Colorado Work Zone Safety Guide

Introduction

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Each year, Colorado workers are injured or killed while working to construct, improve, or maintain our state roadways. This program is intended to give contractors the information and tools they need to enhance compliance and to help them perform their work in a safer manner while working on or near our public roadways.

1 Program Elements

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Scope

This document is entirely voluntary. The information presented here was taken from existing regulatory requirements, other state programs and industry best practices. Whereas regulatory requirements are normally minimum and performance standards, this document is intended to assist users in the improvement of implementation.

It is expected that this program will grow and improve with time by monitoring national practices and making necessary adjustments.

DISCLAIMER: Compliance with this document by itself does not guarantee compliance with Federal, State or local, regulations.

General

Commitment

Colorado is dedicated to making roadway work zones as safe as possible. Regulations, enforcement and encouraging best practices will help meet this goal. Contractors should make every effort to both comply with and assist in this effort.

Goals

a) Reduce accidental vehicle intrusion into roadway work zones.

b) Reduce worker and public accidents, injuries, and deaths.

c) Ensure contractor compliance.

d) Educate the public.

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Ownership

Organization

The Colorado Work Zone Safety Committee was chartered in June 2003 and is comprised of State, regulatory, industry, insurance, and other parties interested in developing the program.

Roles and Responsibilities:

Project Owners / CDOT

Project owners / CDOT will provide the necessary design and regulatory requirements in contract documents provided to contractors to help make roadway work as safe as possible.

Contractors

As a minimum, contractors shall comply with contractual and regulatory requirements.

Law Enforcement

Law Enforcement's role is a difficult one given the miles of roadway needing attention and the volume of traffic. Owners and contractors should work closely with, continually communicate and closely coordinate issues to maximize the benefits from this limited resource. [See ADDENDUM C}

Legislature

State and Local governments can assist work zone safety by enacting legislation to increase accountability for the traveling public.

Regulations [Incorporated by Reference]

CDOT

Construction Specifications [http://www.dot.state.co.us/DesignSupport/Construction/1999index.htm]

MandS Standard Plans [http://www.dot.state.co.us/DesignSupport/]

MUTCD Manual on Uniform Traffic Control Devices, [U.S. DOT, FHA] [http://mutcd.fhwa.dot.gov/]

OSHA

Miscellaneous Requirements [http://www.osha.gov/]

Training

SEE ADDENDUM A

Risk Management

Risk Reduction ~ It's important to the success of any project to anticipate and prepare for potential risks; and one of the first and best means is avoidance. Properly and safely plan your work and also expect the unexpected. Having the correct insurance coverage and services prior to work beginning is key.

Incident Management ~ Make your safety and health staff, and insurance providers, on-call 24 hrs and prepared/practiced to respond at the time of the incident. Getting the right incident investigation information and making contact with potential claimants early on will help manage damages.

Post-Incident Management / cost control ~ Maintain constant communications between claimants and project management/safety/insurance personnel. Address any issues immediately.

Public Information

SEE ADDENDUM B

Traffic Law Enforcement

SEE ADDENDUM C

Incident Management

Emergency Services Coordination

Emergency Services ~ In some cases, especially on larger projects, there will be conflicts of jurisdictions. It is important to establish EXACTLY who will be responding to what type of incident.

Pre-planning

No two work zones will be alike. It's important to know who and HOW emergency services will be responding to issues such as vehicle accidents, fire, medical and any other emergency service. Identify these providers, let them know of your plans and incorporate their input into the work zone set up. For longer or more complicated work zones invite responders to your site for their considerations.

Access is a key element. If your work involves bridges, excavations, concrete barriers, etc., it is important to consider how emergency services will be accessing the area.

Incident in progress

Expect that the public will attempt to follow the path of least resistance, which could mean that they will enter protected work zones to get around accidents.

Secondary accidents can also be a result of initial accidents be alert for vehicles crashing into crashed vehicles

Post-incident

Lessons learned are an important aspect of any effective safety effort. After any incident, review conditions and set-ups and look for opportunities for improvement.

Contracting

Design

CDOT provides the Traffic Control Plan (TCP) for the project. The TCP is defined as parts of the contract documents that contain the requirements for the maintenance of traffic during construction of the project. See further considerations at the end of Section 2.10.

Specifications

CDOT provides specifications in the Contract that state the directions, provisions and requirements pertaining to the performance of the work.

[http://www.dot.state.co.us/Traffic_Manuals_Guidelines/Traffic_Guidelines_and_Information.asp]

Pre-Bid

Contractor reviews plans, specifications, TCP, etc. Design criteria and considerations should be included in the traffic control plan, general notes, or communicated at the job showing.

Bid

The bidder submits his proposal. Communicate what is available for special access or UTC budget to contractors. Communicate quite clearly what is not going to be paid for by CDOT.

Pre-Construction

Contractor develops and submits to CDOT for approval his method for handling traffic (MHT) for each different phase of construction. The MHT shows the Contractor's proposed construction phasing and proposed traffic control devices consistent with the TCP.

The Contractor furnishes certifications for traffic personnel as required in the Contract.

Construction

Inspect job site to assure MHT is followed for each phase of construction.

More Design Considerations:

- Consider special events or high traffic volumes during "rush hour"
- Involve CDOT Resident and Project Engineers to have input on design preferably the individuals responsible for construction of the project.
- Seek contractor input to phasing prior to final design.
- Address height and clearance verification issues in the design phase rather than the construction phase, potential conflicts can be better addressed at this stage rather than causing costly delays and further public inconvenience.
- On Interstate projects make a budget allotment for Uniform Traffic Control (UTC) available to the Project Engineer and note in Project Special Provisions. This would prevent discounting this service due to cost.
- Provide and communicate budget to Project Engineers for special construction accesses if allowed. For example, the use of median turnarounds on rural Interstate jobs or stockpile areas adjacent to live traffic. Have CDOT provide for the traffic control associated for this activity or do not allow it. This is a potential opportunity for contractors to attempt to save money by not providing adequate signage or other traffic control devices.
- Consider more preliminary work zone signage. Traffic backups may start well in ahead of advance warning signs.
- Allow for more than one TCS on a job. TCS or TCM days are paid on a 24-hour basis for one person. Subcontractors quote one TCS for either a 10 or 12-hour period and it is up to the Prime Contractor to add money for overtime or additional traffic control supervisors. This is another opportunity for safety to be compromised for cost.
- Consider more prevalent use of temporary ramp and connecting road closures rather than partial closures that put live traffic adjacent to operations.

2 Implementation and Best Practices

Introduction

(references to the MUTCD are for the Millennium edition published Dec. 2000 and adopted by Colorado Oct. 2002)

Hazard Analysis

Pedestrian Access

(MUTCD) – Typical applications (TA-28, TA-29 and text section 6D.01), are examples for pedestrian considerations other consideration include ADA minimum requirements (four foot wide walkways, guarded hazards, changes in elevation shall not exceed 1:12 ratio, etc.

Limited Site Distance

MUTCD, CCA training for extension of tapers, and buffer spaces when site distance is an issue. These site distances are impacted by horizontal and vertical curves, topography, and landscaping or manmade interference such as advertising signs, buildings or temporary obstructions such as equipment or other activities on the site that cause distractions or line of site interference.

Utilities

Utilities of high hazard (i.e., high pressure gas, high voltage) and high value (i.e., fiber optic, telephone) will be commonly located above, below, and near roadway right-of-ways and bridge structures. Planning for, locating and/or protecting these utilities shall be of utmost concern.

Project Specific

Other considerations are project impacts to traffic and seasonal events (rodeo, fairs, games etc. as well as weather (environmental considerations). Details of impact may be as focused as rural school bus pick –up / drop-off location or as general as no project on XY lane during the period of one day before and two days after “Frontier Days”.

Pre-Job Planning

Project Traffic Safety

Traffic control plans are required by the MUTCD to consider safety as an integral part of each project considering motorist, pedestrian and worker safety.

Regulations and Technical documents (OSHA, MUTCD, ANSI, State documents)

Traffic Law Enforcement

[SEE ADDENDUM C]

Traffic Control Equipment and Devices

Signs

Meet the Federal and state Highway sign standards

Sign Covers

Detailed in the CDOT Specifications manual durable plastic, wood or metal. It is equally important to take down signs and/or cover when they aren't appropriate as it is to place them during work times.

Channelizing Devices

Tubes, cones, drums, vertical panels, barricades and barriers. Uses and prohibitions covered in the appropriate section of the MUTCD.

Cone Setting Vehicle Safety Devices

Fall protection for workers on vehicles are positioning devices, rails, or seat belts for specially constructed seats near the road surface and adjacent to the cargo platform. Truck mounted attenuators for mobile and short-term operations offer worker protection.

Device Maintenance

CDOT requires a minimum of one cleaning cycle each two weeks. The MUTCD requires the devices maintained to meet the manufacturer's specifications.

External Traffic Control Plan (TCP)

WZ Implementation

WZ Layouts –Typical applications are found in the MUTCD and the State standards. May be modified and upgraded to improve the traffic flow or provide an additional margin of safety to fit a particular site. Improvements include: longer advance warning with additional signs, longer tapers, buffer spaces, closer spacing of devices results in more devices in the set up and use of downstream signage and devices to indicate the end of the zone for motorist information.

WZ Set-UP – Ideally Installed stalled from upstream to downstream. First installed is the advance warning signs. Some states use a high level warning device to get the motorists attention to the work while set up is taking place.

WZ Repositioning – Modifications may be necessary to improve the set up because of observation of issues in traveling the project, repeated incidents or to accommodate change in the project. When modifications occur, care must be taken to Motorists the information to provide protection from the hazard and minimize impact to traffic while providing safety for workers.

WZ Pick-up – The work zone set up is ideally picked –up in the opposite direction of set up. Down stream to upstream, leaving the first warning sign the motorist sees as the last item of protection picked up by workers.

WZ Flagging Operations –The MUTCD (chapter 6E Flagger Control) covers flagging operations in basic terms of clothing (performance standard of "visibility at 1000 feet and clearly identifies the wearer as a person") as well as equipment specifications, and techniques. CDOT has a training and certification process that all flaggers must pass before being allowed on Colorado projects.

WZ Nighttime Operations – More and more projects are required to be completed at night for traffic volume considerations. Several issues arise in set up of TCP's for night operations. Motorist visual acuity is diminished when enhanced vision is required. Work must be illuminated and light plants may end up being a distraction or worse poorly positioned temporarily blinding drivers. When workers are at a low ebb in energy levels (even when accustomed to night work) is the time that more drivers are heading home after a visit to a favorite watering hole. There is antidotal data supporting the notion that drunks drive to the light similar to a moth attracted to a flame. Flaggers are required to have their workstation illuminated to be seen by motorists.

WZ Foul Weather Operations — It's important to consider foul weather in your WZ planning/implementation. Foul weather can interrupt traffic control devices unexpectedly, can require longer stopping distances, impede visibility, and make WZ access points more dangerous. Extra care and consideration should be taken.

Internal Traffic Control Plan (ITCP)

WZ Implementation

WZ Layouts – The most critical factor in ITCP's is planning for haul road, machinery movement patterns as the project progresses. Training workers on the hazards presented by changing patterns and performing team based JHA's will minimize the man – machine conflicts. Strict adherence to basic rules of the site must be required i.e. no loafing by equipment, no crossing haul roads, requiring all persons on site to have appropriate gear: hardhats; high visibility clothing in good condition and requiring each operator to complete a walk around the equipment before moving after being parked, even for a short interval.

WZ Set-UP – Speed and visibility are key concerns in the WZ. Construction equipment interacting with vehicles and ground workers should be considered carefully and planned for.

WZ Repositioning – WZ's are dynamic by nature and constant monitoring and improvements should be made as construction activities change and/or are completed.

WZ Pick-up – If you want people to follow and obey all signs and directions there must be a perceived respect. It's as important to remove/cover signs when not appropriate as it is to place them.

WZ Flagging Operations – This is a viable option when high or otherwise dangerous WZ traffic warrants; especially when there is a large amount of heavy equipment traffic.

WZ Nighttime Operations – Lesser visibility is the concern here. Assure that areas have adequate lighting and ground personnel have necessary reflective clothing on.

Worker and Traffic Protection

WZ Training

Basic training for all employees on a construction site must include identification of the hazards they face on the job and what prevention techniques, personal protective equipment or best practice they should use to prevent injury. This level of training is required under the OSHA regulation 1926.21. [SEE ADDENDUM A]

Personal Protective Equipment (PPE)

St Paul Guidance

"It's not what you expect, it's what you inspect!"

Roles and Responsibilities

Owner ~ the work owner should routinely inspect it's contractor for compliance with contract requirements.

Contractor ~ It's a good practice to routinely inspect and record how traffic is reacting to traffic control device and what the equipment condition and configurations are.

Inspections

It is recommended that in addition to required traffic control plans and logs that the conditions be recorded by VHS or other method on a daily basis to help protect the contractor in any possible litigation situations.

Standard Forms [JW]

Traffic Control inspection Form

4 Technical Resources / Bibliography

Federal

MUTCD

[http://mutcd.fhwa.dot.gov/]

OSHA

[http://www.osha.gov]

Workzone Operations ~ Best Practices Guidebook, April 2000

CD-Rom, FHWA-OP-00-010

State

CDOT Contract Specifications

*[http://www.dot.state.co.us/DesignSupport/Construction/1999index.htm]

*[http://www.dot.state.co.us/Traffic_Manuals_Guidelines/Traffic_Guidelines_and_Information.asp]

Dallas

Industry Practices

St Paul1/23/2004

5 Program Credits

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Addendum A

Work Zone Safety Training Matrix (7/11/03)

Functional Group	Job Title	Enabling Objectives	Minimum Training
Project Owners City, County, CDOT)	Policy Makers Managers Engineers/Designers Field Oversight Safety Maintainers		
Project Builders GC, Subs)	Managers Estimators Engineers/Designers Safety Field Supervision Workers/Operators Flaggers		
Specialty Contractors (Subs)	Stripers Traffic Control Set-up Maintainers		
Law Enforcement	Local Patrol County Patrol State Patrol OSHA		

Enabling Objectives MENU

Hazards
Established Program
Accountability
PPE
MUTCD Knowledge
MUTCD Skills
Field Corrective Actions
Laws and regulations

Training Course Menu

	Potential Providers	**Hours Needed**
Traffic Control Technician	Zerah, Inc; ATSSA	8
Traffic Control Supervisor	CCA; ATSSA	16

Addendum B

Public Information Section

Project/Work Zone Communications

Transportation is big news in Colorado. It is rare that it escapes daily media coverage.

The perception of a project's success often depends on communications. Well-managed communications programs help ensure that key messages are properly developed, transmitted and received, resulting in efforts that effectively convey information. But those efforts go beyond communications with drivers. It may include others directly affected by a project: residents, business owners, public safety personnel and even elected officials.

Before work commences on a project, it should be examined to consider, at the very least, if a customized communications plan and coordinating budget is appropriate. Depending upon the size and scope of the project, the plan may be prepared by CDOT or its consultant or contractor. In either case, it should be given adequate thought and planning.

CDOT's public relations director and regional public relations managers each maintain responsibility for at least one of CDOT's six transportation regions. Initial project information can be gathered at pre-construction project meetings and via phone and/or e-mail communications from resident, project or program engineers.

Through CDOT's Construction Public Notification Policy, a short description of each construction project is published monthly via Transportation News and CDOT's web site in advance of construction. Additionally, a press release is written for projects requiring minimal communications. The release generally includes the following:

- Project location (highway number, mile or geographic point)
- What construction entails
- Time/days of operation
- Anticipated delays
- Work zone speed limits
- Truck restrictions – if any
- Project end date
- Project cost
- Project's prime contractor
- CDOT contact name and phone number

Upon completion, the release is distributed via fax and e-mail to local media outlets. In addition, the information is usually distributed to the primary local and county government offices, chambers of commerce, visitor's centers, truck stops and to any other locations where the information would be available to area travelers. The information also is placed on CDOT's website.

If necessary, a letter or flyer also is written and distributed to local businesses and residents who may be impacted by construction. In addition to a release, occasional "updates" can be distributed during a project's duration if a specific operation is expected to impact traffic beyond the normal scope of work.

Continuous project updates also are distributed statewide each Friday via a Highway Lane Closure Report. Each report covers one geographic region: Denver-area, Southeast Colorado, Northeast Colorado, Western Colorado (west of Denver), and State Highway 82. CDOT's Traffic Operations Center is responsible for distributing this information to Visitor Centers, major truck stops and ports-of-entry. Public Relations distributes to media outlets, traffic reporting agencies and to various CDOT offices throughout the state. The information also is placed on CDOT's primary and other various project websites.

CDOT's Public Relations director and managers should do the following as a project contact:

- Be listed as contact with number on any correspondence relating to the project
- Remain subject-to-call at all times and carry a cell phone and/or pager
- Work with project contractor PR designee to provide accurate information on a regular basis to private individuals, news media, businesses, local organizations and any other entity the project engineer deems necessary that are interested in the project
- If necessary, able and ready to make presentations about the project to neighborhood groups or businesses

Strategies to enhance communications could include:

- Neighborhood and/or business owner meetings on regular or semi-regular basis
- Advertisements in local newspapers
- Project-specific brochures, newsletters or flyers distributed via direct or e-mail to area businesses and residences
- Set-up project information phone line (monitored for call-backs/comments or answered directly), or this may be done by project contractor PR designee
- Regular evaluation to monitor progress and measure results to further enhance communication efforts
- Project tours for elected officials and/or media

When a public is informed about what to expect within a project work zone it allows the public to make better decisions about when to travel or take alternate routes. Additionally, consistent communications regarding work zone safety and incidents makes the public more aware of the potential safety issues.

One of the focus areas the PRO works to promote has to do with work zone safety. Listed below are some of the ways we publicize the issue:

Traffic Watchers: The PRO hosts a media luncheon twice a year to provide construction updates and discuss maintenance projects and snow removal plans. The luncheon is held each spring and fall. The luncheon is well attended and includes participation from all major network Denver television stations, Hispanic television stations, the Denver Post, Rocky Mountain News, weekly newspapers from all over the metro area and representatives from both traffic reporting agencies.

National Work Zone Safety Awareness Week: CDOT, in partnership with the Colorado State Patrol and Colorado Contractors Association holds an event/news conference each April to draw attention to this week.

Work Zone Safety Enforcement and Education Program: Over the summer months, the PRO in partnership with CDOT's Safety Office dedicated a specific amount of funding to go to overtime enforcement in select work zones. These projects are selected with input from the regions. The PRO issues news releases to local media regarding the program and also follows up with data collected at the end of the enforcement period.

CDOT's Public Relations Office phone number is (303) 757-9228. Contact the office to for the appropriate regional public relations manager.

Addendum C

Law Enforcement Recommendations

Planning Considerations

CDOT and contractors have a project checklist for road construction planning "Contact local law enforcement" must be added to the planning checklist. Invite representatives of the appropriate law enforcement jurisdiction to significant road construction planning meetings. This will serve notice to the agency that a project will be taking place in their area. Planners can then solicit law enforcement assistance and learn what resources the agency can provide (traffic unit saturation patrols, extra patrols, extra duty officers, SMART trailer, etc.). Planners can then create realistic expectations of police; for example, making traffic stops in the work zone creates another safety hazard; watching for violators in the zone and stopping them after they exit the zone is more realistic. Larger agencies have more resources available than smaller agencies. Realistic expectations can be set based on what that agency can offer.

Clear Expectations and Goals

Determine goals and level of police enforcement desired for the project. This may range from static presence in a marked unit provided by the contractor or agency (depending on agency protocols), SMART Trailer, roving patrol, and active enforcement. Specify the desired goals and activities in any contract made with police regarding use of extra duty officers, and use officers from the appropriate jurisdiction (contractors use whoever is available as extra duty help, not necessarily the jurisdiction where the project takes place). Tailor police presence and enforcement to the project based on available resources and the work times, size, location, and duration of the road project. Create model incident response guidelines for safe responses to incidents in the work zones (small and large scale accidents, hazmat incidents, etc.).

Other Pertinent Considerations

Other related suggestions are for increased use of barricades to separate workers from traffic flow, use of electronic warning signs advising of changes in traffic flow and speed with expanded warning zones, and the creation of "breakdown zones" in the work zones for broken down or accident related vehicles to be sent to until the arrival of a tow. Also explore availability of grants to fund a public awareness media campaign on cone zone safety. Future considerations are to lobby for statutory assistance by creating penalty aggravators for careless driving offenses, vehicular assault and vehicular homicide in a construction zone, similar to the fines doubled for speeding in road construction zones.

Addendum D:

Additional Concerns and Follow-up Issues

Traffic control plans that provide adequate or maximum room for operations, which would mean more inconvenience to the traveling public.

Provision of discretionary budget to Project Engineers for traffic safety, which should put more of a focus on safety instead of cost.