Advancing the Future of Public Safety

IMSA Traffic Signal Inspector Study Guide

Traffic Signal Inspector

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Course Learning Objectives

- Introduction
- LESSON 1 - PPE, SAFETY, AND KEY PERSONNEL
- LESSON 2 - TRAFFIC SIGNAL CONSTRUCTION
- LESSON 3 - TRAFFIC CONTROL PLANS

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Course Learning Objectives

- LESSON 4 - INSPECTION OF TRAFFIC STRUCTURES, CONTROLS, AND ASSOCIATED EQUIPMENT
- LESSON 5 - Work Zone set-up, Maintenance of Roadway Lighting, and Emergency Call-outs
- LESSON 6 - Complaint Validity, Site Assessment, and Component Power Source Verification
- LESSON 7 - Installation of Roadway Lighting

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Course Learning Objectives

- LESSON 8 - Site Clean-Up, Documenting Work Completion, and Fleet Equipment Maintenance
- LESSON 9 - Preventative Maintenance

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Traffic Signal Inspector

INTRODUCTION

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Traffic Signal Inspector Course Introduction

The purpose of a Traffic Signal Inspector is to ensure that traffic signals, also known as traffic lights or traffic control signals, are functioning properly and in compliance with applicable regulations and standards. Traffic Signal Inspectors play a crucial role in maintaining road safety by inspecting, evaluating, and monitoring the operation of traffic signal systems.

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Traffic Signal Inspector Course Introduction

Here are some specific responsibilities and tasks of a Traffic Signal Inspector:

Inspection and Maintenance: Inspect traffic signal equipment, including traffic lights, signal heads, controllers, wiring, and other components, to identify any defects, damage, or malfunctions. They also perform routine maintenance, such as replacing bulbs or repairing damaged wiring, to keep the signals in working order.

Compliance and Regulation: Ensure that traffic signal installations meet the required standards and comply with traffic engineering guidelines and local regulations. Inspectors may review the design plans for new signal installations or modifications to existing signals to verify compliance.

Signal Timing and Coordination: Verify that signal timing and coordination are optimized to facilitate smooth traffic flow and minimize congestion. This may involve monitoring traffic patterns, adjusting signal timings, and coordinating signals along a corridor or network of intersections..

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Traffic Signal Inspector Course Introduction

Troubleshooting and Issue Resolution: Investigate and troubleshoot reported issues with traffic signals, such as signal malfunctions, incorrect timing, or faulty detection. Inspectors identify the cause of the problem and take appropriate action to rectify it, either by performing repairs or coordinating with maintenance crews.

Documentation and Reporting: Maintain accurate records of inspections, maintenance activities, and repairs performed on traffic signal systems. Prepare reports on the condition of signal equipment, any identified issues, and actions taken to resolve them.

Overall, the primary goal of a traffic signal inspector is to ensure the safe and efficient operation of traffic signals, contributing to improved traffic flow, reduced congestion, and enhanced road safety for motorists, pedestrians, and cyclists.

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Traffic Signal Inspector

LESSON 1
PPE, SAFETY, AND KEY PERSONNEL

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Personal Protective Equipment (PPE)

As a Traffic Signal Inspector, it's important to prioritize your safety by wearing appropriate personal protective equipment (PPE) while performing your duties.

Here are some recommended PPE for a Traffic Signal Inspector :

High-Visibility Vest: Wear a high-visibility vest or jacket that conforms to safety regulations to ensure you are visible to motorists and other workers in the vicinity.

Hard Hat: Protect your head from falling objects or potential head injuries by wearing a hard hat. It should meet the necessary safety standards.

Safety Glasses: Use safety glasses with side shields to shield your eyes from dust, debris, or other potential hazards that may arise while inspecting traffic signals.

Gloves: Wear protective gloves to safeguard your hands from sharp edges, electrical components, or other materials that you may come into contact with during inspections.

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Personal Protective Equipment (PPE)

Steel-Toe Boots: Invest in sturdy, closed-toe shoes or boots with reinforced steel toes to protect your feet from potential hazards, such as heavy objects or accidental impacts.

Reflective Gloves: Consider using reflective gloves with reflective materials or strips for enhanced visibility, especially when working in low-light conditions.

Ear Protection: If you work in noisy environments, it's advisable to wear earplugs or earmuffs to protect your hearing from excessive noise levels.

Face Mask: Depending on the circumstances and local regulations, wearing a face mask may be necessary, especially when working closely with other individuals or in public spaces.

Remember, the specific PPE requirements may vary based on your location, local regulations, and the specific tasks you perform as a Traffic Signal Inspector. Always follow the guidelines provided by your employer and adhere to any safety regulations in your area.

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Personal Protective Equipment (PPE)

An ANSI-approved safety vest refers to a high-visibility garment designed to enhance the visibility of workers in hazardous environments or low-light conditions. The American National Standards Institute (ANSI) has established standards for safety vests to ensure consistent levels of visibility and protection. ANSI-approved safety vests are commonly used by construction workers, road crews, surveyors, and others who work near moving vehicles or in areas with poor visibility.

The ANSI standards classify safety vests into three types: Type 1, Type 2, and Type 3

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Personal Protective Equipment (PPE)

Type 1 Class Vest:

· Also known as "off-road" or "breakaway" vests.

· Provides the least amount of coverage among the three types.

· Designed for workers who need high visibility but are not exposed to heavy traffic.

· Primarily used in non-roadway environments or areas with minimal vehicle traffic.

· Typically have the most basic design, with a single reflective stripe around the torso.

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Personal Protective Equipment (PPE)

Type 2 Class Vest:

- Offers more coverage and visibility than Type 1 vests.
- Features additional reflective material on the front and back.
- Usually have a solid fluorescent background color for better visibility.
- Widely used by roadway construction workers, utility workers, and emergency responders.
- Can provide more visibility in complex work environments.

The industry rule of thumb is to require these vests on worksites where traffic flow is 25mph – 50mph. These safety vests are more noticeable during the day or night at greater distances when compared to class 1 safety vests

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Personal Protective Equipment (PPE)

Class 2 safety vests are designed to provide enhanced visibility in environments with moderate to high traffic speeds and where background visibility is reduced. They typically have a minimum of 775 square inches of background material and 201 square inches of reflective tape. Class 2 safety vests should be worn in the following situations:

- Road Construction: Workers on road construction sites, including flaggers and surveyors, should wear Class 2 safety vests to enhance their visibility to passing motorists.
- Airport and Port Workers: Employees working on airport runways, taxiways, and aprons, as well as port workers, should wear Class 2 vests to ensure their visibility around moving vehicles and equipment.
- Utility Workers: Utility workers, such as those employed by electric or telecommunications companies, should wear Class 2 vests when working near roadways or in areas with vehicular traffic.
- Parking Lot Attendants: Individuals directing traffic or managing parking lots should wear Class 2 safety vests to increase their visibility and ensure their safety.

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Personal Protective Equipment (PPE)

Type 3 Class Vest:

· Provides the highest level of visibility and coverage.

· Covers a larger portion of the upper body, including the front, back, and sides.

· Incorporates a significant amount of reflective material.

· Designed for workers in high-risk environments with heavy traffic or complex backgrounds.

· Often used by road construction workers, traffic control personnel, and tow truck operators.

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Personal Protective Equipment (PPE)

A Class 3 safety vest is a high-visibility garment designed for workers who require maximum visibility in high-risk environments, particularly on roadways. These vests have a minimum of 1240 square inches of background material and 310 square inches of reflective tape. Here are the situations when you should wear a Class 3 safety vest:

• Working in High-Speed Traffic Zones: If you work on or near roadways where traffic speeds exceed 50 miles per hour, it is recommended to wear a Class 3 safety vest. These areas pose a higher risk due to the fast-moving vehicles, and the enhanced visibility provided by the vest helps ensure that you are easily seen by drivers.

• Poor Lighting Conditions: Class 3 safety vests are especially crucial in low-light or nighttime conditions when visibility is significantly reduced. The vest's fluorescent color and reflective striping reflect light from headlights, making you more visible to drivers and increasing your safety.

• Inclement Weather: During adverse weather conditions such as rain, fog, or snow, visibility can be severely impaired. Wearing a Class 3 safety vest in these situations ensures that you stand out, even in challenging weather, and helps drivers spot you from a distance. If while on the traffic signal project site, it starts to rain and the reflective safety vest being worn gets wet. The BEST way to store the vest after it gets wet is to hang the wet vest in a protected, and a well-ventilated area to air dry. Once dry, return it to a proper approved storage area.

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Personal Protective Equipment (PPE)

All ANSI-approved safety vests must meet specific criteria regarding color, retroreflective material, and the placement of reflective stripes. They are typically available in fluorescent colors like orange, yellow, or lime green to enhance visibility during the day, and the reflective stripes ensure visibility in low-light or nighttime conditions.

It's important to note that the specific requirements for safety vests may vary depending on the industry and local regulations. Therefore, it's crucial to consult relevant safety guidelines and regulations applicable to your specific work environment to ensure compliance and adequate protection.

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Fall Protection Equipment

For work at heights, fall protection equipment like safety harnesses, lanyards, and lifelines are used to prevent falls and mitigate the risk of serious injuries.

Safety Harnesses should always be used while working from a Bucket Truck or any other type of Aerial Lift.

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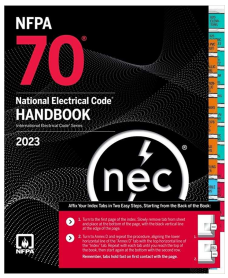
National Electrical Code Handbook

The National Electrical Code (NEC) Handbook is a comprehensive guidebook that provides detailed interpretations, explanations, and additional information to accompany the National Electrical Code. The NEC Handbook is published by the National Fire Protection Association (NFPA), which is responsible for developing and updating the NEC.

The NEC Handbook expands upon the NEC, which is a set of electrical standards and regulations that govern the safe installation, operation, and maintenance of electrical systems in the United States. It covers a wide range of topics, including electrical wiring, grounding, equipment installation, electrical calculations, and safety practices.

The NEC Handbook offers the following features:

1. Commentary
2. Case Studies
3. Historical Information
4. Cross-References and Index



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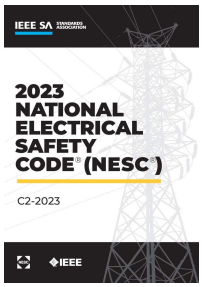
National Electrical Code Handbook



The 2023 NESC® covers practical safeguarding of persons during the installation, operation, or maintenance of:
Electric supply stations
Overhead supply and communications lines
Underground or buried supply and communication cables
It also includes work rules for the operation of electric supply and communications lines and equipment. This Code consists of the introduction, definitions, grounding rules, lists of referenced and bibliographic documents, and Parts 1, 2, 3, and 4 of the 2023 Edition of the National Electrical Safety Code.

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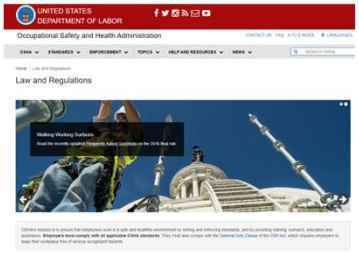
Occupational Safety and Health Administration

OSHA stands for the Occupational Safety and Health Administration. It is a federal agency within the United States Department of Labor. OSHA's primary mission is to ensure safe and healthy working conditions for employees across various industries in the United States.

Here are some key aspects of OSHA:

1. Workplace Safety Standards
2. Inspections and Compliance
3. Training and Education
4. Recordkeeping and Reporting
5. Whistleblower Protection
6. Partnerships and Collaboration

The role of OSHA is to enforce safety and health regulations, provide guidance and assistance, and promote a culture of workplace safety. By setting and enforcing standards, OSHA plays a vital role in safeguarding the well-being of workers and ensuring they have the necessary protections in their workplaces.



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Underground Utilities

Underground Utilities

When digging or excavating is required there is the hazard of exposing or damaging underground utilities.

It is necessary to call or contact the utility locating service in your area, **811**

811
Know what's below.
Call before you dig.

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Locating Underground Utilities

Cable locators, also known as underground cable locators or cable detectors, are devices used to locate and trace underground cables and pipes. They are commonly used in construction, utility work, and maintenance activities to identify the path and depth of buried cables before digging or excavation work.

Cable locators work based on the principle of electromagnetic field detection. They detect the magnetic fields generated by electric currents flowing through buried cables or pipes. By using a cable locator, you can trace the route of underground cables, identify their depth, and avoid accidentally damaging them during construction or excavation work.

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Key Personnel

Key personnel involved in traffic signal installation can vary depending on the specific project and the organization responsible for the installation. However, here are some common roles that are typically involved in traffic signal installation projects:

Traffic Engineer/Transportation Engineer: Traffic engineers are responsible for planning, designing, and implementing traffic management systems, including traffic signals. They analyze traffic flow, conduct traffic studies, and determine the optimal signal timings and configurations for efficient traffic management.

Project Manager: A project manager oversees the entire traffic signal installation project. They are responsible for coordinating various tasks, managing resources, setting timelines, leading the traffic signal pre-construction meeting, and ensuring that the project is completed on schedule and within budget.

Electrical Engineer: Electrical engineers play a crucial role in traffic signal installation. They design and implement the electrical infrastructure required for traffic signal systems. They ensure that the electrical connections, wiring, power supply, and control systems are properly installed and functioning.

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Key Personnel

Traffic Signal Technician/Installer: Traffic signal technicians are responsible for physically installing and maintaining traffic signal equipment. They work with electrical components, traffic signal controllers, and other hardware. They ensure that the equipment is correctly installed, connected, and functioning as per the design specifications.

Construction Crew/Contractors: Construction crews or contractors are involved in the physical installation of traffic signal infrastructure, including poles, signal heads, pedestrian crossings, and related infrastructure. They handle excavation, concrete work, pole erection, and other construction tasks as per the design plans.

Traffic Control Supervisor: During the installation process, a traffic control supervisor is responsible for ensuring that traffic is safely managed around the construction site. They plan and implement temporary traffic control measures to minimize disruptions and maintain safety for both the workers and road users.

Inspectors: Inspectors are responsible for quality control and ensuring that the installation work meets the required standards and specifications. They conduct inspections at various stages of the project, identify any issues or deficiencies, and ensure compliance with applicable regulations.

Note: These roles can overlap or vary depending on the scale and complexity of the project, as well as the specific organizational structure and processes involved in the traffic signal installation process

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Knowledge Check: Multiple Choice

Orange paint markings in close proximity to white excavation markings would indicate the possible conflict with what type of utility?

a) Communication

b) Gas

c) Power

d) Water

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Knowledge Check: Multiple Choice

What type of reflective vest should be worn during the day in a traffic signal construction site on a 45 mph (72KMH) roadway?

a) Type 1.

b) Type 2

c) Type 3

d) Type 4

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Knowledge Check: Multiple Choice

What locate mark color is for underground electrical lines?

a) Blue.

b) Orange.

c) Red.

d) White

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Knowledge Check: Multiple Choice

Who is responsible for leading the traffic signal pre-construction meeting?

a) Police Chief

b) Project Manager

c) Signal Contractor

d) Signal Inspector

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Knowledge Check: Multiple Choice

From whom would the traffic signal inspector obtain the latest approved version of the traffic signal plans associated with a traffic signal project?

a) Traffic Engineer/Engineer of record

b) Traffic Signal Consultant

c) Traffic Signal Contractor

d) Traffic Signal Inspector

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Knowledge Check: Multiple Choice

Who is responsible for maintaining the approved products list (APL)?

a) Project Manager

b) Traffic Engineer/Engineer of record

c) Traffic Signal Contactor

d) Traffic Signal Inspector

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Knowledge Check: Multiple Choice

A traffic signal inspector should inspect and verify which of the following electricity hazards of the job site?

a) Direct Current

b) Photovoltaic

c) Static

d) Underground

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Knowledge Check: Multiple Choice

Whose responsibility is it to ensure the milestones are met with their respective timeline?

a) Office Administrative staff

b) Project Manager/Engineer

c) Signal contractor

d) Underground Contractor

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Traffic Signal Inspector

LESSON 2
TRAFFIC SIGNAL CONSTRUCTION

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Manual of Uniform Traffic Control Devices - MUTCD

The MUTCD stands for the Manual on Uniform Traffic Control Devices. It is a document published by the Federal Highway Administration (FHWA) in the United States that provides guidance on the design and usage of traffic control devices, including signs, signals, and pavement markings. The MUTCD is widely used by transportation agencies at the federal, state, and local levels to ensure uniformity and consistency in traffic control across the country.

The manual covers various aspects of traffic control, including the design and placement of signs, signal timing and operation, pavement markings, traffic signals, work zone safety, and pedestrian and bicycle facilities. It establishes standards, guidelines, and options for traffic control devices to enhance safety and efficiency on roadways.

The IMSA Traffic Signal Inspector can use the MUTCD to find information of the most current versions of applicable standards. For example, the MUTCD can be referenced to make sure a pedestrian push button is ADA compliant.

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Engineering Survey

Before constructing a traffic signal, an engineering survey is conducted to determine the appropriate location. Factors such as traffic volume, pedestrian flow, visibility, and nearby intersections are considered.

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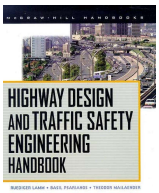
Traffic Signal Design and Permitting



Once the location is determined, Engineers create a detailed design for the traffic signal system, including signal heads, signal poles, detection equipment, and timing plans. This design may need to comply with local transportation department guidelines and obtain necessary permits.

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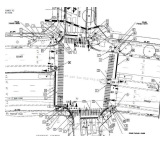
Traffic Control Plan



Traffic Control Plan: A traffic control plan is developed to ensure the safety of motorists, pedestrians, and construction workers during the installation process. This plan includes temporary traffic signs, barricades, and detour routes, if required.

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Traffic Signal Construction Plans

A typical traffic signal construction plan set includes several sections that outline different aspects of the project. The specific sections may vary depending on the jurisdiction and the complexity of the project, but here are some common sections you might find in a traffic signal construction plan set:

Cover Sheet: This section provides basic information about the project, such as the project name, location, and contact details for the parties involved.

General Notes: This section includes general information and instructions applicable to the entire plan set, such as construction standards, materials specifications, and any special requirements.

Existing Conditions: This section provides detailed information about the existing conditions at the project site, including existing roadways, utilities, structures, and any other relevant features.

Traffic Control Plan: This section outlines the temporary traffic control measures that will be implemented during construction to ensure the safety of motorists, pedestrians, and workers. It includes details on lane closures, detours, signage, and any necessary flagging operations.

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Traffic Signal Construction Plans

Traffic Signal Plans: This section contains detailed drawings and specifications for the traffic signal equipment, including the signal heads, poles, mast arms, controllers, and wiring diagrams. It also includes information on the timing and phasing of the signal operation. Any required or requested changes to the Traffic Signal plans will be made with a red pencil/pen.

Electrical Plans: This section provides detailed drawings and specifications for the electrical components of the traffic signal system, such as the power supply, conduits, pull boxes, and grounding details.

Construction Details: This section includes detailed drawings and specifications for various construction elements, such as foundations for signal poles, signal cabinet installations, pavement markings, and signal interconnect systems.

Landscaping and Right-of-Way: If landscaping or modifications to the right-of-way are required as part of the project, this section will provide the necessary details, including planting plans, tree protection measures, and any necessary permits or approvals.

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Traffic Signal Construction Plans

Specifications: This section contains detailed technical specifications for the materials, equipment, and construction methods to be used in the project. It may include requirements for signal equipment, pavement markings, wiring, and other relevant items.

Bid Documents: If the project is being put out to bid, this section will include instructions to bidders, contract forms, and any other documents necessary for contractors to submit their bids.

It's important to note that the content and organization of a traffic signal construction plan set can vary, and additional sections may be included based on the specific requirements of the project or jurisdiction

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Traffic Signal Construction Plans

A Traffic Signal Contractor is responsible for installing and maintaining traffic signals and related infrastructure. Their main tasks typically include:

Installation: The contractor installs traffic signal systems, including traffic lights, signal poles, controllers, and wiring. This involves coordinating with local authorities, engineers, and transportation departments to ensure proper placement and functionality of the signals.

Electrical Work: Traffic signal contractors are skilled in electrical work and are responsible for connecting and wiring the traffic signal components. This includes ensuring the proper electrical connections, grounding, and power supply for the signals to operate effectively. The Signal Project plans show any and all splices.

Testing and Commissioning: Once the installation is complete, the contractor tests the entire traffic signal system to ensure proper functioning. This includes checking the electrical connections, signal visibility, timing accuracy, and coordination with other nearby signals. It should be noted that all installs are subject to verification of proper operation.

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Knowledge Check: Multiple Choice

Which of the following is a section of the traffic signal construction plan set?

a) Electrical

b) Emergency response plan

c) HVAC

d) Itemized billing receipts

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Knowledge Check: Multiple Choice

Where would the IMSA traffic signal inspector find information of the most current versions of applicable standards?

a) Authority Having Jurisdiction (AHJ)

b) NEMA

c) NHTSB Website

d) Signal contractor

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Knowledge Check: Multiple Choice

What document is used to determine the scope of traffic signal work within the project?

a) As-built

b) MUTCD

c) Traffic control plan

d) Traffic signal design plan

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Knowledge Check: Multiple Choice

The redline drawing of the traffic signal intersection marked by the Inspector will show

a) A list of all contractors required for the project.

b) any changes or modifications from the current revision

c) any safety concerns and deficiencies that occurred throughout the project

d) any traffic control used throughout

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Knowledge Check: Multiple Choice

What resource is referenced to make sure a pedestrian push button is ADA compliant?

a) ADA Manual

b) DAD Manual

c) MUTCD

d) NEC Handbook

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Knowledge Check: Multiple Choice

What color pencil should revisions to traffic signal plans be made in?

a) Blue

b) Orange

c) Pink

d) Red

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Traffic Signal Inspector

LESSON 3
TRAFFIC CONTROL PLANS

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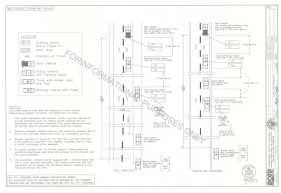
Traffic Control Plans



Traffic control plans are detailed strategies designed to manage the flow of vehicular and pedestrian traffic during construction or maintenance activities, special events, or emergencies. These plans help ensure the safety of workers, drivers, and pedestrians while minimizing disruptions to traffic flow.

The following slides show some key components typically included in a traffic control plan:

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Traffic Control Plans

Traffic Flow Analysis: This involves assessing the existing traffic patterns, volume, and congestion levels in the area under consideration. It includes collecting data on peak hours, traffic counts, and travel speeds. This analysis helps determine how temporary traffic control measures may affect the overall traffic flow and identify potential bottlenecks.

There are several methods and tools used for traffic flow analysis, including:

- Traffic Counts
- Speed Measurement
- Travel Time Studies
- Traffic Simulation Models
- Traffic Signal Optimization
- Capacity and Level of Service Analysis
- Data Analytics and Machine Learning

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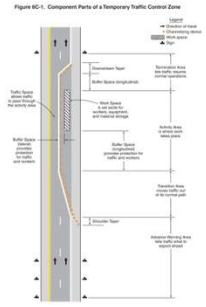
Traffic Control Plans

Work Zone Setup: The plan outlines the layout and setup of the work zone, including the placement of traffic control devices such as cones, barricades, signs, and flaggers. The goal is to create a safe and clearly delineated area for workers while maintaining an organized flow of traffic.



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Traffic Control Plans

Detour Routes: In cases where the planned activity requires a complete or partial closure of a roadway, alternative detour routes must be identified and communicated to drivers. The plan should clearly outline the detour routes, signage, and any temporary traffic signals required to guide drivers safely around the work zone.

Temporary Traffic Control Devices: The plan specifies the appropriate placement of temporary traffic control devices, such as signs, barricades, cones, and delineators, to guide motorists and pedestrians safely through or around the work zone. These devices help maintain traffic flow, provide clear instructions, and warn drivers of any hazards or changes in road conditions.

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Traffic Control Plans

Flagging Operations: If flaggers are needed to direct traffic, the plan should include guidelines for their deployment. This includes the number of flaggers required, their positioning, and communication procedures to ensure smooth traffic flow and the safety of both workers and drivers.

55

Traffic Control Plans

Emergency Response: The plan should also account for emergency situations and outline procedures to be followed in case of accidents, vehicle breakdowns, medical emergencies, or any other unforeseen circumstances that may affect traffic flow or endanger workers or the public.

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Traffic Control Plans

Determining public relations needs for temporary traffic control involves understanding the specific goals, challenges, and stakeholders involved in the project. Here are some steps to help you determine the public relations needs for temporary traffic control:

- Identify project goals
- Define target audience
- Conduct stakeholder analysis
- Assess communication channels
- Develop key messages
- Establish a communication plan
- Engage with stakeholders
- Monitor and evaluate

Remember, effective public relations for temporary traffic control requires proactive communication, transparency, and a focus on addressing the needs and concerns of the affected stakeholders. In todays digital age, Social Media would seem to be the best means of communicating to the public.

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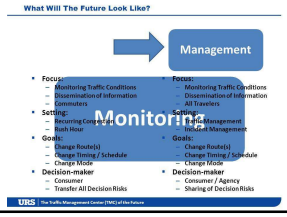
Traffic Control Plans

Monitoring and Evaluation: Regular monitoring and evaluation of the traffic control plan are essential to identify any issues or areas for improvement. This includes conducting traffic counts, assessing the effectiveness of traffic control measures, and making adjustments as needed.



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Traffic Control Plans

It's important to note that traffic control plans may vary depending on local regulations, specific project requirements, and the scale of the planned activity. Local transportation authorities, construction companies, event organizers, or emergency management agencies are typically responsible for creating and implementing traffic control plans.

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Knowledge Check: Multiple Choice

When can the traffic contractor perform nighttime lane closures?

a) According to the plan documents.

b) As allowed by DOT specifications.

c) if the project is behind schedule

d) Whenever there is off peak times.

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Knowledge Check: Multiple Choice

When reviewing the project timeline, why is it important to monitor the material deliverable timeline?

a) To identify when the Signal inspector needs to order materials

b) To provide a bill of materials that will be used on the project

c) To show which supplier is delivering the materials

d) To stay in front of potential delays to the project due to undelivered materials

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Knowledge Check: Multiple Choice

When the intersection is still in its construction phase, which group is responsible for the closures and diversions of traffic?

a) Electric utility contractor

b) Fire department

c) line locates/markings

d) Traffic control

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Knowledge Check: Multiple Choice

What is the process an IMSA traffic signal inspector uses for implementing proposed changes to a traffic control plan?

a) Document and submit proposed changes to the traffic control plan as needed to the project manager for review and approval.

b) Document and submit proposed changes to the traffic control plan to the project manager. The project manager forwards these requests to the traffic engineer/engineer of record for approvals.

c) Implement any necessary changes to the traffic control plan as needed directly. Document changes and notify the project manager.

d) Traffic signal contractors can directly make any needed changes to the traffic control plan at any time throughout the duration project.

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Knowledge Check: Multiple Choice

What document is used to properly implement a detour as part of a traffic project?

a) Signal control plan

b) Traffic control plan

c) Traffic signal plan/special provisions

d) Traffic volume/movement study

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Knowledge Check: Multiple Choice

What is the BEST method for communicating to the public about signal construction detour or lane closure?

a) City council meeting

b) Press release

c) Public bulletins

d) Social media

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Traffic Signal Inspector

LESSON 4
INSPECTION OF TRAFFIC STRUCTURES, CONTROLS, AND ASSOCIATED EQUIPMENT

IMSA
Advancing the Future of Public Safety

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INSPECTION

When inspecting a traffic signal installation, there are several responsibilities the Traffic Signal Inspector need to accomplish daily:

Verify site conditions at the start of each day

- ✓ Checks Project site layout per Traffic Control plan daily
- ✓ Has the responsibility and authority to reject materials that do not match shop drawings and needs to relay this information to the Traffic Signal Contractor
- ✓ Prior to the start of any work it is most important the construction plans
- ✓ Has Safety responsibility to notify the Contractors of PPE deficiencies
- ✓ Participates in the onsite project meeting whenever on site
- ✓ Responsible for ensuring milestones are met during the construction phase
- ✓ Have the ability to read and interpret plans
- ✓ Identifies any/all safety concerns and potential hazards
- ✓ Wear proper PPE on work site
- ✓ Keep log book of everything that happens on the work site, to include a list of all workers and equipment

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INSPECTION

When inspecting a traffic signal installation, there are several key aspects to consider. Here are some important elements to inspect:

- ✓ Signal Equipment
- ✓ Wiring and Electrical Connections
- ✓ Signal Poles and Mounting Hardware
- ✓ Visibility and Placement
- ✓ Signage and Markings
- ✓ Timing and Sequencing
- ✓ Pedestrian Safety Features
- ✓ Emergency and Backup Systems
- ✓ Compliance with Regulations
- ✓ Documentation and Maintenance

Remember, traffic signal installations are typically inspected by qualified professionals, such as traffic engineers or transportation department personnel, who have expertise in traffic control devices and safety standards.

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SIGNAL EQUIPMENT INSPECTION

Check the physical condition, proper installation, and functionality of the signal equipment, including traffic signal heads, pedestrian signals, countdown timers, and any additional devices such as emergency vehicle preemption systems.

Familiarize yourself with the installation plans, including electrical diagrams, signal equipment specifications, and any relevant documentation provided by the manufacturer or regulatory bodies.

Start by visually inspecting the signal equipment and its components. Look for any physical damage, loose connections, or signs of improper installation. Ensure that all components are properly mounted and secured.

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FIBER OPTICS

A fiber optic injector, also known as an optical power meter or optical power injector, is a device used in fiber optic networks to measure and inject optical power. It is primarily used for testing and troubleshooting fiber optic cables and components.

Fiber optic injectors/meters are commonly used by network technicians, engineers, and installers to validate fiber optic installations, troubleshoot network issues, and verify signal integrity. They are crucial tools for maintaining and optimizing the performance of fiber optic networks

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FIBER OPTICS

Here's a brief explanation of how a fiber optic injector/meter works:

Optical Power Measurement: The fiber optic injector/meter measures the power level of light signals transmitted through fiber optic cables. It typically uses a calibrated sensor or photodiode to convert the light power into an electrical signal.

Measurement Units: The optical power is usually expressed in units of decibel milliwatts (dBm) or watts (W), depending on the device. The power measurement helps determine the signal strength, quality, and losses along the fiber optic link.

Wavelength Range: Fiber optic injectors/meters can operate over a specific wavelength range or multiple wavelength bands. They are designed to work with different types of fiber optic networks, such as single-mode or multimode, and support various wavelengths like 850 nm, 1300 nm, 1310 nm, 1550 nm, etc.

Power Injection: In addition to measuring optical power, some fiber optic injectors also have the capability to inject optical signals into the fiber optic network. This feature is useful for testing and verifying the functionality of optical links, connectors, and network components.

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Wiring and Electrical Connection INSPECTION

Inspect the wiring and electrical connections for signs of damage, wear, or corrosion. Ensure that all connections are secure and properly insulated. Test electrical components and circuits to verify they are functioning correctly.

Use appropriate testing equipment to check the electrical connections, voltage levels, continuity, and grounding of the wiring. Verify that the wiring is correctly installed, properly insulated, and free from any short circuits or exposed conductors.

Test each signal component to verify its functionality. This may include signal heads, lamps, LED displays, audible devices, sensors, and communication interfaces. Activate and observe the signals to ensure they respond correctly according to the intended design and traffic control plans.

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Continuity Test

A continuity test is a method used to verify the electrical continuity of a cable. It is commonly performed to ensure that all the conductors within a cable are properly terminated, there are no breaks or open circuits, and are on the correct phase.

To conduct a cable continuity test, you will need a few tools:

Multimeter: A multimeter is a versatile device used to measure voltage, current, and resistance. It typically has a continuity testing function that can be used for this purpose.

Test leads: These are the cables with probes that connect the multimeter to the cable being tested.

It's important to note that a continuity test only checks for a complete path of conductors in the cable. It does not verify the quality of the signal or the cable's ability to transmit data accurately, which may require specialized tests.

Always exercise caution and follow safety procedures when working with cables, especially if they are connected to live power sources.

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Continuity Test

Here's a step-by-step guide on how to perform a cable continuity test:

- Ensure that the cable is not connected to any power source or equipment. This is crucial for safety reasons.
- Set your multimeter to the continuity or resistance mode. The exact setting may vary depending on the model of your multimeter.
- Connect one probe of the multimeter to one end of the cable you want to test.
- Connect the other probe of the multimeter to the opposite end of the cable.
- Observe the multimeter reading. If the cable is continuous and intact, the multimeter will typically emit a beep sound or display a low resistance reading (close to zero ohms). This indicates that there is a complete electrical path between the two ends of the cable.
- Move the probes along the cable, testing different segments, to identify any discontinuities or breaks in the cable. If the multimeter does not emit a beep sound or shows a high resistance reading (infinite or significantly high ohms), it suggests an open circuit or a break in the cable.
- Repeat the test for each conductor within the cable.

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Signal Poles and Mounting Hardware INSPECTION

Signal poles and mounting hardware inspection involves assessing the condition and functionality of poles and the associated hardware used for mounting various signals, such as traffic lights, streetlights, or signage. The inspection ensures that these structures are in proper working order, meet safety standards, and are maintained appropriately.

Here are the key aspects to consider during a signal poles and mounting hardware inspection:

Visual Inspection: Start by visually inspecting the signal poles and mounting hardware for any signs of damage, corrosion, wear and tear, or other visible defects. Look for cracks, rust, loose bolts, bent components, or missing parts.

Structural Integrity: Check the structural integrity of the poles by examining their stability and alignment. Ensure that the poles are straight, firmly anchored to the ground, and not leaning or showing signs of instability.

Mounting Hardware: Assess the condition of the mounting hardware, such as brackets, clamps, or straps. Ensure that they are securely fastened, without any signs of rust or damage. Verify that the hardware is appropriate for the specific signal and capable of holding it in place.

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Signage and Markings INSPECTION

Verify the presence and accuracy of traffic signs and pavement markings associated with the traffic signal installation. Ensure that signs are properly placed and adequately reflect nighttime visibility standards.

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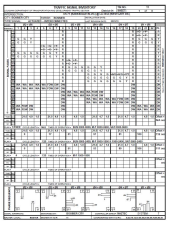
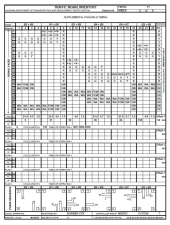
Timing and Sequencing INSPECTION

Coordinate with traffic engineers to assess the timing and sequencing of the signal phases. Confirm that the signal cycle and timing are appropriate for the traffic patterns and optimize traffic flow.





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Pedestrian Safety Features INSPECTION

Pay attention to pedestrian crosswalks and associated safety features. Inspect push buttons, audible signals, and signage to ensure they are in good working order. Verify that pedestrian signal timings provide sufficient crossing time.

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Emergency and Backup System INSPECTION

If applicable, inspect any emergency and backup systems, such as battery backups or generator connections, to ensure they are functioning correctly. Test these systems to verify their effectiveness during power outages or emergencies.

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UPS

A Traffic Signal UPS (Uninterruptible Power Supply) is a backup power system designed to provide continuous electrical power to traffic signals in the event of a power outage or disruption. Traffic signals play a critical role in managing traffic flow and ensuring safety on roads, so it's important to have a reliable power source to keep them operational.

Traffic Signal UPS systems are designed to provide temporary power during short power outages or until the main power is restored. The duration of backup power depends on the capacity of the UPS unit and the energy stored in the battery. Typically, UPS systems for traffic signals are designed to provide backup power for a few hours to ensure continuous traffic management during temporary power disruptions.

The Traffic Signal Inspector should use the Manufacturers manual or website to verify the procedure for operating the UPS.

It's important to note that Traffic Signal UPS systems require regular maintenance to ensure proper functioning. This includes battery checks, testing, and periodic replacement to ensure reliable backup power when needed. This includes ensuring proper battery voltage at the UPS. A Voltmeter can be used to verify the power condition at the UPS.

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Compliance with Regulations INSPECTION

Ensure that the traffic signal installation complies with relevant regulations and standards, including local traffic ordinances, MUTCD (Manual on Uniform Traffic Control Devices) guidelines, and ADA (Americans with Disabilities Act) requirements.

Documentation and Maintenance: Review documentation related to the installation, such as design plans, specifications, and maintenance records. Confirm that regular maintenance has been conducted, and check for any outstanding issues that need attention.

Remember, traffic signal installations are typically inspected by qualified professionals, such as traffic engineers or transportation department personnel, who have expertise in traffic control devices and safety standards.

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Documentation and Maintenance INSPECTION

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FOOTINGS

When conducting a footing inspection for a traffic signal installation, there are several key aspects to consider. Here is a general overview of the process:

Familiarize yourself with the approved design plans for the traffic signal installation. Pay close attention to the specifications and dimensions of the footings. Ensure that the footing excavations are in the correct positions according to the design plans. Check for any discrepancies or deviations from the approved layout. Inspect the footing excavations for proper depth and width as specified in the design plans. The dimensions should comply with the engineering requirements to provide stability and support for the traffic signal pole.

Examine the soil within the excavation to evaluate its properties and suitability for the footing. The soil should have sufficient bearing capacity to support the load imposed by the traffic signal pole. Inspect the reinforcement bars (rebar) placed within the footing excavation. Verify that the rebar is correctly positioned and adequately tied to provide the required structural integrity. Check the formwork to ensure it is properly constructed, providing the desired shape and dimensions for the footing..

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FOOTINGS

Verify that the footing excavation maintains the required clearances from any underground utilities, such as electrical cables or water pipes. The footings should not encroach on these utilities or compromise their integrity. Ensure that the soil within the footing excavation is appropriately compacted to achieve the necessary stability. Improper compaction can lead to settlement and structural issues over time. Examine the bottom of the footing excavation to ensure it is clean and free from any debris or loose material. This will allow for proper contact and load transfer between the footing and the underlying soil. If you find your foundation hole fills halfway with water, use a pump to remove the water to be able to complete the concrete pour in a timely manner.

Document your findings, including photographs and detailed notes, to maintain a record of the footing inspection. Note any observations, issues, or corrective measures taken during the inspection. Based on your inspection findings, determine whether the footings meet the required standards and specifications. If everything is satisfactory, approve the footings for further construction and installation of the traffic signal pole.

When pouring concrete in colder conditions, ensure the concrete footing is covered with a blanket to trap the heat to allow the concrete to cure naturally and retain strength when temperatures fall below freezing.

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Traffic Signal Inspector

LESSON 5
TRAFFIC SIGNAL CABINET AND CABINET EQUIPMENT

Advancing the Future of Public Safety

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Controllers

Traffic signal controllers are devices used to regulate the flow of traffic at intersections or road junctions. They control the operation of traffic signals, ensuring that vehicles and pedestrians move safely and efficiently through the intersection.

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Controllers

The Traffic Signal Inspector needs to verify timings in the controller. The Inspector needs to run the controller in Technician flash and ensure all phases are being serviced prior to the controller being brought out of flash.

The Traffic Signal Inspector needs to verify the vehicle and pedestrian detectors are working and that the controller is receiving, servicing, and dropping the calls.

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Conflict Monitor

The primary objective of a Traffic Signal Conflict Monitor is to prevent conflicts and accidents by detecting and managing potential clashes between different road users. It accomplishes this by monitoring the movements of vehicles and pedestrians within an intersection and analyzing their patterns for potential conflicts

Every outgoing command sent from the controller is checked by the conflict monitor. The device is hard-wired to prevent conflicting movements from being sent to the signal's lights in the event of a controller malfunction. If there is a problem with a controller, the monitor itself, or if signal light wiring is removed or damaged, the conflict monitor automatically puts the signal into flash mode until the issue is resolved.

Conflict Monitor Test

Conflict Monitor test will verify opposing green indications will not run together unless allowed.

Use jumpers to energize only the green terminals on opposing phases while they are not on to perform Conflict Monitor test on just green indications

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Detection

Traffic signal controllers often integrate with various detection systems to gather data about traffic conditions. These include loop detectors embedded in the road surface, video cameras, radar sensors, and infrared sensors. The controller uses this data to make informed decisions about signal timings and adapt to changing traffic patterns.

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