WWVDS Installation Manual

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Quality Record

ISO 9001 is the international standard that demonstrates the ability of a company to consistently meet customer and regulatory requirements. GovComm is ISO 9001:2015 certified.

Approval

The signatures below certify that this document has been reviewed and accepted and demonstrate that the signatories are aware of all the requirements contained herein and are committed to ensuring their participation.

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Amendment Record

This document is reviewed to ensure its continuing relevance to the systems and process that it describes. A record of contextual additions or omissions is given below:

Page #	Context	Revision	Date

Company Proprietary Information

The electronic version of this document maintained on GovComm's online server in PDF format contains the latest revisions. It is the responsibility of the user to ensure that the document they are reading is the current version. Downloaded and printed versions of this document are uncontrolled.

Contents

About This Document

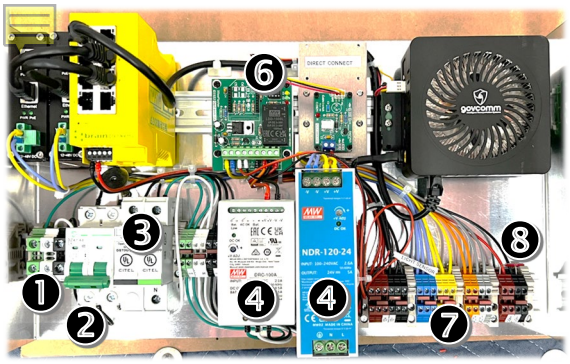
This document provides comprehensive step-by-step instructions for the installation of GovComm's wrong-way vehicle detection system (WWVDS) hardware and highlighted signs. It outlines the necessary components and installation procedures. The goal is to equip installation technicians with the knowledge and guidance required to successfully deploy the WWVDS and highlighted wrong-way signs and ensure its optimal performance.

This manual does not cover WWVDS software configuration, e.g. configuring network settings for cameras and video streams, detection & confirmation zones, maintenance tasks, etc. For additional information on how to configure WWVDS, please see the WWVDS Configuration Manual.

Wrong-Way Vehicle Detection System Overview

GovComm's wrong-way vehicle detection system (WWVDS) offers versatility in power and activation methods. They can be powered by utility or solar energy, and activate highlighted signs using the wired or wireless communication. The specific components of the WWVDS depend on your project requirements.

Here's a breakdown of the typical components you might find:



1. **Power Input Terminals:** These terminals connect the sign to its power source (AC/DC or solar).
2. **Circuit Breaker:** Protects the electrical circuit from overload.
3. **Surge protection device (SPD):** Safeguards the sign from damaging voltage spikes (optional).
4. **Power Converter(s):** Converts AC or DC power to the required DC voltage, if needed (optional).
5. **RS-485/TTL Converter:** Allows for communication with devices, e.g. sign controllers, located at longer distances (optional, not pictured).
6. **Sign Activation Device:** Activates the highlighted signs in response to the wrong-way event.
7. **DC Terminals:** Connect internal DC power components.
8. **Varistor:** An additional surge protection component (optional).
9. **Backup Battery:** Provides temporary power in case of primary power source failure (optional, not pictured).

The provided images depict a sample WWVDS on the recessed plate. Your project might have a different setup.

Don't be alarmed if you see missing components compared to the image or this list. If you have concerns about the configuration of the WWVDS, contact GovComm support for clarification.

Highlighted Wrong-Way Sign Overview

GovComm's highlighted wrong-way signs can be powered by utility or solar energy, and activated by dry contact closure or other technologies. The specific components within the accompanying NEMA enclosure will depend on your project requirements.

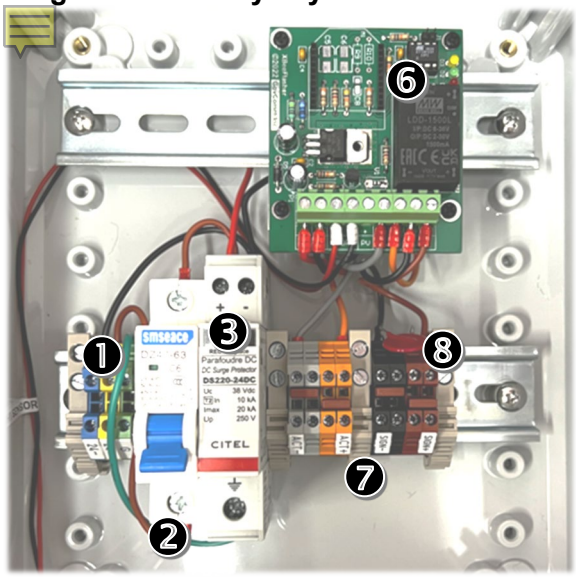
Here's a breakdown of the typical components you might find

1. **Power Input Terminals:** These terminals connect the sign to its power source (AC/DC or solar).
2. **Circuit Breaker:** Protects the electrical circuit from overload.
3. **Surge protection device (SPD):** Safeguards the sign from damaging voltage spikes (optional).
4. **Power Converter(s):** Converts AC or DC power to the required DC voltage, if needed (optional).
5. **RS-485/TTL Converter:** Allows for communication with the main unit (optional, used in some configurations).
6. **Sign Controller:** The brain of the sign, controlling its operation and LED illumination.
7. **DC Terminals:** Connect internal DC power components.
8. **Varistor:** An additional surge protection component (optional).
9. **Backup Battery:** Provides temporary power in case of primary power source failure (optional, not pictured).

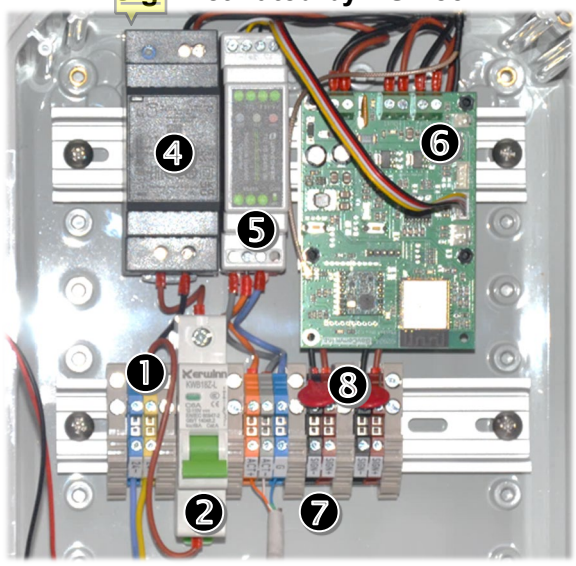
The provided images depict sample NEMA enclosure configurations for an DC-powered sign. Your project might have a different setup.

Don't be alarmed if you see missing components compared to the image or this list. If you have concerns about the configuration of the NEMA enclosure, contact GovComm support for clarification.

Sign Activated by Dry Contact Closure



Sign Activated by RS-485



Mounting WWVDS Equipment

This section outlines the procedures for physically mounting the WWVDS main unit at the designated installation location.

General Recommendations

- **Safety First:** Always disconnect power to the system, highlighted signs, and other WWVDS components before making any connections.
- **Adhere to Regulations:** Comply with local, state, and federal regulations regarding sign installation and electrical work.
- **Use Safety Equipment:** Utilize appropriate safety gear, including gloves, safety glasses, and hard hats.

Mounting WWVDS in the ITS Cabinet

- Position the WWVDS recessed plate within the ITS cabinet as specified in the project drawings.
- Ensure no cables or other equipment interfere with the system's normal operation.

Mounting WWVDS in the Small Equipment Enclosure

- Ensure the small equipment enclosure (SEE) is securely attached to the sign pole.
- Position the enclosure at an accessible height, unless otherwise specified by the project drawings.
- Utilize the provided mounting brackets for secure attachment.
- Verify that the enclosure is firmly fixed to withstand environmental conditions.

Securing NEMA Enclosure on the Pole

Properly securing the enclosure is crucial for the protection of the system's components.

- Unless otherwise specified, position the NEMA enclosure at an accessible height.
- Use the provided mounting brackets to securely attach the enclosure to the pole.
- Ensure the enclosure is firmly fixed to withstand environmental conditions.

Positioning Highlighted Signs

Optimal sign positioning is essential for effective driver communication.

- Position signs at a slight angle (5-10 degrees) to the perpendicular of the road for improved visibility.
- Adhere to project documentation regarding sign height.
- Verify sign alignment and visibility for optimal performance.

Connect the WWVDS Equipment

Important: Before connecting any WWVDS components, including signs, it's crucial to thoroughly review the corresponding wiring diagrams (see Appendix B. WWVDS Diagrams for additional information). Failing to follow the designated wiring scheme can lead to serious consequences, including:

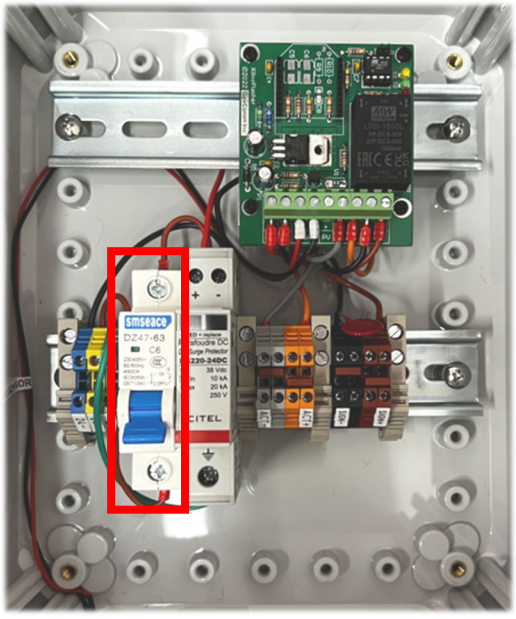
- Damage to the main unit and its critical components
- Project delays due to troubleshooting and repairs
- Voided warranty on damaged components
- Incurring additional costs for replacement materials and labor

Turn off the Circuit Breakers

To minimize the risk of electrical shock and equipment damage, always disconnect power to both the main unit and the sign's NEMA enclosure before making any connections.

1. **Disconnect Main Unit Power:** Locate and turn off the circuit breaker for the main WWVDS unit in the ITS cabinet.

2. **Disconnect Sign(s) Power:** Locate and turn off the circuit breaker in the NEMA enclosure mounted on the pole.

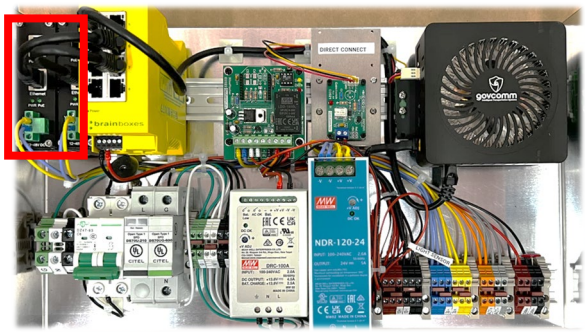


Connect WWVDS Cameras

The WWVDS is supplied with GovComm cameras, which are selected and configured in accordance with the project specification. The cameras are connected using the dedicated Power-over-Ethernet (PoE) injectors typically located on the upper left side of the recessed plate.

- To provide power and establish communication with WWVDS cameras, connect the POE OUT ports on the PoE injectors to the RJ-45 ports on the cameras.

  Use CAT6 Ethernet cables for optimal performance.



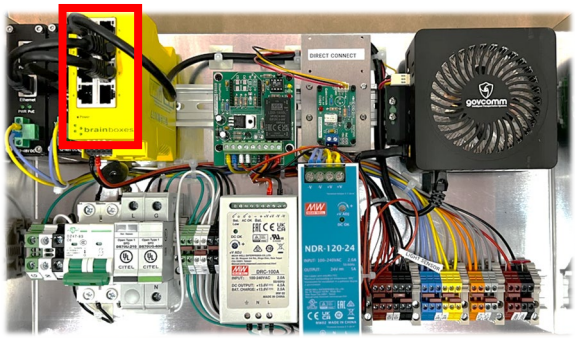
Note: There is no distinction between the installed PoE injectors, so you can connect any WWVDS camera to any PoE injector offered by the WWVDS.

Connect the WWVDS Network Switch to the LAN

The WWVDS is supplied with network switch that is used by the main unit of the WWVDS to communicate with cameras and other Ethernet devices, e.g. the managed field ethernet switch (MFES) located in the ITS cabinet.

- To establish communication between the WWVDS network switch and the MFES, connect any available RJ-45 port on the WWVDS network switch to the designated RJ-45 port on the MFES.

  Use CAT6 Ethernet cables for optimal performance.



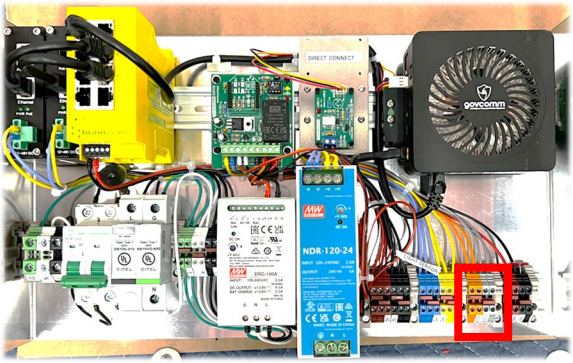
Note: There is no distinction between ports on the unmanaged WWVDS network switch, however MFES may have a designated port for communication with WWVDS. Please refer to the project documentation to make sure that you connect WWVDS to the right MFES port.

Connect the Sign Controller

The method for connecting the sign controller to the WWVDS for activation depends on the system's configuration.

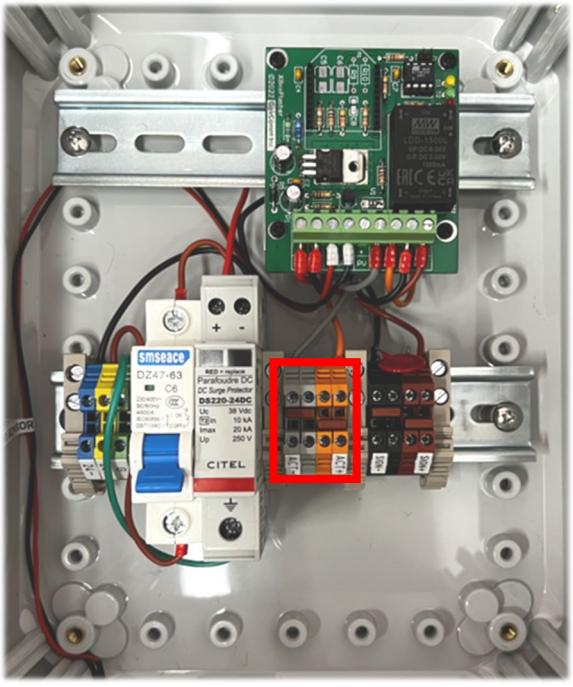
Wired Activation: Dry Contact Closure

Connect the WWVDS sign activation terminals (orange and gray, typically labeled ACT− and ACT+) in the main WWVDS unit to the corresponding activation terminals in the NEMA enclosure. Ensure correct polarity: ACT− to ACT−, ACT+ to ACT+.



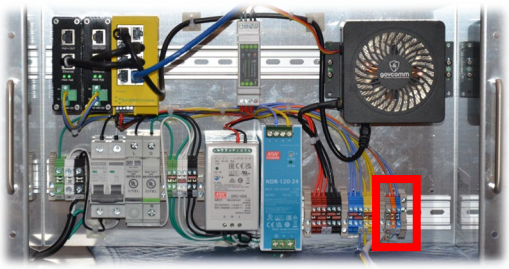
Activation terminals in the main WWVDS unit:

Activation terminals in the NEMA Enclosure:

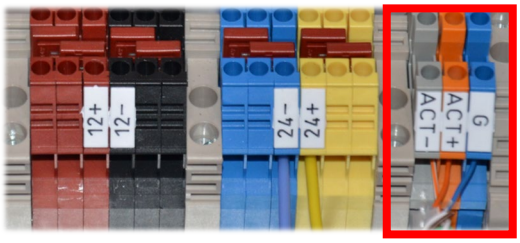


Wired Activation: RS-485 Connection

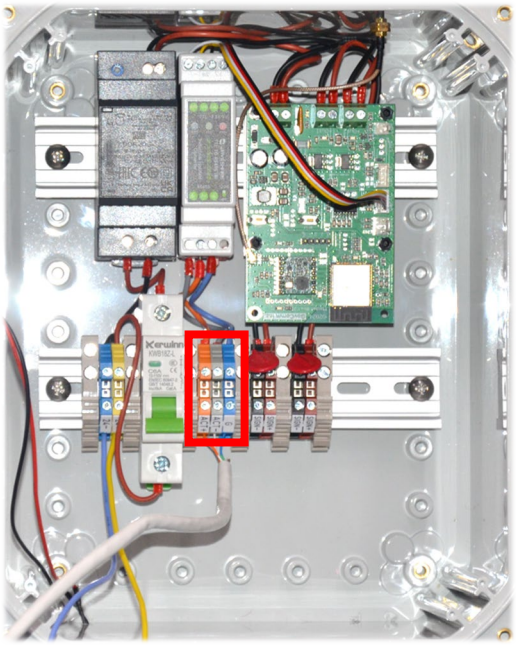
Use an Ethernet CAT5 or CAT6 cable to connect the RS-485 terminals in the main unit (typically labeled ACT−, ACT+, and G) to the RS-485 terminals in the NEMA enclosure (similarly labeled).



RS-485 terminals in the main WWVDS unit:



RS-485 terminals in the NEMA enclosure:



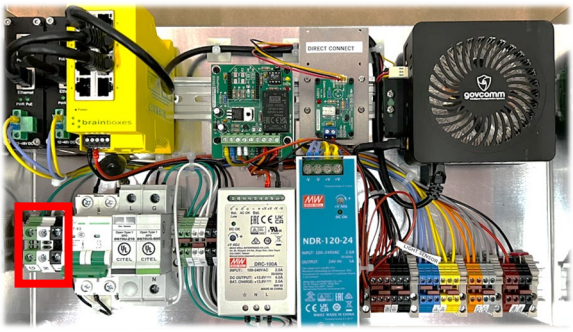
Wireless Activation

Wireless-activated signs offer a convenient and efficient method of communication with the main WWVDS unit. Unlike wired systems, these signs do not require physical connections for activation. The sign controller is equipped with a pre-configured wireless module that communicates directly with the main unit. This eliminates the need for on-site pairing or additional setup, simplifying the installation process.

Connect Power Source to the Main WWVDS Unit

If the WWVDS is housed in the ITS cabinet, connect the power cables to the designated power input terminals on the DIN rail on recessed plate.

If WWVDS is housed in the Small Equipment Enclosure (SEE) enclosure mounted on the pole, connect the power cables to the designated power input terminals on the DIN rail in the SEE.



Depending on the WWVDS configuration, you will find the following terminals on the DIN rail to the left of the circuit breaker:

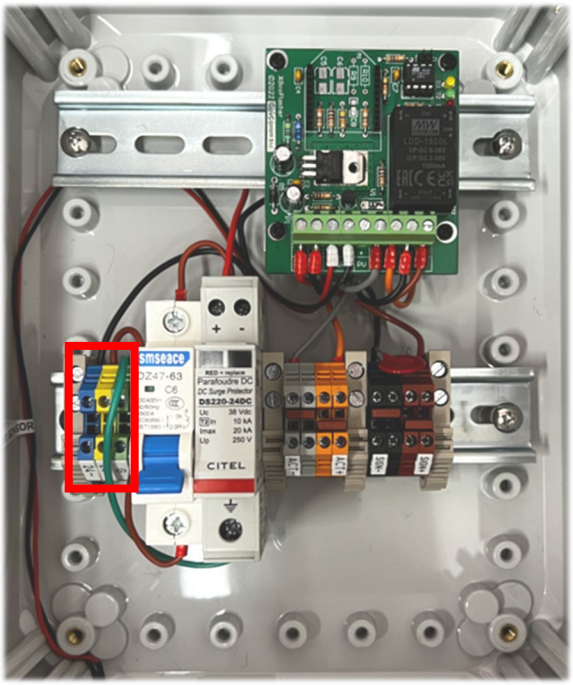
- **Utility (120VAC) Powered System:** green (Ground), white (Neutral) and black (Live) terminals
- **Solar Powered System:** black (SP−) and dark red (SP+) terminals

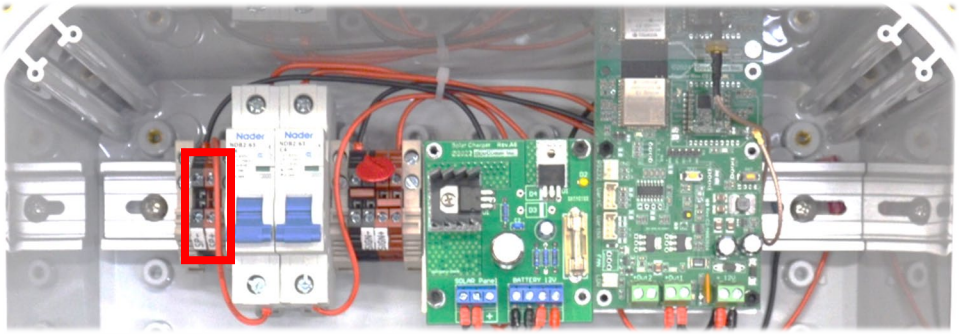
Connect Power Source to the NEMA enclosure

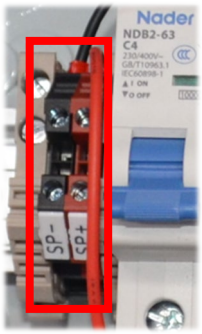
In the NEMA enclosure mounted on the pole, connect the power cables to the designated power input terminals.

Depending on the NEMA enclosure configuration, you will find the following terminals on the DIN rail to the left of the circuit breaker:

- **12VDC Powered Signs:** black (12−) and dark red (12+) terminals
- **24VDC Powered Signs:** blue (24−) and yellow (24+) terminals
- **Solar Powered Signs:** black (SP−) and dark red (SP+) terminals







Power Up the WWVDS Equipment

Once all connections are verified, follow these steps to power up the system:

1. **Turn on NEMA Enclosure Power:** Activate the circuit breaker in the NEMA enclosure.
2. **Turn on Main WWVDS Unit Power:** Activate the circuit breaker for the main unit.

After approximately one minute, the WWVDS web interface will become accessible at the default IP address: `10.1.10.64:8000`.

Note: Your system and/or cameras may have been preconfigured with different IP addresses. Please refer to your project documentation for IP address information.

Maintenance

The WWVDS and highlighted signs manufactured by GovComm are designed for minimal maintenance, maximizing uptime and reducing operational costs.

To ensure optimal performance and system integrity, we recommend performing the following basic checks at regular intervals:

- **Physical Inspection:** Visually inspect the WWVDS and highlighted signs for any physical damage, including cracks, loose mounting hardware, or signs of vandalism.
- **LED Functionality Test:** Utilize the WWVDS web interface to initiate a simulated wrong-way event. This will activate the sign's flashing LED pattern, allowing you to verify proper functionality.

For specific guidance on the recommended frequency and any additional maintenance requirements mandated by your local jurisdiction, please refer to the relevant DOT procedures. These procedures may be available online or by contacting your local DOT office.

Technical Support

If you encounter any difficulties with WWVDS operation, GovComm offers dedicated technical support. You can reach us through the following methods:

- Submit a support ticket online at: https://support.govcomm.us
- Call us at: (305) 937-2000

Appendices

Appendix A. Key WWVDS Components

The GovComm WWVDS is a sophisticated system comprised of interconnected components working in unison to detect and prevent wrong-way driving incidents.

Depending on the project configuration, the WWVDS can include:

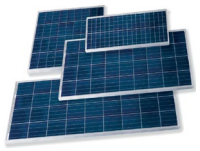
- **Main Unit with Computer Module:** This central unit processes video feeds from cameras to identify potential wrong-way drivers. Upon detection, it activates warning signs and transmits incident data to the traffic management center (TMC).

- **Cameras:** These cameras, using high-definition (HD) or bi-spectrum technology, help identify and track vehicles on the road.

- **Highlighted Wrong-Way Signs:** These signs are equipped ultra-bright LEDs flashing to warn wrong-way drivers. The signs come with additional hardware like enclosures, controllers, poles, and mounting brackets for proper installation.

- **Communication Network:** This network allows the components to exchange data. It can include PoE injectors, cables, fiber optic lines, wireless devices, or a combination depending on the project setup.

- **Power Source:** AC or DC, or solar panels (optional).



- **Backup Batteries:** These batteries provide temporary power in case of a solar power outage, ensuring uninterrupted operation (optional).

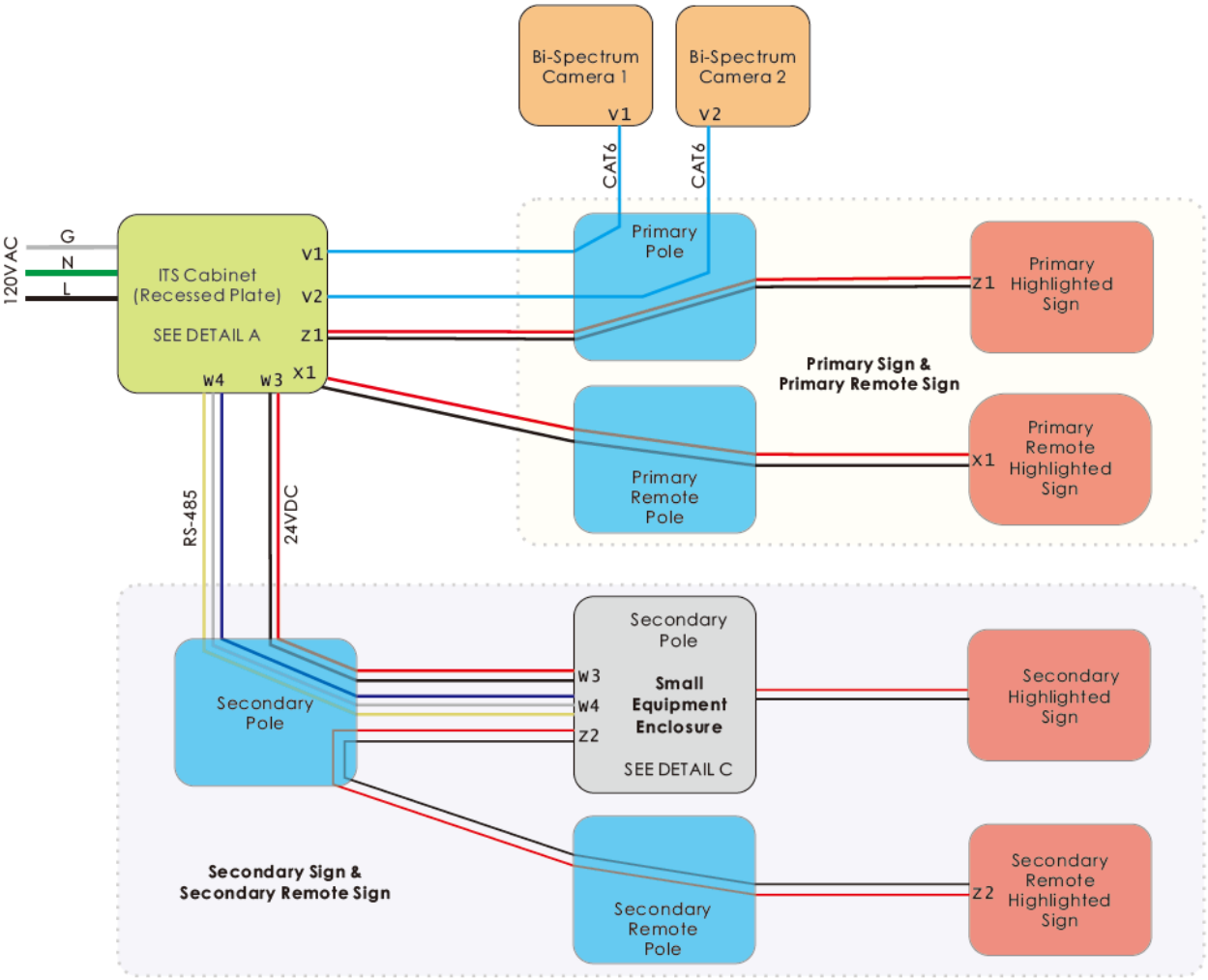
- **Additional Sensors/Equipment:** The system might include extra sensors or equipment depending on specific project needs. For example, these could involve LIDAR sensors for additional traffic monitoring (optional).

Appendix B. WWVDS Diagrams

This appendix provides visual representations of the typical WWVDS infrastructure, including system topology, site layout, and detailed wiring configurations.

WWVDS Topology Diagram

This blueprint illustrates the interconnection between all WWVDS components, including cameras, the main unit, signs, and communication equipment. It details the types of connections used (cable, fiber optic, wireless) and the power sources (AC or DC voltage) used in the system.

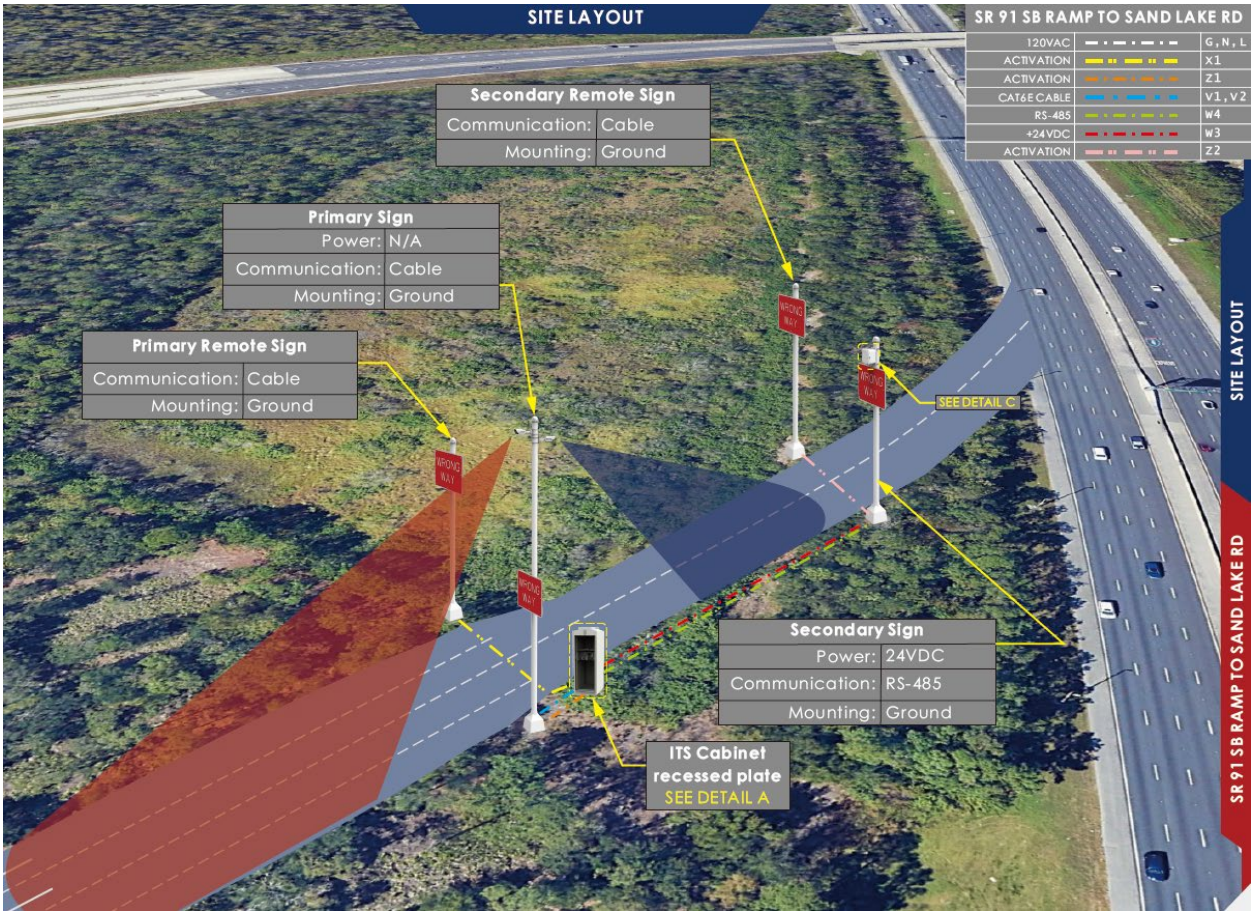


The diagram above is included here for illustration purposes. The actual system layout will be unique to your project. For the most accurate depiction of your specific setup, refer to the detailed diagrams and explanations in your project documentation.

Site Layout Diagram

This diagram illustrates the physical location of each highlighted wrong-way sign. It utilizes a satellite image of the designated installation site, making it easy to visualize the sign placement.

Similar to the topology diagram, it reiterates the information about connection types and power sources, but with a focus on how they relate to the specific sign locations.

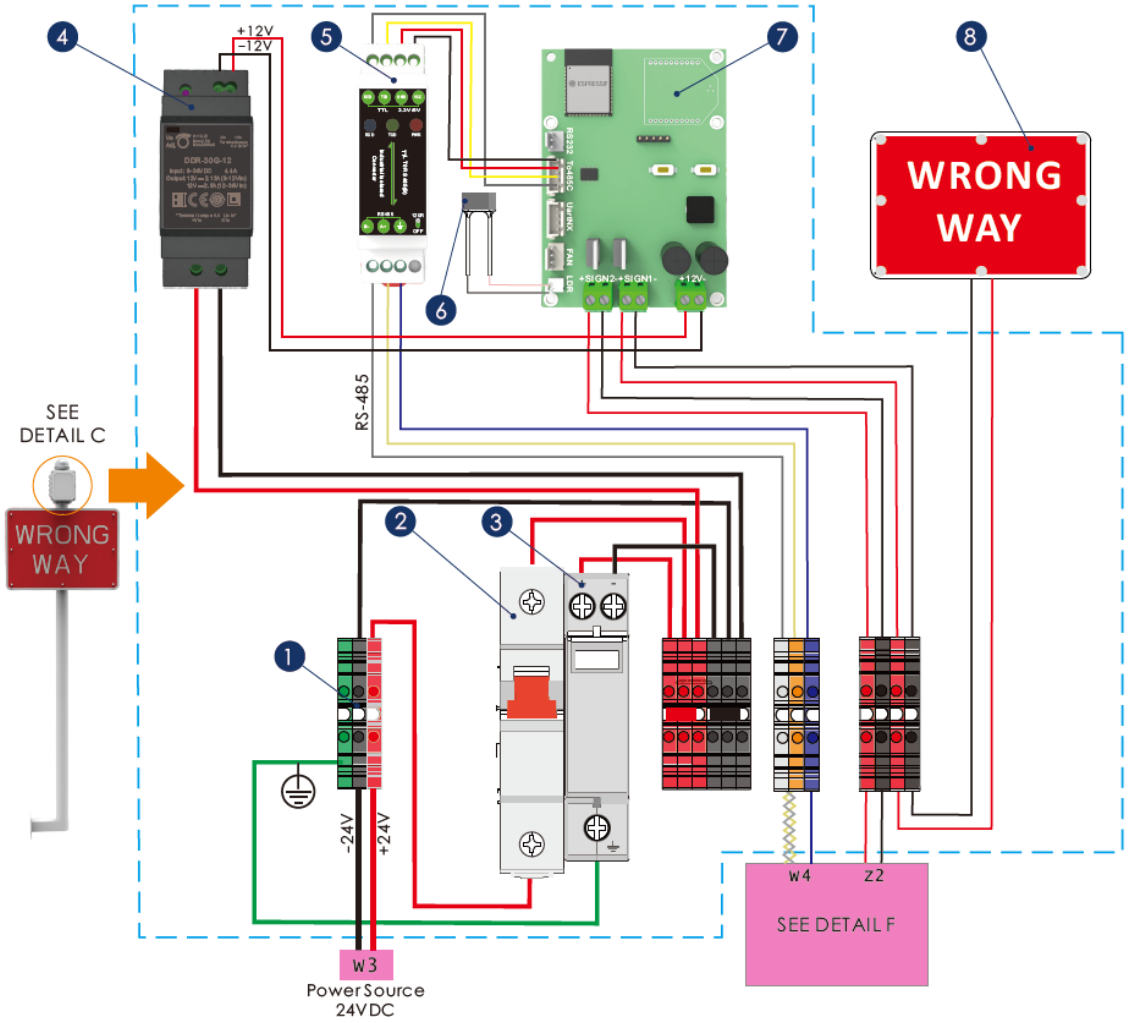


The provided diagram is a reference example. Your project documentation contains the exact layout for your system.

Wiring Diagrams

GovComm provides comprehensive wiring diagrams for each WWVDS project. These diagrams visually represent the proper connections between system components, ensuring a safe and functional installation. Understanding these diagrams is essential for successful installation.

Here is an example of the wiring diagram for the system with the RS-485/TTL converters:



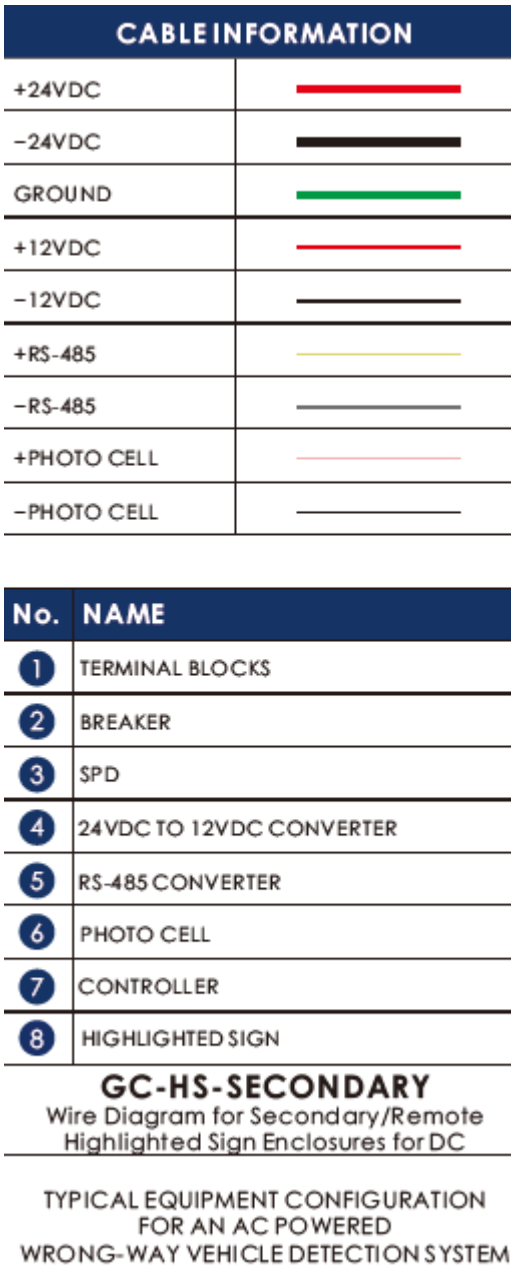
Key elements of a wiring diagram:

- **Color Coding:** The diagrams typically adhere to a standard color-coding scheme:
  - **Black wires:** Represent negative voltage.
  - **Red wires:** Represent positive voltage.
  - **Green wires:** Represent ground connections.

  A legend section, usually located in the right section of the diagram, provides descriptions of the voltages and polarities of the depicted connections.
- **Component List:** A numbered list usually located in the right section of the diagram identifies the various components represented on the diagram.

While the basic color coding remains consistent, specific configurations may have slight variations.

For detailed instructions specific to your WWVDS system configuration, please refer to the relevant wiring diagrams included within your project documentation.



CABLE INFORMATION	
+24VDC	
−24VDC	
GROUND	
+12VDC	
−12VDC	
+RS-485	
−RS-485	
+PHOTO CELL	
−PHOTO CELL	

No.	NAME
1	TERMINAL BLOCKS
2	BREAKER
3	SPD
4	24VDC TO 12VDC CONVERTER
5	RS-485 CONVERTER
6	PHOTO CELL
7	CONTROLLER
8	HIGHLIGHTED SIGN

Appendix C. Highlighted Wrong-Way Sign Operation

GovComm's highlighted wrong-way signs capture attention with their flashing ultra-bright LED displays. Their primary function is to warn drivers who may have accidentally entered the wrong direction, thereby preventing wrong-way driving incidents.

Real-Time Detection and Activation

The WWVDS implements the following processes:

1. **Continuous Monitoring:** Detection camera continuously monitors traffic flow by capturing video footage.
2. **Intelligent Analysis:** The captured video is transmitted to the WWVDS main unit, the system's central processing unit, typically located in the ITS cabinet. The main WWVDS unit is connected to both the cameras and the sign controller housed within a NEMA enclosure on the highlighted sign’s pole. The main WWVDS unit utilizes advanced software to analyze the video data.
3. **Wrong-Way Event Identification:** Once the software identifies a vehicle traveling in the wrong direction, it sends an activation command to the sign controller.
4. **Flashing Warning:** Upon receiving the command, the sign controller initiates the distinctive flashing pattern of the embedded ultra-bright LEDs, instantly alerting the driver to their mistake.

Customizations for Optimal Visibility

The main unit features a convenient web interface to fine-tune sign operation parameters to ensure optimal visibility under different conditions.

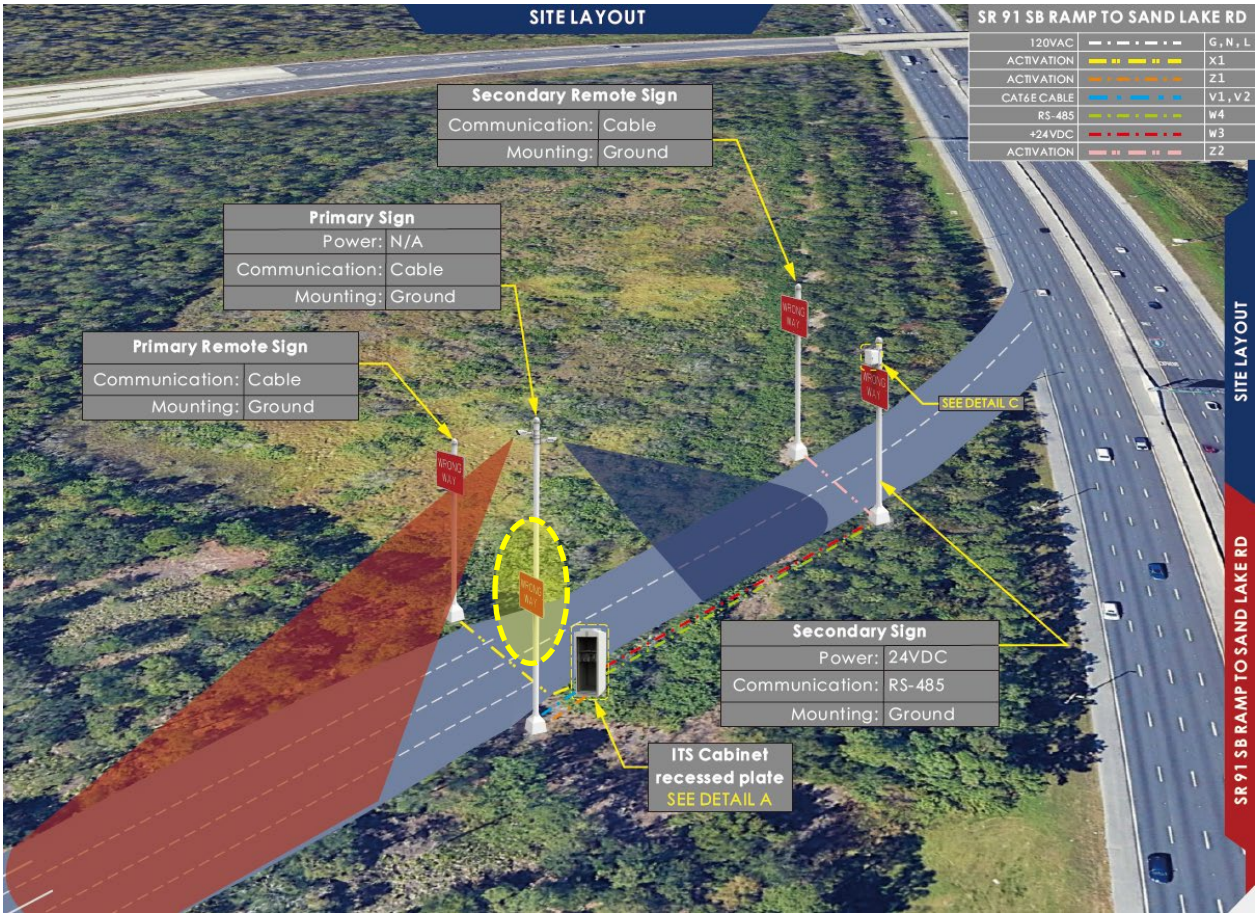
For additional information on configuring sign parameters, see the “WWVDS Configuration Manual.”

Appendix D. Highlighted Wrong-Way Sign Configurations

GovComm's WWVDS utilizes various sign configurations to best suit individual project needs. While a typical system might include 4 signs, the actual number and placement can vary depending on your specific requirements. It's crucial to refer to your project documentation for the most accurate configuration.

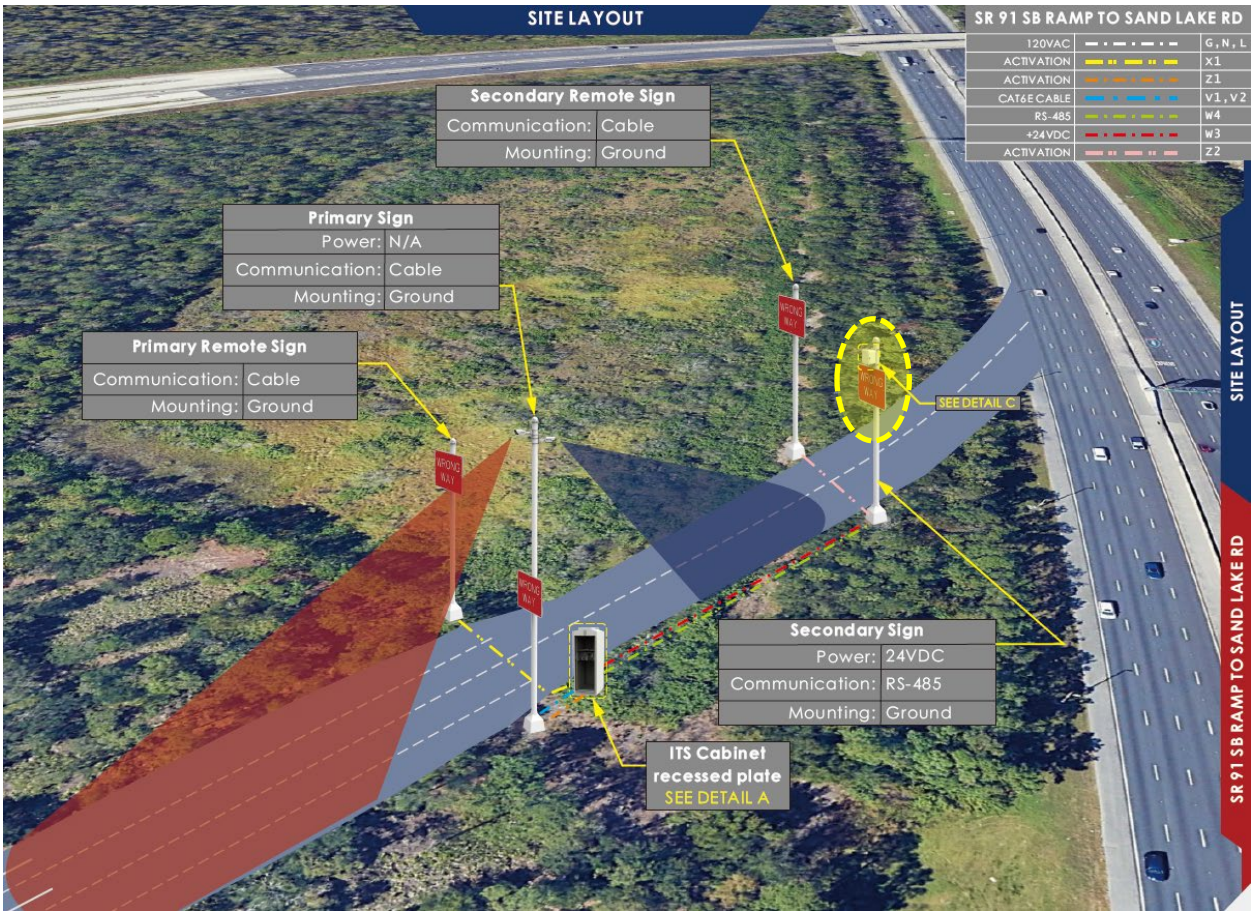
Primary Sign

This sign is installed on side of the road, closest to the WWVDS main unit typically housed in a recessed plate within an ITS cabinet or a dedicated cabinet.



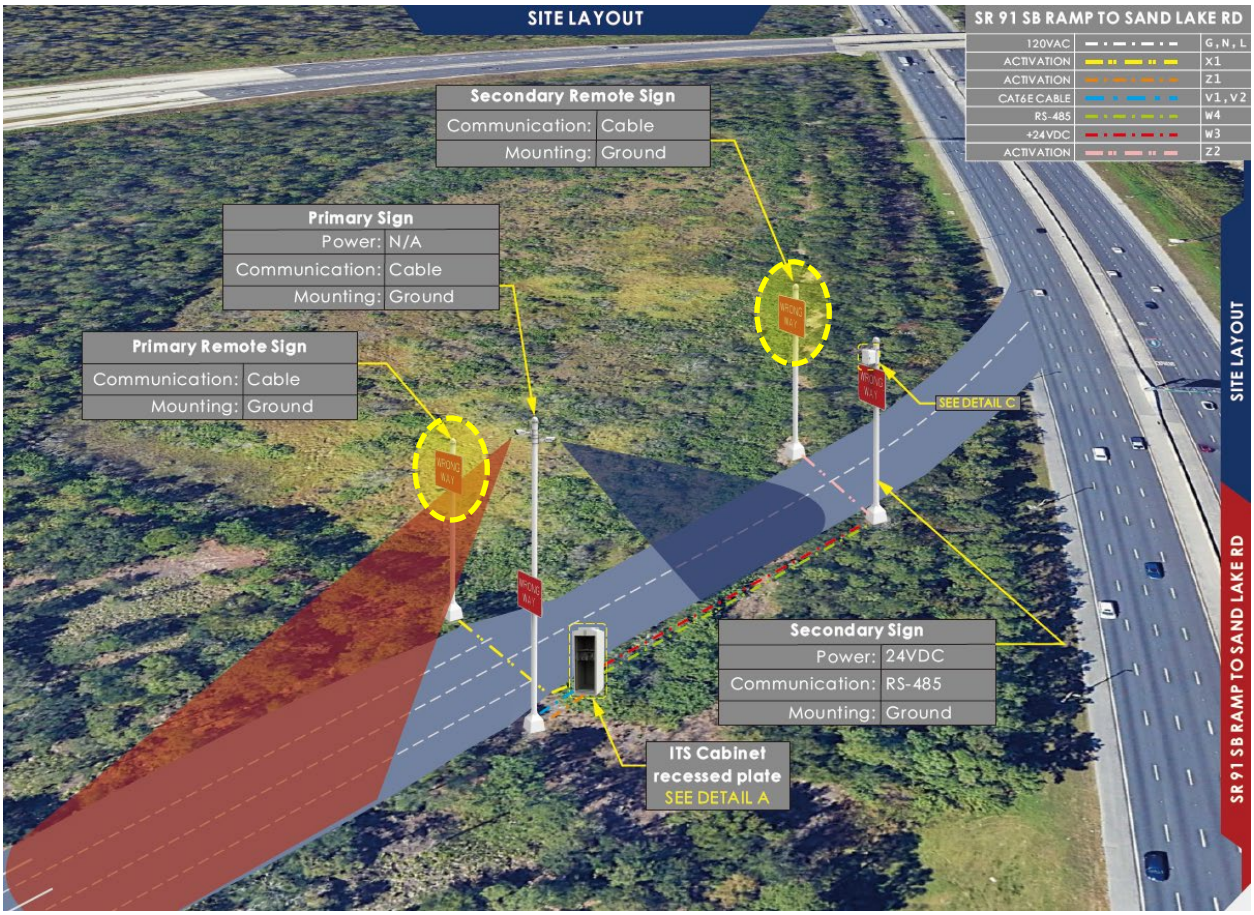
Secondary Sign

This sign is installed on the same side of the road as the main unit further away from the main unit compared to the primary sign. Not all projects require secondary sign.



Remote Signs

These signs are situated on the opposite side of the road from the main unit. They can be paired with either primary or secondary signs depending on the project's specific needs.



Please note that the diagrams provided in this document are for reference only. The number and positioning of primary, secondary, and remote signs is unique to your project.

To ensure a clear understanding of your system configuration, including the presence and location of any secondary or remote signs, always consult your project's detailed documentation.

Appendix E. Grounding Best Practices

Proper grounding is crucial for optimal system performance and to prevent damage to the WWVDS components. GovComm strongly recommends adhering to the following grounding best practices during the installation of your WWVDS system:

- **Low Ground Impedance:** Ensure the grounding rod has a low impedance connection to earth. This can be achieved by driving the rod to the manufacturer's recommended depth in a soil type suitable for proper grounding.
- **Grounding Wire Selection:** Use high-quality, insulated copper wire with a gauge size appropriate for the system's current requirements. Refer to the WWVDS wiring diagrams and project documentation for specific wire gauge recommendations.
- **Grounding Point Connection:** Make a secure and reliable connection between the grounding wire and the designated grounding terminal on the WWVDS enclosure. Utilize the appropriate grounding lug or connector as specified in the installation instructions.
- **Grounding Continuity Verification:** Prior to powering up the system, verify the continuity of the grounding path between the grounding rod and the WWVDS enclosure. A qualified electrician can perform this test using appropriate tools.

By following these grounding best practices, you can help to ensure:

- **Safe and Reliable Operation:** Proper grounding minimizes the risk of electrical faults and protects sensitive electronic components within the sign controller.
- **Optimal System Performance:** A well-grounded system experiences less electrical noise and interference, contributing to reliable data transmission and overall system functionality.
- **Extended Equipment Lifespan:** Adequate grounding helps to prevent damage to the sign controller and other system components, promoting long-term system reliability.

For more detailed information on grounding practices for electrical installations, you may refer to the National Electrical Code (NEC), also known as NFPA 70, or consult with a qualified electrician.

While these best practices provide valuable guidance, it's crucial to always adhere to all applicable local and national electrical codes during installation.