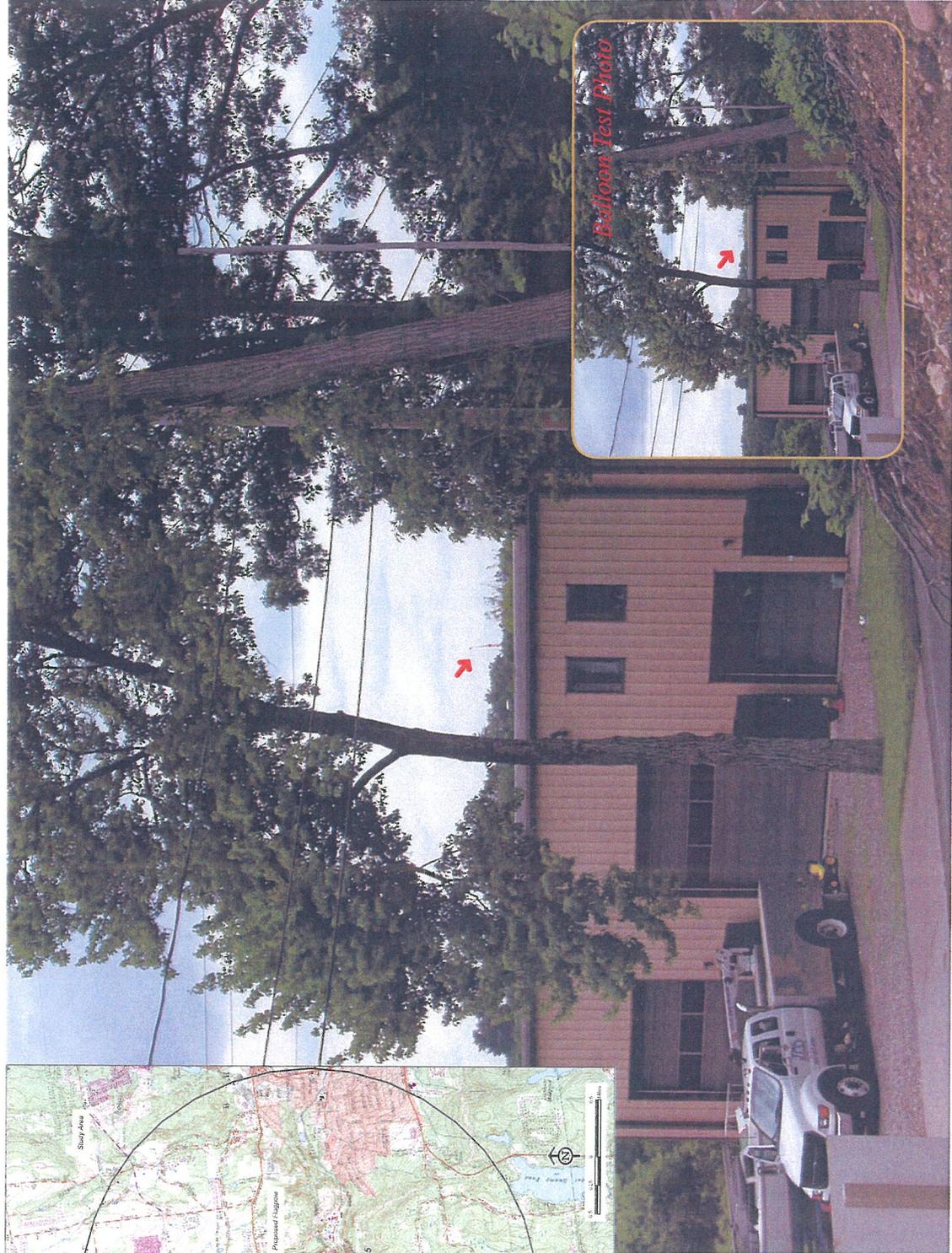
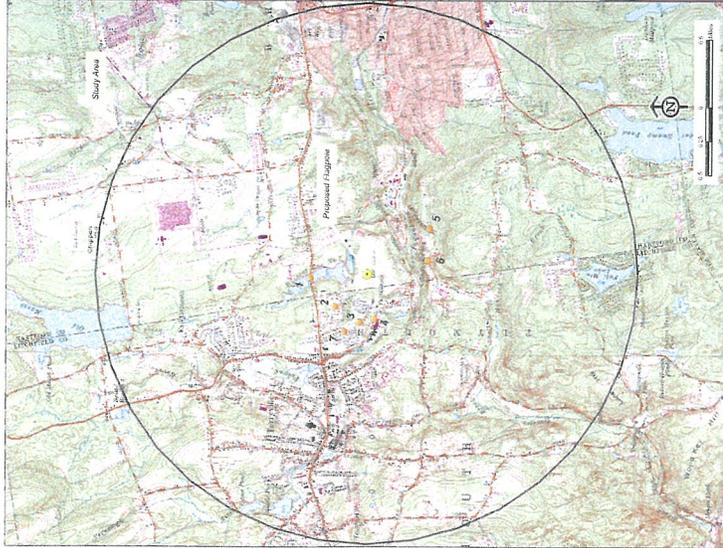
Bristol West  
1191 Terryville Road  
Bristol, CT

Flagpole installation  
with flag



**PHOTO TAKEN FROM ROUTE 72, LOOKING NORTHEAST**  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.36 MILE +/-

# Photographic Documentation and Simulation View 5



Bristol West  
1191 Terryville Road  
Bristol, CT

Flagpole installation  
with flag

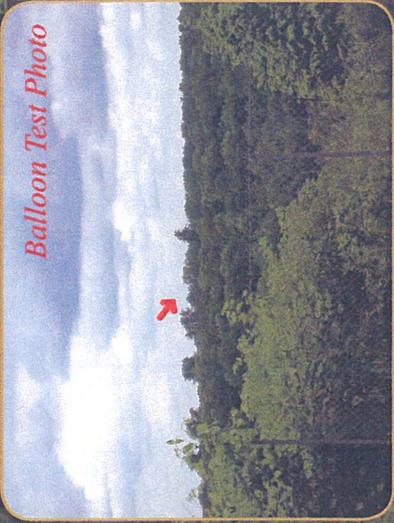
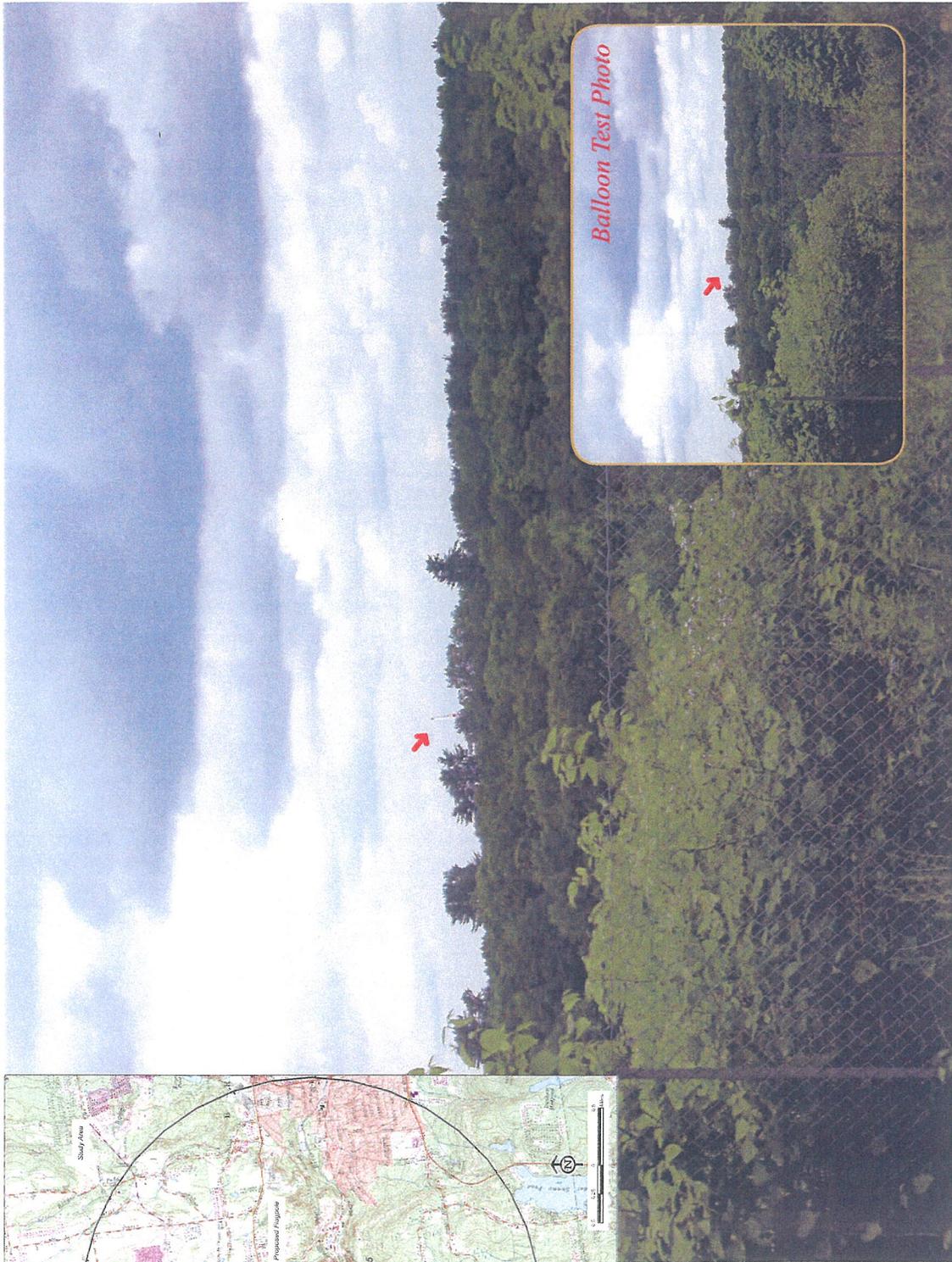
PHOTO TAKEN FROM TOWER ROAD AT WATERBURY ROAD, LOOKING NORTHWEST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.57 MILE +/-

# Photographic Documentation and Simulation *View 6*



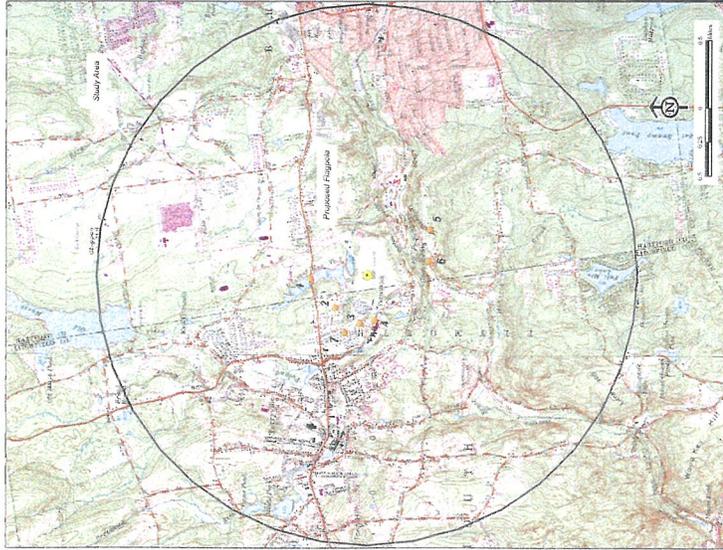
Bristol West  
1191 Terryville Road  
Bristol, CT

Flagpole installation  
with flag



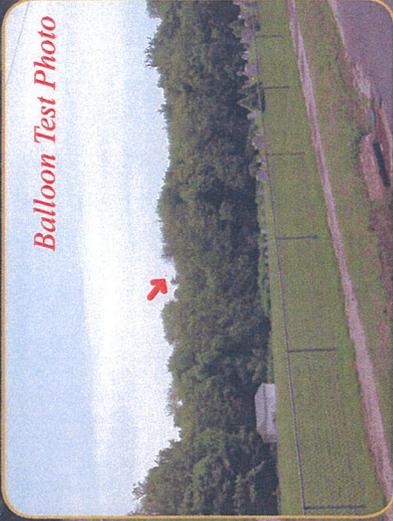
**PHOTO TAKEN FROM WATERBURY ROAD ADJACENT TO HOUSE #503, LOOKING NORTH**  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.46 MILE +/-

# Photographic Documentation and Simulation *View 7*



Bristol West  
1191 Terryville Road  
Bristol, CT

Flagpole installation  
with flag



**PHOTO TAKEN FROM KEARNEY STREET ADJACENT TO HOUSE #44, LOOKING SOUTHEAST.**  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.43 MILE +/-