

ATTACHMENT 8

Viewshed Analysis - Photographic Simulation Package

Proposed AT&T Wireless Telecommunications Facility

CT0016

Branford Rose Hill Road

45 Rose Hill Road

Branford, CT 06405

- Proposed new 134 ft AGL monopole type tower
- Balloon Test completed 11/8/2014
- Photo Documentation completed 11/8/2014
- Visibility Analysis completed 11/18/2014

Package prepared by:

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Viewshed Analysis has not been verified. Results are Preliminary and the accuracy of the resulting data is not guaranteed and is not for redistribution



Project Introduction

At the request of Tower Co, Inc. and New Cingular Wireless PCS, LLC DBA "AT&T", Virtual Site Simulations, LLC (VSS) was contracted to provide a Viewshed/Visibility Analysis for a proposed telecommunications facility located at 45 Rose Hill Road, Branford, CT 06405. Hereafter referred to as "the Site". Tower Co, Inc. seeks approval from the Connecticut Siting Council for a Certificate of Environmental Compatibility and Public Need to construct said facility. This Viewshed/Visibility Analysis was conducted to evaluate the potential visibility of the Facility within a 2 mile radius. This radius is defined as the "Study Area". The 8,042 acre Study Area encompasses the towns of Branford and East Haven Connecticut. A map labeled "Photolog" depicting the Study Area, and the proposed location of the Facility is provided in "attachment A".

The proposed telecommunications facility would consist of an approximate 134 foot tall above ground level ("AGL") Monopole type antenna structure with 12 panel antennas mounted at a centerline height of approximately 130 foot AGL. Associated unmanned equipment will be housed in an 11' 5" x 16' equipment shelter. The equipment shelter, diesel backup generator and other associated unmanned equipment for the proposed facility will be located on a proposed 11' 5" x 24' concrete pad located approximately 10' to the east of proposed tower. The tower, equipment shelter, generator and other associated unmanned equipment will be placed within a 60' x 90' "L" shaped fenced compound that is in the southwest corner of the parcel. Access to the Site is provided thru a 15' easement that traverses from the site to the east approximately 250 feet to Rose Hill Road.

Site Description and Setting

The proposed monopole type telecommunications facility is located on the host property designated by the Town of Branford Tax Assessor as parcel number A8-0-3-16. The host property consists of approximately 2 acres of that is currently occupied by a waste management company. Land use within the general vicinity of the host property is comprised of a mix of single family residential properties, commercial properties and some farmland. The Site is approximately .54 miles south of Connecticut RT 1 at the Rose Hill Road interchange and bounded by the Beacon Hill Preserve to the west. Connecticut RT 95 is approximately .8 miles to the north.

The Study Area contains approximately 1757 acres of surface water. Water bodies within the Study Area include; The Long Island Sound located approximately 1.25 miles to the south, the Farm River located .2 miles to the south west, the Beaver Swamp Brook located .25 miles to the north and a large portion of Lake Saltonstall located .75 miles to the north. Ground elevation within the Study Area ranges for sea level to approximately 200 feet AMSL and is characterized by rolling hills with moderate changes in elevation.

There are two CT Trail System Trails located within the Study Area. The Short Beach Trail, is a five mile trail that runs from north to south, then west thru the study area. It is 847 feet to the west of the proposed site at its closest point. The Saltonstall Trail begins at CT RT 1, its closest point to the site, .34 miles to the northwest and continues northwest for 2 miles.

There are no CT Blue Blazed Trails within the study area.

There are no schools within 250 feet of the proposed facility. The nearest school is the Tuttle Elementary School that is located .9 miles to the west. There are no licensed daycare facilities within 250 feet of the proposed facility. The nearest licensed daycare facility is the Duck Pond Daycare that is located .625 miles to northeast.

Tree cover within the Study Area consists of approximately 2175 acres of deciduous and coniferous tree species. The average tree height for was determined to be approximately 50 feet on average using the method outlined below.

Methodology

A two mile radius surrounding the site is defined as the study area for this Viewshed Analysis. The Viewshed Analysis was conducted within the predefined study area using two different methods: computer modeling and on-site observation. Each method was used to verify the results of the other, providing the best possible prediction of locations that will have views of proposed telecommunications facility.

Computer Modeling – Viewshed Analysis

A combination of Image based and Digital Elevation Model (“DEM”) based data was used to perform this analysis. The primary software used was Environmental Systems Research Institute Inc. (ERSI) ArcGIS Spatial Analysis. This software allows the user to perform spatial analysis on imported maps and datasets. The maps and datasets used are documented in the “documentation” page at the end of this report. The maps and datasets are imported as layers within the software mapping program. Once imported, spatial analysis tools are used to evaluate each position within those layers from which the proposed facility may be visible. These tools allow for the input of: viewing reference height (assumed to be 5 foot AGL) and tower height (in this case 134 ft. AGL). The tools also take into account any layers that have been imported that may affect viewing location (i.e. topography, tree canopy, ground cover, buildings, roads etc.). In this case no current data sets exist that accurately depict the actual building or tree canopy heights. It was determined that averaging manual measurements of the existing tree canopy and building heights and manually inputting this data into the analysis would increase the accuracy of the model. Therefore, tree canopy elevations were measured randomly throughout the study area to obtain an average tree canopy height. A Lieca DISTO D2 infrared laser range finder developed by Lieca Geosystems, Inc. with a typical accuracy of +/- .06 “ was used to obtain these measurements. An average height of 50’ AGL was determined to be the most accurate representation of the existing tree canopy. Buildings within the study area are mainly single story commercial structures and two story single family residential properties. An average building height of 20 foot AGL was determined to best represent these types of structure. These averages were incorporated into their specific layers, and viewshed analysis tools were applied. The results of this computer model were then graphically layered on topographic and aerial maps. These maps can be found in Attachment B.

On-site Observation & Documentation

A balloon float test was conducted on November 8th, 2014 and used as the visual reference for site observations from locations throughout the study area. The balloon float test consisted of flying an approximately 4 ft. diameter helium-filled balloon to the top elevation of the proposed tower. The balloon was tethered to the location of the proposed tower, and its elevation was verified using the Lieca DISTO D2 described above. A preliminary viewshed analysis was done using the method outlined above to determine what areas were predicted to have views of the proposed site and to verify the computer model. Drive-by visual reconnaissance of the Study Area was then conducted using the preliminary viewshed analysis as a guide. Locations where the Balloon was visible and not visible were photo documented and a GPS track of reconnaissance areas was made. Reconnaissance areas were limited to public areas/roads, no private property was used in the on-site observations of this test.

Photo documentation of this test was accomplished using a Nikon AW110 16Mp digital camera set to use a 50mm focal length^{1 2}. The Nikon AW110 was chosen because it has built-in XMP metadata files that embed the GPS location, light conditions and bearing to target within the image source data file. These photos document the necessary location and bearing data to ensure the accuracy of simulation location. This documentation was then incorporated into a computer model prediction. The on-site observations were used to adjust model assumptions as necessary.

Photographic Documentation

A number of photographs were chosen from the on-site documentations photos and used to prepare photorealistic simulations of the proposed telecommunications facility. GPS coordinates and bearing information recorded within the XMP metadata file of the documentation photos was used to generate virtual camera positions within a 3d model. The balloon in the documentation photos was used as a spatial reference to verify the proportions

¹ "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 24 x 35mm image, the normal focal length is about 50mm" Warren Bruce Photography, West Publishing Company, Egan, MN c 1993 (page 70)

² 50 mm focal length is based on 35mm film photography. Since Digital photographic sensors are not the same size as 35mm film ALL digital photography focal lengths must be corrected

and height of the proposed tower. Site plan information, field observations and 3D models were then used in these simulations to portray relative scale and location of the proposed structure. The photo simulations were then created using a combination of the 3d model and photo rendering software. These simulations and the existing site photographs provided for reference are attached.

Eight photographs were used for site simulations and were taken from the following locations:

Image #	Location	Latitude:	Longitude:	Distance to site		Orientation
1	Pent Road 2	41.27842	-72.85204	+/- 0.44	Miles	North West
2	Pent Road 1	41.27601	-72.85225	+/- 0.30	Miles	North West
3	Rose Hill Rd	41.27463	-72.85639	+/- 0.11	Miles	North
4	Monticello Drive	41.27440	-72.84903	+/- 0.40	Miles	West
5	Rose Hill Rd South	41.27178	-72.85522	+/- 0.11	Miles	South West
6	Rose Hill Rd south	41.27046	-72.85503	+/- 0.19	Miles	South
7	Short Beach Rd	41.26602	-72.87066	+/- 0.88	Miles	South East
8	Short Beach Road	41.26139	-72.86411	+/- 0.90	Miles	South East

Visibility Analysis Results

The Results of the of viewshed analysis are provided on the visibility analysis map attached at the end of this report within Attachment B. Predicted estimate of year round views of the proposed tower facility are from approximately 858 acres. Approximately 670 Acres (+/- 78 percent) of this acreage occurs over open water or tidal marsh areas. Year round views of the top of the facility are predicted from a +/- 1800 foot section of the Short Beach Trail that is within the tidal area .5 miles to south of the site. The remaining +/-188 acres of potential year round views are mainly contained within 2 areas; 1. An area of approximately 72 acres that is 1.5 mile to west/southwest of the site within the Tweed New Haven Regional Airport facility that is not publicly accessible. And, 2. An area of approximately 63 acres of scattered and consistent year round views to east/southeast immediately adjacent to the host property. Land use in this area, along Rose Hill Road, Pent Road, Burban Drive and Sunny Meadow Drive, is largely residential with some farmland and open space. The remaining acreage with predicted year round views is scattered within the study area and is largely over 1 mile from the site.

Predicted seasonal views of the proposed facility are from an additional approximate 984 acres. With the majority of that acreage, approximately 717 acres (+/- 73 percent), being from viewing locations over .5 miles away. These views are therefore predicted to be distant and partially obscured by tree cover. Approximately 246 acres (+/- 25 percent) of the remaining acreage within .5 miles of the site is contained within an area immediately adjacent to the site to the west. This area contains the Beacon Hill Preserve and the East Haven Marsh Wildlife Area. This area also contains a portion of the Short Beach Trail. An approximate 2000 foot of this trail is expected to have some seasonal views of the proposed site. Seasonal views within these areas are predicted to be partially obscured by existing tree cover. The remaining acreage within .5 miles of the site with seasonal views, approximately 21 acres, is scattered within the residential/farmland areas to east and southeast of the site.

Documentation

Sources used for Visibility Analysis located at:

Proposed Wireless Telecommunications Facility
CT0016 Branford Rose Hill Road
45 Rose Hill Road
Branford, CT 06405

Maps and datasets /consulting documents:

United States Geological Survey - USGS Topographical quadrangles (2011-2012)

National Resource Conservation Service -NAIP aerial photography (2010, 2012)

UCONN- Center for Land Use Education and Research

- LiDAR data (2000)
- Land Use/Ground Cover (2006)

DEEP- Connecticut Department of Energy and Environmental Protection

- Open Space (1997)
- DEEP Property(2007)
- Historic Places (2008)

United States Census (2010) – Landmark Polygon Features

Connecticut Forest & Park Association (CFPA) – Blue Blazed Trails (2014)

Connecticut.Gov eLicensing Website – Child Daycare & Group Daycare Homes Roster (2014)

Environmental Systems Research Institute Inc (ERSI) – CT state boundaries/counties (2010)
2013 National Geographic Society

Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

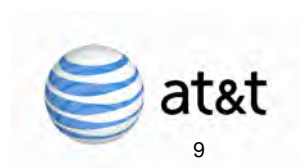
Limitations:

This report and the analysis herein does not claim to depict all locations, or the only locations from which the proposed facility will be visible; it is intended to provide a representation of those areas where proposed facility is likely to be visible.

Attachment A

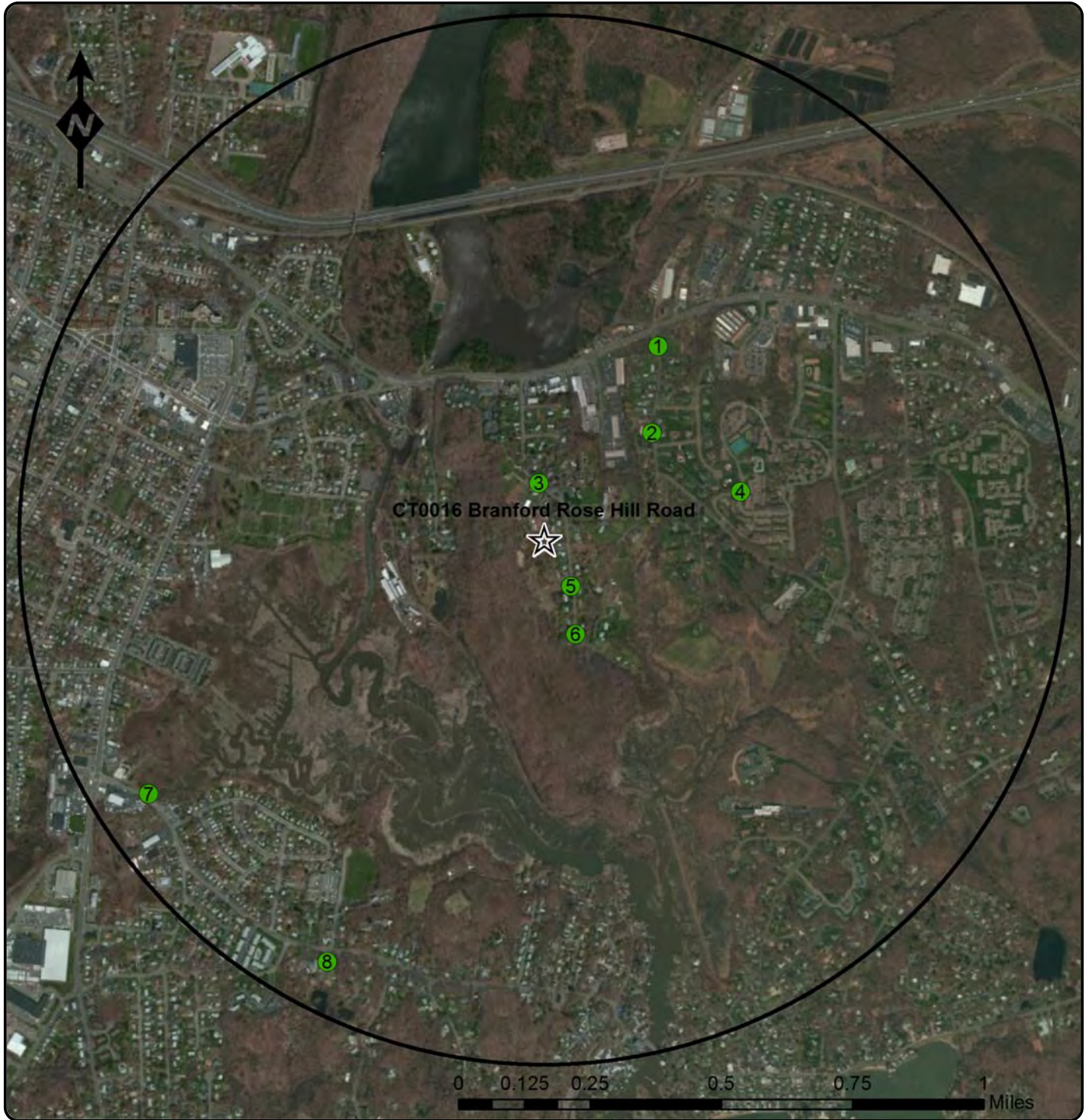
Site Study Map - Photolog, Photographic
Documentation, Photographic Simulations

CT0016
Branford Rose Hill Road
45 Rose Hill Road
Branford, CT 06405



Photolog - 1 Mile Radius

☆ CT0016 Branford Rose Hill Road
45 Rose Hill Road , CT 06405
Lat, Lon: 41.273044, -72.856269
Proposed Tower Height: 134.0'



Existing



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
1	Pent Road 2	41.27842 -72.85204	+/- 0.44 Miles	North West	207.65	Year Round

Site: CT0016 Branford Rose Hill Road

Photo Simulations are for demonstration purposes only. It should not be used in any other fashion or with any other intent. The accuracy of the resulting data is not guaranteed and is not for redistribution



Simulation



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
1	Pent Road 2	41.27842 -72.85204	+/- 0.44 Miles	North West	207.65	Year Round

Site: CT0016 Branford Rose Hill Road

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Existing



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
2	Pent Road 1	41.27601 -72.85225	+/- 0.30 Miles	North West	227.34	Seasonal

Site: CT0016 Branford Rose Hill Road

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Simulation



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
2	Pent Road 1	41.27601 -72.85225	+/- 0.30 Miles	North West	227.34	Seasonal

Site: CT0016 Branford Rose Hill Road

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Existing



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
3	Rose Hill Rd	41.27463 -72.85639	+/- 0.11 Miles	North	181.53	Year Round

Site: CT0016 Branford Rose Hill Road

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Simulation



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
3	Rose Hill Rd	41.27463 -72.85639	+/- 0.11 Miles	North	181.53	Year Round

Site: CT0016 Branford Rose Hill Road

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Existing



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
4	Monticello Dr	41.27440 -72.84903	+/- 0.40 Miles	West	251.04	Seasonal

Site: CT0016 Branford Rose Hill Road

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Simulation



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
4	Monticello Dr	41.27440 -72.84903	+/- 0.40 Miles	West	251.04	Seasonal

Site: CT0016 Branford Rose Hill Road

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Existing



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
5	Rose Hill Rd South	41.27178 -72.85522	+/- 0.11 Miles	South West	324.26	Year Round

Site: CT0016 Branford Rose Hill Road

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Simulation



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
5	Rose Hill Rd South	41.27178 -72.85522	+/- 0.11 Miles	South West	324.26	Year Round

Site: CT0016 Branford Rose Hill Road

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Existing



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
6	Rose Hill Rd south	41.27046 -72.85503	+/- 0.19 Miles	South	338.33	Seasonal

Site: CT0016 Branford Rose Hill Road

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Simulation



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
6	Rose Hill Rd south	41.27046 -72.85503	+/- 0.19 Miles	South	338.33	Seasonal

Site: CT0016 Branford Rose Hill Road

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Existing



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
7	Short Beach Rd	41.26602 -72.87066	+/- 0.88 Miles	South East	58.55	Year Round

Site: CT0016 Branford Rose Hill Road

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Simulation



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
7	Short Beach Rd	41.26602 -72.87066	+/- 0.88 Miles	South East	58.55	Year Round

Site: CT0016 Branford Rose Hill Road

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Existing



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
8	Short Beach Road	41.26139 -72.86411	+/- 0.90 Miles	South East	26.97	Year Round

Site: CT0016 Branford Rose Hill Road

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Simulation



Photo #	Location	Gps Coordinates	Distance to site	Orientation	Bearing to site	Visibility
8	Short Beach Road	41.26139 -72.86411	+/- 0.90 Miles	South East	26.97	Year Round

Site: CT0016 Branford Rose Hill Road

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