

UTILITY AS-BUILT SPECIFICATIONS

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- A. All contractors installing new underground utilities shall provide, at contractor's cost, a licensed surveyor for performing surveying of the new utilities. Within 2 weeks of installing utilities, contractor shall submit to Rutgers Utilities for review, utility drawings with utility-specific information as indicated below. Two weeks after the completion of utility installation, contractor shall submit a complete set of As-Built Documents. The As-Built Drawings shall comply with the Rutgers Survey and CAD As-Built Standards. If the final As-Built Documents do not meet the standards listed in this specification section, then Rutgers reserves the right to hire a locating service & surveyor to complete the work at the contractor's sole expense.
- B. As-Built CAD and Survey Standards
1. Drawings shall comply with Rutgers University CAD standards found at: <https://ipo.rutgers.edu/pdd/consultants-cad-standards>
 2. Drawings shall be in recent AutoCAD DWG drawing format.
 3. Drawings shall use Rutgers Utility standard line-types.
 4. Drawings shall be presented in NJ state plane format without altered coordinate systems or views.
 5. All As-Built Drawings must be supplied as 2D drawings, and elevation data must be shown via text at critical junctions, supplemented with an ASCII text, tri-coordinate point file for all survey points.
 6. All surveys shall be performed to meet current NGS accuracy standards.
 7. Drawings shall be drawn in the NJ state plane coordinate system, NAD 83 Horizontal Datum, and NAVD 88 Vertical Datum.
 8. If the vertical translation is through a Geiod model, then it shall be defined and identified on all submissions.
 9. Site Survey Control shall be established by contractor and tested by Rutgers during pre-construction.
- C. Project Red Lines
1. Project shall maintain a set of Red-Line drawings on site showing all changes to the original design as the project progresses and necessitates.
 2. All changes shall be shown in colored pencil, primarily in red.
 3. Notes and dimensions shall be added where necessary.
 4. Red-Line drawings shall be made available upon request and inspected by Rutgers Utilities.
 5. Red-Line drawings are considered "intermediate drawings" that will be utilized in part to prepare accurate As-Built Drawings but shall not be considered a substitute for As-Built Drawings.
 6. Field modifications from the original Construction Documents shall be depicted in a manner to alert Rutgers to any changes. These shall be depicted on the Red Line and final As-Built CAD and PDF drawings.

D. Survey Requirements

1. All installed utilities must be surveyed using precision land survey practices.
2. All linear utility features must be surveyed at regular intervals no more than 20 feet on straight runs and at all feature, direction, and elevation changes.
3. All utility termination/cap points must be surveyed and labeled clearly on the As-Built Drawings. All removed utility structures and pipes must also be identified. Approximate length of removed pipes must be indicated on the As-Built Drawings as well. Connection point, disconnection point, and utility line re-routes must be clearly shown on the As-Built drawings.
4. All utilities discovered during excavation that are not previously shown on the survey must be surveyed and documented.

E. Photographic Record

1. Rutgers requires a photographic record of all utility work and installations. Photographs must be taken at the completion of new installations or repairs, just prior to backfill. Multiple photographs must be taken along the run of each utility from both directions, start to finish. Photographs must be taken in such a way to show the surrounding area features as a background reference. Photographs just showing a utility in an excavation are not acceptable. Photographs must be named and numbered in a logical sequence with a utility type text descriptor and sequence number. (Ex: Pri-Elec-001, Pri-Elec-002 or W-Fire-001, W-Fire-002 or G-Ln-001 G-Ln-002 etc.)
2. Inspection Photographs must be taken to show proper installation according to Rutgers requirements such as correct pipe connections, proper bedding and tracer wires.

F. Deliverables

1. Electronic CAD file of the As-Built Drawings.
2. Electronic CAD file of the As-Built Single-Line Diagram Drawings.
3. Point file of all survey points.
4. PDF copy of the As-Built Drawings.
5. PDF copy of the As-Built Single-Line Diagram Drawings.
6. Two hard copies of the final As-Built Drawings signed and sealed by a licensed NJ Land Surveyor.
7. Two hard copies of the final As-Built Single-Line Diagram Drawings signed and sealed by a licensed NJ Professional Engineer.
8. A photographic record of all utility installations and inspections.

G. Utility-Specific Information

1. Communications, Telco, Fiber Optics – ductbank/conduit location and width, number of conduits, conduit sizes, conduit material, bends and turns, poles, manhole structures, handholes, pull-boxes, stub ups, etc. must be shown on the As-Built Drawings referenced in the NJ state plane coordinate system.
2. Electric –
 - a. Utility Plan drawing showing ductbank/conduit location and width, feeder

- lengths, number of conduits, conduit sizes, conduit material, bends and turns, poles, manhole structures, handholes, pull-boxes, transformers, switches, load breaks, poles, grounds, grounding grids, generators, charging stations, stub ups, distribution panels, photovoltaic panels, inverters, site lighting, and site lighting circuits, etc. on the As-Built Drawings referenced in the NJ state plane coordinate system.
- b. Single-Line Diagram Drawings showing conduit size, cable size, transformer, switches, buildings, etc. The identifying number of any manhole, feeder, or piece of equipment (switches, transformers, etc.) shall be coordinated with Rutgers Utilities.
 3. Natural Gas, Pressurized Gas, Air Lines – lengths, pipe sizes, materials, bends, valves, caps, vents, tees, stub-ups, meters, etc. must be shown on the As-Built Drawings referenced in the NJ state plane coordinate system.
 4. Heating/Cooling Systems (High-Temp, Medium-Temp, Dual-Temp, Chilled Water) – pipe sizes, pipe material, bends, elbows, elevation changes, expansion loops, thrust blocks, manholes, handholes, valves, vents, etc. must be shown on the As-Built Drawings referenced in the NJ state plane coordinate system.
 5. Sanitary Sewer – All sanitary system components including piping (size, material, top of pipe elevation, and a slope), manhole structures, cleanouts, forced main valves, lift stations, etc. must be shown on the As-Built Drawings referenced in the NJ state plane coordinate system.
 6. Storm Sewer – lengths, pipe sizes, inverts, rim elevations, grate elevation, pipe material, and slope (%) must be shown on the As-Built Drawings. All storm system components including piping (size, material, top of pipe elevation, and a slope), manholes, cleanouts, storm, trench drains, downspouts, head walls, flared end section, sump pumps, mechanical treatment devices, swales, retention/detention systems, outflow control structures, etc. must be located on the As-Built Drawings referenced in the NJ state plane coordinate system.
 7. Water System (Potable Water and Fire Water) – top of pipe, pipe material, pipe sizes, and elevations, piping (size, material, top of pipe elevation, and a slope), elbows, tees, caps, elevation changes, thrust blocks, valves, service valves, fire valves, post indicator valves, hydrants, standpipes, water meters, etc. must be shown on the As-Built Drawings referenced in the NJ state plane coordinate system.
 8. Tracer Wire Stations – all tracer wire stations must be shown on the As-Built Drawings referenced in the NJ state plane coordinate system with utility specific labeling. Each tracer station shall be labeled for its respective utility.
- H. Technical Coordination and Assistance
1. Contractors shall coordinate pre-construction with Rutgers Utilities to ensure a seamless interface of technical data, software, and mapping systems to ensure a compatible final product.
 2. Project contractor and surveyor shall verify that Site Survey Control is correctly calibrated and agrees with the Design Survey Control and verified against Rutgers Survey Observations of that control.

3. Rutgers will provide assistance with survey coordination and calibration.
 4. Final electronic and hard copies of As-Built Drawings shall be supplied directly to the Rutgers Utilities Department.
 5. A DWG CAD KIT is available for standard utilities blocks and linetypes from Rutgers upon request.
- I. Review and Acceptance
1. All As-Built Documents submissions will be reviewed for compliance and accuracy by Rutgers. The review will be based on the above criteria. Additionally, a geodetical comparison to known and registered utility features will be used to test the quality of the submitted As-Built Drawings. Drawings found to be unsatisfactory shall be returned to the contractor for correction. If after multiple submittals, the contractor cannot produce acceptable As-Built Documents, Rutgers reserves the right to hire a utility locating firm to produce the required results at the contractor's sole expense.

SURVEY MUST BE PERFORMED PRIOR TO BACKFILL IN ORDER TO OBTAIN TOP OF
PIPE/CONDUIT/DUCTBANK ELEVATION AND POSITION INFORMATION.

NOTE: THIS IS A SEPARATE DELIVERABLE FROM THE RECORD SET AND THE GIS
DELIVERABLES.