

CITY OF GRAND RAPIDS ENGINEERING DEPARTMENT
SPECIAL PROVISIONS
FOR
SURVEYING, DRAFTING, AND CONSTRUCTION STAKING SERVICES

WORK ITEMS - TYPICAL PROJECT REQUIREMENTS

SURVEY REQUIREMENTS

Requirement A - For the improvement or reconstruction of streets and alleys, the placement of new or reconstruction of watermain, sanitary sewers or storm sewers that are to be located in the public rights-of-way or public easements:

1. Alignment - The alignment will be the centerline of the right-of-way or section line, as requested, showing all deflection angles of the alignment, and including all deflection angles for side streets and railroads rights-of-way. This will include all curve data.

This will also include physically measuring to the nearest 1/4 section corner or section corner at both the beginning and ending points of the project, and if the project is larger than the 1/4 section, the project will be tied into section corners, as necessary and will include the bearings and distances to all these corners.

The Consultant shall set, describe, and show a minimum of four (4) control points per project, or every 1,000 feet. The state plane coordinates shall be listed (NAD83 Michigan State Planes, South Zone, International Foot coordinate system).

2. Stationing - Stationing will be along the above alignment line as established and stationed from west to east and south to north. Do not use negative stationing. The intersection of the southernmost or westernmost ROW centerline and the above alignment line shall be Sta. 10+00.
3. Limits - The limits will be a minimum of 15 feet outside of all right-of-way lines, full intersections (all directions) from the beginning to the ending of the project at a distance of 150 feet (minimum) down all cross streets and railroads from the right-of-way line.
4. Pickups - Locate all physical surface objects including trees, shrubs, bushes, brush line limits, fences, utility poles or pedestals, guy wires, utility marker posts, concrete/bituminous/gravel areas, buildings, retaining walls, stairs (top & bottom steps), alcoves, manholes per field data and as-built plan data (clearly label the utility type in notes), catch basins, valves, hydrants, curb boxes, curbs and curb radii, and signs within the total survey area. Include the front face(s) of all buildings, with address and parcel numbers. The survey notes shall clearly label these items so there is not any difficulty in interpreting the notes.
5. Elevations - Will consist of the following points, the centerline, gutter, top of curb at the back of curb, face of walk, back of walk, right-of-way line, and to the minimum of 15-foot limit outside of right-of-way line. Additionally, for street reconstruction projects, at all driveways within the project limits, including the centerline, gutter, flowline, top of curb, face of walk, back of walk, right-of-way line. Any additional points of grade change in the survey area that helps define the existing contour of the land will be picked up, (including top and bottom of stairs, steps, doors, retaining walls). Centerline "x" and centerline elevations will be taken at all intersections and in all directions to an approximate limit of 150 feet. When new or reconstruction of sanitary sewer projects are requested, the basement floor or window sill elevations shall be taken at each house or building along the entire project or first floor elevation if there isn't a basement. Elevations on hard surfaces must be done with a total station, survey grade scanning equipment or a conventional differential level. "GPS" elevations on hard surfaces are not allowed

There is a standard notice that is given to each homeowner and business, for them to call in a basement floor to windowsill measurement. This standard notice must be distributed when this type of work is requested.

All top of manholes, catch basins (gutter), valve boxes, water mains in valve chambers, all sewer inverts, including the direction and size of pipe of storm sewer, sanitary sewer, and culverts will be clearly labeled in the notes.

All vertical control will be taken in NAVD 88 unless otherwise approved, with a listing of all benchmarks set and used, along with the differential level loop for that project. All benchmarks set shall be on items such as concrete steps to houses, top of concrete headwalls, or any other item that will be relatively permanent in nature and would not be removed during the construction of that project.

The Consultant will set benchmarks at each street intersection along the limits of the project, or a maximum of 800 feet apart, whichever is the lesser distance. This is a requirement. There is a minimum of three (3) benchmarks per project.

Benchmarks from previous city projects shown on construction plans in close vicinity may be used. NOAA's Online Positioning User Service (OPUS) may also be used to establish an elevation on a benchmark for the project. The GPS observation session should be at least 15 minutes.

6. Contour and Surface Accuracy – The existing surface generated by design software should be reviewed and compared with the real terrain within specified boundaries based on the following criteria:
 - a) Flat terrain: road profile from 0% to 5% - interval of minor contour shall be 0.2 ft and major contour shall be 1.0 ft
 - b) Rolling terrain: road profile from 5% to 8% - interval of minor contour shall be 0.5 ft and major contour shall be 2.0 ft.
 - c) Hilly terrain: road profile more than 8% - interval of minor contour shall be 1.0 ft and major contour shall be 5.0 ft.

If a contour plan is required as part of the work, then the contour plan will be based on the above criteria.

The City may require the Consultant to assist in writing legal descriptions for the acquisition of property and easements on various projects. The property acquisition work shall meet the requirement of P.A. 132 of the Public Act of 1970, as amended. This work will also include the placement of monumentation as required by the Act. The Certificate of Survey must be recordable and sealed by the Michigan Professional Surveyor as required by the Act.

Requirement B – For placement of new or reconstruction of water main, sanitary sewers or storm sewers in existing or proposed public easements:

1. Alignment - The alignment will be the centerline of the easement, as per the description or as per the job request to establish the easement. Show all deflection angles, including the deflection angles of all cross streets, and railroads. This will include all curve data.

This will also include physically measuring to the nearest 1/4 section corner or section corner at both the beginning and ending points of the project, and if the project is larger than the 1/4 section, the project will be tied into two or more section corners as necessary and will include the bearings and distances to all these corners.

The Consultant shall set, describe, and show a minimum of four (4) control points per project, or every 1,000 feet. Their control points must be outside of the construction zone if possible. The state plane coordinates shall be listed (NAD83 Michigan State Planes, South Zone, International Foot coordinate system).

If the job requires the establishment of the easement description, the Consultant will physically measure to the nearest section corner(s) and plat corners, (if applicable) to adequately prepare the legal description. The accuracy of the survey shall meet requirements of P.A. 132 of the Public Act of 1970, as amended.

In addition, the property corners of parcels crossed shall have distances to the easement line and these

property corner shall be located or set. If the parcel is not located in a platted subdivision the property corner shall be located by bearing and distance to the nearest section corner.

2. Stationing - Stationing will be along the alignment centerline and stationed from west to east and south to north and beginning at the centerlines of the beginning streets or easements, or as specified in the Supplementary Provisions. This will include the placement of wood stakes all station points, outside of the roadway, or paved areas. Do not use negative stationing. The intersection of the southernmost or westernmost ROW centerline and the above alignment line shall be Sta. 10+00.
3. Limits - The limits will be the width of the easement plus an additional 25 feet (minimum) each side of the easement or as requested. Also, 50 feet (minimum) from the easement line in either direction of the beginning or ending streets and all cross streets, easements, or railroads.
4. Pickups - Locate all physical surface objects including trees, shrubs, bushes, brush line limits, fences, utility poles or pedestals, guy wires, utility marker posts, concrete/bituminous/gravel areas, buildings, retaining walls, stairs (top & bottom steps), alcoves, manholes per field data and as-built plan data (clearly label the utility type in notes), catch basins, valves, hydrants, curb boxes, curbs and curb radii, and signs within the total survey area. Include the front face(s) of all buildings, with address and parcel numbers, including the front doors of buildings adjacent to the right-of-way. The survey notes shall clearly label these items so there is not any difficulty in interpreting the notes. This also includes any major feature that may pose as an engineering or construction problem, which is adjacent to the survey area.
5. Elevations - Will consist of the following points: the centerline, right and left easement line, and a point at 20 feet and 40 feet (minimum) beyond each easement line. Also, any additional significant grade changes that help define the existing contour of the terrain.

When new or reconstruction of sanitary sewer projects are requested, the basement floor or window sill elevations shall be taken at each house or building along the entire project or first floor elevation if there isn't a basement.

All top of manholes, catch basins (gutter), valve boxes, water mains in valve chambers, all inverts including the direction and size of pipe of storm sewer, sanitary sewer, and culverts will be clearly labeled in the notes.

All vertical control will be measured in NAVD 88 unless otherwise approved, with a listing of all benchmarks set and used, along with the differential level loop for that project. All benchmarks set, shall be on items such as concrete steps to houses, top of concrete headwalls, or any other item that will be relatively permanent in nature and would not be removed during the construction of that project.

The Consultant will set benchmarks at each street intersection along the limits of the project, or a maximum of 800 feet apart, whichever is the lesser distance. This is a requirement. There is a minimum of three (3) benchmarks.

Benchmarks from previous city projects shown on construction plans in close vicinity may be used. NOAA's Online Positioning User Service (OPUS) may also be used to establish an elevation on a benchmark for the project. The GPS observation session should be at least 15 minutes.

6. Contour and Surface Accuracy – the existing surface generated by design software should be reviewed and compared with the real terrain within specified boundaries based on the following criteria:
 - a) Flat terrain: road profile from 0% to 5% - interval of minor contour shall be 0.2 ft and major contour shall be 1.0 ft.
 - b) Rolling terrain: road profile from 5% to 8% - interval of minor contour shall be 0.5 ft and major contour shall be 2.0 ft.
 - c) Hilly terrain: road profile more than 8% - interval of minor contour shall be 1.0 ft and major contour shall be 5.0 ft.

If a contour plan is required as part of the work, then the contour plan will be based on the above criteria.

The City may require the Consultant to assist in writing legal descriptions for the acquisition of property and easements on various projects. The property acquisition work shall meet the requirement of P.A. 132 of the Public Act of 1970, as amended.

Requirement C – For resurfacing of streets or alleys:

1. Alignment - The alignment will be the centerline of the right-of-way, or section line, as requested, showing all deflection angles including the deflection angles of all side streets, and railroads.

This will also include physically measuring to the nearest 1/4 section corner or section corner at both the beginning and ending points of the project, and if the project is larger than the 1/4 section, the project will be tied into two, or more section corners as necessary and will include the bearings and distances to all these corners.

The Consultant shall set, describe, and show a minimum of four (4) control points per project, or every 1,000 feet and their points will be witnessed relative to the centerline of the right-of-way. Their control points must be outside of the construction zone if possible. The stateplane coordinates shall be listed (NAD 83 Michigan State Planes, South Zone, International Foot coordinate system).

2. Stationing - Stationing will be along the above alignment line as established and stationed from west to east and south to north, beginning at the centerlines of the beginning streets, or as specified in the Supplementary Specifications. The intersection of the southernmost or westernmost ROW centerline and the above alignment line shall be Sta. 10+00.
3. Limits - The limits will be from right-of-way to right-of-way, full intersections of the beginning and ending streets and a distance of 50 feet (minimum) down all cross streets and railroads, from the right-of-way line.
4. Pickups - Locate all physical surface objects including trees, shrubs, bushes, brush line limits, fences, utility poles or pedestals, guy wires, utility marker posts, concrete/bituminous/gravel areas, the face of buildings at the right-of-way line, retaining walls, stairs (top & bottom steps), alcoves, manholes per field data and as-built plan data (clearly label the utility type in notes), catch basins, valves, hydrants, curb boxes, curbs and curb radii, and signs within the total survey area. Include the front face(s) of all buildings, with address and parcel numbers, including the front doors of buildings adjacent to the right-of-way. The survey notes shall clearly label these items so there is not any difficulty in interpreting the notes.
5. Elevations - Elevations will consist of the following points, the centerline at 50-foot intervals and at the intersections of all cross streets, and railroad crossings.

All vertical control will be taken in NAVD 88 unless otherwise approved, with a listing of all benchmarks set and used, along with the benchmark level loop for that project. If you are unable to establish a benchmark based on the previous criteria, contact the City. This is a requirement. All benchmarks set, shall be on items such as concrete steps to houses, top of concrete headwalls, or any other item that will be relatively permanent in nature and would not be removed during the construction of that project.

The Consultant will set benchmarks at each street intersection along the limits of the project, or a maximum of 800 feet apart, whichever is the lesser distance. There is a minimum of (3) benchmarks. This is a requirement. Benchmarks from previous city projects shown on construction plans in close vicinity may be used. NOAA's Online Positioning User Service (OPUS) may also be used to establish an elevation on a benchmark for the project. The GPS observation session should be at least 15 minutes.

6. Contour and Surface Accuracy – The existing surface generated by design software should be reviewed and compared with the real terrain within specified boundaries based on the following criteria:
 - a) Flat terrain: road profile from 0% to 5% - interval of minor contour shall be 0.2 ft and major contour shall be 1.0 ft
 - b) Rolling terrain: road profile from 5% to 8% - interval of minor contour shall be 0.5 ft and major contour

shall be 2.0 ft.

- c) Hilly terrain: road profile more than 8% - interval of minor contour shall be 1.0 ft and major contour shall be 5.0 ft.

If a contour plan is required as part of the work, then the contours will be based on the above criteria.

Requirement D – For boundary survey (do the following, as well as, all requirements of P.A. 132 of the Public Act of 1970, as amended):

1. Easements - The survey shall define any utility easement or any other easements that affect the subject property.
2. Physical Objects - The survey shall show any abutting or dividing streets, alleys, water courses, (e.g., rivers or established creeks), etc. Any buildings or structures that encroach onto or out of the subject property shall be clearly shown and dimensioned from the property line.
3. Certification and Accuracy - The survey shall be certified to the City of Grand Rapids and to any other parties named by the City. A professional surveyor licensed in the State of Michigan shall seal the survey drawings. The accuracy of the survey shall meet the requirements of the Act.
4. The Drawing - The drawing shall be the standard 8-1/2" X 14" Certificate of Survey drawing as needed for recording purposes, unless otherwise requested. The Surveyor shall record said drawing and provide the City three (3) copies showing the instrument number of said recording. The City may also require a large format drawing (22" x 34") showing the subject property, all easements, physical objects, and descriptions of objects.

Requirement E: For topographic survey

1. Grid System - A Grid System may be required with base lines as requested.
2. Limits of Survey - The limits will be from the centerlines of adjacent streets, and/or to a limit of 15 feet outside of the subject property as defined in the legal description of subject property.
3. Steel Stakes - The surveyor shall place capped steel rods at all angle points and the point of curvature and the point of tangency of the perimeter of the subject property, if requested. Control points used for the topographic survey shall be shown and described on the drawing and will have state plane coordinates (NAD83 Michigan State Planes, South Zone, International Foot coordinate system).
4. Easements - The survey shall define any utility easement or any other easements that affect the subject property.
5. Physical Objects, i.e. Pickups - The survey shall show any abutting or dividing streets, alleys, watercourses (e.g., rivers or established creeks); all utility poles (ownership indicated) with overhead wires and all guy wires, guy poles; all underground utilities (public and private), and labeled with size; all concrete, asphalt, brick, gravel, seeded or landscaped areas; all shrubs, bushes, trees (4 inches in diameter and larger), with smaller trees indicated as bush, indicating limits (if site conditions warrant that only the limits of trees be shown this will be requested); all fences, buildings, retaining walls, signs and any other structures on or within said project limits.
6. Elevations - Elevations will be taken (at all points on the grid, if grid system requested) within said project limits, and will also include the gutter, top of curb, back of walk, right-of-way line (along said grid, if grid system requested), and all intermediate points to define all existing conditions of said subject property.

Contours will also be shown at one-foot intervals along with all other elevations as requested.

All inverts of storm and sanitary sewers; all top of castings of manholes, catch basins, and valve boxes; and the top of water mains in all chambers.

All vertical control will be taken in NAVD 88, unless otherwise approved, with a listing of all benchmarks set and used, along with the differential level loop for that project, unless otherwise approved. All benchmarks set, shall be on items such as concrete steps to houses, top of concrete headwalls, or any other item that will be relatively permanent in nature and would not be removed during the construction of that project.

The Consultant will set benchmarks at each street intersection along the limits of the project, or a maximum of 800 feet apart, whichever is the lesser distance. There is a minimum of (3) three benchmarks per project. Benchmarks from previous city projects shown on construction plans in close vicinity may be used. NOAA's Online Positioning User Service (OPUS) may also be used to establish an elevation on a benchmark for the project. The GPS observation session should be at least 15 minutes.

7. Certification and Accuracy - If the boundary is requested to be staked, the survey shall be certified to the City of Grand Rapids. A professional surveyor licensed in the State of Michigan shall seal the survey drawing. The accuracy of the survey shall meet requirements of P.A. 132 of the Public Act of 1970, as amended.
8. The Drawing - The final approved as-built drawing will normally be on the City Standard 22" X 34" Mylar (all preliminary drawings on bond or PDF format). If the site requires match lines, these will be shown and labeled. If the site is large enough to require multiple sheets, a plan location schematic may be requested, if warranted, on each sheet.

The City may require the Consultant to assist in writing legal descriptions for the acquisition of property and easements on various projects. This work shall meet the requirement of P.A. 132 of the Public Act of 1970, as amended. This work will also include the placement of capped steel stakes, and a recordable survey sealed by the professional surveyor licensed in the State of Michigan.

Requirement F – For construction staking:

1. Transfer any witness measurements for control points to objects that will not be disturbed during construction. This may include section corner or other Kent County Remonumentation Monuments and must be coordinated with the contractor and the Surveyor appointed as the Kent County Representative, and reestablish these monuments and witnesses as required by P.A. 74 of the Public Acts of 1970.
2. Transfer and re-establish any bench marks that are to be disturbed because of construction.
3. Set off-set stakes with grades for the placement of sanitary sewer, storm sewer, water main, curb and gutter, street lighting, and traffic signal; as required by the City or Contractor, so the construction work can be completed.
4. Set any grade stakes as necessary, for the placement of subbase, granular material, aggregate base, bituminous, concrete, and brick pavements as required by the City or Contractor so the construction work can be completed.
5. Set off-set stakes and grade for the placement of sidewalks, driveway approaches, alley approaches, and retaining walls as required by the City or Contractor, so the construction work can be completed.
6. Take the final "as-built" elevations, as required by the Engineer, of sanitary sewer, storm sewer inverts so this information can be part of the record drawings.
7. Take the final "as-built" measurements, as required by the Engineer, from manhole to manhole of sanitary sewer and storm sewer, valve to valve of water main with measurements to hydrants, so these can be compared with the inspector's measurements that were taken during construction.
8. Reset any monuments or property corners along the rights-of-way that were disturbed or removed during construction as may be required by the City.
9. The consultant will be available with the appropriate size crew to perform construction staking as required 7:00 am to 6:00 pm, Monday through Saturday at City or Contractor request.

Note: Items 4 and 6 will be for setting stakes once for these items. Item 5 and Curb and Gutterstakes in Item 4 will be for setting stakes twice for these items. Any additional times to stake the same will be paid for by the Contractor.

SURVEY NOTES (FOR SURVEY REQUIREMENTS A THROUGH E)

The Consultant will provide survey notes to the City in the following format, the consultant must adhere and no substitutions will be accepted.

1. This shall be the data as collected by Total Station and Data Collector type of surveying equipment or “survey grade” GPS equipment.
2. All data shall be provided in electronically in a digital format as appropriate.
3. The following data will be required and will consist of the following items:
 - A. Title sheet listing project name, date, firm.
 - B. Alignment sketches showing project and all measurements, angles, bearings and distances to section corner(s), control points and witness information.
 - C. Listing of vertical control used with new benchmarks set and a complete copy of the field notes of the differential level loops.
 - D. All data will be in a station and off-set output format starting from the beginning of the project and proceeding to the end. This data will be a reduced version of the collector data and must follow the example as stated below. This will be in groups as follows:
 - i. Entire project listing.
 - ii. Cross-sections at stated intervals. A description will be required for all elevation points of cross sections.
 - iii. Driveway cross-sections. A description will be required for all elevation points of cross-sections.
 - iv. Sketches of all structures including all inverts and sizes of pipe.
 - E. Elevations will be given for each point (Elev. 000.00) and only in NAVD 88 (2 decimal places).
 - F. Description of all items, if abbreviations are used, a legend sheet will be included.
4. An example of the printout shall be as follows: Sta. 10 + 15.30, 20.00' L Elev. 695.00 T. Pole
Additional examples may be provided upon request.
5. Autodesk Civil 3D base drawings submitted can, as an option, contain survey data points. However, it is required that the (survey only) Consultant shall submit a comma delimited file (CSV file) containing all project survey points.

DRAFTING REQUIREMENTS

Layout:

1. All submitted CAD drawings will be on City of Grand Rapids standard size sheets, 22” x34” with a 1-1/2” left margin and a 1/2” margin on all other sides (for boundary survey drawing requirements, see *Requirement D*). All submitted sheets shall include the City standard title block and border, in accordance with the current City of Grand Rapids CAD Standards.
2. All final project drawings are to be provided as specified in the RFQ and/or RFP.

Standard Drawing Items:

1. Title sheet, title blocks, layer attributes, standard blocks, line types and multiple settings will be in accordance with the current City of Grand Rapids CAD Standards.

2. The City of Grand Rapids CAD Standards guide, as well as all associated standard electronic files are available for download at the City of Grand Rapids web site:
<https://www.grandrapidsmi.gov/Government/Departments/Engineering-Department/Engineering-Documents-Center>

Drawing Conventions and Guidelines:

1. The plan view will show a maximum of 450' (1" = 20' scale) or as requested by the Engineer or designee. Station 0+00 will always start at the left side of the sheet. This information will be placed so that sufficient space is left between the pick-up notes and the plan view. This will allow construction notes for our design to be placed without making the drawings unreadable.

If requested by the Engineer or designee, projects will show contour lines at appropriate intervals in accordance with the current City of Grand Rapids CAD Standards, and as specified in the minimum contour and surface accuracy requirements.

2. All underground public utilities, (e.g. sanitary sewer, water main, storm sewer) will be shown and labeled on the drawings. If the Engineer or designee requests, the Consultant will also show city street lighting and traffic signal, all water services (including type and size), sanitary sewer laterals (including size), and storm sewer laterals (including size). The Consultant must show all underground telephone, power company, T.V. cable systems, gas company, steam, fiber optics communication company(s), and any other private utility on the drawing. For resurfacing projects, all existing surface objects will be shown, but not labeled.
3. Matchlines will be at 50' station points and will be shown at the appropriate locations, so intersections will not be broken at these matchlines. A minimum of 50 feet from said intersection will be required to any matchline.
4. All property lines will be shown, such as: platted lots, lot splits, metes and bounds, and all vacated streets or alleys. All addresses and parcel numbers will be shown for each property. All parcel front measurements will be shown.
5. When drawing curbs or curb and gutters, they will be as follows: a straight curb section has one dashed line, which represents the face of curb. A curb and gutter section has two dashed lines, which represent the face of curb and front of gutter pan (edge of metal).
6. All plans will show dimensions for rights-of-way, width of streets, (i.e. edge to edge of pavement or face to face of curbs), width of sidewalks, distances to water mains, sanitary sewers, storm sewers, and all other utilities, and dimensioned to the centerline/survey line (preferred) or right-of-way line, for all projects.
7. The deflection angles will be labeled at all points. These will be shown behind the right-of-way lines.
8. The Consultant will provide the profile as follows:
 - a) The standard profile will consist of a base line and vertical lines at all 50- and 100-foot station points per the current City of Grand Rapids CAD Standards.
 - b) The vertical line will stop at the existing centerline profile line.
 - c) The base line will be an even numbered elevation, i.e. 600, 610, 620 and labeled "BASE_".
 - d) The profile will be drawn from the base line to the centerline with sufficient area to adequately show all invert data, and any new construction notes, as may be required.
 - e) When storm drainage projects are requested, the profile may consist of left profile, centerline profile and right profile all within the same grid layout. See City examples for this format.
 - f) The centerline and (centerline/centerline station) of cross streets will be shown and labeled in the profile.
 - g) All sanitary sewer, combined sewer, and storm sewer main lines will be shown in the profile. Transmission water mains (24" and larger) will also be shown in the profile. Label all mainlines as to the type of utility and size.

- h) Catch basins and catch basin leads will not be shown or labeled in profile (this data will only be in the field notes).
 - i) Below each manhole in the profile, provide data including the manhole type, station, and each invert including pipe size, direction, and elevation.
9. The Consultant will provide a job site map showing the specific work location in relation to the project location map, on the title sheet in a format per current City of Grand Rapids CAD Standards title sheet template.
 10. A north arrow with scales will be on all sheets. Benchmarks, and any witness, and control points will be on all sheets where they occur. This data should be placed in the upper right-hand corner of the sheet, for all projects.
 11. The standard horizontal scales on drawings will be 1" = 20', both plan and profile. The standard vertical scale in profile will be 1" = 10'. Any variation of the vertical and horizontal scale will be specified when the project is requested.
 12. The title blocks will be filled in, as requested by the City.
 13. Examples of drawings can be provided. Contact department staff to discuss the drawing format prior to beginning work.
 14. The Consultant shall furnish the final drawings as specified in the Request for Proposals or Request for Qualifications.

Reference:

City of Grand Rapids CAD Standards are available on the Department website.
<https://www.grandrapidsmi.gov/Government/Departments/Engineering-Department/Engineering-Document-Center>

Data Supplied:

The project package shall consist of image files of all drawing sheets (TIFF) and PDF and Autodesk Civil 3D drawing formats. This information will be included in the drawing file as submitted for preliminary approval.

As-Built/Record Drawings Standards:

The Consultant is required to prepare final as-built drawings including various schedules and summaries for projects that the Consultant has designed, constructed, and/or inspected. The Consultant will be required to provide these final as-built drawings per current standards for said work and per the current City of Grand Rapids CAD Standards. The Consultant's CAD technician(s) will be required to work with City staff to complete said task in the time frames requested.

All hard-copy drawings, electronic files and other documents relative to the project which the Consultant prepares or causes to be prepared in connection with their services shall be delivered to and become the property of the City.

GLOBAL POSITIONING SYSTEMS (G.P.S.) REQUIREMENTS

General Specifications:

- a) Vertical control references on all submissions be only NAVD 88, once established.

- b) All digital submissions should have Northings and Eastings computed on the Michigan South (Zone 2113) State Plane Coordinate System.

Utility GPS Inventory Specifications (Optional)

Geodetic Control Survey

To support the GPS utility location survey the established CORS (**Continuously Operating Reference Stations**) should be used.

The following coordinate units and datums will be used for the project:

Coordinate Units:	International Foot = 0.3048 meters
"exact" Horizontal Datum:	NAD83/HARN
Vertical Datum:	NAVD 88

The Consultant will use static or fast-static GPS techniques to provide first-order positions on each monument following Federal Geodetic Control Subcommittee (FGCS) (formerly the Federal Geodetic Control Committee) specifications for a first-order GPS control network.

These points will be used primarily as base station points for the utility location task. However, they will also be useful to land surveyors and mappers in the area for later use in surveying, mapping, and GIS projects.

The Consultant will recover the existing City/County benchmarks within the county and will then establish additional benchmarks where necessary to provide sufficient vertical control for the utility location survey. The Consultant will use conventional differential leveling methods to set any additional benchmarks and to check between existing benchmarks.

Utility Inventory Survey

The Consultant will use on-the-fly (OTF)-kinematic and real-time kinematic (RTK) GPS observation techniques to determine the X, Y, Z components of the aboveground sanitary sewer storm water, and water distribution structures. This will meet or exceed accuracies of ± 0.11 -foot horizontal and ± 0.11 -foot (3.5 centimeters) vertical.

Any City asset that is deemed unobservable with GPS techniques will have their location identified using conventional ground surveying, using a total station or the equivalent.

At the end of each observation session, the data will be adjusted and analyzed, and inferior points will be scheduled for re-observation before moving to the next session. Redundant points will be checked to ensure that overlap areas are compared geographically. Geoidal modeling and ellipsoidal height comparison will be evaluated to verify GPS-generated orthometric heights.

The Consultant will deliver the following to the City:

- All raw GPS data for control points & field notes.
- Station description for new points set.
- An ASCII file containing Utility Identification Number, Feature Code, Northing (NAD83/HARN), Easting (NAD83/HARN), and elevation (NAVD 88) in International Foot = 0.3048 meters "exact".