A. General Requirements

1. Standards for survey shall meet or exceed the minimum acceptable level of performance by the Maryland State Board for Professional Land Surveyors under the provisions of Business Occupations and Professions Article, Annotated Code of Maryland, Title 15 and the code of Maryland Regulations, Title 19 Subtitle 13.

2. The survey shall include north arrow reference to true north, date of survey, and surveyor’s certification, professional seal and signature. A vicinity map showing the general location of the project shall be shown on the plans.

3. Survey Control
   a. The survey control shall be referenced to published control monuments and benchmarks within the project vicinity. The survey shall be based on the Maryland State Plane coordinate grid system and datum with a two-foot topographic contour interval, unless otherwise indicated in the scope of work. Area to be surveyed shall extend a minimum of 50 feet beyond property lines and shall be produced at a scale of 1”=30’, unless otherwise indicated in the scope of work. The limits of the area to be surveyed shall be designated in the project scope of work.
   
   b. A minimum of three recoverable traverse points with all coordinate data and any benchmark (MD State) in the vicinity of the project to allow further tie-in for construction stakeout. A minimum of three grid ticks shall be shown on the plans.
   
   c. The horizontal datum shall be NAD 83/91 or NAD 83(2007), Maryland State Plane Coordinate System, U.S. Survey Foot.
   
   d. The control points shall be semi-permanent in order to be recoverable at the time of construction of the project. All survey control points will be shown on the final plans with coordinate and elevation information provided for each.
   
   e. The vertical datum for the project shall be established from published benchmarks or existing benchmarks established at the project site and shall be documented on the plans for the project.
   
   f. A minimum of three (3) benchmarks will be provided at the site and will be located on or immediately adjacent to the site. Benchmark elevations to be published to nearest 0.01 feet.
   
   g. A detailed description of benchmarks and their datum, along with the source benchmark and datum used for the survey, including the conversion factor between datum’s, such as NGVD 1929 and NAVD 1988 shall be noted on the plans.
   
   h. M-NCPCC will provide any previous control information they have in their records for the project site if needed.
B. **Boundary Survey**

1. The boundary survey of the site shall be based on prior boundary survey information, current record plats and deeds recorded among the Land Records of Montgomery County, Maryland.

2. All park property lines and corners shall be labeled with bearing and distances and sufficient data for curves to include (arc length, delta, radius, chord and chord bearing).

3. All adjoining properties will be labeled with the current owner information, address, parcel number, liber/folio and plat reference if applicable.

4. Existing easements, rights of ways and building restriction lines shall be identified and shown.

5. M-NCPPC will provide any boundary information they have in their records for the project site as needed.

C. **Topographic Survey**

1. A complete topographic survey of the site shall be prepared to be used for design. The topographic survey can be compiled from a field run survey or aerial photogrammetric methods, unless otherwise indicated in the scope of work. The method chosen for the topography must be sufficient to determine accurate earthwork and drainage computations.

2. The limits of the topography shall extend 50 to 100 feet (based on project requirements) beyond all property boundaries.

3. The survey should include spot elevations, grade break lines, streams and their buffers, wetlands and waterways, drainage ditches, ponds, existing utilities, utility poles, overhead lines and underground utilities, manholes, drainage structures, utility invert elevations, utility pipe sizes, fences, buildings, walls, stairs, driveways, roads, curb, walks and paved areas, edge of woods, landscaping beds, vegetated areas, any trees with a diameter at breast height (DBH) of 6” and larger labeled with DBH and botanical name, unless otherwise indicated in the scope of work. Include all other physical features that could impact the design.

4. The final topographic survey should provide contours at a minimum of 2-foot intervals, spot elevations on paving and other hard surfaces to the nearest 0.01 foot, spot elevations on other surfaces to the nearest 0.1 foot. Provide spot elevations, covering the entire survey limits showing high points, low points, grade changes, building floor elevations, top and bottom of walls at grade changes, top and bottom of stairs, and at sufficient intervals to represent the general character of the terrain and existing site features. Refer to the specific project scope of work for any additional requirements.

5. All text shall be appropriately sized and oriented such that they are legible on a printed copy of the survey and a minimum of 1/10 inch in height.

6. Where existing topographic data is available adjacent to or within the survey area, match all new work to existing survey maps to provide topographic continuity. Surveyor must verify the present day accuracy of all data prior to incorporation into their work.

D. **DTM Deliverable**

1. The topographic survey shall include a 3D digital terrain model (DTM) of the site and all adjacent areas included in the survey. Contours and elevations shown on the plan shall be on their actual elevation and represented properly in the DTM.
2. The Surveyor shall utilize and ensure that the modeling software is compatible with the current software utilized by M-NCPPC. Currently: AutoCAD (Release 2010)

3. The survey shall include two separate models with all breakpoints, break lines, slopes, grades, and elevations in the DTM. The first DTM shall exclude all points that are not representative of the ground surface (i.e. manholes, utility boxes, fences, monuments, etc.) The second DTM shall include all points.

4. Any errors in the DTM shall be corrected by the Surveyor before the DTM is submitted to M-NCPPC.

5. In the event that the topographic survey is generated by aerial mapping, the survey shall include the DTM used in the mapping to generate the contours and topographic information and shall include a digital ortho-rectified photograph in the drawing on the same coordinate basis as the survey.

E. Survey Deliverables

1. Facility Planning Stage - The following survey information shall be provided:
   
   a. One electronic file in AutoCAD (Release 2010 or as specified) format with the accompanying base information (point number, northing, easting, elevation and description in a generally accepted format) that matches the survey base drawing information submitted in the certified mylars.

   b. One printed list that defines information found on each CAD layer.

   c. One set of Mylars containing the survey data, sealed and signed by a licensed surveyor.

2. Detailed Design and Construction Documents - In addition to the survey deliverables for Facility Planning stage, the following survey information should be included in the final project documents ready for construction:

   a. All the Limits of disturbances (LOD) clearly identified with proper information (offset and distance or coordinates) for the contractor to stake the LOD in the field.

   b. All the survey information, distance and offset from the traverse or base line of survey, or X, Y, and Z coordinates tied to traverse points for the proposed features in the construction plans. The plans shall include adequate information for the contractor to be able to construct all features within design tolerances with accompanying AutoCAD files without scaling of any distances from the construction plans.

   c. Provide accurate and up to date copies of all record drawings received from various appropriate utility companies or certified confirmation that utility does not exist within project area.