Work Zone Regulatory Speed Limit Policy

Introduction
The goal of every work zone is to provide a safe environment for workers to complete their activities while minimizing both safety and mobility impacts to roadway users. In order to achieve this goal, a work zone design must consider four essential elements: (1) safety of the worker and road user, (2) mobility, (3) driver conformance, and (4) cost. Each of these essential elements can impact the others, so it is important to find an optimal balance. No two work zones are exactly the same, so the appropriate weight applied to each essential element will need to be considered on a project-by-project basis.

Speed is a key criterion that influences all four essential work zone elements, and it is critical that the evaluator (i.e. designer or field overseer) carefully considers a work zone’s impact on speed throughout the duration of the operation. This is of particular concern on higher speed facilities (>45 MPH) such as interstates and limited access highways where motorists have an expectation of greater mobility and higher running speeds. As noted in Section 6C.01 of the MUTCD, motorists only reduce their speed if they perceive a reason to do so. Therefore, the current practice of subjectively reducing the work zone speed limit up to 10 MPH may be counter-intuitive to safety, mobility, and driver conformance. More importantly, an unjustified 10 MPH work zone regulatory speed limit reduction could lead to severe disparities in operating speeds resulting in unnecessary congestion, aggressive driving behavior, and an increased potential for crashes.

The Pennsylvania Department of Transportation (PennDOT) has developed the Work Zone Regulatory Speed Limit Policy to assist evaluators in determining an appropriate work zone speed limit through objective evaluation of geometric, safety, and operational criteria. It was developed by evaluating national best practices, other Department policies, and concerns with current practices.

This policy is consistent with the MUTCD and provides guidance to specifically address MUTCD Section 6C.01, Paragraph 14 which states: “Reduced speed zoning (lowering the regulatory speed limit) should be avoided as much as practical because drivers will reduce their speeds only if they clearly perceive a need to do so.”

Purpose
It is the desire of the Bureau of Maintenance and Operations (BOMO) that all work zones be designed to accommodate the existing posted regulatory speed limit whenever possible unless adequate justification is provided.

This policy was developed to ensure a consistent, data-driven process for determining appropriate work zone speed limits and to specifically address how to:

- Evaluate worker and motorist safety issues and concerns within a work zone
- Maintain acceptable mobility and driver expectations within work zones to reduce crashes
- Establish consistency and credibility for reduced regulatory speed limits within work zones
- Improve motorist compliance with work zone regulatory speed limits
- Ensure work zone speed limits are properly established for use with ASEWZ
- Address concerns identified by FHWA through their Independent Oversight Program (IOP)
Applicability
All temporary traffic control regulatory speed limits (Advisory Speeds Limits, Variable Regulatory Speed Limits, and Continuous Regulatory Speed Limits) on the state roadway system must adhere to the requirements in this policy. This includes all utility, highway occupancy permit (HOP), and local jurisdiction construction or maintenance projects that impact a state road. For the purpose of this policy, “impact” includes signs and traffic control devices from a non-state road work zone being installed on or along a state road.

Emergency response temporary traffic control zones are exempt from this policy.

Work Zone Regulatory Speed Limit Evaluation Process
A Traffic Engineering Form (TE-Form) Work Zone Regulatory Speed Limit Reduction Evaluation was developed in concert with this policy to help guide designers and field overseers through the work zone speed limit evaluation process. The TE-form guides evaluators through the sequential steps when conducting a speed limit evaluation and is not intended as a rigid process. However, completion of the TE-form is required when a reduced regulatory work zone speed limit is proposed, as it will suffice as adequate study for the District Traffic Engineer (DTE) to approve or deny the request. If the work zone is being considered for the Automated Speed Enforcement in Work Zones (ASEWZ) program, concurrence from the BOMO Highway Safety and Traffic Operations (HSTO) Division Chief is also required. Once approved by the appropriate PennDOT personnel, District Traffic staff will generate a temporary regulatory speed limit reduction permit for the duration of work when the speed limit reduction is needed. Completion of the TE-form should not increase the level of effort required from the evaluator since this type of analysis should already be occurring when a reduced regulatory speed limit is being considered within a work zone.

Timeline
Work zone regulatory speed limits must be evaluated during the temporary traffic control design (construction projects) or PA Typical Application (PATA) selection (maintenance activities) process. However, work zone regulatory speed limits may be re-evaluated at any time during construction or maintenance activities. Timelines for when work zone regulatory speed limits can be evaluated are as follows:

- Prior to Construction/Maintenance Activities
  - **Construction, Utility, and HOP Projects** – Designers shall identify the proposed project work zone speed limit during the determination of significant projects process (if applicable) and revisit the proposed speed limits during preliminary engineering. If a speed limit reduction is being considered, the TE-XXX Work Zone Regulatory Speed Limit Reduction Evaluation form with appropriate attachments (see Section C of TE-XXX form) must be submitted to the DTE for review prior to or with the Design Field View (DFV) Submission. The proposed work zone regulatory speed limit reduction must be approved prior to the start of Final Design of Temporary Traffic Control Plans. A Temporary Traffic Control Plan with a reduced work zone regulatory speed limit will not be approved without an approved TE-XXX form and temporary regulatory speed limit reduction permit.
Maintenance Operations – District County Manager and/or assistant shall identify the
proposed work zone regulatory speed limit. If a reduced work zone regulatory speed limit
is being proposed, the TE-XXX Work Zone Regulatory Speed Limit Reduction Evaluation
form shall be submitted along with the appropriate attachments (see Section C of the TE-
XXX form) so that the DTE has at least two (2) weeks to review before the start of work
activities. To minimize the number of requests, submitting one (1) request for an entire
section of roadway where multiple, similar work zone set-ups will be deployed is
desirable. Maintenance work activities may be delayed or suspended if the maintenance
operation does not have an approved TE-XXX form and temporary regulatory speed limit
reduction permit.

After Construction/Maintenance Begins

All project types – Contractor, maintenance, or District personnel can identify a safety or
operational concern that may warrant re-evaluation of the work zone regulatory speed
limit once work has begun on a project. If this occurs and a speed limit reduction is
proposed, the person who has oversight of the project (Inspector-in-Charge or Assistant
Construction Engineer) should submit a TE-XXX Work Zone Regulatory Speed Limit
Reduction Evaluation form with appropriate attachments (see Section C of the TE-XXX
form) to the DTE for review. The proposed work zone regulatory speed limit reduction
must be approved by the DTE prior to issuance of a temporary regulatory speed limit
reduction permit and implementation of the reduced work zone regulatory speed limit.

For more details regarding the submission and review process, refer to the last section in the policy.

Work Zone Speed Limit Setting Guidance

There are three types of regulatory speed limits that may be utilized within a work zone:

Advisory Regulatory Speed Limit – where motorists encounter work zone conditions (e.g. rough
road, bump, uneven pavement, minor geometric revisions, lane shifts, or crossover/flagging
operations) that require a sign warning of the actual conditions with an appropriate safe speed
message. The work zone condition encountered should be less than 0.5 mile in length.

Variable Regulatory Speed Limit – effective only when a temporary traffic control operation (e.g.
daily lane/shoulder/median closures or restrictions with workers on foot with no positive
protection near active travel lanes, flagging operation, or daily lane closures with a traffic shift
onto a shoulder or median) justifies a lower operational speed specifically for the duration of the
operation which cannot exceed 24 consecutive hours.

Continuous Regulatory Speed Limit – a speed limit reduction effective 24 hours a day for the
duration that a work zone condition exists (such as placing traffic on temporary alignments that
can’t be designed for the existing speed limit, motorist sight distance concerns, or other long-term
work zone safety issues to motorists).

To avoid driver confusion and speed variability, frequent changes in the work zone regulatory speed limit
should be avoided as noted in MUTCD 6C.01 Paragraph 12. Consider the following guidance when
determining a continuous work zone regulatory speed limit:

In a short work zone (<=1 mile), it may be necessary to extend the lowest reduced speed zone to
encompass the entire work zone. This can reduce driver confusion and improve credibility and
compliance with the lowered speed limit.
In a longer work zone (>1 mile), it may be necessary to post an advisory speed or a short regulatory speed limit reduction zone for the specific condition that may require a reduced speed instead of reducing the regulatory speed limit for the entire work zone.

A regulatory speed limit reduction for a short segment in a work zone should only be utilized if the condition requiring the speed limit reduction is at least 0.5 mile in length, otherwise, an advisory speed limit should be deployed. Three or more regulatory speed limit reduction zones within one work zone should be avoided to improve credibility and compliance with the work zone regulatory speed limit.

Regulatory work zone speed limit reductions shall only be requested for the applicable timeframe and type of speed limit reduction to complete the necessary work activities. The designer, field overseer, and Inspector-in-Charge should only request speed limit reductions for the construction phase/stage that may need a reduction.

**EXAMPLE:** A designer or field overseer completes their work zone regulatory speed limit evaluation and it is determined that a speed limit reduction is only necessary for Phase 2 of a four-phase construction project. The designer or field overseer should only request a temporary regulatory speed limit reduction permit via the TE-XXX form for Phase 2 of the construction project. If approved, the regulatory speed limit reduction will only be valid during Phase 2 of construction and the existing regulatory speed limit shall remain in effect for Phases 1, 3, and 4.

### TE-form Evaluation Guidance

The TE-XXX Work Zone Regulatory Speed Limit Reduction Evaluation form defines the minimum data required to be evaluated to determine if a reduced work zone regulatory speed limit is appropriate. As the evaluator begins to populate the TE-XXX form, they should reference both Tables 1 and 2 in this policy to aid in the completion of the form. The numbered rows in both tables correspond to the cell numbers in Section D and E of the TE-XXX form respectively. Table 1 elaborates on the minimum data to be provided and potential data sources for Section D of the TE-XXX form. Table 2 elaborates on regulatory speed limit reduction considerations that should be weighed in Section E of the TE-XXX form before requesting a reduced work zone regulatory speed limit.

The evaluator will need to exercise engineering judgement as to which considerations from Table 2, if any, are applicable to their specific project based on the work activities and project specific data provided in Section D of the TE-XXX form. If minimal considerations from Table 2 are applicable or appropriate due to the type of work or associated costs to implement, the evaluator needs to justify their decisions in Section G of the TE-XXX form and clearly document why a reduced work zone regulatory speed limit is needed. Specifically, the evaluator needs to address the following elements within Section G, Engineering Justification:

- **Design Safety** - Can the work zone be designed per Publication 213 to accommodate the posted regulatory speed limit?
- **Traffic Safety** – What safety benefit would a speed limit reduction provide for motorists beyond that realized through standard or enhanced work zone safety and traffic control methods?
- **Worker Safety** – What safety benefit would a speed limit reduction provide for workers that cannot be provided in the work zone design and operation?
- **ADA, Pedestrian, and Bike Safety (if applicable)** - What safety benefits would be provided for non-vehicular user groups that cannot be provided in the work zone design and operation?

**REMEMBER:** Completion/submission of the TE-XXX form is only necessary when a proposed work zone regulatory speed limit is lower than the current posted regulatory speed limit of the roadway.
Table 1 – Minimum Data for a Work Zone Speed Limit Reduction Evaluation

<table>
<thead>
<tr>
<th>Project Specific Data (Section D of TE-XXX form)</th>
<th>Data Sources/Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Existing regulatory speed limit for each road where work activities are to be conducted. (Road 1 = Primary road where majority of work is conducted, Road 2 = Secondary road where supplementary work activity is to occur, if applicable).</td>
<td>PennDOT Videolog</td>
</tr>
<tr>
<td>2 Existing 85\textsuperscript{th} percentile speeds for both the primary road (Road 1) and secondary road (Road 2) through the use of probe, sensor, or project specific data for typical weekday and weekend travel periods during the anticipated construction months. Specify whether the speed data was measured in the field or estimated from RITIS probe data.</td>
<td>RITIS – Probe data Project Traffic Counts</td>
</tr>
<tr>
<td>3 Traffic volume data (i.e. ADT and Truck Percentage) associated with Road 1 and Road 2 at the start of construction. Specify whether the data was measured in the field or estimated from previously collected vehicle count data/PennDOT TIRE.</td>
<td>PennDOT TIRE Project Traffic Counts</td>
</tr>
<tr>
<td>4 Predicted safety performance of the work zone for Road 1 and Road 2 based on calculated crash frequencies or crash rates. Use predicted HSM models when possible to analyze crash frequencies. When an HSM option is not available, calculate crash rate and refer to the statewide homogenous crash rate of other safety data. Use most recent 5 years of crash data.</td>
<td>PennDOT HSM, FHWA IHSDM, FHWA ISATe</td>
</tr>
<tr>
<td>5 Crash data (most recent 5 years) for Road 1 and Road 2 as it relates to specific crash types, severity, and contributing factors (i.e. speeding and aggressive driving).</td>
<td>PennDOT CDART and PA Crash Information Tool</td>
</tr>
<tr>
<td>6 Type of work operation (i.e. short-term, long-term, mobile) and location of work activities (i.e. median, travel lane, shoulder).</td>
<td>Project Specific TCP or Pub 213</td>
</tr>
<tr>
<td>7 Minimum travel lane width if travel lane restrictions are anticipated (worst case) for both Road 1 and Road 2.</td>
<td>Project Specific TCP or Pub 213</td>
</tr>
<tr>
<td>8 Identification of all types of proposed traffic control devices and if temporary barrier is being used to separate live traffic from workers.</td>
<td>Project Specific TCP or Pub 213</td>
</tr>
<tr>
<td>9 Work zone has active operations during hours of darkness.</td>
<td>Project Specific TCP or Pub 213</td>
</tr>
<tr>
<td>10 Ultimate roadway grade % of a segment at least 0.5 mile in length (greater than +/- 3% may negatively impact capacity and heavy vehicle speeds).</td>
<td>Project Specific Plans</td>
</tr>
<tr>
<td>11 Stopping and/or intersection sight distance restrictions due to temporary alignment or intersection locations for either Road 1 or Road 2.</td>
<td>Project Specific TCP or Pub 213</td>
</tr>
<tr>
<td>12 Lane shifts/transitions/tapers meet requirements for the existing regulatory speed limit for either Road 1 and Road 2.</td>
<td>Project Specific TCP and Pub 213</td>
</tr>
<tr>
<td>13 Crossover design speed is equal to or exceeds the existing regulatory speed limit for either Road 1 and Road 2.</td>
<td>Project Specific TCP and Pub 213/AASHTO Green Book</td>
</tr>
<tr>
<td>14 Work zone elements such as temporary road approaches, intersections, intersection control (such as a temporary signal), or flagging operations have changed the roadway design speed for either Road 1 or Road 2.</td>
<td>Project Specific TCP or Pub 213</td>
</tr>
<tr>
<td>15 Construction access points within the activity area have no acceleration or deceleration areas to improve ingress and egress for either Road 1 or Road 2.</td>
<td>Project Specific TCP or Pub 213</td>
</tr>
<tr>
<td>16 Stop control is provided on at least one interchange ramp termini due to lack of room for acceleration lanes.</td>
<td>Project Specific TCP or Pub 213</td>
</tr>
</tbody>
</table>

Table 1 Notes: Web and network addresses for each of the data sources listed above are as follows:
PennDOT Videolog: http://www.dot7.state.pa.us/VideoLog/index.html
RITIS: https://www.ritis.org/login?r=Lw
PennDOT TIRE: https://www.dot7.state.pa.us/tire
PennDOT HSM: https://www.penndot.gov/TravellnPA/Safety/Pages/Safety-Infrastructure-Improvement-Programs.aspx
CDART: http://164.156.155.62/cdart/ or P:\CDART
PA Crash Information Tool: https://www.dotcrashinfo.pa.gov/PCIT/welcome.html
Pub 213: http://www.dot.state.pa.us/public/PubsForms/Publications/PUB%20213.pdf
Table 2 – Regulatory Speed Reduction Considerations

<table>
<thead>
<tr>
<th>Considerations in Lieu of Reducing the Speed Limit (Section E of TE-XXX)</th>
<th>Essential Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Provide positive protection such as barriers in the advance taper and/or supplemental Truck Mounted Attenuators (TMAs) to protect workers where positive protection is not proposed.</td>
<td>S M DC $$</td>
</tr>
<tr>
<td>2 Provide a lateral buffer space between workers and live traffic, defined by channelization devices, to allow space for minor traffic intrusions or occasional encroachment by workers. A half lane width is desirable, but a minimum of two (2) feet is an acceptable lateral buffer for existing speed limits posted 45 MPH or lower. For an existing speed limit greater than 45 MPH, positive protection or a minimum lateral buffer of a half lane width is preferred.</td>
<td>X X X</td>
</tr>
<tr>
<td>3 Use temporary traffic signals in lieu of flaggers.</td>
<td>X X</td>
</tr>
<tr>
<td>4 Use more closely spaced traffic control devices or sequential lighting on merging tapers to improve work area separation and motorist guidance.</td>
<td>X X X</td>
</tr>
<tr>
<td>5 Use additional warning devices such as temporary rumble strips or portable changeable message signs to warn motorists of changing conditions in the activity area.</td>
<td>X X X</td>
</tr>
<tr>
<td>6 Reduce temporary shoulder or work area width to maintain existing lane widths and/or number of travel lanes.</td>
<td>X X X</td>
</tr>
<tr>
<td>7 Minimize decision point conflicts or confusion through elimination or supplemental signing.</td>
<td>X X X X</td>
</tr>
<tr>
<td>8 Minimize construction access points and provide adequate acceleration and deceleration lanes/areas for any required access points.</td>
<td>X X X</td>
</tr>
<tr>
<td>9 Design effective merge areas to minimize queuing before entering the work zone and to provide adequate distance for vehicles to accelerate/decelerate at on/off-ramps. Eliminate stop conditions on acceleration ramps.</td>
<td>X X X X</td>
</tr>
<tr>
<td>10 Add temporary illumination to improve visibility during unprotected nighttime work or where major geometric changes or high-volume access points exist (i.e. crossovers, multiple lane drops, intersections, on/off ramps, and high-volume construction accesses).</td>
<td>X X X</td>
</tr>
<tr>
<td>11 Use a pilot car to control driver behavior and manage vehicle speeds through the work zone.</td>
<td>X X X X</td>
</tr>
<tr>
<td>12 Deploy Smart Work Zone applications as suggested per FHWA (<a href="https://ops.fhwa.dot.gov/wz/workshops/accessible/pant_paper.htm">https://ops.fhwa.dot.gov/wz/workshops/accessible/pant_paper.htm</a>) to warn motorists of changing conditions in the work zone.</td>
<td>X X X X</td>
</tr>
<tr>
<td>13 Utilize law enforcement for queue protection and enforcement throughout the work zone.</td>
<td>X X X X</td>
</tr>
</tbody>
</table>

Key: S = Safety, M = Mobility, DC = Driver Conformance, $$ = Cost

Review Process for Work Zone Regulatory Speed Limit Reduction Requests

Decision Making

The DTE will ultimately be responsible for approving and issuing the temporary regulatory speed limit reduction permit unless the work zone being evaluated is proposing to implement automated speed enforcement, at which time the BOMO HSTO Division Chief will need to concur with the DTE’s approval. It is the responsibility of the designer or field overseer to clearly justify why a reduced regulatory speed limit is necessary to improve work zone safety. Specifically, the designer or field overseer needs to complete the TE-XXX Work Zone Regulatory Speed Limit Reduction Evaluation form and clearly identify the safety benefits of a reduced work zone regulatory speed limit for workers and all applicable road users (motorists, pedestrians, and bicyclists).
Submission Procedure

Prior to Maintenance and Construction Activities

The following are the steps to request and implement a regulatory speed limit reduction in a work zone prior to the start of maintenance or construction activities:

1) The designer or field overseer (Inspector-in-Charge or Assistant Construction Engineer) requesting the speed limit reduction will work with the appropriate PennDOT Project and/or County Manager to determine if a speed limit reduction is justified. The process includes:
   a) Evaluating the appropriateness of the proposed construction or maintenance methods/techniques being utilized to determine if additional alternatives exist in lieu of reducing the work zone regulatory speed limit.
   b) Submitting a completed TE-XXX Work Zone Regulatory Speed Limit Reduction Evaluation form and applicable supporting documentation (see Section C of TE-XXX form) for the speed limit reduction request to the appropriate DTE prior to start of work activities (maintenance) or with the DFV submission (construction/HOP projects).
      i) Conducting and submitting an official engineering and traffic study if the speed limit reduction request is greater than 10 MPH.

2) DTE will review the submission for appropriate consideration of mitigation strategies and statewide consistency when evaluating work zone regulatory speed limit reductions. The DTE will provide feedback and/or concurrence to the submittee within ten (10) business days of receiving the request. If the DTE concurs, a temporary regulatory speed limit reduction permit will be issued by the appropriate District Traffic Unit.
   a) If a work zone regulatory speed limit reduction is being proposed within an ASEWZ, the DTE shall forward the TE-XXX form with all necessary supporting documentation to the BOMO HSTO Division Chief for concurrence within two (2) business days of the DTE’s initial approval.
      Concurrence from the BOMO HSTO Division Chief will be required prior to the start of work activities (maintenance) or Final Design of Temporary Traffic Control Plans (construction/HOP projects).

3) If a temporary regulatory speed limit reduction permit is issued, the following actions must be completed:
   a) Design Project Manager must ensure the TE-XXX form and temporary regulatory speed limit reduction permit are attached to the Project Development Checklist (PDC) in ECMS.
   b) Department personnel and/or field overseer must ensure that an appropriate speed limit reduction is placed into the Department’s Road Condition Reporting System (RCRS) once it becomes active and removed once it is complete.

4) Project Inspector-in-Charge or Assistant Construction Engineer will be responsible for verifying and ensuring the approved work zone speed limit is posted for each phase/stage of work.
After Maintenance and Construction Activities

The following are the steps to request and implement a regulatory speed limit reduction in a work zone after the start of maintenance or construction activities:

1. The contractor, maintenance, or District personnel requesting the speed limit reduction will work with the appropriate PennDOT Project and/or County Manager to determine if a speed limit reduction is justified. The process includes:
   a) Submitting a completed TE-XXX Work Zone Regulatory Speed Limit Reduction Evaluation form and applicable supporting documentation (see Section C of TE-XXX form) for the work zone speed limit reduction request to the appropriate DTE.
      i) Conducting and submitting an official engineering and traffic study if the speed limit reduction request is greater than 10 MPH.

2. DTE will review the submission for appropriate consideration of mitigation strategies and statewide consistency when evaluating work zone regulatory speed limit reductions. The DTE will provide feedback and/or concurrence to the submittee within five (5) business days from receiving the request. If the DTE concurs, a temporary regulatory speed limit reduction permit will be issued by the appropriate District Traffic Unit.
   a) If a work zone regulatory speed limit reduction is being proposed within an ASEWZ, the DTE shall forward the TE-XXX form with all necessary supporting documentation to the BOMO HSTO Division Chief for concurrence within two (2) business days of the DTE’s initial approval. Concurrence from the BOMO HSTO Division Chief will be required prior to the creation of the temporary regulatory speed limit reduction permit.

3. If a temporary regulatory speed limit reduction permit is issued, the following actions must be completed:
   a) Design Project Manager must ensure the TE-XXX form and temporary regulatory speed limit reduction permit is attached to the Project Development Checklist (PDC) in ECMS.
   b) Department personnel and/or field overseer must ensure that an appropriate speed limit reduction is placed into the Department’s Road Condition Reporting System (RCRS) once it becomes active and removed once it is complete.

4. Project Inspector-in-Charge or Assistant Construction Engineer will be responsible for verifying and ensuring the approved work zone speed limit is posted for each phase/stage of work.