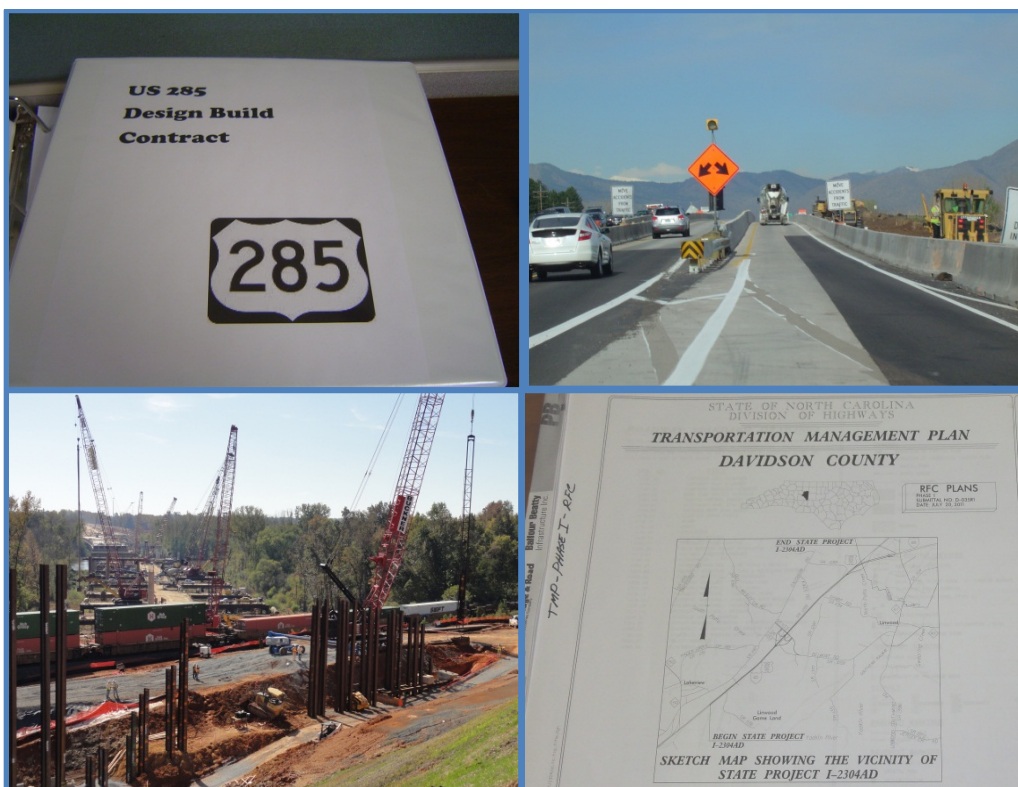


APPLYING THE WORK ZONE SAFETY AND MOBILITY RULE TO DESIGN-BUILD PROJECTS KEY CONSIDERATIONS



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Purpose

The purpose of this technical memorandum is to identify key aspects of the FHWA Work Zone Safety and Mobility Rule (the Rule) and how they might apply to design-build (DB) projects in a different manner than they apply to design-bid-build (DBB) projects. The Rule was originally designed for DBB projects. Because the stakeholders have different roles and responsibilities in the two project delivery methods, some issues can arise when those aspects are applied to DB projects. With the recent popularity of the DB project delivery method, it has become necessary to assess how best to apply the Rule to DB projects and to provide tips, guidance, and other useful information to agencies, contractors, and other stakeholders. The memorandum describes the issues and the effect they have on the application of the Rule.

The Rule

In order to “meet current and future work zone safety and mobility challenges, and serve the needs of the American people,” the Rule (23 CFR 630 Subpart J) was published in September 2004 and became effective in October 2007. The Rule applies to all Federal-aid highway projects and affects agencies receiving such funding. The overarching goal of the Rule is to reduce crashes and congestion in and around work zones. The Rule aims to bring this about through greater consideration and understanding of work zone impacts throughout project development; minimization of those impacts where possible through scheduling, coordination, design, and staging decisions; and better management of remaining impacts during construction.

There are eight *key aspects* of the Rule. They are:

1. Work zone assessment and management procedures
2. Work zone data collection and analysis
3. Training
4. Process review
5. Transportation Management Plan (TMP)
6. Plans, Specifications & Estimates (PS&E) shall include the TMP or provisions for contractors to create a TMP
7. Pay item provisions – method based or performance based
8. The designated trained person

All of these aspects apply to both DB and DBB projects. While the principles advocated by the Rule and its key aspects still apply to DB projects, some of these aspects may need to be applied somewhat differently to DB projects to address the differences between DB and traditional DBB processes.

Design-Bid-Build v. Design-Build

One of the major differences between the DBB and DB project delivery methods is who assumes the risk during the project. Because of this, the key aspects of the Rule apply to a DBB project differently than they do a DB project. This is due to the different way the roles and responsibilities are handled in the two different delivery methods. Table 1 illustrates the different roles and responsibilities for the Owner/Agency and the Contractor (contractor and consultant – DB team) in both project delivery methods.

Table 1. Comparison of Roles and Responsibilities in Project Delivery Methods

Design-Bid-Build Method	Design-Build Method
<u>Owner/Agency</u> (like items aligned across columns) • Develop plans and specifications • Identify and estimate work zone impacts • Identify appropriate transportation management strategies: ▪ Temporary traffic control ▪ Traffic operations ▪ Public information • Identify coordination issues (e.g., utilities, enforcement, emergency response, community) and conduct upfront coordination • Develop TMP, including Traffic Control Plan (TCP) • Include in the PS&E those TMP items that will be implemented by the Contractor • Develop and implement public information plan • Implement TMP, except those components included in the contract • Perform quality assurance, control, and verification, including for maintenance of traffic • Monitor and manage work zone impacts during construction - has greater ownership than does the Contractor	<u>Owner/Agency</u> • Define requirements for work zone impacts assessment and allowable impacts during construction • Define requirements for transportation management strategies: ▪ Temporary traffic control ▪ Traffic operations ▪ Public information • Identify coordination issues (e.g., utilities, enforcement, emergency response, community) • Develop a Request for Proposal (RFP) that outlines project requirements • Assist with public outreach and interagency coordination • Perform quality verification, including for maintenance of traffic • Provide oversight over monitoring and management of work zone impacts during construction
<u>Contractor</u> (like items aligned across columns) • Construct the project in accordance with the Owner/Agency plans and specifications • Implement the components of the TMP that were included in the contract • Coordinate with utilities on field work • Provide a safe worksite • Monitor and manage work zone impacts during construction, if included in the contract	<u>Contractor</u> • Design plans • Assess work zone impacts per contract requirements • Develop the TMP (including TCP) • Construct the project based on the Contractor completed design and TMP • Implement TMP • Develop and implement public information plan – may share responsibility for public outreach with the Owner/Agency • Coordinate with utilities both upfront and during field work • Provide a safe worksite • Monitor and manage work zone impacts during construction • Perform quality control and quality assurance, including for maintenance of traffic

Another major difference between the DBB and DB project delivery methods is how the Agency's requirements are presented to the Contractor. In a DBB project, the construction documents (PS&Es) specifically identify what the contractor is supposed to build, where they should build it, what they should build it with, and what phasing, staging, and traffic control are to be used while constructing the project. In a DB project, the Agency identifies the overall project requirements in the RFP, and the Contractor has the ability to choose the methods to create the construction plans and build the project. This allows the Contractor much greater flexibility to use its own innovations and efficiencies in building the job. For a DB project, the Agency must make sure that it produces an RFP that is very clear and insistent on non-negotiable items, milestones, and safety, quality, and mobility elements, but leaves enough room for the proposer to create a solid proposal with value-added elements and innovative ideas. This balance is generally easier to achieve in a performance-based RFP that focuses on outcomes rather than methods.

Issues with Applying the Rule to Design-Build Projects

This section identifies issues that can arise when the key aspects of the Rule are applied to a DB project. For each of the key aspects, a brief description of the aspect is provided, followed by a table comparing how it is applied to DBB and DB delivery methods, and concluded with a list of issues associated with applying the aspect. Recommendations on remedies/strategies to overcome those issues are provided where applicable.

General Issues

Buy-in from all levels of the Agency staff is important for Rule implementation. Applying the Rule to construction projects can be a challenge if the Agency staff as well as the Contractor are not familiar with the Rule. One of the key issues identified through research conducted for this project is that Agency staff may not have necessary familiarity with the Rule. This lack of familiarity hinders the effective application of the Rule to work zones. For DB projects, it hampers the Agency's ability to convey the key messages of the Rule and associated Agency policies to the Contractor, provide guidance and oversight to the Contractor regarding implementation of the Rule, and adequately weight work zone safety and mobility factors in the proposal evaluation process. The Agency may need to train its staff in the differences between DB and DBB and how that affects Rule implementation.

The Contractor's knowledge and buy-in is important to effectively apply the Rule to projects, and becomes more important in DB projects as the Contractor bears more responsibilities for work zone management. The Agency may need to educate the Contractor, and it may take time for the Contractor to realize the benefits of applying the Rule. Once a Contractor is familiar with the Rule, it tends to realize the benefits - more work gets done, and the project does not suffer setbacks when the work zone is safer and less congested.

It is important to include Agency staff from multiple disciplines in the RFP development process. Agency staff with individual expertise in their own areas can help develop specific requirements and expectations for those areas. This is especially important for developing an RFP for a DB project. Unlike a DBB project where project specific requirements are specified in the PS&E, a DB project relies on a good RFP which specifies requirements, specifications, and expectations to ensure the DB Contractor understands them and is able to deliver the design and implement the project to meet the Agency's goals and expectations. There may be cases where the Agency's guidelines and/or procedural requirements are conflicting or vague. When this is the case, it is important that the RFP includes

project specific guidance that supersedes policy material to ensure that clearly defined and unambiguous guidelines and requirements are specified. Once the requirements and expectations for each area are developed, the Agency staff can assemble the information, remove unnecessary items, ensure language specific to DBB projects are kept out of the RFP, and make sure the RFP is appropriate for a DB project. The cooperation and collaboration is essential to get the appropriate information in the correct context and presentation.

Aspect #1 – Work Zone Assessment and Management

Summary of the Aspect

This aspect encourages Agencies to develop and implement systematic procedures to assess work zone impacts in project development and manage safety and mobility during project implementation.

Issues

Table 2 compares how this aspect is applied to DBB and DB delivery methods. It also identifies general issues with applying the aspect of the Rule to DB projects.

Table 2. Common Issues with Applying Aspect #1 of the Rule to DBB and DB Projects

Design-Bid-Build	Design-Build
• Agency has applied its work zone assessment and management procedures to the project during project development. It has assessed and considered the impacts in choosing the preferred alternative and developing its design. • Since design was finalized before the project went to bid, the Agency was able to fully assess potential impacts for the chosen design and make use of that understanding in developing the TMP. • If the contractor proposes an alternative method of staging the project, the Agency has a procedure to assess the impacts of the proposal prior to approval. • Agency typically has experienced in-house staff to manage safety and mobility during project implementation.	• Since the design is being developed in parts, sometimes just prior to construction of a certain segment of the job, impacts assessment must be an iterative process. • Requirements for developing a TMP and/or a partial TMP framework are handed off to design-builder. Contractor has several objectives and its primary emphases are oriented not only to safety and mobility, but also profitability and schedule. Contractor may not be aware of all the agreements with outside stakeholders and commitments made by the Agency. • Contractor may not be familiar with the Agency's work zone assessment and management policies and procedures. • Contractor may assign personnel with less experience or with other jobsite priorities to manage safety and mobility during project implementation, which could reduce effectiveness, and work zone safety and mobility may not be as good.

Safety, mobility, quality, time (project duration) and finances are a few of the main elements of a project. The Agency and the Contractor may place these elements at different importance levels. Though both parties will value all elements, the Agency is more likely to make safety, mobility, and

quality of the project their highest priorities. A solid RFP with an adequate emphasis on safety, mobility, and quality is vital to achieve the desired level of Contractor's attention to those elements.

Maximizing safety of workers and the traveling public during construction should always be a top priority for construction projects. It is important to emphasize that safety is a priority and establish goals right from the beginning of a project. Both the Agency and the Contractor need to recognize such an emphasis and work cooperatively to establish a strong safety ethic that continues throughout the project. This collaborative recognition is especially essential for DB projects as a significant amount of the roles and responsibilities for work zone management are handed off from the Agency to the Contractor.

The Agency is responsible for the development of systematic procedures for assessing work zone impacts and managing safety and mobility. The Agency should include requirements in the RFP for how a Contractor is to implement relevant aspects of these procedures during a DB project. For example, the Agency will often develop permitted lane closure times or specific lane closure restrictions based on what traffic impacts and delays it considers tolerable. These lane closure requirements would then be included in the RFP. As the Contractor develops the project design and TMP, it will need to comply with these lane closure requirements. The Contractor may decide to request a variance to a particular lane closure restriction and may then be required to assess the possible work zone impacts of the proposed variance and submit it to the Agency for review and approval. For a DB project, because exact work zone and lane closure locations, schedules, and durations are not determined at the beginning of the project and TCPs are developed throughout different stages of the project, impacts assessment typically needs to be an iterative process.

The Agency should address in the RFP what types of impacts assessment the Contractor is required to perform to assess the likely impacts to traffic and facilities from the construction. Having an understanding of the likely impacts to traffic and facilities is important for developing an effective TMP that manages those impacts and keeps them to acceptable levels, while still allowing for construction operations. In DB projects, the project design progresses in parallel to construction, so there is often limited time to develop and update the TMP. This needs to be taken into account when establishing the requirements for assessing work zone impacts. Such requirements should address elements such as:

- When the Contractor needs to perform an assessment (e.g., for major phase changes, while developing a new set of TCPs),
- Type of assessment required (qualitative, quantitative, or both),
- Whether higher-level, accelerated assessments can be done in certain situations,
- Analysis tools/computer models required for the analysis,
- Types of outputs required – both format and measures (e.g., delay, maximum queue length expected),
- What to do if the analysis shows that desired performance goals will be exceeded, and
- When updates to analysis are required (e.g., when significant changes to the TMP are made).

Assessing and establishing good baseline data prior to construction is critical to assessing work zone impacts and developing a successful TMP. The DB Contractor, in collaboration with the Agency, needs to follow the guidelines and requirements in the RFP to implement the procedures and to develop a TMP and manage work zone safety and mobility during project implementation. As such, it is critical that the guidelines, requirements, and any previously completed relevant work zone impact assessment results are included in the RFP or shared with the Contractor at appropriate stages of the project. The

Agency should be prepared to “think outside of the box” for innovative ideas that do not impact the traveling public adversely.

Improving work zone safety and mobility is a collective effort by all parties involved in the project. These parties include not only the Agency and the Contractor, but also other State, regional, and local stakeholders, including law enforcement and incident/emergency management stakeholders. It is important to establish a good relationship between the Agency and other agencies involved in incident management early, preferably during the planning and development stage of the project. Regular communication with these stakeholders and obtaining their inputs and feedback can keep all parties informed and achieve buy-ins and cooperation throughout the duration of the project. This is particularly important for a DB project because of the frequently changing nature of work zone locations and durations as TCPs are developed throughout different stages of the project.

Aspect #2 – Work Zone Data Collection and Analysis

Summary of the Aspect

At the project level, Agencies are required to use field observations, available work zone crash data, and operational information to manage work zone impacts for specific projects. At the agency level, Agencies are required to continually pursue improvement of work zone safety and mobility by analyzing work zone crash and operational data from multiple projects to improve State processes and procedures over time.

Issues

Table 3 compares how this aspect is applied to DBB and DB delivery methods. It also identifies general issues with applying the aspect of the Rule to DB projects. Agency level work zone data analysis and use does not differ from DBB to DB projects.

Table 3. Common Issues with Applying Aspect #2 of the Rule to DBB and DB Projects

Design-Bid-Build	Design-Build
• Agency has skilled personnel that are likely to be more equipped to make field observations, and evaluate crash data and operational information to analyze and control work zone impacts directly. They are more likely to have devices and resources to gather data and monitor work areas during construction. • Agency is aware of the current trends in work zone management strategies and techniques because of multiple project reviews. • Agency may have historical crash data and operational information on the project site and can utilize its resources to analyze data during project development.	• Traffic engineering consultant on the DB Team will have the expertise in work zone data collection and analysis. The consultant is likely to devote more time on the front end (design stage) of the project and is less likely to stay on-site for continuing data collection and as needed work zone analysis once construction is underway. • Contractor’s on-site personnel responsible for work zone data collection may have additional duties that may limit the commitment to do the job with effectiveness. • Contractor more than likely will not be as aware of current trends in work zone management strategies and techniques because their focus is one DB project.

	• Agency needs to share available crash and operational data of the project site with the Contractor so an effective TMP can be developed. • Agency or Contractor may be responsible for collecting, monitoring, and analyzing work zone crash and operational data. Roles, responsibilities, requirements, and expectations should be defined in the RFP or the contract.
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Work zone operational data are valuable for safety and mobility analyses to assist with improving traffic control and management techniques not only for the project itself but also future projects. It is beneficial to include provisions in the RFP for the Contractor to collect and/or analyze operational and safety data to monitor and manage work zone impacts. For example, a travel time data collection program can be included as a requirement to facilitate monitoring and management of work zone mobility performance. The Agency could include a documentation requirement for crashes so that it is easy to identify if changes need to be made at high accident locations, ensure follow-up to address corrective items, and facilitate documentation gathering in the event of any legal actions.

When high percentages of the evaluation score are devoted to work zone safety and mobility in the RFP, it is not uncommon for the Contractor to include work zone monitoring/data collection capabilities (e.g. additional CCTV and portable vehicle detection) as value-added elements. However, due to resource limitations, the collected operational data may not be used to identify potential causes and remedies for work zone safety and mobility impacts or for other safety or operational related analyses. The Agency may include provisions in the RFP for the Contractor to collect as well as analyze the data if resources are available or for the Contractor to collect and submit the data to the Agency for analysis. Detailed requirements for data collection and/or analysis should be specified in the RFP.

The Contractor may need to be trained to perform project level data collection and analysis. While some National level training may be available, States may desire different types of information or information in different formats. Also, it is possible that parties other than the Agency and the Contractor may be potential data collectors and sources. For instance, law enforcement agencies and towing companies may have crash data for after hours that are not collected by the Agency or the Contractor. These parties would not be a part to the training as required in a project RFP.

Many agencies may collect work zone data. However, collected data may not be stored, distributed to other team members, or used for analyses. It will be beneficial for the Agency to specify in the RFP that the Contractor should collect and analyze work zone crash data and operational information as a way to continually monitor and improve safety and mobility. Collection and analyses of work zone data is even more critical to DB projects as they provide the basis for developing a good TMP. Even if the Contractor is not required to use work zone data to perform any analysis, it will be beneficial for the Agency to require the Contractor to collect and record certain work zone data and turn them over to the Agency. The data will not only help the Agency with performing safety and mobility analyses for the current project, but also facilitate work zone safety and mobility improvements for future projects. The Agency may encourage and sometimes require the Contractor to use intelligent transportation systems (ITS) for work zone management. ITS has become an important application for work zone management. ITS

devices such as cameras, VMS, and vehicle detection, can be used to collect work zone traffic data and monitor and manage work zone traffic conditions. In some locations, permanent ITS may already be installed and could be useful for monitoring and managing the work zone and providing data for assessing performance. The Agency may need to make arrangements for obtaining the data from an established traffic management center (TMC).

Aspect #3 – Training

Summary of the Aspect

Agencies shall require that personnel involved in the development, design, implementation, operation, inspection, and enforcement of work zone related transportation management and traffic control be trained, appropriate to the job decisions each individual is required to make.

Issues

Table 4 compares how this aspect is applied to DBB and DB delivery methods. It also identifies general issues with applying the aspect of the Rule to DB projects. Training is an aspect of the Rule that should not differ significantly between DB and DBB projects. However, since the Contractor may be directly carrying out some responsibilities that it may not typically perform for DBB projects, there may be some additional training needs.

Table 4. Common Issues with Applying Aspect #3 of the Rule to DBB and DB Projects

Design-Bid-Build	Design-Build
- Generally the Agency provides training opportunities to its staff when they are offered. That training is put to use day in and day out. Some States have in-house training that may not be offered to industry. - Contractor must meet Agency training requirements for the construction phase of a project. Examples of possible requirements include having a traffic control supervisor onsite or using certified flaggers.	- Contractor may need to perform additional duties such as plan design, TMP development, and impacts assessment that the Agency usually performs. In addition to the same requirements on DBB projects, there may be additional training needs and related requirements included in the contract. - Training that is offered to Agencies may not be available to Contractors. - National training or industry training is generally not specific to State or local Agencies' requirements and processes. A Contractor may not put training to use as regularly as Agency trained people (use it or lose it). Large firms from out of state likely to bid on large DB projects are less likely to be aware of State and local standards.

The Contractor bears significantly more responsibilities in the design, maintenance of traffic (MOT), and implementation in a DB project than that in a DBB project. Training related to Agency requirements for design and MOT may not be offered to the Contractor at the appropriate time, and the same level of training offered to the Agency may not be available to the Contractor. If agencies have state- or agency-specific training on their work zone policies or procedures, it can be helpful to offer it to consultants and contractors as well so they can appropriately apply these requirements on DB projects. DB Contractors

also need to be proactive in identifying and taking advantage of training opportunities in anticipation of upcoming projects.

One common characteristic of DB projects is that many of the Contractor's workers come from out of state and often from a different DB project that has been recently completed. These individuals may not be as versed on the guidelines, protocols, regulations, and policies that are unique to the Agency, the project, and other local stakeholder agencies (e.g. DNR, watershed district, EPA, etc.). It is important for the Agency to include training requirements in the RFP to ensure personnel on the DB team will receive appropriate training that meets the Agency's expectations. The Agency can also require the Contractor to have a designated trained person (Aspect #8) with previous experience and expertise working in the particular state to improve the Contractor's knowledge in State and local guidelines and standards.

On the Agency side, it may be beneficial for the Agency to assign an "always available" person for guidance and over the shoulder help in DB projects. This could help maintain the same level of expertise in DB projects as there is in DBB projects, as well as expedite comment resolution and speed up the design review process.

Aspect #4 – Process review

Summary of the Aspect

Agencies shall perform a process review at least every two years. Appropriate personnel who represent the project development stages and the different offices within the Agency and the FHWA should participate. While this aspect pertains to the agency level, it involves receiving data and feedback from staff on individual projects and doing reviews of a sample of projects.

Issues

Table 5 compares how this aspect is applied to DBB and DB delivery methods. It also identifies general issues with applying the aspect of the Rule to DB projects. Contractors will typically have a limited role in an Agency's process review, so the process review is an aspect of the Rule that should not differ significantly between DB and DBB projects.

Table 5. Common Issues with Applying Aspect #4 of the Rule to DBB and DB Projects

Design-Bid-Build	Design-Build
- Agency performs process review at least every two years to learn what works and what needs to improve. Agency makes changes as needed based on review findings. - Contractor is expected to be cooperative if necessary, such as on a project chosen for individual analysis as part of a review. Contractor does not participate in overall review and has no buy-in with decisions. - Contractor may be asked to provide data collected during construction or to develop a post-construction report related to work zone safety and mobility.	- Agency performs process review at least every two years to learn what works and what needs to improve. Agency makes changes as needed based on review findings. - Contractor is expected to be cooperative if necessary, such as on a project chosen for individual analysis as part of a review. Contractor does not participate in overall review and has no buy-in with decisions. - Contractor may be asked to provide data collected during construction or to develop a post-construction report related to work zone safety and mobility.

Performing a process review is the Agency’s responsibility, but if they choose a DB project for individual analysis as part of a review they need to collaborate more with the Contractor to obtain relevant data and in sharing relevant findings from the review. The Agency may require that “after-action” reports (which can be coupled with as-built plans) be prepared by the Contractor for both DBB and DB projects to provide another means of review of the TMP and overall traffic management of a project. There could be language in the RFP that insures the Contractor would cooperate in this task.

As the Agency completes their process review they also need to consistently review and update the MOT scope that is included in DB RFPs. It is important the Agency includes appropriate language and sufficient level of details in the project scope to ensure project requirements and expectations are clearly communicated and understood by the Contractor. The Agency can enhance their work zone and MOT scope by learning lessons from past projects, and incorporating better requirements and methods for applying the Rule to future project scopes. Gathering experience and lessons learned from prior projects becomes critically important for the Agency to keep on top of how future project scopes related to MOT can be enhanced.

Aspect #5 – Transportation Management Plan

Summary of the Aspect

Agencies are required to develop and implement a TMP for all Federal-aid projects in consultation with appropriate stakeholders.

Issues

Table 6 compares how this aspect is applied to DBB and DB delivery methods. It also identifies general issues with applying the aspect of the Rule to DB projects.

Table 6. Common Issues with Applying Aspect #5 of the Rule to DBB and DB Projects

Design-Bid-Build	Design-Build
- Agency or its consultant creates TMP over a period of time in consultation with other staff, offices, agencies, Counties, and Municipalities. Agency makes commitments to stakeholders. The relevant components of that TMP are included in the PS&E package put out for bid. - Fewer changes to the TMP should occur in a DBB project because the Agency is the sole author, and the design is completed before bidding and contract award. Modifications after award are made with change orders.	- Contractor takes over a partially completed TMP and may have little history on what previous considerations and facts led to its current development stage if this information is not conveyed in the RFP. - TMP may be prepared by a Consultant working for the Contractor who must please his employer as well as the Agency. The TMP may have compromises to satisfy the Contractor and still meet the Agency’s requirements. The Consultant is in the middle with demands from both sides. - TMP development is an iterative process. The TMP needs to be further developed and refined as the design for the project is developed, which may be only a short time before construction on some segments begins. This often compresses TMP

	development and review time. • Contractor/Consultant may find it difficult to modify the TMP in a timely way once the project has begun because of the faster pace of construction and the ever evolving traffic control and staging plans, and if an adequate budget has not been set aside for this function. • Agency review and approval time is shortened. Agency needs to define: ○ Who has responsibility for reviews (whether done by the Agency itself or a consultant/contractor) ○ How approvals will be done ○ How long should the review periods be ○ Whether the Contractor can proceed when reviews are delayed. • A good Quality Management Plan (QMP) is key to ensuring the Contractor delivers a good design and TMP and successfully executes the project, but can be a challenge to develop. It is usually more complex because the Contractor takes on more responsibilities.
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Improving work zone safety and mobility is a collective effort by all parties involved in the project. These include not only the Agency and the Contractor, but also other stakeholders. For example, involving incident management stakeholders early in the incident management planning during project development enhances work zone safety and mobility. While early engagement of incident management stakeholders in the design, RFP, and TMP development for DBB projects is essential, it is even more critical for DB projects as plan development is handed off to the Contractor. For a DB project, early engagement and participation from stakeholders helps with building goals and expectations into the RFP to ensure the Contractor can develop a TMP that meets the Agency's needs and the project requirements.

The DB delivery method promotes coordination and collaboration and builds a strong sense of ownership for all parties involved. The designer, traffic engineer, construction company, and the Agency all have to work closely throughout the project to successfully develop and implement the design, the TMP, and other aspects. Establishing different task forces early in the project to guide the development and review of quality and safety plans will lead to solid results and will be very beneficial throughout the project. It is essential to make sure all parties are informed. Co-location is often beneficial for coordination, collaboration, and building a good working relationship.

The Agency can benefit from using qualified staff within its organization to perform TMP review to ensure all standards, requirements, and Agency goals and expectations are met. The Agency may opt to hire a consultant, on behalf of the Agency, to review the TMP developed by the Contractor for a DB project. The Agency should be aware that a potential conflict of interest may exist when a Consultant reviews the work done by another Consultant with whom it may have a business relationship on other

projects. The conflict of interest may hinder the Consultant's ability to perform an unbiased review; however, such reviews can usually be done successfully with oversight from an engaged Owner/Agency.

The RFP should specify who will review and approve the TMP and the various TCPs for the project, and what the timelines are for these reviews. New or revised TCPs can be developed at an accelerated rate during a DB project. Delays in reviewing TCPs can quickly delay the project and result in compounding issues. The Agency needs to think through and clearly define who has responsibility for TCP reviews (whether done by the Agency itself or a Consultant), how approvals will be done, and whether the Contractor can proceed when reviews are delayed. The Agency may want to use over-the-shoulder reviews or have a staff member available for face-to-face meetings to expedite the review process. While some parts of the TMP may change regularly for a DB project, other components such as the use of a safety service patrol or ITS may be established once and carry through the entire project, or only be updated periodically. The Agency may want to specify different review procedures for the full TMP or components that change less frequently.

In addition, the DB RFP should specify when the TMP needs to be updated and who is responsible for making the updates to avoid confusion during the project. Identifying the requirements for TMP updates/changes can help avoid the possibility that the TMP becomes out of date as the project progresses and circumstances change. Due to the fast moving nature of DB projects, issues with implementing TMPs and/or TCPs may not always be addressed before the work associated with the issues has been completed and the work zone has been removed or altered to a new stage. The Agency can address this concern by including provisions in the RFP stating that work zone traffic control issues must be addressed within a specific time frame or monetary damages will be assessed.

The Agency's review period for the Contractor's deliverables is often short due to the pace of the DB project. As such, the Contractor's quality assurance (QA) process becomes crucial in a DB project. A good QA process can ensure the design plans, TMP, and other documents are meeting the Agency's specifications and requirements; the review by the Agency can be done within the desired short timeframe; and the project is kept on schedule.

Specifying in a DB RFP what the Quality Program must include, especially with performance-based specifications, can be a challenge to the Agency. Specifying quantities instead of quality can be more effective in assessing performance-based specifications. However, it is not always easy to do. Without explicitly specifying the requirements and expectations for the quality program in the RFP, the DB Contractor may not allocate sufficient resources to the program and the Agency may end up performing the QA/QC tasks that are originally intended for the Contractor to do.

Development of a Quality Management Plan (QMP) for a DB project can be a challenge as the QMP required in the RFP is usually more complex for a DB project because the Contractor takes on more responsibilities in the design of the project, development and implementation of the TMP, and management of the work zone. Teamwork and partnering between the Agency and the Contractor can help overcome the challenge. It is more difficult for the Contractor to develop a QMP without appropriate guidance from the Agency. The Contractor can benefit from have an example from the Agency so the QMP can be developed to meet the Agency's requirements and expectations. It is critical in a DB project that the Agency and the Contractor work closely together to overcome this challenge by exchanging ideas and identifying the Agency's desired concept for this element of the project.

Implementation of a comprehensive QMP leads to mutual understanding in roles and responsibilities; positive collaboration between the Agency, Designer, and Contractor; and increased commitment and subject knowledge by the developers of the QMP. This should lead to more efficient and effective utilization of resources, quality products, and cost savings for both the Agency and the Contractor.

Maintaining the same level of safety and mobility standards in DB projects as they are in DBB projects can be challenging. In DB projects, the Contractor is in a position to assume more and greater risks in order to expedite schedule and increase profitability, which may at times run contrary to reducing safety and mobility impacts. While the Agency should avoid including very prescriptive requirements in the RFP that specify “how” to do something to avoid stifling innovation, the RFP needs to be specific enough to ensure that the Agency gets what it needs, including for work zone safety and mobility. The Agency must have solid (special or overall) standards that allow for a quantitative look into important aspects rather than leaving requirements at a qualitative level. For example, qualitative requirements such as “adequate retro-reflectivity” would be better stated as “must meet MUTCD minimum retro-reflectivity standards.” A less prescriptive RFP may require the Agency to perform more careful reviews later in the project.

Aspect #6 – PS&E Shall Include TMP or Provisions for Contractor to Create TMP

Summary of the Aspect

A TMP will be created and provided by the Agency, or the Contractor will develop it subject to the approval of the Agency prior to implementation.

Issues

Table 7 compares how this aspect is applied to DBB and DB delivery methods. It also identifies general issues with applying the aspect of the Rule to DB projects.

Table 7. Common Issues with Applying Aspect #6 of the Rule to DBB and DB Projects

Design-Bid-Build	Design-Build
Most of the relevant parts of the TMP (public information campaign, highway helpers, signal timing changes, etc.) are part of the PS&E. The Agency and the Contractor are aware of the requirements and cost before the contract is awarded.	- There is no typical PS&E developed before bid. The RFP contains project requirements and specifications, rather than a full PS&E package. Not providing a full PS&E package allows for Contractor innovation, but also means the Agency needs to include its framework for work zone safety and mobility performance in the RFP. - Requirements for developing a TMP and/or a partial TMP are handed off to the Contractor. Contractor finishes the TMP after project award and must satisfy the Agency’s concerns. Cost of implementing the TMP is more difficult to estimate before award, leading to cost uncertainty and possible budget issues.

The natural characteristics of DB projects, especially on the design side, can make the Agency somewhat uncomfortable. It is common that segments of a project can be under construction, while an adjacent segment may not even be designed at that time. Because of this, the Agency loses a great deal of control, as unlike in the DBB delivery method, the project can be built while the Agency does not have a complete plan set.

The responsibility for the development and implementation of work zone traffic control in a DB project lies largely with the Contractor. The traffic engineering firm on the DB team is critical to the success of the TMP and work zone traffic control plans. To include an appropriate level of scoring for safety and mobility elements in the proposal evaluation criteria, it is valuable to have work zone traffic control staff on the RFP development team and the evaluation and selection committee to ensure safety and mobility factors are adequately considered and weighed in the proposal process.

It is critical to have safety, mobility, and quality as part of the value-based criteria in the RFP to communicate to bidders that these factors are important to the project owner and will be considered in proposal scoring. The RFP should explicitly state the Agency's goals and expectations, and include good specifications. The Agency then needs to see in the proposals an indication of how the DB team intends to provide for work zone safety and mobility during the project through design, MOT, public outreach, etc.

The scoring portion of the proposal evaluation can be framed to support MOT and traffic control efforts. For projects where MOT is a major element, more evaluation points can be assigned to that section of the RFP (for instance 30 out of 100 – 30%) compared to projects where most of the work may be completed on a new alignment with little MOT and traffic control required (which might assign 15 of 100 points – 15%). Allocating a greater weight to the MOT element of the RFP scoring will encourage that a prospective DB team places work zone safety and mobility as a high priority and has an incentive to use a quality traffic engineering consultant to develop a superior MOT plan.

Another challenge with applying the Rule to DB projects is related to the level of prescriptive requirements in the RFP concerning work zone safety and mobility. Using a highly prescriptive RFP for DB projects can clearly set the Agency's expectations, but at the same it may limit the opportunity for innovation. A less prescriptive RFP allows flexibility and encourages innovation, such as alternative technical concepts (ATCs) and value-added elements, yet requires more scrutinized oversight by the Agency. Value-added elements can improve work zone safety and mobility through the use of strategies such as reducing periods of lane or ramp closures, deploying positive protection (pre-cast portable barrier in lieu of barrels and cones), and shortening the schedule to reduce the overall project duration. With the conventional DBB method, opportunities or incentives for these methods are likely minimal. The Agency needs to carefully exercise its options to find appropriate places in the RFP for the inclusion of less prescriptive information, while still being clear and firm with "non-negotiables" to avoid bearing unnecessary risks. When using less prescriptive requirements in the RFP, it is important to indicate the desired outcomes and results for those requirements.

An example of using less prescriptive requirements is the exclusion of intermediate contract times (ICTs) in the RFP. ICTs require when certain elements of the project need to be completed. While ICTs are necessary in certain cases, allowing the DB Contractor to be innovative and set their own substantial completion dates based on the project characteristics, and Contractor's approach and resources often leads to a condensed schedule with monetary savings that also reduces the duration of safety and

mobility impacts. This is due to the fact that the Contractor can mobilize and build the project based on their strengths and not predetermined requirements.

Aspect #7 – Pay Item Provisions – Method or Performance Based

Summary of the Aspect

For method-based specifications, individual pay items, lump sum payment, or a combination thereof may be used. For performance-based specifications, applicable performance criteria and standards may be used.

Issues

Table 8 compares how this aspect is applied to DBB and DB delivery methods. It also identifies general issues with applying the aspect of the Rule to DB projects.

Table 8. Common Issues with Applying Aspect #7 of the Rule to DBB and DB Projects

Design-Bid-Build	Design-Build
• Method based pay item provisions are most common in DBB projects.	• Performance-based specifications, used to measure the performance of the Contractor, are more likely to be used in DB projects. • Agency may not have a method and a process to collect necessary data for the evaluation of the Contractor's performance. As a result, the Contractor may become frustrated with how the performance is measured and the payments are made.

DBB projects give a large degree of control of the design to the Agency and use prescriptive design and specifications, while DB projects require the Agency to relinquish much of that control and trust to the DB Contractor and more often use performance-based specifications in RFPs. The use of performance-based specifications may open the door for the Contractor to take risks which may allow for trade-offs in safety and mobility, schedule delivery, and cost. To ensure that any such tradeoffs will be acceptable to the Agency, the RFP needs to specify some bounds. For example, the RFP can specify the most critical intermediate contract times to specify when certain elements of the project must be done (e.g., a ramp constructed and opened to traffic), or time restrictions for when specific lanes and ramps can be narrowed or closed during given time periods (e.g., weekdays, weekends, special events). Liquidated damages can be attached to these conditions to address non-compliance.

Agencies are familiar with using performance-based specifications for tangible elements of the project such as lane smoothness for the asphalt and concrete pavement. However, using performance-based specifications to address work zone safety and mobility can present challenges to agencies. For example, unlike material quality and quantity, elements such as safety and traffic control can be challenging to specifically measure, test, and verify. It is not uncommon that in the RFP, the TMP and its components are identified as a Traffic Management line item in the pay items list. To use performance-based specifications in a DB project, the Agency can impose liquidated damages along with TMP-related performance specifications to ensure the Contractor meets the project requirements.

For example, due to the fast moving nature of DB projects, issues with implementing the TMP and/or traffic control may not be addressed before the work associated with the issues has been completed and the work zone has been removed or altered to a new stage. This situation can be prevented by including provisions in the RFP stating that work zone traffic control issues must be addressed within a specific time frame or monetary damages will be assessed.

Performance-based specifications are difficult to use if appropriate data cannot be collected. It is important to identify data needs for performance-based specifications and define data collection responsibilities early in project development. Explicitly defining data needs and data collection responsibilities in the RFP is critical to ensure data required for performance-based specifications are captured. In addition, it should be recognized that parties other than the Agency and the Contractor may be potential data collectors and sources. For instance, law enforcement agencies and towing companies may have crash data for after hours that are not collected by the owner or the contractor. It is equally important to recognize potential data sources and collaborate closely with them throughout the project duration.

Aspect #8 – Designated Trained Person

Summary of the Aspect

The Agency and the Contractor shall each designate a trained person at the project level who has the primary responsibility and sufficient authority for implementing the TMP and other safety and mobility aspects of the project.

Issues

Table 9 compares how this aspect is applied to DBB and DB delivery methods. It also identifies general issues with applying the aspect of the Rule to DB projects. The requirement for designating a trained person from both the Agency and the Contractor is an aspect of the Rule that should not differ significantly between DB and DBB projects. The difference is who has the responsibility for implementing and monitoring the TMP.

Table 9. Common Issues with Applying Aspect #8 of the Rule to DBB and DB Projects

Design-Bid-Build	Design-Build
- Agency has primary responsibility, and the designated Contractor person plays a lesser role than their Agency counterpart. However both have a share in the responsibility. - Designated Trained Person from the Agency may be more aware of current work zone issues if these are their full-time, ongoing duties.	- The designated Contractor person, who takes on a bigger role and has the primary responsibility, may not be as current with work zone issues as their Agency counterpart. This person must also satisfy the Contractor's wishes and get approval from him before certain issues are resolved with the Agency. This person may have other duties in addition to traffic control. - Contractor takes on greater responsibility for implementing the TMP. - Contractor bears more responsibility for monitoring the TMP and work zone safety and mobility during implementation. If a

	traffic engineering consultant developed the TMP and has not stayed on-site during construction, the person performing the monitoring may not be well-versed in traffic management and what to look for,
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For both DBB and DB projects, the Agency and the Contractor are both required to designate a trained person who is responsible for implementing and overseeing the TMP and other safety and mobility aspects of the project. With a DB project, the Contractor's designated person takes on a greater share of the responsibility for developing and implementing the TMP, assessing the likely effects of changes to the TMP, and monitoring the TMP and work zone safety and mobility in the field. The Agency or its Consultant still has responsibility for review and approval of TMP changes during implementation, and some oversight of actual TMP performance. Since the Agency is usually held accountable by the public, elected officials, and others for all its projects, the Agency has a clear stake in how the work zone performs in handling traffic.

Some of the key questions the Agency needs to ask include:

- What is the designated Contractor person's availability?
- Does this person have adequate training?
- Does the person satisfy the needs of the Agency?
- Does this person understand the needs of road users and other affected parties regarding work zone safety and mobility?

The RFP needs to clearly require answers to questions like these to ensure the Contractor to provide a qualified individual as the designated person responsible for implementing the TMP and other safety and mobility aspects of the project. The Agency should execute the same exercise to designate an individual representing the Agency. However, the bottom line in some decisions may have cost winning out over safety and mobility.

A common characteristic of DB projects is that many of the Contractor's laborers come from out of State and may not be as versed on the guidelines, protocols, regulations, and policies that are unique to the Agency, the project, and other local stakeholder agencies (e.g. DNR, watershed district, EPA, etc.). Having a designated trained person with previous experience and expertise working in the particular State can be very beneficial.



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