

Creating a VRS Control Narrative when C4Gnet.XYZ RTN is used

A not infrequent question asked is, "How do I, a surveyor, indicate the authoritative control used in a survey that used the VRS service from the LSU Center for GeoInformatics (C4G) via the C4Gnet.XYZ Real-Time Network (RTN)?" We will try to answer this question below.

Guiding Principle:

The goal of any control narrative is to provide enough detail for another competent surveyor to understand, evaluate, and retrace the work. For a VRS survey, this means demonstrating clear **traceability** from the rover's position back to the **National Spatial Reference System (NSRS)** through the physical **Continuously Operating Reference Stations (CORS)** that anchor the network.

Q: [How might a professional surveyor describe the control for a survey performed using the C4Gnet.XYZ RTN?](#)

A: Essential Elements of a VRS Control Description

A complete description should go beyond simply stating "C4Gnet.XYZ RTN was used." It should include the following key elements:

1. Network Identification

- **What it is:** The name of the specific Real-Time Network (RTN) provider, i.e., C4Gnet.XYZ RTN.
- **Example:** ["C4Gnet.XYZ Real-Time Network operated by the LSU Center for GeoInformatics"](#).

2. Horizontal Datum & Epoch

- **What it is:** The reference framework for the horizontal coordinates. The **epoch date is critical** as it defines the "snapshot in time" for the coordinates, accounting for crustal motion.
- **Example:** ["North American Datum of 1983 \(NAD 83\), realized from adjustment of 2011 \(Epoch 2010.00\)."](#)

3. Vertical Datum & Geoid Model

- **What it is:** The reference for orthometric heights (elevation). Crucially, the **specific geoid model** used to convert the raw GNSS ellipsoid heights into meaningful elevations must be stated.

- **Example:** "North American Vertical Datum of 1988 (NAVD 88), derived using Geoid Model GEOID18 (CONUS)."

4. Coordinate System & Units

- **What it is:** The map projection and units used to express the final coordinates on the survey plat.
- **Examples:**

In South Louisiana: "Coordinates are expressed in the Louisiana State Plane Coordinate System, South Zone (1702), in U.S. Survey Feet."

In North Louisiana: "Coordinates are expressed in the Louisiana State Plane Coordinate System, North Zone (1701), in Meters."

Note: The date of the State Plane Coordinate System used is time-dependent, i.e., NAD83, NAD27, &c.

5. Methodology and Instrumentation

- **What it is:** A clear statement of the technique and equipment used to establish the positions. This is where the dots are connected for traceability.
- **Example:** "Positions were established using a Real-Time Kinematic (RTK) survey performed with a Trimble R12i GNSS receiver. Observations were processed in real-time against a Virtual Reference Station (VRS) solution provided by the C4Gnet.xyz network. The network solution for the project area was derived from data from the following Continuously Operating Reference Stations (CORS): [List the actual CORS stations used, e.g., 1LSU, ZACH, GVMS, etc.]."
- **Note:** The list of contributing CORS is the most important and often overlooked part of this statement. This information can typically be found in the metadata of a logged RTK data file or obtained from the network provider's portal.

6. Date of Survey

- **What it is:** The date(s) the fieldwork was performed.
 - **Example:** "Field observations were performed on July 18, 2025."
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Sample Control Narrative for a Survey Plat:

Here is how you could combine these elements into a professional note on a survey plat:

BASIS OF COORDINATES & ELEVATIONS

The horizontal control for this survey is based on the North American Datum of 1983 (2011), with coordinates at Epoch 2010.00. The vertical control is based on the North American Vertical Datum of 1988 (NAVD 88). All coordinates shown are expressed in the Louisiana State Plane Coordinate System, South Zone (1702), in Meters.

Positions were established on July 18, 2025, using a Trimble R12i GNSS receiver performing a Real-Time Kinematic (RTK) survey. The observations were processed against a Virtual Reference Station (VRS) solution provided by the C4Gnet.XYZ RTN network. Traceability to the National Spatial Reference System is established through the network's connection to the following Continuously Operating Reference Stations (CORS) which contributed to the solution for the project area: 1LSU (Baton Rouge, La.), ZACH (Zachary, La.), and GVMS (Galvez, La.). Elevations were derived from the observed ellipsoid heights through the application of Geoid Model GEOID18.

Sample Control Narrative for a FEMA FIP Elevation Certificate:

The vertical control is based on the North American Vertical Datum of 1988 (NAVD 88) in Meters.

Positions were established on July 18, 2025, using a Trimble R12i GNSS receiver performing a Real-Time Kinematic (RTK) survey. The observations were processed against a Virtual Reference Station (VRS) solution provided by the C4Gnet.XYZ RTN network. Traceability to the National Spatial Reference System is established through the network's connection to the following Continuously Operating Reference Stations (CORS), which contributed to the solution for the project area: 1LSU (Baton Rouge, La.), ZACH (Zachary, La.), and GVMS (Galvez, La.). Elevations were derived from the observed ellipsoid heights through the application of Geoid Model GEOID18.

These statements are defensible, repeatable, and provide a clear record of how the survey control was established, which is immensely valuable to any professional relying on the survey.

The examples above are just that, examples. They are intended to guide the professional when describing the source of positioning used in a project. Certain items may require amendments specific to the work performed and beyond our ability to be correct for all cases. How the C4Gnet.XYZ services are used is outside the ability of the LSU Center for GeoInformatics and the Louisiana Spatial Reference Center to control.

In every case, the responsibility for the accuracy of claims remains with the professional.

We hope this proves helpful.

THE C⁴G TEAM.