EXPLANATION OF VFR TERMS AND SYMBOLS

The discussions and examples in this section are based on the Sectional Aeronautical Chart (Sectional). Sectionals include the most current data and are at a scale (1:500,000) most beneficial to pilots flying under Visual Flight Rules. A pilot should have little difficulty in reading these charts which are, in many respects, similar to automobile road maps. Each chart is named for a major city within its area of coverage.

The chart legend lists various aeronautical symbols as well as information concerning terrain and contour elevations. You may identify aeronautical, topographical, and obstruction symbols (such as radio and television towers) by referring to the legend. Many landmarks which can be easily recognized from the air, such as stadiums, pumping stations, refineries, etc., are identified by brief descriptions adjacent to small black squares marking their exact locations. Oil wells are shown by small open circles. Water, oil and gas tanks are shown by small black circles and labeled accordingly, if known. The scale of an item may be increased to make it easier to read on the chart.

NACO charts are prepared in accordance with specifications of the Interagency Air Cartographic Committee (IACC) and are approved by representatives of the Federal Aviation Administration (FAA) and the Department of Defense (DoD).

TERRAIN AND OBSTRUCTIONS

The elevation and configuration of the Earth’s surface are certainly of prime importance to pilots. Cartographers devote a great deal of attention to showing relief and obstruction data in a clear and concise manner. Five different techniques are used: contour lines, shaded relief, color tints, obstruction symbols, and Maximum Elevation Figures (MEF).

1. Contour lines are lines connecting points on the Earth of equal elevation. On Sectionals, basic contours are spaced at 500’ intervals. Intermediate contours may also be shown at 250’ intervals in moderately level or gently rolling areas. Occasionally, auxiliary contours at 50, 100, 125, or 150’ intervals may be used to portray smaller relief features in areas of relatively low relief. The pattern of these lines and their spacing gives the pilot a visual concept of the terrain. Widely spaced contours represent gentle slopes, while closely spaced contours represent steep slopes.

2. Shaded relief is a depiction of how the terrain might appear from the air. The cartographer shades the areas that would appear in shadow if illuminated by a light from the northwest. Studies have indicated that our visual perception has been conditioned to this view.

3. Color tints, also referred to as hypsotints, are used to depict bands of elevation relative to sea level. These colors range from light green for the lowest elevations to dark brown for the higher elevations.

4. Obstruction symbols are used to depict man-made vertical features that may affect the National Airspace System. NACO maintains a database of over 118,000 obstacles in the United States, Canada, the Caribbean and Mexico. Each obstacle is evaluated by cartographers based on charting specifications before it is added to the visual charts. When the position or elevation of an obstacle is unverified, it is marked UC (under construction or reported but not verified).

The data in the Digital Obstacle File (DOF) is collected and disseminated as part of NACO’s responsibility for depicting the National Airspace System.

Source data on terrain and obstructions is sometimes not complete or accurate enough for use in aeronautical publications; for example, a reported obstruction may be submitted with insufficient detail for determining the obstruction’s position and elevation. Such cases are identified by NACO and investigated by the FAA Flight Edit program.

The FAA Flight Edit crew conducts data verification missions, visually verifying cultural and topographic features and reviewing all obstacle data. Charts are generally flight-checked every three years. This review includes checking for obstructions that may have been constructed, altered, or dismantled without proper notification.
Generally, only man-made structures extending more than 200' above ground level (AGL) are charted. Objects 200' or less are charted only if they are considered hazardous obstructions; for example, an obstruction is much higher than the surrounding terrain or very near an airport. Examples of features considered hazardous obstacles to low level flight are smokestacks, tanks, factories, lookout towers, and antennas.

Obstacles less than 1000' AGL are shown by the symbol . Obstacles 1000' AGL and higher are shown by the symbol . Man-made features which are used by FAA Air Traffic Control as checkpoints may be represented with pictorial symbols shown in black with the required elevation data in blue.

The elevation of the top of the obstacle above mean sea level (MSL) and the height of the structure AGL are shown when known or when they can be reliably determined by the cartographer. The AGL height is shown in parentheses below the MSL elevation. In extremely congested areas the AGL values may be omitted to avoid confusion.

Obstacles are portrayed wherever possible. But since legibility would be impaired if all obstacles within city complexes or within high density groups of obstacles were portrayed, only the highest obstacle in an area is shown using , the group obstacle symbol.

Obstacles under construction are indicated by the letters uc immediately adjacent to the symbol. If available, the AGL height of the obstruction is shown in parentheses; for example, . Obstacles with high-intensity strobe lighting systems are shown as:

5. The Maximum Elevation Figure (MEF) represents the highest elevation, including terrain and other vertical obstacles (towers, trees, etc.), within a quadrant. A quadrant on Sectionals is the area bounded by ticked lines dividing each 30 minutes of latitude and each 30 minutes of longitude. MEF figures are depicted to the nearest 100 foot level. In this example the MEF represents 12,500'.

MEFs are shown over land masses as well as over open water areas containing man-made obstacles such as oil rigs.

In the determination of MEFs, extreme care is exercised to calculate the values based on the existing elevation data shown on source material. Cartographers use the following procedure to calculate MEFs:

When a man-made obstacle is more than 200' above the highest terrain within the quadrant:

1. Determine the elevation of the top of the obstacle above MSL.
2. Add the possible vertical error of the source material to the above figure (100' or 1/2 contour interval when interval on source exceeds 200').
3. Add a 200' allowance for natural or man-made obstacles which are not portrayed because they are below the minimum height at which the chart specifications require their portrayal.
4. Round the figure up to the next higher hundred foot level.

Example: Elevation of obstacle top (MSL) = 2424
Possible vertical error + 100 equals 2524
Obstacle Allowance 200 equals 2724
Raise to the following 100 foot level 2800
Maximum Elevation Figure 26

When a natural terrain feature or natural vertical obstacle (e.g., a tree) is the highest feature within the quadrangle:

1. Determine the elevation of the feature.
2. Add the possible vertical error of the source to the above figure (100' or 1/2 the contour interval when interval on source exceeds 200').
3. Add a 200' allowance for natural or man-made obstacles which are not portrayed because they are below the minimum height at which the chart specifications require their portrayal.
4. Round the figure up to the next higher hundred foot level.

Example: Elevation of obstacle top (MSL) = 3450
Possible vertical error + 100 equals 3750
Obstacle Allowance 200 equals 3950
Raise to the following 100 foot level 4000
Maximum Elevation Figure 38

Pilots should be aware that while the MEF is based on the best information available to the cartographer, the figures are not verified by field surveys. Also, users should consult the Aeronautical Chart Bulletin in the A/FD or NACO website to ensure that your chart has the latest MEF data available.

RADIO AIDS TO NAVIGATION

On visual charts, information about radio aids to navigation is boxed, as illustrated. Duplication of data is avoided. When two or more radio aids in a general area have the same name with different frequencies, TACAN channel numbers, or identification letters, and no misinterpretation can result, the name of the radio aid may be indicated only once within the identification box. VHF/
UHF radio aids to navigation names and identification boxes (shown in blue) take precedence. Only those items that are different (e.g., frequency, Morse Code) are repeated in the box in the appropriate color. The choice of separate or combined boxes is made in each case on the basis of economy of space and clear identification of the radio aids.

Radio aids to navigation located on an airport depicted by the pattern symbol may not always be shown by the appropriate symbol. A small open circle indicates the NAVAID location when co-located with an airport symbol. The type of radio aid to navigation may be indicated by letter identification; e.g., VOR, VORTAC, or VOR-DME, positioned on and breaking the top line of the identification box.

AIRPORTS

Airports in the following categories are charted as indicated (additional symbols are shown later in this Section).

Public use airports:

- Hard-surfaced runways greater than 8069' or some multiple runways less than 8069'
- Hard-surfaced runways 1500' to 8069'
- Other than hard-surfaced runways
- Seaplane bases

Military airports:

- Other than hard-surfaced runways

Hard-surfaced runways are depicted the same as public-use airports.

U.S. military airports are identified by abbreviations such as AAF (Army Air Field), AFB (Air Force Base), MCAS (Marine Corps Air Station), NAS (Naval Air Station), NAF (Naval Air Facility), NAAS Naval Auxiliary Air Station), etc. Canadian military airports are identified by the abbreviation DND (Department of National Defense).

Services available:

- Tick marks around the basic airport symbol indicate that fuel is available and the airport is tended during normal working hours. (Normal working hours are Monday through Friday 10:00 A.M. to 4:00 P.M. local time.)

Other airports with or without services:

- Airports are plotted in their true geographic position unless the symbol conflicts with a radio aid to navigation (navaid) at the same location. In such cases, the airport symbol will be displaced, but the relationship between the airport and the navaid will be retained.

Airports are identified by their designated name. Generic parts of long airport names (such as "airport", "field" or "municipal") and the first names of persons are commonly omitted unless they are needed to distinguish one airport from another with a similar name.

The figure at right illustrates the coded data that is provided along with the airport name. The elevation of an airport is the highest point on the usable portion of the landing areas. Runway length is the length of the longest active runway including displaced thresholds and excluding runways. Runway length is shown to the nearest 100', using 70 as the division point; a runway 8070' in length is charted as 81, while a runway 8069' in length is charted as 80.

Airports with Control Towers (CT), and their related information, are shown in blue. All other airports,
and their related information, are shown in magenta (redish purple).

The symbol L indicates that runway lights are on during hours of darkness. A * indicates that the pilot must consult the Airport/Facility Directory (A/FD) to determine runway lighting limitations, such as: available on request (by radio call, letter, phone, etc), part-time lighting or pilot/airport controlled lighting. Lighting codes refer to runway edge lights. The lighted runway may not be the longest runway available, and may not be lighted full length. A detailed description of airport and air navigation lighting aids available at each airport can be found in the A/FD. When information is lacking, the respective character is replaced by a dash. The symbol B indicates the existence of a rotating or flashing airport beacon operating continuously sunset to sunrise. The Aeronautical Information Manual (AIM) thoroughly explains the types and uses of airport lighting aids.

**CONTROLLED AIRSPACE**

Controlled airspace consists of those areas where some or all aircraft may be subject to air traffic control, such as Class A, Class B, Class C, Class D, Class E Surface (SFC) and Class E Airspace.

**Class A Airspace** within the United States extends from 18,000’ up to 60,000’ MSL. While visual charts do not depict Class A, it is important to note its existence.

**Class B Airspace** is shown in abbreviated form on the World Aeronautical Chart (WAC). The Sectional Aeronautical Chart (Sectional) and Terminal Area Chart (TAC) show Class B in greater detail. The MSL ceiling and floor altitudes of each sector are shown in solid blue figures with the last two digits omitted: 70 15 . The following figures identify a sector that extends from the surface to the base of the Class B: . The name by which the Class C is identified is shown as:  Burbank Class C . Separate notes, enclosed in magenta boxes, give the approach control frequencies to be used by arriving VFR aircraft to establish two-way radio communication before entering the Class C (generally within 20 NM):

**Class D Airspace** is symbolized by a blue dashed line. Class D operating less than continuous is indicated by the following note: . Ceilings of Class D are shown as follows: . A minus in front of the figure is used to indicate “from surface to but not including .... .”

**Class E Surface (SFC) Airspace** is symbolized by a magenta dashed line. Class E SFC operating less than continuous is indicated by the following note:

**Class E Airspace** exists at 1200’ above ground level unless designated otherwise. The lateral and vertical limits of all Class E up to but not including 18,000’ are shown by narrow bands of vignette on Sectionals and TACs. Controlled airspace floors of 700’ above the ground are defined by a magenta vignette; floors other than 700’ that abut uncontrolled airspace (Class G) are defined by a blue vignette; differing floors greater than 700’ above the ground are annotated by a symbol and a number indicating the floor. If the ceiling is less than 18,000’ MSL, the value (prefixed by the word “ceiling”) is shown along the limits of the controlled airspace. These limits are shown with the same symbol indicated above.

**UNCONTROLLED AIRSPACE**

**Class G Airspace** within the United States extends up to 14,500’ MSL. At and above this altitude is Class E, excluding the airspace less than 1500’ above the terrain and certain special use airspace areas.

**SPECIAL USE AIRSPACE**

Special use airspace confines certain flight activities and restricts entry, or cautions other aircraft operat-
ing within specific boundaries. Except for Controlled Firing Areas, special use airspace areas are depicted on visual aeronautical charts. Controlled Firing Areas are not charted because their activities are suspended immediately when spotter aircraft, radar, or ground lookout positions indicate an aircraft might be approaching the area. Nonparticipating aircraft are not required to change their flight paths. Special use airspace areas are shown in their entirety (within the limits of the chart), even when they overlap, adjoin, or when an area is designated within another area. The areas are identified by type and identifying name or number, positioned either within or immediately adjacent to the area.

**OTHER AIRSPACE AREAS**

**Mode C Required Airspace** (from the surface to 10,000’ MSL) within 30 NM radius of the primary airport(s) for which a Class B is designated, is depicted by a solid magenta line. Mode C is required but not depicted for operations within and above all Class C up to 10,000’ MSL. Enroute Mode C requirements (at and above 10,000’ MSL except in airspace at and below 2500’ AGL) are not depicted. See FAR 91.215 and the AIM.

**FAR 93** Airports and heliports where Federal Aviation Regulation (FAR 93) special air traffic rules and airport traffic patterns apply are shown by "boxing" the airport name.

**FAR 91** Airports where fixed wing special visual flight rules operations are prohibited (FAR 91) are shown with the type "NO SVFR" above the airport name.

**National Security Areas** indicated with a broken magenta line and **Special Federal Aviation Regulations (SFAR) Areas** indicated with the following symbol: \[\text{symbol}\], consist of airspace with defined vertical and lateral dimensions established at locations where there is a requirement for increased security and safety of ground facilities. Pilots are requested to voluntarily avoid flying through these depicted areas. When necessary, flight may be temporarily prohibited.

**Temporary Flight Restriction (TFR) Areas Relating to National Security** are indicated with a broken blue line. A Temporary Flight Restriction (TFR) is a type of Notices to Airmen (NOTAM). A TFR defines an area restricted to air travel due to a hazardous condition, a special event, or a general warning for the entire airspace. The text of the actual TFR contains the fine points of the restriction. It is important to note that only TFRs relating to National Security are charted.

**Air Defense Identification Zones (ADIZs)** are symbolized using the ADIZ symbol: \[\text{symbol}\]. As defined in 14 CFR Part 99, an ADIZ is an area in which the ready identification, location, and control of all aircraft is required in the interest of national security. ADIZ boundaries include Alaska, Canada and the Contiguous U.S.

Due to federal security agencies’ concerns about unidentified VFR aircraft flying too close to the nation’s capital, in early 2003 the FAA adapted the ADIZ concept to address these concerns and issued a Flight Data Center (FDC) NOTAM that designated this airspace as the Washington DC Metropolitan Air Defense Identification Zone (DC ADIZ).

**The Washington DC Flight Restricted Zone (FRZ) Relating to National Security** is depicted using the Prohibited/Restricted/Warning Area symbology and is located within the DC ADIZ. It is defined as the airspace within approximately a 13 to 15NM radius of the KDCA VOR/DME. Additional requirements are levied upon operators requesting access to operate inside the National Capitol Region.

**Terminal Radar Service Areas (TRSAs)** are shown in their entirety, symbolized by a screened black outline of the entire area including the various sectors within the area...

The outer limit of the entire TRSA is a continuous screened black line. The various sectors within the TRSA are symbolized by slightly narrower screened black lines.

Each sector altitude is identified in solid black color by the MSL ceiling and floor values of the respective sector, eliminating the last two digits. A leader line is used when the altitude values must be positioned outside the respective sectors because of space limitations. The TRSA name is shown near the north position of the TRSA as follows: \[\text{symbol}\]. Associated frequencies are listed in a table on the chart border.

**Military Training Routes (MTRs)** are shown on Sectionals and TACs. They are identified by the route designator: \[\text{symbol}\]. Route designators are shown in solid black on the route centerline, positioned along the route for continuity. The designator IR or VR is not repeated when two or more routes are established over the same airspace, e.g., IR201-205-227. Routes numbered 001 to 099 are shown as IR1 or VR99, eliminating the initial zeros. Direction of flight along the route is indicated by small arrowheads adjacent to and in conjunction with each route designator.
The following note appears on Sectionals and TACs covering the conterminous United States.

MILITARY TRAINING ROUTES (MTRs)

All IFR and VR MTRs are shown, and may extend from the surface upwards. Only the route centerline, direction of flight along the route and the route designator are depicted - route widths and altitudes are not shown. Since these routes are subject to change every 56 days, and the charts are reviewed every 6 months, you are cautioned and advised to contact the nearest FSS for route dimensions and current status for those routes affecting your flight. Routes with a change in the alignment of the charted route centerline will be indicated in the Aeronautical Chart Bulletin of the Air Force/FAA Directory. Military Pilots refer to Area Planning AP/1B Military Training Route North and South America for current routes.

There are IFR (IR) and VFR (VR) routes as follows:

Route identification:

a. Routes at or below 1500' AGL (with no segment above 1500') are identified by four-digit numbers; e.g., VR1007, etc. These routes are generally developed for flight under Visual Flight Rules.

b. Routes above 1500' AGL (some segments of these routes may be below 1500') are identified by three-digit or less numbers; e.g., IR21, VR302, etc. These routes are developed for flight under Instrument Flight Rules.

MTRs can vary in width from 4 to 16 miles. Detailed route width information is available in the Flight Information Publication (FLIP) AP/1B (a DoD publication), or in the Digital Aeronautical Chart Supplement (DACS) produced by NACO.

Special Military Activity areas are indicated on the Sectionals by a boxed note in black type. The note contains radio frequency information for obtaining area activity status.

INSET COVERAGE

Inset coverage is shown on appropriate Sectionals by a 1/8" masked line as indicated below. A note to this effect appears near the masked boundary line.

CHART TABULATIONS

Airport Tower Communications are provided in a columnized tabulation for all tower-controlled airports that appear on the respective chart. Airport names are listed alphabetically. If the airport is military, the type of airfield, e.g., AAF, AFB, NAS, is shown after the airfield name. In addition to the airport name, tower operating hours, primary VHF/UHF local Control Tower (CT), Ground Control (GND CON), and Automatic Terminal Information Service (ATIS) frequencies, when available, will be given. An asterisk (*) indicates that the part-time tower frequency is remoted to a collocated full-time FSS for use as Local Airport Advisory (LAA) when the tower is closed. Airport Surveillance Radar (ASR) and/or Precision Approach Radar (PAR) procedures are listed when available.

Approach Control Communications are provided in a columnized tabulation listing Class B, Class C, Terminal Radar Service Areas (TRSA) and Selected Radar Facilities when available. Primary VHF/UHF frequencies are provided for each facility. Sectorization occurs when more than one frequency exists and/or is approach direction dependent. Availability of service hours is also provided.

Special Use Airspace (SUA) information is comprised of Prohibited, Restricted, Alert, and Warning Areas. They are presented in blue and listed numerically for U.S. and other countries. Restricted, Danger and Advisory Areas for Canada are tabulated separately in blue. A tabulation of Military Operations Areas (MOA) that appear on the chart are presented in magenta and listed alphabetically. All are supplemented with altitude, time of use and the controlling agency/contact facility, and its frequency, when available. The controlling agency will be shown when the contact facility and frequency data is unavailable.
### Control Tower

<table>
<thead>
<tr>
<th>Airport</th>
<th>TWR Freq</th>
<th>Duty Time</th>
<th>ATIS</th>
<th>ASR/PAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIRBORNE</td>
<td>119.7</td>
<td>6:00-18:00</td>
<td>121.6</td>
<td>124.25</td>
</tr>
<tr>
<td>BLUE GRASS</td>
<td>119.7</td>
<td>6:00-18:00</td>
<td>121.9</td>
<td>124.3</td>
</tr>
<tr>
<td>BOSTON</td>
<td>119.7</td>
<td>6:00-18:00</td>
<td>121.3</td>
<td>121.8</td>
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<tr>
<td>CHARLOTTE-ALBEMARLE</td>
<td>119.7</td>
<td>6:00-18:00</td>
<td>121.3</td>
<td>182.0</td>
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<tr>
<td>CINCINNATI/KENTUCKY INTL</td>
<td>119.7</td>
<td>6:00-18:00</td>
<td>121.3</td>
<td>124.35</td>
</tr>
<tr>
<td>FOX DAYTON INTL</td>
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<td>6:00-18:00</td>
<td>121.3</td>
<td>124.35</td>
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<tr>
<td>SOUTHERN WFX/REED SHEPHERD</td>
<td>119.7</td>
<td>6:00-18:00</td>
<td>121.3</td>
<td>124.35</td>
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### Radar Approach

<table>
<thead>
<tr>
<th>Class B, Class C, TRSA and Selected Radar Approach Control Frequencies</th>
</tr>
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<tbody>
<tr>
<td>Facility</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>CINCINNATI CLASS B VHF/UHF</td>
</tr>
<tr>
<td>CHARLESTON CLASS C</td>
</tr>
<tr>
<td>COLUMBUS CLASS A</td>
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<tr>
<td>DAYTON CLASS C</td>
</tr>
<tr>
<td>BRISTOL/TRA</td>
</tr>
<tr>
<td>HUNTINGTON TRSA</td>
</tr>
<tr>
<td>PERKINS/BARK RADAR</td>
</tr>
</tbody>
</table>

### Special Use, Surface on Sectional Chart

Unless otherwise noted altitudes are MSL and in feet. Time is local. *155 indicates the location is not included in the sectional chart. Other times by NOTAM. "R" = Right hand. "L" = Left hand. "A" = Accessible. "FA" = FAA or other federal communications. "C" = Control number. *Special Use areas indicate the control number.

### U.S. Prohibited, Restricted, Alert, Warning, MDA-Military Operations Area

<table>
<thead>
<tr>
<th>Number</th>
<th>Altitude</th>
<th>Frequency</th>
<th>Controlling Agency/Contact Facility</th>
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<tbody>
<tr>
<td>R4602 A</td>
<td>3,000-5,000</td>
<td>126.5</td>
<td>WASHINGTON CNTR</td>
</tr>
<tr>
<td>R4602 B</td>
<td>5,000-10,000</td>
<td>130.9</td>
<td>WASHINGTON CNTR</td>
</tr>
<tr>
<td>R4602 C</td>
<td>10,000-15,000</td>
<td>130.9</td>
<td>WASHINGTON CNTR</td>
</tr>
</tbody>
</table>

### Canada Restricted, Danger and Advisory Area

<table>
<thead>
<tr>
<th>Number</th>
<th>Location</th>
<th>Altitude</th>
<th>Frequency</th>
<th>Controlling Agency/Contact Facility</th>
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<tbody>
<tr>
<td>C8075A</td>
<td>CONFEDERATION BRIDGE PE</td>
<td>500</td>
<td>CONTINUOUS</td>
<td></td>
</tr>
<tr>
<td>C8075A</td>
<td>HALIFAX, NS</td>
<td>700</td>
<td>NOAA</td>
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<td>C8075A</td>
<td>GREENPORT, NY</td>
<td>500</td>
<td>NOAA</td>
<td></td>
</tr>
<tr>
<td>C8075A</td>
<td>5560F, LGA</td>
<td>1000</td>
<td>NOAA</td>
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### MDA Operation

<table>
<thead>
<tr>
<th>MDA Name</th>
<th>Altitude*</th>
<th>Frequency</th>
<th>Controlling Agency/Contact Facility</th>
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</thead>
<tbody>
<tr>
<td>BRUSH CREEK</td>
<td>3,000-5,000</td>
<td>130.9</td>
<td>WASHINGTON CNTR</td>
</tr>
<tr>
<td>BUCKEYE</td>
<td>2,000-3,000</td>
<td>130.9</td>
<td>WASHINGTON CNTR</td>
</tr>
<tr>
<td>EVANS</td>
<td>3,000-5,000</td>
<td>130.9</td>
<td>WASHINGTON CNTR</td>
</tr>
<tr>
<td>TANAGER</td>
<td>3,000-5,000</td>
<td>130.9</td>
<td>WASHINGTON CNTR</td>
</tr>
<tr>
<td>PICKET</td>
<td>5,000-7,000</td>
<td>130.9</td>
<td>WASHINGTON CNTR</td>
</tr>
</tbody>
</table>

*Altitude indicates MDA altitude. MOA area includes 1800 unless otherwise indicated in the MDA table. *Other times by NOTAM.