

Technical Publications Committee

Meeting Agenda

1:00 PM August 25, 2021

Google Meet Meeting

E-mail distribution message will include connection instructions

Call to Order

Roll Call of Attendees

Approval of Minutes of 6-17-2021 Meeting

Unfinished Business

- | | | | |
|---|-------------------------------|--------------|---------|
| 3 | DD-666 Impact Attenuators | T. Whitmore | 10-1-20 |
| 4 | DD-105 – Technical Committees | M. Dougherty | 6-17-21 |

New Business

- | | | | |
|---|---|-------------|---------|
| 5 | DD-706 Guidelines for Preparing PS&E, PS&E
Check List, Proposal Work Category Check List | S. Danberry | 8-25-21 |
|---|---|-------------|---------|

Next Meeting – Wednesday November 3, 2021, via Google Meet. Deadline for submissions October 4, 2021.

Adjournment

Technical Publications Committee
Meeting Minutes
June 17, 2021

Meeting was called to order at 1:00 by Chair Martin Dougherty

Attendees:

DOH

Bodnar, David - DD	Dougherty, Martin - DS	Neeley, Barrett - DD
Boyd, Jason - FC	Hall, Joe - DD	Robinson, Chad* - OM
Brayack, Daniel* - FM	Hoover-Trent, Kimberly - OM	Scites, RJ* - DD
Brown, Phillip - FM	Kirk, Douglas - DD	Sizemore, Jess - FM
Conley-Rinehart, Laura - DD	Long, Travis - DS	Smith, Shawn* - FC
Cummings, John - FM	Mongi, Ahmed - DD	

*Voting Delegate

Others:

John Susong – Rinker Pipe	Don McNutt – ACPA	Chet Radabaugh – WV Paving
Sandy Collins-Carmargo – ADS	Yuvonne Smith – FHWA	Bob Brookover – WV Paving
Pat Parsons – CAWV/WVAPA	Tony Anders – Triton	Kyle Stollings – Potesta
Don Lepley - Forterra	Billy Varney - ACEC	

Minutes of April 15, 2021 meeting were approved without objection.

Unfinished Business

DD-666 – Impact Attenuators

There was small discussion on this item; however, due to the large amount of changes presented a vote was not taken to allow further review.

DD-812 – Salvage Value of Materials

Industry had several comments related to agency policy; however, this directive only provides guidance to designers on how to implement the policy established by management. Vote was 4-0 in favor of the revisions.

DD-204 Guidance for Use of CPM Schedules for Projects Under Design

No comments were received. There was no discussion. Vote was 4-0 in favor of the revisions.

DD-503 Selection of Pipe Materials

One written comment was received from the polymer pipe industry regarding expanding the use range of polypropylene pipe. Upon consideration, no change was made to the proposed revisions to this directive. Vote was 4-0 in favor of the revisions.

DD-621 Intersection Sight Distance

No comments were received. There was no discussion. Vote was 4-0 in favor of the revisions.

DD-702 Signing and Sealing Professional Work

No comments were received. There was no discussion. Vote was 4-0 in favor of the revisions.

DD-803 Determination of Contract Completion Date

Previous comments from industry were addressed in the revisions presented. There was minimal discussion. Vote was 4-0 in favor of the revisions.

Standard Detail for Elliptical Concrete Safety End Sections

No comments were received. There was no discussion. Vote was 4-0 in favor of this new drawing.

New Standard Detail - Type X Median Barrier

No comments were received. There was no discussion. Vote was 4-0 in favor of the new drawing.

Rescind Existing Standard Detail GR17 – Type 10 Median Barrier

No comments were received. There was no discussion. Vote was 4-0 in favor of removing this drawing from the standard details.

New Business

DD-105 Specification, Publication, and Material Procedures Approval Process

Proposed revisions were presented. There was no discussion.

Erratum on Existing Standard Detail DR4 Sheet 2 of 2

An error on the drawing was found and the proposed correction presented. Since this is a minor revision and there being no objection from any voting delegate or the FHWA the revision is considered passed.

Next Meeting – Thursday August 25, 2021

Deadline for submissions July 26, 2021.

Adjournment

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

**DESIGN DIRECTIVE 666
IMPACT ATTENUATORS**

Draft of August 19, 2021

First Edition

The purpose of this Directive is to establish the Division's ~~guidelines-criteria~~ for the use of permanent and temporary impact attenuators.

It is critical that designers document in the project file their decision-making process leading to the decision to specify the use of an attenuator in lieu of other options.

~~The scope of this Directive includes a description and explanation of attenuators, guidelines as to when attenuators should be incorporated, attenuator type selection and specification, and additional related design considerations.~~

~~Sections 4 of this Directive provides the information the Designer needs to properly specify an attenuator for a project. Sections 1 through 3 provide primarily background information. However, it is important that the Designer have an understanding of the information provided in these sections such as how the devices function, how they are categorized, and when their use is warranted.~~

SECTION 1 - IMPACT ATTENUATOR GENERAL DESCRIPTION

Attenuators are traffic safety devices that prevent errant vehicles from impacting ~~fixed-hazardous~~ objects. Attenuators have the ability to shield the object from vehicles approaching from the front and typically either side. Attenuators function during ~~front-~~head-on impacts by gradually decelerating vehicles to a safe stop. During side impacts, attenuators are designed to either function as a rigid barrier which redirects vehicles away from the attenuator and object (non-gating), or to allow penetration by the vehicle and bring it to a safe gradual stop (gating). ~~or to capture the vehicle and bring it to a gradual safe stop (gating).~~ ~~Note, m~~Most non-gating devices have a "Length-Of-Need" (LON) point some distance downstream from the nose of the device, though in most cases the distance is small relative to the overall device length. ~~Regardless, note that t~~These devices should be considered to be completely gating when a side impact occurs upstream of the LON point. ~~; that is, it should be assumed that s~~Side impacts upstream of the LON point will result in the vehicle passing through and beyond the opposite side of this type attenuator.

SECTION 2 – DETERMINATION OF NEED

Although impact with an attenuator may be preferable to impact with a fixed object, the use of an attenuator may actually increase the likelihood of an impact due to its closer proximity to the roadway and in many cases, its more formidable size in relation to the object that the attenuator shields.. Attenuators should only be utilized when other options recommended in the AASHTO *Roadside Design Guide* (RDG) have been considered and it is determined that an attenuator is the most practical and/or cost-effective solution. Other options include removing the object, relocating the object to a location where shielding it will not be required as defined in the RDG, making the object itself "crashworthy" as defined by other standards, or shielding the object with another

device. An attenuator should not be selected to shield the end of a run of single faced guardrail unless unique circumstances require otherwise. Typically, a less costly guardrail Tangent or Flared End Terminal, as appropriate, should be utilized. The most common application for attenuators is to shield the upstream end of concrete or double-faced guardrail median barrier. To a lesser extent, attenuators are frequently placed in the back of interchange exit gore areas, most commonly on elevated roadways where concrete parapets converge at the back of the gore.

The RDG lists typical fixed objects that generally merit shielding when located within the clear zone.

It is critical that designers document in the project file their decision-making process leading to the decision to specify the use of an attenuator in lieu of other options.

SECTION 3 – CLASSIFICATION OF IMPACT ATTENUATORS

Attenuators may be classified based on, but not limited to, gating characteristics, [design](#) impact speed ~~design~~, maximum width of the object to be shielded, and intended application.

SECTION 3.1 – SPEED CATEGORIZATION AND TEST LEVELS

Attenuators are subject to industry crash testing requirements mandated by the FHWA. Current crash testing requirements are contained in the AASHTO publication *Manual for Assessing Safety Hardware* (MASH), latest edition. Testing parameters and performance requirements are established within MASH for different Test Levels, which ~~are primarily defined by the impact speed used in the testing. Designers for the WVDOH shall specify the attenuator test level to be used based on Table 4.1. for the scope of this discussion are distinguished from one another by the velocity of the impacting vehicle. For the purposes of attenuators, the two relevant Test Levels are Test Level 2 (TL-2) and Test Level 3 (TL-3). The TL-2 parameters require an impact speed of 70 Kilometers Per Hour (Km/h), or 43.5 Miles Per Hour (MPH). The TL-3 parameters require an impact speed of 100 Km/h, or 62.1 MPH.~~

~~The WVDOH recognizes and refers to these Test Levels for the purpose of specifying attenuators for particular applications. Designers for the WVDOH shall specify the attenuator test level to be used based on the table provided in Section 4.~~

When determining the appropriate Test Level ~~device criteria~~ to be used for a temporary work zone application, ~~this the test level~~ is to be based on the normal posted speed limit of the roadway and not the temporary reduced speed limit that will be in effect during construction, [see table 4.1](#).

SECTION 3.2 – GATING CHARACTERISTIC CATEGORIZATION

Attenuators may be categorized as gating or non-gating. Non-gating attenuators are designed to safely decelerate impacting vehicles during front on impacts. Beginning at the nose or a short distance downstream of the nose of the attenuator, they are designed to perform essentially the same as a rigid longitudinal barrier during side impacts by redirecting the vehicle downstream. For ~~front-end~~[head-on](#) impacts, gating attenuators perform essentially the same as non-gating attenuators. During side impacts, ~~they are designed to capture~~[gating attenuators allow penetration](#) and gradually decelerate the vehicle and do not have any ability to redirect vehicles. Gating attenuators ~~are typically~~[are](#) sand barrel arrays. One ~~fallacy~~[inherent performance concern](#) of sand barrels is their inability to adequately prevent impacts that result in excessive vehicle decelerations when a side impact occurs near the back of the array. In some cases, the vehicle may impact only

one of the barrels before impacting the fixed object. Due to this and other concerns, gating attenuators should ~~be avoided if possible and~~ only be utilized for temporary work zone or emergency applications, and should only be used for those applications when it is not possible or feasible to use a non-gating device. This is typically only the case when the object to be shielded is relatively wide. For permanent applications, manufacturers offer non-gating attenuators that are designed to shield relatively wide objects.

SECTION 3.3 – WIDTH CATEGORIZATION

Non-gating attenuators are typically manufactured in various models to accommodate a range of maximum object widths, typically ranging from 24-inches to 120-inches. Attenuators are not designed to be adjustable in width. Different models of the same attenuator are manufactured with each model designed to shield a set maximum width object. Typically, attenuators designed to shield objects greater than 36-inches in width are designed such that the sides of the attenuator taper outward from front to rear in order to achieve the design width, and ~~a~~Attenuators designed to shield objects 36-inches or less in width are designed such that sides of the attenuator do not taper.

In some cases, particular manufacturers do not offer models of an attenuator in design widths greater than the maximum width non-tapered model. Under certain circumstances, a non-tapered model may be acceptably used for shielding an object wider than the model design width. This can be accomplished if the manufacturer offers a rigid, crash-tested, tapered transition system that can be used to transition from the rear of the device to the object. However, in this case the overall installation length will be greater and may not be desirable due to additional reduction of the traversable area across the gore.

Gating devices such as sand barrels can typically be designed to accommodate any width object by simply adding additional barrels to the array.

SECTION 4 – SELECTION AND SPECIFICATION OF IMPACT ATTENUATORS

The guidance herein reflects the capabilities of the products that are currently available and is subject to modification based on changes to the Approved Products List (APL). Designers are encouraged to review the APL of available products then review properties and correct application of each.

Permanent Impact Attenuators

The bid item to be used for each permanent attenuator installation is to be one of the following:

- 664015-* Impact Attenuating Device, C-1, TL-2, "Design Width in Inches"
- 664016-* Impact Attenuating Device, C-1, TL-2, 36+"
- 664020-* Impact Attenuating Device, C-1, TL-3, "Design Width in Inches"
- 664021-* Impact Attenuating Device, C-1, TL-3, 36+"
- 664025-* Impact Attenuating Device, C-2, TL-3, 24"

The "Design Width in Inches" portion of items 664015 and 664020 are supplemental descriptions to be determined by the designer. These are explained below.

The C-1 and C-2 descriptions in the bid items refer to the device Class Number. The Class Numbers are defined as follows:

- Class 1: Non-Gating Impact Attenuator requiring a concrete pad or bridge deck

- Class 2: Non-Gating Impact Attenuator with driven or drilled support posts not requiring a concrete pad. **Class 2 devices are to only be considered when shielding is required at the end of a run of double faced guardrail.**

Designers shall coordinate with the Traffic Engineering Division in order to make the determination considering grading, location, test level, and item selection.

Class 2 devices are generally less costly but more sacrificial than Class 1 devices typically requiring almost complete replacement after a design impact. Both classes of devices offer the same level of protection in an impact. However, the design of Class 2 devices gives less consideration to time and monetary cost of repairs. If it is determined that an attenuator may be subject to an elevated increase in impact frequency and/or severity, a Class 1 device should be considered. Designers should consult with the Traffic Engineering Division as needed in order to make this determination, use best judgement to make this determination. Factors to consider include, but are not necessarily limited to, proximity of the device to the roadway, horizontal curvature of the roadway, amount of traffic (ADT) along the roadway, and operating speed of the roadway. For example, double faced guardrail is typically used to separate the adjacent ramps at partial cloverleaf interchanges. Although the device will be in close proximity to the roadway, operating speeds will be relatively low. A Class 2 device would typically be acceptable in this situation. However, along the mainline of an expressway having an operating speed of 65 mph and an ADT of 50,000, Class 1 would be a better choice for a device within the same proximity of the roadway. Limitations on the placement of the device and the increased portion of the front of the device that must be considered gating with Class 2 devices may also be a factor.

The TL-2 and TL-3 descriptions in the bid items refer to the crash testing Test Level. The Test Levels are required as follows:

Design or Operating Speed	Speed Limit*	Test Level
≤ 43.5 MPH	≤ 40 MPH	2
> 43.5 MPH	> 40 MPH	3

* - In the absence of design or operating speed data

TABLE 4.1

For the design width portion of the supplemental description, designers should follow the following guidance:

Object Width	Device Width to be Specified	Additional Notes
≤ 24 inches	24	<u>24-in wide devices are appropriate for existing and proposed constructed barriers that do not exceed 24-inches in width at the base. 24-inch wide devices are appropriate for existing F-shape and NJ-shape barriers, as well as the Type 10 median barrier shown in the Standard Details, Vol. I.</u>
> 24 inches and < 30 inches	30	<u>30-in wide devices are appropriate for existing and proposed barriers that exceed 24-inches, but do not exceed 30-inches, in width at the base. 30-inch wide devices are appropriate for existing Type VII single slope barriers.</u>
> 30 inches and ≤ 36 inches	36	
> 36 inches	36+	

TABLE 4.2

Typically, manufacturers offer non-tapered models in 24, 30, and 36-inch widths, or can accommodate a 30 and/or 36-inch object using a 24-inch design width model and specially designed transition panels at the rear of the device. There is no uniform set of “standard” design widths for the tapered models designed to accommodate widths greater than 36-inches.

For example, if the designer determines that a 24-inch wide, Test Level 3, Class 1 device is required, the bid item number and complete description would be:

664020-* - Impact Attenuating Device, C-1, TL-3, 24

Designers are not responsible for the design of many of the details associated with an attenuator installation. This includes specific placement, anchoring, pad design, transitions, etc. These details are to be determined and specified by the device manufacturer in the required shop drawings and submitted by the Contractor for approval, and followed by the Contractor. The primary concern of the designer should be to provide a proper template with the design of the roadway, barriers, shoulder, median, and gore areas to ensure that an attenuator can be chosen and installed by the Contractor that can be properly installed meeting the requirements of the RDG and the device manufacturer. This also includes producing plans that provide a clear representation of the specific site conditions that exist or that are to be constructed, including all cross slopes and longitudinal grades as well as allowable variances in these slopes so that the device manufacturer can provide the proper site-specific recommendations for the installation. The Additional Design Considerations section See Section 5 of this directive provides for additional guidance for designers in this regard.

Temporary Impact Attenuators

The bid item to be used for each temporary attenuator installation is to be one of the following:

- [636060-002 Remove and Reset Attenuator Device](#)
- 636060-015 Temporary Impact Attenuating Device, C-1, TL-2
- 636060-020 Temporary Impact Attenuating Device, C-1, TL-3
- 636060-021 Temporary Impact Attenuating Device, C-3, TL-2
- 636060-025 Temporary Impact Attenuating Device, C-3, TL-3

The C-1 and C-~~2~~³ descriptions in the bid items refer to the device Class Number. The Class Numbers options are defined as follows:

- Class 1 ([C-1](#)): Non-Gating Impact Attenuator.
- Class 3 ([C-3](#)): Gating Impact Attenuator.

~~The TL-2 and TL-3 descriptions in the bid items refer to the crash testing Test Level. The Test Levels options are defined as follows:~~

- ~~• TL-2: To be specified where the normal posted speed limit is 40 MPH or less~~
- ~~• TL-3: To be specified when the normal posted speed limit is greater than 40 MPH~~

The width of the obstacle is not specified as part of the temporary attenuator bid item. Standard Class 1 devices owned and utilized by industry for temporary applications are typically 24-inch design width, and determination of the Class device to be specified should be based on this. Typically, a 24-inch design width Class 1 device will be acceptable with any of the various temporary longitudinal barriers that a Contractor may choose to utilize. Manufacturers also typically have specialized anchoring options available for temporary Class 1 devices placed on top of base stone, asphalt, or a combination thereof rather than concrete. In cases where a Class 3 device must be specified based on the obstacle width, the Contractor will be responsible for determining the appropriate model and/or manufacturer recommended design of the device based on the required width and specified Test Level.

For example, if the designer determines that a Test Level 2, Class 1 device is required, the bid item number and complete description would be as follows:

636060-015 - Temporary Impact Attenuating Device, C-1, TL-2.

Note, Section 636 of the Specifications also includes bid item 636060-002 - Remove and Reset Attenuator Device. The quantity of each temporary device bid item specified for a project should be equal to the maximum number of devices falling under that bid item to be in place on the project at a given time. The quantity of Item 636060-002 specified for a project should recognized the availability of a “Temporary Impact Attenuating Device” for the next phase of a project using the Remove and Reset pay item.

SECTION 5 – ADDITIONAL DESIGN CONSIDERATIONS

The typical overall length and length of need (LON) point (see Section 1) for the classes of devices described are pertinent to portions of the items of discussion in this Section. These values can of course vary based on the specific model device utilized. Table 5.1 provides values that the designer

may reference for design purposes. Exact lengths for specific models are available in the manufacturers' literature.

Class	Test Level	Length (ft)		LON Point (ft)
		Non-Tapered (\leq 36-inches)	Tapered ($>$ 36-inches)	
1	2	10-15	10-20	0-3
1	3	20-25	20-25	0-3
2	2	n/a	n/a	n/a
2	3	25-40	n/a	15-20
3	2	22		n/a
3	3	40		n/a

Table 5.1

Designers should take into account that when a Class 1 or 2 device is installed to shield the end of a run of double faced guardrail, a transition is required between the w-shape or thrie beam guardrail and the thrie or quad beams of the attenuator. These transitions are included in the attenuator bid item. It is the responsibility of the Contractor to determine [and provide the needed transition](#) and [provide the transitions install per the manufacturer's specifications](#). These transitions may be fairly significant in length based on the specific device used, typically ranging from 5-25 feet for w-beam guardrail and 5-20 feet for thrie beam guardrail.

One [suggested way method](#) for the designer to deal with the variance in device and transition lengths for different devices would be to specify the station number for the nose of the attenuator for each location and require the Contractor to adjust the station number for the end of the double faced guardrail or concrete barrier based on the nose location, length of device, and length of transition.

Approaches to Impact Attenuators

One of the most important considerations for the area leading up to and adjacent to all attenuator installations is the need for these areas to be nearly uniform in longitudinal and [lateral cross-slope](#). [All crash testing that is conducted by manufacturers is conducted under these conditions.](#)

The [nose approach](#) area leading up to the installation should be considered to begin a minimum of fifty (50) feet in advance of the estimated location of the nose of the device. If the device may be subjected to side impacts by vehicles approaching from the rear, such as when the device is installed in a median, the [rear approach](#) area leading up to the device should ~~also~~ be considered to begin a minimum of fifty (50) feet in advance of the estimated location of the rear of the device. The area adjacent to the installation should be considered to run all the way along the length of the device and ending at the beginning of the object being shielded. Figure 5.1 shows the areas leading up to and adjacent to an impact attenuator in a bi-directional traffic application.

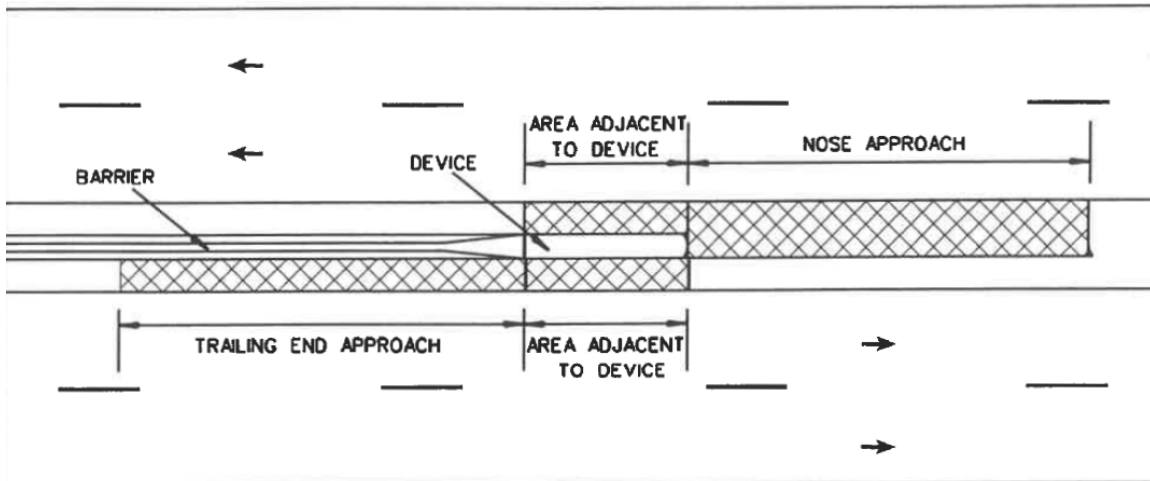


Figure 5.1

If the approach areas are non-uniform, the vehicle may impact the device with its suspension compressed or extended, or with the vehicle yawing, pitching, and/or rolling. In many cases, this may result in attenuator performance being below its crash test performance, or even completely ineffective. The two roadside characteristics that most frequently cause difficulties in achieving a level and uniformly sloped area leading up to and adjacent to the installation are slope and curbs.

Designers should not specify curbs to be built along the area leading up to and adjacent to where an attenuator is to be installed. If curb is necessary [the minimum profile necessary shall be used and](#), the following guidelines shall be followed:

Design or Operating Speed	Speed Limit*	Curb Guidelines (see DD-663 for curb types)
< 45 MPH	≤ 35 MPH	Only Types II, III or IV curbs are Curb as high as six (6) inches with a mountable face is undesirable but acceptable if the face of the curb will be a minimum of eight (8) feet outside of the near face of the device. Type I curbs shall not be used.
45-50 MPH	40-45 MPH	Curb as high as four (4) inches with a mountable face is undesirable but Only Type IV curb is acceptable if the face of the curb will be a minimum of thirteen (13) feet outside of the near face of the device. Types I, II, and III curbs shall not be used.
>50 MPH	>45 MPH	Curb shall not be used. No guidelines exist which allow for the use of curb along the area leading up to and adjacent to where an attenuator is to be installed when the traffic speeds at the location are higher than those specified above.

* - In the absence of design or operating speed data

Existing attenuator locations should be reviewed to determine if the presence of a curb is likely to affect the performance of the device if the above guidelines for new construction are not met, and if so, consideration should be given to making appropriate modifications when major roadway rehabilitation is being performed to bring the location into compliance with the above guidance. In general, a curb no higher than four (4) inches should be considered to be acceptable to be left in

place at existing locations. Locations where the design or operating speed is 45 MPH or greater, or if the posted speed limit is 40 MPH or greater in the absence of design or operating speed data, and where the slope of the face of the curb is greater than 1V:3H should be of particular concern.

Once off of the traveled way and shoulder, The cross slope in the area leading up to and adjacent to where an attenuator is to be installed should be 1V:10H or flatter in order to avoid deviations of the vehicle bumper height from its normal position after the vehicle leaves the traveled way and paved shoulder. In addition, the cross slope of the area where the attenuator is to be placed should be 1V:11 H or flatter.

Sight Distance

The attenuator devices discussed herein are normally about the same height as the rigid barriers and guardrails that they typically shield. When considering sight distance criteria, designers should take this and the lengths of the devices and transitions into account. Figure 5.2 demonstrates a situation where the designer would take the device length into account when determining placement so that drivers turning left onto the expressway from the intersecting road will be provided the WVDOT and AASHTO Green Book required sight distance.

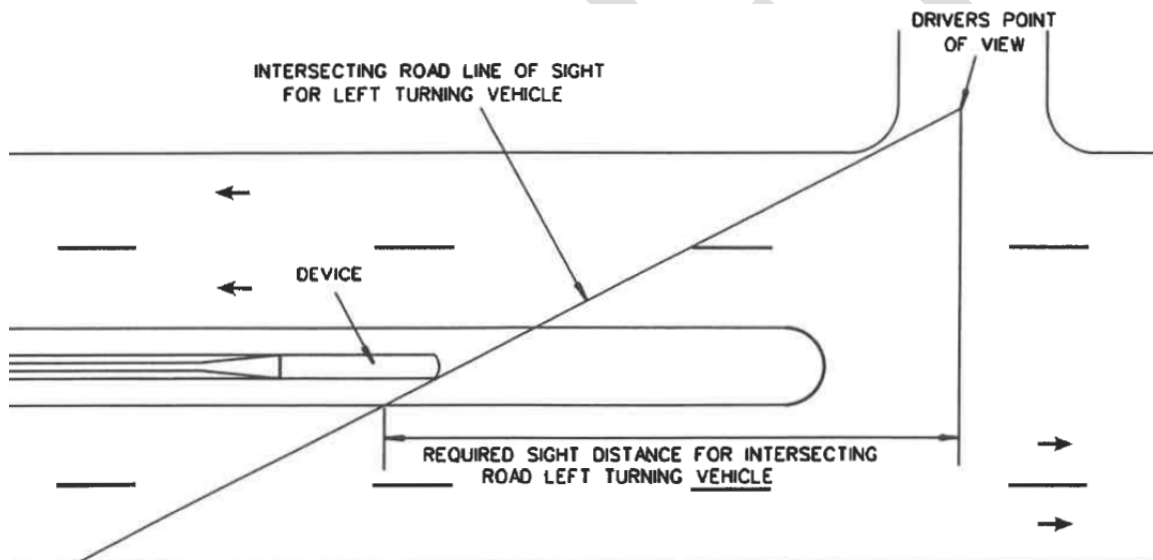


Figure 5.2

Impact Attenuator Accommodating Transitions

In most cases, attenuators are used at the beginning of a run of another type of barrier. This may be a concrete median barrier, double faced guardrail, or at the beginning of two diverging runs of concrete parapet or guardrail in the rear of a gore area. Designers should design the beginning of these barriers so that the attenuator can be easily and properly transitioned to the barrier. The preference of the WVDOT is that these preferred designs design- be such that a 24-inch wide Class 1 or 2 device, as appropriate, that can be connected directly to the transition. This avoids the need for an additional device manufacturer proprietary transitions or wider tapered devices.

If the attenuator is to be used to shield the beginning of a double faced guardrail section, whether it is at the beginning of a long run of double faced guardrail or it is at the rear of a gore area where

the faces of the guardrail diverge away from one another, the double faced guardrail should be terminated at an appropriate point and the attenuator manufacturer provided transitions will be used to transition from the attenuator to the double faced guardrail w-beam or thrie beam. This would be used when the recovery area is insufficient and cannot be corrected. As an example, for a gore area with guardrail adjacent to the ramp and mainline and it is determined that an attenuator is necessary in lieu of separate guardrail end terminals spaced adequately apart, it is necessary that the two guardrail faces run parallel to one another for a short distance and that the end view of the barrier appear as is shown on Standard Details Book Volume I Sheet GR3 with the beams being at the same elevation. It is recommended that the two guardrail faces run parallel to one another for a minimum distance equal to the length of a standard section of guardrail, 12'-6". Figure 5.3 below shows an example drawing of this.

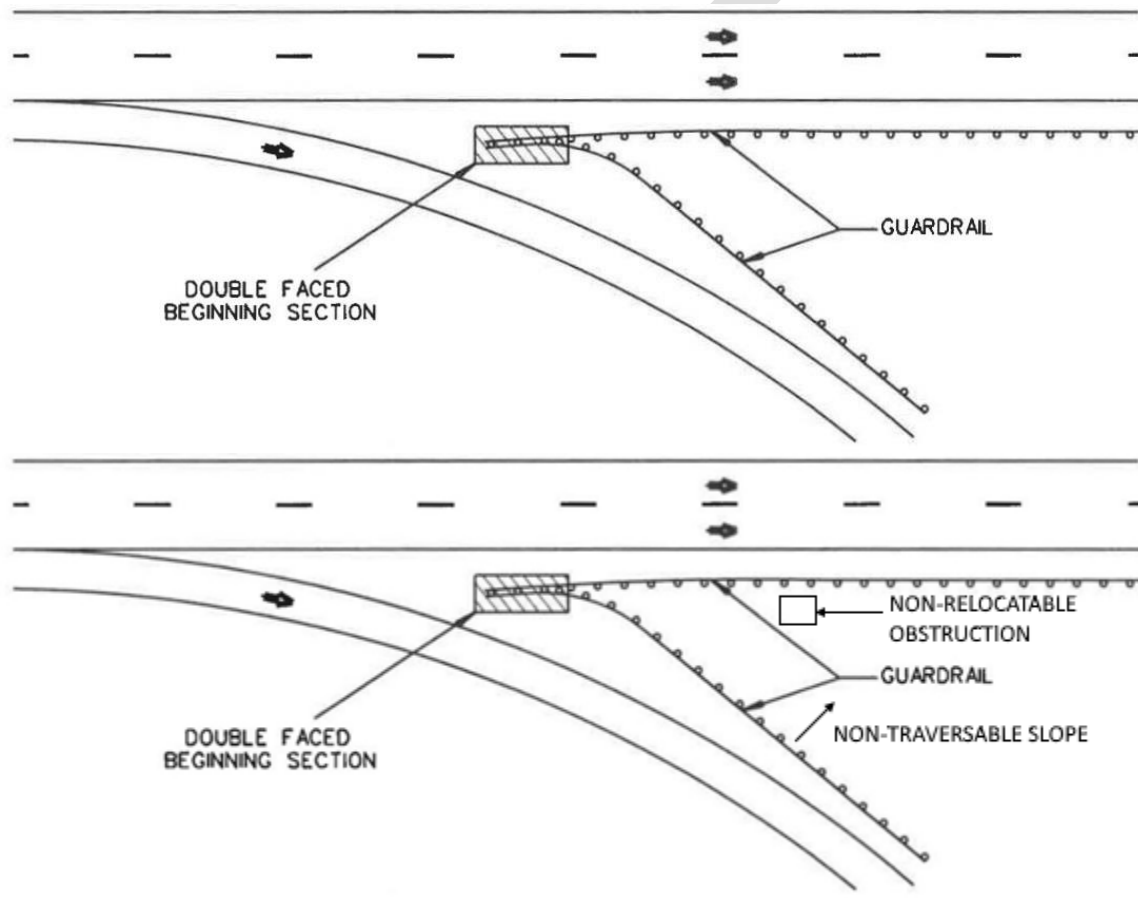


Figure 5.3*

*Figure 5.3 depicts a situation where penetration within the perimeter of the guardrail is unacceptable due to terrain issues that cannot be addressed by grading, or other features or obstacles that cannot be addressed by removal or other means. Depending on the site conditions, alternative designs or devices may be more desirable or appropriate. If there is ample gore traversable area and therefore frequent impacts of the nose are not expected, a thrie beam bull nose treatment may be more cost effective. If penetration by vehicles approaching the nose is acceptable, separate tangent end terminals for each run of guardrail with proper lateral spacing between each may also be more cost effective and will provide for more ease of access within the perimeter for routine maintenance activities.

If the attenuator is used to shield the end of a concrete median or shoulder barrier, a transition should be included as part of the construction of the start of the barrier. More specifically, the barrier should begin as a twenty-four (24) inch wide by thirty-two (32) inch tall by thirty (30) inch long block, and should be transitioned to the barrier shape over a length of five-feet three-inches (5'-3") beyond the rear of the block. In addition, a six (6) inch chamfer should be incorporated on the left and right sides of the front face of the block to prevent wheel snagging. Figure 5.4 shows an isometric representation of the concrete block and an example transition from the block to a single slope barrier shape.

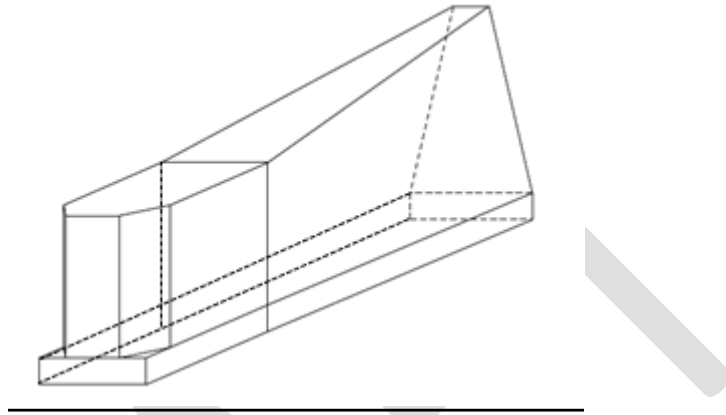


Figure 5.4

Typically on elevated structures, parapet walls are initiated on either side of the gore area near the rear. The barriers should be initiated with the same twenty-four (24) inch wide by thirty-two (32) inch tall by thirty (30) inch long block described previously, and each barrier should be transitioned to the parapet shape over a length of five-foot three-inches (5'-3") as the parapets diverge from one another. Figures 5.5 and 5.6 below show example isometric and plan view drawings of this concept.

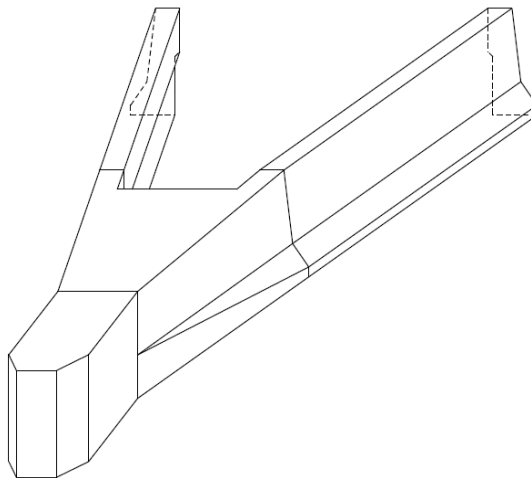


Figure 5.5

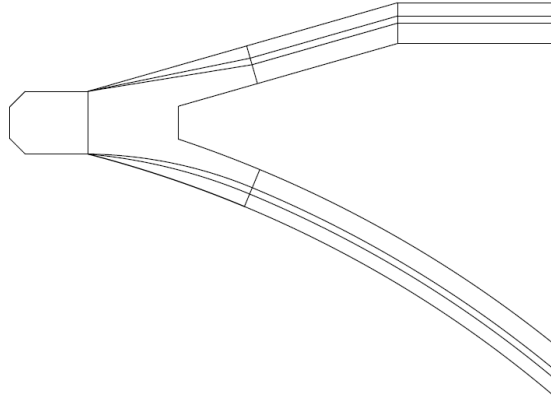


Figure 5.6

Maintenance Considerations

Maintenance personnel and Contractors must access attenuators to perform inspections and repairs when the devices are damaged, ideally with minimal required traffic control such as lane closures, and minimal exposure of personnel to surrounding traffic hazards. This should be taken into account when designing medians, shoulders, and gore areas. Designs that lessen the likelihood of impacts should also be implemented as much as possible. Generally, this is achieved by creating as much distance between the device and traffic as reasonably possible.

Typically, maintenance personnel are required to reset Class 1 devices by pulling on the front of the device using chains and a pickup truck. In gore areas, ideally the gore area should be designed such that the gore maintains a width of twelve (12) feet for a minimum distance of about twenty-five (25) feet in front of where the nose of the device will be expected to be. Preferably, the gore area should also ideally be designed such that a pickup truck can be placed alongside the device while not encroaching into the roadway with additional room to spare. Therefore, distances of approximately ten (10) feet minimum should be maintained in these areas. These needs should also be taken into consideration as applicable, and accommodated within reason, in the design of attenuator installations in medians and along shoulders.

Another factor to consider for gore areas is the amount of traversable recovery area provided between the front of the gore and the device for vehicles making erratic maneuvers across the front of the gore area to avoid missing an exit. A reliable metric that can be used for quantifying and comparing this is demonstrated directly below in Figure 5.7.

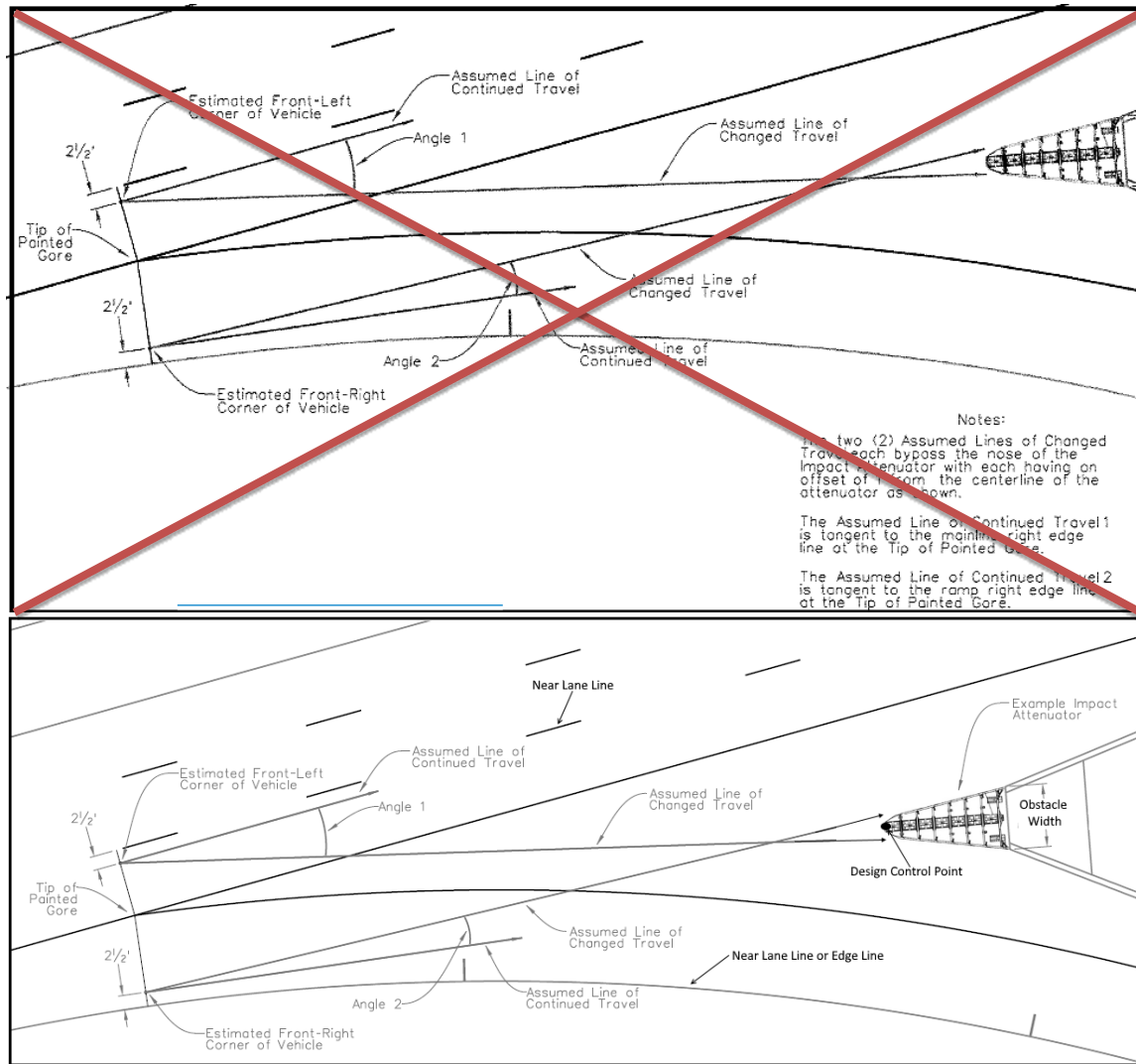


Figure 5.7*

***The Design Control Point is located at the point where the nose of the device is expected to be located and in line with the expected device centerline. The paths of each of the Assumed Lines of Changed Travel are offset one (1) foot laterally from the Design Control Point. The path of each of the Assumed Lines of Continued Travel are tangent to, and offset two-and-one-half (2-1/2) feet laterally from, the path of the near lane line or edge line where the Assumed Lines of Continued Travel begin.**

After estimating the approximate location of the nose of the attenuator, if the gore area can be designed such that Angles 1 and 2 are minimized this will provide maximal recovery area and lessen the likelihood of impacts. Based on past experience with various attenuator installations, the ideal scenario would be to have Angles 1 and 2 both less than 10 degrees. The next best scenario would be to have no more than one of these angles greater than 10 but less than 15 degrees. Angles greater than 15 degrees will cause difficulty for vehicles to cut across the gore area and avoid an impact with the device. Of course, in most cases one of these angles will be more critical than the

other based on the configuration. Typically, this would be Angle 1. The designer should also take this into consideration in their design.

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APPENDIX A – CONTRACTOR DEVICE SUBSTITUTION REQUIREMENTS

As described in Section 664.2 of the Specifications, the Contractor may at their option elect to utilize a 36-inch wide or less non-tapered Class 1 device in lieu of a 36-inch + wide tapered device in order to shield gore area objects greater than 36-inches in width. This shall not have a significant effect on the amount of recovery and maintenance area provided in the front of the gore area.

Refer to Section 5, the subsection on Maintenance Considerations, and Figure 5.7. If the Contractor elects to propose substituting a non-tapered device for a tapered device as described above, the following shall be included with the Contractor's shop drawing submittal:

- Project plan sheet showing the gore area and object to be shielded with a scaled drawing of the tapered device selected by the Contractor imposed onto the drawing. Angle 1 and Angle 2 shall be measured and labeled on the drawing. The drawing shall also show the distance in front of the nose of the device for which the gore area width is at least 12-feet.
- Identical project plan sheet with a scaled drawing of the non-tapered device and manufacturer recommended rigid transition imposed onto the drawing. Angle 1 and Angle 2 shall be measured and labeled on the drawing. The drawing shall also show the distance in front of the nose of the device for which the gore area width is at least 12-feet.

The plan sheets shall demonstrate that Angle 1 on the drawing showing the non-tapered device will conform with the following:

- < 10 degrees if Angle 1 on the drawing showing the tapered device is < 10 degrees
- < 15 degrees if Angle 1 on the drawing showing the tapered device is < 15 degrees

The same criteria shall apply to Angle 2.

In regard to the distance in front of the nose of the device for which the gore area width is at least 12-feet, this distance on the drawing showing the non-tapered device shall be 25-feet or more if this distance is 25-feet or more on the drawing showing the tapered device.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

DESIGN DIRECTIVE 105
SPECIFICATION, PUBLICATION, AND MATERIAL PROCEDURE
APPROVAL PROCESS
Draft of August 9, 2021
Supersedes August 1, 2019

This Design Directive outlines the procedure that has been accepted by the Division for preparing and processing proposed Specifications and Special Provisions, Standards, Manuals, Publications, and Material Procedures for approval. The Publications Section of the Technical Support Division consists of three units, Specifications, Standards, and Manuals. The Materials Control, Soils, and Testing Division is the home division of the Materials Procedures Manual.

10. Specifications

The general processing of Specifications and Special Provisions is administered through the ~~Contract Administration Division~~ Technical Support Division by the Specification Engineer.

Standard Specifications will be issued periodically as the need dictates. Supplemental Specifications to accompany the Standard Specifications are issued annually on January 1st and are effective on all projects let to contract thereafter. Each new Supplemental Specification replaces the previous one and incorporates changes from all previous supplemental specifications.

A searchable version of the Standard Specifications book and Supplemental Specifications is available from the Specifications webpage, located online at <http://transportation.wv.gov/highways/contractadmin/specifications/>

10.1 Procedure for Processing Specification Changes

Permanent specifications changes to the Standard Specifications or Supplemental Specifications should be submitted electronically to DOHSpecifications@wv.gov by the 'champion'. The originating Division will prepare the specification changes in a format conforming to Design Directive 820. A brief overview of the item and background information with reason for the changes should accompany the request.

The Specifications Engineer will review all recommendations received and transmit to the Specifications Committee for action. The champion should attend all committee meetings pertaining to their respective specification. A proposed specification must be presented at two committee meetings before it can be recommended or rejected by the Specifications Committee.

10.2 Procedure for Processing Special Provisions for Individual Projects

There may be a need to use an innovative product or an experimental procedure to address unique demands of a project. Often, these items are not covered by existing

specifications, so they may require new or modified specifications to describe their material requirements, construction requirements and payment. Special Provisions (SPs) are written to address these situations.

Before drafting a SP, check with the Specifications Engineer (or ProjectWise folder: [Approved Project Specific Provisions \(PDF\)](#)) to determine if a SP already exists that meets the needs of the project.

SPs are processed as outlined above in 10.1. In general, the originating Division should submit proposed SP at least six months prior to their project's PS&E submission. This provides adequate time to process and resubmit any changes that may be requested by the committee.

When time does not permit this procedure, the following procedures should be followed:

- a. The originating Division will prepare the draft Special Provision in a format conforming to Design Directive 820, coordinating with the ~~Contract Administration Division~~ **Technical Support Division**, Specifications Engineer for review, comment, assignment of an appropriate section number and/or pay item number.
- b. The originating Division will secure the approval of the Applicable Deputy State Highway Engineer and the Federal Highway Administration as appropriate for that project. The approval of the Special Provision would only apply to the specific project. The submission for approval shall follow Design Directive 202 and may only encompass the PS&E package for advertising the project.

There are Project Specific Special Provisions that require management approval prior to their use on projects. These are listed in ProjectWise subfolder title "Requires Management Approval". The Project Manager shall provide justification of why the SP is needed to the ~~Appropriate~~ Deputy State Highway Engineer —~~Construction & Development~~ for approval.

10.3 Specifications Committee

The Specifications Committee review and recommend actions to proposed Specifications and Special Provisions. The committee meets on call by the Specifications Engineer with regular meetings scheduled every other month and follow the Open Government Meeting Act. Details of this act are available at: <https://ethics.wv.gov/openmeetings/Pages/default.aspx>.

The Specifications Committee consists of voting and non-voting members who provide expertise to review and recommend action of the proposed Specifications and Special Provisions. The committee requests comments on the provisions in the meeting agenda; and review/discuss them during the meeting. The committee meeting agenda will designate the items that are up for approval and dependent upon comments/discussion/changes the Specifications Engineer has the right to call for a vote on the final version.

The voting members consist of one representative from each of the following Divisions:

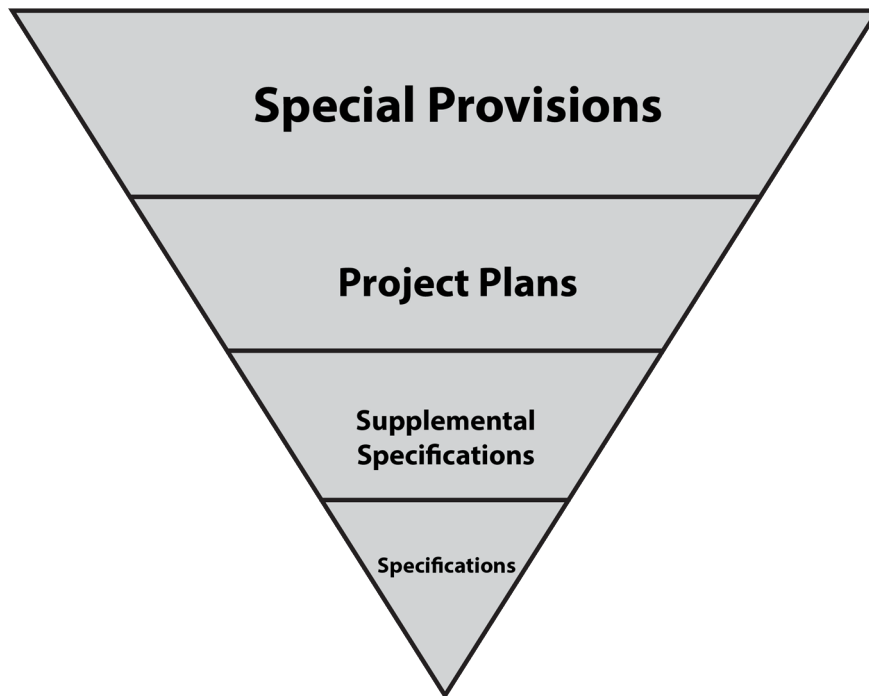
- Engineering Division
- Materials Control, Soil and Testing Division
- Traffic Engineering Division
- ~~Maintenance~~ **Operations** Division
- Contract Administration Division

A quorum of 3 voting members must exist for the meeting to be valid. A majority of the present voting members is required to pass the proposed item. The Specifications Engineer shall have the authority to cast the deciding vote when a tie occurs. All approved specification changes will be sent to FHWA for comment and concurrence.

The non-voting members consist of one or more representatives from the following agencies: Federal Highway Administration, Contractors Association of West Virginia, ACEC – WV, Asphalt Pavement Association of West Virginia, American Concrete Pavement Association, Builders Supply Association of West Virginia, various vendors, and anyone from the Division or Industry that has knowledge of the specifications being discussed.

10.4 Coordination of Specifications, Special Provisions, and Project Plans

The Specifications, Supplemental Specifications, Special Provisions, and project plans are essential parts of the Contract; and a requirement occurring in one is as binding as though occurring in all. In case of discrepancy, Supplemental Specifications will govern over Specifications; Plans will govern over Specifications and Supplemental Specifications; Special Provisions will govern over Specifications, Supplemental Specifications, and Plans as prescribed in Section 105.4 of the Standard Specifications. Below is a graphic display of the hierarchy of contract documents; where the items shown above, govern over items below it.



Project plans or plan notes should not be used to change specifications. The procedure outlined in this Design Directive should be utilized when this is necessary.

20. Publications Standards and Manuals

The general processing of ~~Publications Standards and Manuals~~ is administered through the ~~Technical Section of the Engineering Division~~ Technical Support Division by the ~~Standards/Publications~~ Unit Leader and the Manual Unit Leader.

~~Standards and Manuals~~ Publications will be issued periodically as the need dictates. Each revised ~~Publication edition~~ supersedes the previous one and incorporates changes from all previous ~~Publications~~ editions.

~~These publications~~ Publications are available in electronic format on the Division of Highways' Engineering Division Publications webpage, located online at <https://transportation.wv.gov/highways/engineering/Pages/publications.aspx>.

20.1 Procedure for Processing Publication Standards or Manuals Changes

Proposed changes to any of the Division of Highways' ~~Publications Standards or Manuals~~ should be submitted electronically to the ~~Engineering Technical Support~~ Division's ~~Standards or Manuals~~ Standards/Publications Unit Leader, as appropriate. The originating Division will prepare the ~~Publication document~~ changes in a format conforming to that particular ~~Publication document~~. A brief overview of the ~~Publication document~~ and background information with reasons for the changes should accompany the request.

The ~~Standards and Publications~~ or Manuals Unit Leader will review all recommendations received and transmit them to the Technical Publications Committee for action. A proposed ~~Publication standard or manual~~ or ~~Publication~~ revisions to an existing document must be presented at two committee meetings before it can be recommended or rejected by the Publications Committee, unless considered by the committee to be a minor change.

20.2 Publications Committee

The Publications Committee will review and recommend actions to proposed ~~Publications/Publication~~ standards, manuals, or revisions to existing documents. The committee meets on call by the ~~Standards/Publications~~ appropriate Unit Leader with regular meetings scheduled every other month (and as needed) and follow the Open Government Meeting Act. Details of this act are available at:

<https://ethics.wv.gov/openmeetings/Pages/default.aspx>.

The Publications Committee consists of voting and non-voting members who provide expertise to review and recommend action of the proposed ~~Publications/Publication~~ revision standard or manual. The committee requests comments on the ~~Publications/Publication~~ revisions standard or manual in the meeting agenda; and reviews/discusses them during the meeting. The committee meeting agenda will designate the items that are up for approval and dependent upon comments/discussion/changes the ~~Standards/Publications Unit Leader~~ presiding unit leader has the right to call for a vote on the final version.

The voting members consist of one representative from each of the following Divisions:

- Engineering Division
- Materials Control, Soil and Testing Division
- Traffic Engineering Division

- ~~Maintenance~~Operations Division
- Contract Administration Division

A quorum of 3 voting members must exist for the meeting to be valid. A majority of the present voting members is required to pass the proposed item.

The ~~Standards and Publications Unit Leader~~presiding unit leader shall have the authority to cast the deciding vote when a tie occurs.

The non-voting members consist of one or more representatives from the following agencies: Federal Highway Administration, Contractors Association of West Virginia, ACEC – WV, Asphalt Pavement Association of West Virginia, American Concrete Pavement Association, Builders Supply Association of West Virginia, various vendors, and anyone from the Division or Industry that has knowledge of the ~~Publications~~publications being discussed.

30. Material Procedures

The Material Procedures (MP) are updated on a four (4) year cycle unless the need dictates otherwise, as determined by the Materials Control Engineer who is the Chairperson of this committee. This person is referred to as “Chairperson” throughout the rest of this section. The MP Committee shall be modeled after AASHTO’s Committee on Materials and Pavements (COMP); specifically, how this committee reconfirms various AASHTO procedures and processes. The Chairperson is the default Champion for the updating of these MPs, though the Chairperson may assign a Champion for a particular MP or accept a volunteer Champion.

A new MP may also be submitted by a Champion to the Committee.

30.1 Material Procedures Committee

The Material Procedures Committee consists of voting and non-voting members who provide expertise to review and recommend action on the proposed additions or changes.

The Material Procedures Committee meets on call by the Chairperson with regular meetings usually scheduled on a four (4) to eight (8) week basis.

A quorum of 3 voting members must exist for the meeting to be valid. A majority of present voting members at any meeting shall be required for approval. The Chairperson shall have the authority to cast the deciding vote when a tie occurs.

The voting members consist of one (1) representatives from the following:

- ~~Engineering~~Technical Support Division
- Materials Control, Soil and Testing Division
- Traffic Engineering Division
- ~~Maintenance~~Operations Division
- Contract Administration Division

The non-voting members consist of one or more representatives from the following agencies: Federal Highway Administration, Contractors Association of West Virginia, ACEC – WV, Asphalt Pavement Association of West Virginia, American Concrete Pavement Association, Builders Supply Association of West Virginia, Various Vendors, and anyone from the Division or Industry that has knowledge of the MP being discussed.

30.2 Procedure for Adding a New MP

All proposals are to be submitted by the Champion to the Chairperson. The purpose for the changes to policy and/or reason(s) for the new MP should accompany the request. These ~~changes items shall~~ should be submitted within ~~fourteen (14)~~ seven (7) calendar days prior to the next meeting to be considered at the meeting. The Champion, or a knowledgeable proxy must be present for all meetings pertaining to their respective MP or the MP will be pushed back to the next meeting that the Champion or proxy can be present. This requirement can be waived at the discretion of the Chairperson.

A proposed MP must be presented at two (2) Committee Meetings before it can be recommended or rejected by the Committee. ~~All Committee members must receive a copy for comment fourteen (14) calendar days in advance of the meeting. These comments should be returned to the Chairperson seven (7) calendar days prior to the Committee meeting to give the Champion time to review them.~~

If a proposed MP is designated as minor or inconsequential in its intent, only one (1) Committee Meeting will be required for a vote of recommendation or rejection. Any voting member, or the FHWA representative may veto this designation as minor or inconsequential.

30.3 Procedure for Changing an Existing MP

A proposed MP change must be presented by the Champion at Two (2) Committee meetings before the MP can be recommended or rejected by the Committee. All Committee members should receive a copy of the MPs for review prior to the ~~on the agenda for comment fourteen (14) calendar days in advance of the meeting.~~ These comments should be returned to the Chairperson ~~seven (7) calendar days~~ prior to the Committee meeting to give the Champion time to review them.

If a proposed MP change is designated as minor or inconsequential in its intent, only one (1) Committee meeting will be required for a vote of recommendation or rejection. Any voting member, or the FHWA representative may veto this designation as minor or inconsequential.

30.4 Procedure for Submission of Recommended Approvals

Pending the recommendation for approval from the committee, the Chairperson will forward the Provisional MP through the chain of command to FHWA.

A minor or inconsequential MP will not require the approval of FHWA, but will be forwarded through the chain of command at the DOH for approval. The FHWA representative for the MP Committee Meeting shall be given a chance to veto the minor or inconsequential status of the MP.

Upon receiving comment and approval by FHWA (if applicable), the updated or new MP will be published on the MCS&T webpage and be distributed to District Materials Supervisors and other interested parties.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

DESIGN DIRECTIVE 706
GUIDELINES FOR PREPARATION OF PROJECT
PLANS, SPECIFICATIONS, AND ESTIMATES SUBMITTALS
Draft of August 2, 2021
Supersedes February 19, 2016

The ~~following are~~ purpose of this Design Directive is to provide Project Managers guidelines for the preparation and assembling of ~~PS&E~~ (Plans, Specifications and Estimate) (PS&E) submittals for projects developed or processed by Divisions (including all Districts projects) under the State Highway Engineer. ~~It should be noted that other~~ Other Design Directives are referenced ~~to~~ and hereby shall be considered a part of this DD. ~~that~~ These other directives pertain to similar subject matter and are more precise than these guidelines. They are referenced for clearer understanding of the preparation of items required to be submitted.

A checklist for developing the PS&E submittal package is attached ~~to~~ and made a part of this Design Directive. This checklist shall be used for all projects.

Attachment

I. DEFINITIONS

- A. Engineers Estimate.** The predicted project cost at the time of receipt of bids developed from a knowledge of the costs for materials, labor, and equipment required to perform the necessary items of work.
- B. Contract Plans.** The contract drawings which show the locations, character, and dimension of the prescribed work, including layouts, profiles, cross sections, and other details.
- C. Required Contract Provisions.** Those provisions required by law or regulation of the various jurisdictions involved in funding projects and administering contracts for construction projects.
- D. Special Provisions.** Specifications for specific items or details applicable to the individual project and which are not covered in the Standard or Supplemental Specifications.
- E. Pre-PS&E Submission.** A submission made to the FHWA on Full Oversight projects to allow for their informal review and comment. This submission will include the completed contract plans and any project-specific Special Provisions and is intended to make the subsequent official submission to the FHWA as complete as possible.

- F. **Specifications.** The compilation of provisions and requirements for the performance of prescribed work.
- G. **Standard Details.** Drawings approved for repetitive use showing details to be used where appropriate. Included are Revised Standard Details that are to be referenced by revision date as appropriate.
- H **Special Details.** Modifications to a Standard Detail drawing, or any detail drawing required to describe an item of work not covered by a Standard Detail drawing.
- I. **Standard Specifications.** A book of Specifications approved for general application and repetitive use.
- J. **Supplemental Specifications.** Approved additions and revisions to the Standard Specifications.
- K. **Working Time Calendar.** A bar chart completed by the designer showing the estimated time required for a contractor to complete a construction contract. See DD-803.
- L. **Proposal Work Category Checklist.** A worksheet completed by the designer showing all relevant items performed as part of the project.

II. PLANS

- A. **Contract Plans.** Contract Plans are instructions using drawings containing engineering data or details pertaining to geometrics, drainage, structures, soils and pavements, and other appurtenances. See DD-701, Contract Plan Presentation, for further information concerning the preparation of Contract Plans.
 - 1. Plans should not encompass material that is properly a part of the Standard or Supplemental Specifications, Special Provisions, or Standard Details.
 - 2. The original drawings should be on standard sheets conforming to modern, accepted drafting practices or aerial photograph base maps. (See DD-701)
 - 3. Straight-line plans may be used provided they give sufficient information to properly complete the project. (See DD-701)
- B. **Right of Way Plans**

See DD-301 for information on preparation of right of way plans.

III. SPECIFICATIONS

Specifications contain the written instructions for constructing highway projects, outlining in detail a description of the work, materials, construction methods, method of measurement, and the basis of payment for each item of work involved in the contract.

A. Standard Specifications

Since every construction project involves subjects or items that occur repeatedly, standard specifications setting forth provisions and requirements applicable to the construction of highway projects have been prepared.

B. Supplemental Specifications

1. Supplemental Specifications are specifications developed subsequent to the publication of the Standard Specifications to cover new or additional construction items or substantial changes regarding items included in the Standard Specifications.
2. Supplemental Specifications will be printed and bound from time to time depending upon when the Standard Specifications are updated.

C. Special Provisions

1. Special Provisions are specifications for governing all matters applicable to the individual project and, therefore, are not covered in the Standard or Supplemental Specifications.
2. Special Provisions should be held to a minimum and, as much as possible, applicable Standard or Supplemental Specifications should be utilized.
3. Commitments for environmental mitigation which are contained in the environmental documentation should be incorporated into the project as Special Provisions.
4. Special Provisions should be in printed, copied or other acceptably reproducible form. Each Special Provision to be utilized in the project is to be listed in the appropriate place on the PS&E Checklist.

IV. ESTIMATES

- A. The Engineer's Estimate shall be prepared and reviewed carefully to reflect as realistically and accurately as possible the expected costs of the work at the time of receipt of bids. (Also see DD-707.)
- B. Consistent and compatible procedures for the preparation, review, and updating of estimates shall be followed.
 - 1. The unit prices used for estimates, and corresponding actual unit bid prices when available, for the preceding 12 months should be reviewed to determine if changes in estimated unit prices are needed to reflect any trends that have occurred.
 - 2. The estimate should reflect prices that are realistic for the areas, times, and characteristics of the work to be done (regional adjustment and seasonal adjustment are especially important, as is size of the project).
 - 3. Incentive/disincentive or escalation clauses should be considered in determining the estimated unit costs since such clauses may affect the estimate considerably. (See DD-708)
 - 4. Other factors that can affect the estimated cost of a project, such as labor rates, equipment rates, interest rates, time to complete, competition levels, and material shortages, should be considered and estimated costs adjusted as necessary.
 - 5. Bid price data bases should be current at the time of estimate preparation and at the time of advertisement.
- C. Estimates should include an item number, description of the item, estimated quantity, unit, and price for each proposed item of work.
- D. For accounting purposes, the Engineer's Estimate should identify separately:
 - 1. Municipal and Non-Municipal quantities are not to be shown, but are to be broken down by the contractor in accordance with DD-805.
 - 2. State-by-state breakdown;
 - 3. Tabulations of items coded on the basis of the predominant Improvement and Construction Type Code. For applicable code numbers, see the most recent code numbers provided in the AASHTO Transport Project Preconstruction software, to be used when preparing the Engineer's Estimate.

- E. Engineering and Contingencies (E & C) will be shown for each category of work, and then summed.

V. REQUIRED CONTRACT PROVISIONS

- A. Federal, state, and local agencies have certain required contract provisions covering employment, records of materials and supplies, subletting or assigning the contract, safety, false statements, termination, nonsegregated facilities, and environmental requirements among others that are to be included in contracts for construction projects.
- B. Because requirements may change on short notice, required contract provisions should not be included in bound books of general specifications.

VI. PS&E CONTENT

PS&E assemblies should include:

- A. Complete sets of plans;
- B. Special Provisions;
- C. Engineer's Estimate;
- D. Right-of-Way Certificate and Status of Utilities Report from the Engineering Division;
- E. Approved agreements with railroads, utilities, and municipalities, if not previously submitted;
- F. Applicable permits;
- G. For projects which include outside funding, written documentation from the outside agency confirming the authorization to advertise. (i.e. other states, boards of education, private developers, etc.);
- H. The completed current PS&E Checklist as maintained by the Engineering Division and attached to and made a part of this DD; **and**
- I. Working time calendar; **and**
- J. Proposal Work Category Checklist

VII. PS&E ASSEMBLY AND PROCESSING

The Project Manager or Designer shall assemble and submit the material listed in Section VI to the Contract Administration Division's PS&E Contract Development Section for processing of the PS&E package.

The processing of the PS&E package will vary based on whether the project is Full FHWA Oversight or Delegated.

The steps to be followed and the estimated time required in working days for processing the PS&E package for each type of project are shown in the following tables:

PS&E ASSEMBLY AND PROCESSING

FULL FHWA OVERSIGHT FEDERAL-AID PROJECTS

	REQUIRED ACTIVITY	Estimated Number of Working Days
*a.	Completed contract plans and project specific Special Provisions are reviewed by the Project Manager or Designer. A “pre-PS&E” submission of completed contract plans and project specific Special Provisions will be made to the Federal Highway Administration (FHWA) at this time for their informal review and comment. The number of sets of plans and Special Provisions is to correspond with the number required for the “Half-Size PS&E Plans” submission in the Plan Distribution Schedule in DD-202.	20 days
*b.	The “pre-PS&E” comments from the FHWA are reviewed by the Project Manager or Designer. Any necessary revisions are made at this stage by the consultant and resubmitted to the Project Manager, or the revisions to the contract plans and project specific Special Provisions are made by the Designer if the project is In-House or District-designed.	
*c.	The PS&E Package is submitted to the Contract Administration Division’s PS&E Section <u>Contract Development Section</u> for the preparation of the official submission of the proposal, plans, and estimates to FHWA for approval of authorization to advertise for receipt of bids. If construction cost is more than \$250,000.00, Equal Employment Opportunity Division reviews the project for possible DBE goal.	
*d.	Programming Division prepares and submits to FHWA all required financial data to complete the Funding Authorization Request.	
*e.	Contract Administration Division’s PS&E Section <u>Contract Development Section</u> assembles the Contractor’s Bidding Proposal. The appropriate number of copies of bidding proposals and sets of plans are prepared.	
f.	The Contractor’s Bidding Proposal, Contract Plans, Right of Way Certificate, Signed Detailed Estimates, and Chart for Estimating Contract Time are formally submitted to the FHWA.	1 day
g.	FHWA reviews PS&E and gives written comments to Project Manager or Designer.	10 days
h.	Comments are reviewed by Project Manager or Designer. All responses to comments and necessary revisions are returned to FHWA for approval of PS&E.	10 days

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i.	FHWA will authorize funding and give approval to Programming Division to advertise the project for the next available letting once the PS&E package is complete and ready to advertise.	2 days
j.	Programming Division contacts Contract Administration Division to advertise for receipt of bids for the next available letting.	2 days
**k.	An amendment for an advertised project: The Project Manager or Designer revises the plans, specifications, and detailed estimate of cost as required. These revisions are then given to Contract Administration Division's PS&E Section <u>Contract Development Section</u> for the assembling of the amendment and the preparation the amendment directive that incorporates all proposal and plan revisions. These revisions must be submitted to Contract Administration Division's PS&E Section<u>Contract Development Section</u> a minimum of 14 calendar days prior to the letting to allow for the preparation and submission of the amendment to FHWA for approval 12 calendar days prior to the advertised letting date. Amendment revisions must be printed and given to Contract Administration Division to mail to all contract plan holders a minimum of 7 calendar days prior to the advertised letting date.	14 days (Not included in the Total Time below)
**l.	Time between advertisement and letting (28 calendar days has been assumed to be 20 working days for the purpose of this table)	20 days (Minimum)

*, ** Performed simultaneously

TOTAL

65 DAYS

STATE FUNDED AND DELEGATED FEDERAL-AID PROJECTS

	REQUIRED ACTIVITY	Estimated Number of Working Days
*a.	Completed contract plans and project specific Special Provisions are reviewed by the Project Manager or Designer. Any necessary revisions are made at this stage.	15 days
*b.	PS&E package is submitted to Contract Administration Division's PS&E Section <u>Contract Development Section</u> for advertising for receipt of bids. If construction cost is more than \$250,000.00, the project is reviewed by Equal Employment Opportunity Division for a possible DBE Goal (Federal Aid Projects Only).	
*c.	Programming Division reviews the project's financial data in this submission to ensure it is complete and in accordance with the Federal Aid Funding Requirements. For State Funded Projects the submission is reviewed to ensure it is in accordance with the State Funded Program Requirements.	
d.	When the Right of Way Certificate is available, the PS&E package and the Contractor's Bidding Proposal are assembled.	3 days
e.	Programming Division prepares and submits to FHWA all required financial data to complete the Funding Authorization Request, for an exempt Federal-Aid project.	2 days
f.	The advertising memo and signed BF-98 are prepared for Contract Administration to advertise for receipt of bids for the next available letting. The signed detailed estimate is given to the Deputy State Highway Engineer/Development for final approval of cost.	1 day
g.	Programming Division verifies project cost to be in accordance with the funding request. The package is hand carried to the Deputy State Highway Engineer/Development for approval to advertise for receipt of bids.	3 days
h.	When funding is approved by FHWA or the State itself, Programming Division contacts Contract Administration Division to advertise the project for receipt of bids in the next available letting once the PS&E package is complete and ready to advertise.	3 days

**i.	An amendment for an advertised project: The Project Manager or Designer revises the plans, specifications, and detailed estimate of cost as required. These revisions are then given to Contract Administration Division PS&E Section <u>Contract Development Section</u> for the assembling of the amendment and the preparation the amendment directive that incorporates all proposal and plan revisions. These revisions must be submitted to Contract Administration Division's PS&E Section<u>Contract Development Section</u> a minimum of 12 calendar days prior to the letting to allow for preparation and printing of the amendment. Amendment revisions must be printed and given to Contract Administration Division to mail to all contract plan holders a minimum of 7 calendar days prior to the advertised letting date.	12 days (Not included in the Total Time below)
**j.	Time between advertisement and letting (21 calendar days has been assumed to be 15 working days for the purpose of this table)	15 days (Minimum)

*, ** Performed simultaneously

TOTAL

42 DAYS

VIII. DATE OF PS&E SUBMISSION

Federal regulations [23 CFR 635.112(b)] require that all Federal-aid contracts be advertised for a minimum 3-week advertisement period prior to a scheduled letting and the contract documents are available for distribution at least 3 weeks prior to the letting.

The Division of Highways policy is to advertise Federal-aid projects at least 4 weeks, and preferably 5 weeks, prior to letting with contract documents available at least 4 weeks prior to the letting.

State law requires that State projects be advertised for a minimum 2-week advertisement period prior to a scheduled letting and the contract documents are available for distribution at least 2 weeks prior to the letting.

The Division of Highways policy is to advertise 100% State funded projects at least 3 weeks, and preferably 4 weeks, prior to the letting with contract documents available at least 2 weeks, and preferably 3 weeks, prior to the letting.

When pre-bid conferences are necessary, these time limits should be increased by 2 weeks to allow adequate time for review by interested contractors prior to the pre-bid meeting and to allow adequate time for issuance of amendments prior to the letting. See DD-104 for more information concerning pre-bid conferences.

To conform with this policy, the Project Manager or Designer shall submit the material listed in Section VI to the Contract Administration Division's ~~PS&E Section~~Contract Development Section to allow adequate time for assembly and processing of the PS&E package as shown in Section VII and to allow adequate time for printing (3 working days).

The material listed in Section VI shall be submitted as indicated below:

Full FHWA Oversight Federal-aid Projects - minimum 65 days prior to the letting.

Full FHWA Oversight Federal-aid Projects - minimum 75 days prior to the letting (With pre-bid conference).

State Funded and Delegated Federal-aid Projects - minimum 42 days prior to the letting.

State Funded and Delegated Federal-aid Projects - minimum 52 days prior to the letting (With pre-bid conference).

All days are working days unless otherwise indicated.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

PS&E DOCUMENTATION CHECKLIST

Revised July 29, 2021

State Project Number: _____

Federal Project Number: _____

Project Name: _____

County: _____

Project Manager: _____ PS&E Submitted By: _____

Telephone Number: _____ Telephone Number: _____

Email: _____ Email: _____

Signature Applicable Section Head (Central Office or District): _____

Type of Funding with Percentage: FHWA: _____ State: _____

Engineering Phase Authorization Number: _____

Is project on the latest approved STIP? _____ Yes _____ No

Geotechnical Report Required? _____ Yes _____ No

Material to Be Furnished to Contract Administration Division's Contract Development Section		
Note: All Material is to be submitted in PDF format		
All Projects	BY	DATE
1. One set of Plans in PDF format.		
2. One copy of the detailed estimate, in PDF format, to be signed by the Responsible Charge Engineer or Project Manager, and Estimate Preparer - for review by FHWA, Contract Administration Div., & Civil Rights Compliance Div.		
3. One copy of the Project Specific Special Provisions, in PDF format.		
4. One set of working day calculations		
5. One copy of the executed project agreement, if applicable, in PDF format.		
6. All applicable Permits, in PDF format.		
7. Completed Design Exception Report in PDF format (if applicable and not previously submitted)		
8. Completed Americans With Disabilities Act Exceptions Justification Report (if applicable, in PDF format).		
9. Federal Aid Resurfacing 'Operational and Safety Review' Checklist approved by FHWA PRIOR to PS&E for all Interstate and APD Highways		
10. Completed Proposal Work Category Checklist in PDF format		
11. Completed PS&E Checklist in PDF format.		

PLANS	BY	DATE
1. Title Sheet signed by all parties.		
2. Design Exceptions shown on Title Sheet.		
3. Revised Standard Drawings Used are listed on General Notes Sheet.		
4. Necessary Special Detail Sheets included in Plans or listed.		
5. Summary of Quantities in plans agrees with Proposal Quantities.		
6. Summary of Quantities has been carried from Plan Tables, including the Bridge Quantity table.		
7. Design Designation is current and agrees with Program Information.		
8. General Notes Sheet is in Plans; the notes have been reviewed and are applicable to the project.		
9. The proper Standard Detail Books are shown in the Standard Details General Note.		
10. Bench Marks and Survey Reference Points are shown on the Plans.		
11. The length of the project is shown on the Title Sheet, (separated into bridge and roadway, and total length).		
12. Typical Sections are shown for every roadway and situation encountered in the project.		
13. Typical Sections agree with pavement design.		
14. Current specifications called for.		
15. Grading Quantities as per DD-705.		
16. Line, grade, typical section, and waterway opening included for a temporary bridge.		
17. North Arrow shown on Plan Sheets.		
18. Bar Scale shown.		

MAINTENANCE OF TRAFFIC	BY	DATE
1. Temporary Traffic Control Plan included.		
2. Temporary Traffic Control Plan has been approved by Traffic Engineering.		

RIGHT OF WAY	BY	DATE
1. Right of way shown on the Construction Plans agrees with the Right-Of-Way Plans.		
2. Right of Way Plans submitted to the Right of Way Division (DR), requesting Right of Way Certificate, Status of Utilities Certificate, and Hazardous Waste Certificate. If Right of Way is not required, a memo to DR stating no Right of Way is required along with a copy of the Title Sheet.		
3. Right of Way Certification received.		
4. Status of Utilities Certification received.		
5. Hazardous Waste Certification received.		

UTILITIES	BY	DATE
1. Encountered utilities are shown on the Title Sheet.		
2. All utility relocations and other dispositions are shown on the Plans.		
3. Bureau for Public Health and owner(s) have approved water and/or sewer lines to be relocated by the project.		

<u>LIST OF UTILITIES TO BE RELOCATED</u>	<u>RELOCATIONS SHOWN ON PLANS</u> (Yes or No, Date if Yes)
1 _____	_____
2 _____	_____
3 _____	_____
4 _____	_____
5 _____	_____
6 _____	_____
7 _____	_____
8 _____	_____
9 _____	_____
10 _____	_____

ENVIRONMENTAL	REQUIRED?		BY	DATE
	Y	N		
1. Categorical Exclusion.				
2. Environmental Assessment (FONSI).				
3. Final EIS/Record of Decision.				
4. Reevaluation (for Final EIS only).				
5. Section 4(f).				
6. *Section 106 (Cultural Resources) clear.				
7. *Endangered Species (plant or animal) clear.				
8. Wetlands clear.				
9. Hazardous Waste clear.				
10. ** Construction noise restrictions.				
11. Farmland impacts.				
12. Floodplain impacts.				
13. Residential or business relocation impacts.				
* - These items must be clear in order to obtain the USACE's 404 Permit.				
** - If yes, then indicate on the General Notes sheet.				

PERMITS APPROVED (If Required)	REQUIRED?		BY	DATE
	Y	N		
1. Corps of Engineers' 404 Permit				
2. Bureau for Public Health				
3. Coast Guard				
4. *NPDES permit				
5. Flood Plain Coordination Letter				
* Required if project will have more than 1 (one) acre (0.42 hectares) of land disturbing activities. The project's Clearing and Grubbing area may be used for this determination.				

REVIEW HISTORY										
REVIEW	BY	DATE	COMMENTS RECEIVED (DATE)				COMMENTS ADDRESSED (DATE)			
			DC	DIST.	FHWA		DC	DIST.	FHWA	
Preliminary Field										
Final Field										
Final Office										

Copies of all written comments and written responses shall be included in the PS&E Package.

District-designed projects shall be submitted to the Engineering Division with a cover memorandum stating that the project plans have been reviewed by the District Construction and Maintenance Sections and all comments have been resolved. This memorandum shall be signed by the Assistant District Engineer - Construction, Assistant District Engineer - Maintenance, and the District Engineer.

AMOUNT TO BE USED FOR ENGINEERING AND CONTINGENCIES IN COST ESTIMATING	
Federal-Aid Projects	
Projects greater than \$5 million	$9\% + 4\% = 13\%$
Projects less than \$5 million	
Bridge Construction	$15\% + 4\% = 19\%$
Roadway Construction	$9\% + 4\% = 13\%$
Resurfacing (3R and 4R)	$9\% + 4\% = 13\%$
Other types of projects	$15\% + 4\% = 19\%$
ER Projects	
FEMA Projects	
Signing Projects	
Lighting Projects	
Guardrail Projects	
Traffic Signal Projects	
APL Projects	
Piling Projects	
State-Funded Projects	
Bridge and Roadway Construction	$9\% + 4\% = 13\%$
Resurfacing	$6\% + 4\% = 10\%$
NOTE: The First % is for Construction Engineering. The Second % is for Contingencies.	

West Virginia Department of Transportation
Division of Highways
Proposal Work Category Checklist

Project Name: _____

State Project Number: _____ Federal Project Number: _____

Prepared By: _____ Date: _____

The Sections indicated below are included in the plans for this project. Prime contractors must be prequalified 15 calendar days prior to the bid letting in a combination of these sections in order to perform work amounting to not less than 30% of the contract cost, in accordance with Section 108.1 of the Standard Specifications. In addition, subcontractors must be prequalified in the items of work they are performing before subcontracting requests are approved.

DIVISION 200-EARTHWORK		
201	CLEARING AND GRUBBING	
202	BUILDING DEMOLITION, WELL AND SEPTIC TANK ABANDONMENT	
203	DISMANTLING STRUCTURES	
204	MOBILIZATION	
206	BASE COURSE REINFORCEMENT GEOGRID	
207	EXCAVATION AND EMBANKMENT	
211	BORROW EXCAVATION	
212	STRUCTURE, ROCK, AND WET EXCAVATION	
217	SPECIAL ROCK FILL	
218	SLOPE AND FOUNDATION PROTECTION	
219	CONTROLLED LOW-STRENGTH MATERIAL	
228	SUBGRADE PREPARATION	
229	SHOULDERS AND DITCHES	
240	CLEANING CULVERTS, INLETS AND MANHOLES	
DIVISION 300-BASES		
307	CRUSHED AGGREGATE BASE COURSE	
311	OPEN GRADED FREE DRAINING BASE COURSE	
DIVISION 400-ASPHALT PAVEMENTS		
401	ASPHALT BASE, WEARING, AND PATCHING AND LEVELING COURSES	
402	ASPHALT SKID RESISTANT PAVEMENT	
405	CHIP SEALS	
407	FOG SEAL	
408	TACK COAT	
410	ASPHALT BASE AND WEARING COURSES, PERCENT WITHIN LIMITS (PWL)	
415	MILLING OF ASPHALT PAVEMENT SURFACES	
420	SINGLE/MULTIPLE COURSE MICRO SURFACING	
DIVISION 500-RIGID PAVEMENT		
501	PORTLAND CEMENT CONCRETE PAVEMENT	
502	APPROACH SLABS	
503	SEALING CRACKS IN CONCRETE PAVEMENT	
506	CONCRETE PAVEMENT REPAIR	
507	CRACK AND POTHOLE REPAIR	
508	DIAMOND GRINDING	
510	RE-SEALING CONCRETE PAVEMENT JOINTS	
511	DOWEL BAR RETROFIT	
512	CONCRETE SLAB STABILIZATION	
513	CONCRETE PAVEMENT CROSS STITCHING	
514	ROLLER COMPACTED CONCRETE	
DIVISION 600-INCIDENTAL CONSTRUCTION		
601	STRUCTURAL CONCRETE	
602	REINFORCING STEEL	
603	PRESTRESSED CONCRETE MEMBERS	
604	PIPE CULVERTS	
605	MANHOLES AND INLETS	
606	UNDERDRAINS	
607	GUARDRAIL	
608	RIGHT-OF-WAY FENCE	
609	SIDEWALKS	
610	CURBS, COMBINATION CURBS AND GUTTERS AND MEDIANS	
611	PRECAST CONCRETE TRAFFIC DIVIDERS	

612	TUNNEL LINER PLATE PIPE	
614	PILING WALLS	
615	STEEL STRUCTURES	
616	STEEL BEARING PILING	
617	RAILINGS	
619	WATERPROOFING	
620	THREE-SIDED REINFORCED CONCRETE BRIDGE/CULVERT	
621	STEEL GRID FLOORING	
622	TIMBER BRIDGE STRUCTURES	
623	PNEUMATICALLY APPLIED MORTAR OR CONCRETE (SHOTCRETE)	
624	PREFORMED ELASTOMERIC JOINT SEALER	
625	ROCK SOCKETED DRILLED SHAFT	
626	RETAINING WALL SYSTEMS	
631	ELECTRICAL WORK	
632	HORIZONTAL DRAINS	
633	CONCRETE GUTTER, INVERT PIPE GUTTER, OR DUMPED ROCK GUTTER	
636	MAINTAINING TRAFFIC	
637	WATER	
638	PROJECT MARKERS, RIGHT-OF-WAY MARKERS, SURVEY MARKERS, AND OUTLET MARKERS	
639	CONSTRUCTION SURVEYING	
640	FIELD OFFICE AND STORAGE BUILDING	
641	MITIGATION DEVICES	
642	TEMPORARY POLLUTION CONTROL	
645	REINFORCED SOIL SLOPES	
651	FURNISHING AND PLACING TOPSOIL	
652	SEEDING AND MULCHING	
653	VINE AND GROUND COVER PLANTING	
654	TREE AND SHRUB PLANTING	
655	MATTING FOR EROSION CONTROL	
656	SEEDLING PLANTING	
657	ROADSIDE SIGN SUPPORTS	
658	OVERHEAD SIGN STRUCTURES	
659	SIGN LIGHTING	
660	TRAFFIC SIGNALS	
661	TRAFFIC SIGNS AND DELINEATORS	
662	ROADWAY LIGHTING	
663	PAVEMENT MARKINGS AND RUMBLE STRIPS	
664	IMPACT ATTENUATORS	
665	PLUGGING GAS, OIL, AND DRILLED WATER WELLS	
670	WATERLINE INSTALLATION	
675	SANITARY SEWERS	
679	OVERLAYING OF PORTLAND CEMENT CONCRETE BRIDGE DECKS	
681	ASBESTOS ABATEMENT	
685	BRIDGE CLEANING	
687	SHOP PAINTING METAL STRUCTURES	
688	FIELD PAINTING OF METAL STRUCTURES	
689	METALIZING STEEL	
690	SURFACE PREPARATION AND POWDER COATING OF NEW GALVANIZED STEEL FOR HIGHWAY SIGNING AND LIGHTING STRUCTURES	