

105 CONTROL OF WORK

105.01 Authority and Responsibility of the District Engineer

The District Engineer oversees all construction and maintenance activities within the district. The District Engineer represents ADOT on all transportation issues involving local and county governments and has input into what new projects are planned for the District.

All ADOT Construction Field Offices within a district fall under the District Engineer's management. Part of the District Engineer's job is to ensure uniformity in contract interpretation and consistency in how construction contracts are administered. The District Engineer decides which projects are assigned to each Field Office and assists the Resident Engineer in staffing each project.

The District Engineer can authorize contract supplemental agreements as high as \$1,000,000. In addition, the District Engineer may delegate this authority to the Assistant District Engineer. The District Engineer, or the Assistant District Engineer also signs for the State of Arizona regarding change orders for Time Extensions. The District Engineer is the first point of contact in the partnering escalation process beyond the project level.

105.02 Authority and Responsibility of the Resident Engineer

The Resident Engineer has immediate charge of one or more construction projects. The Resident Engineer represents the Department on official business conducted at the project site. The Resident Engineer is seen by the contractor, local government agencies, the traveling public, and the media as a state official who can make (or get) decisions and conduct business on behalf of the State.

The Resident Engineer's main tasks are to administer and oversee construction contracts for the Department and ensure that projects are built according to the contract and the Department's requirements.

Administrative responsibilities involve managing the routine affairs of construction contracting such as recording work progress, paying the contractor, documenting changes, and ensuring compliance with state and federal regulations.

Oversight responsibilities include observation of construction activities, sampling and testing materials, interpreting contract documents, measuring work for conformity to the contract requirements, and tracking construction costs and contract time.

Senior Resident Engineers have the added responsibilities of administering more complex projects or many ongoing projects within a single highway corridor. They provide input into the project development process for upcoming projects within the District.

These are some specific responsibilities of the Resident Engineer:

- Creating and maintaining an atmosphere of trust and teamwork on the project. Good relations must be maintained with the Project Manager, Field Office Personnel, members of other ADOT groups, the contractor's staff, outside agencies, private citizens, and any other involved parties.
- Building and maintaining an organization that can administer the projects efficiently, effectively, and in accordance with ADOT policies and procedures. Sufficiently trained personnel must be allocated to provide all of the required inspection, sampling, testing, and documentation. In many cases the RE relies on staff from the Area/District lab to sample materials. In most instances the lab can accommodate the RE's request. However, it is ultimately the RE's responsibility to assure sampling occurs. A phone call between the RE (or designee) and the lab to schedule sampling is required; furnishing the lab a copy of

the contractor's weekly schedule, leaving a voice mail or merely sending an email is not acceptable notification. The lab should be notified at least 48 hours in advance. If the lab does not have personnel available, it is the RE's responsibility to provide the Inspector.

- Being involved first-hand in every major project-related issue. The Resident Engineer must visit each project as often as possible and attempt to view all the major work items underway.
- Ensuring the design is actually compatible with the conditions encountered at the project site.
- Communicating promptly and accurately—the Resident Engineer must manage the flow of project information and paperwork.
- Ensuring the Department's policies and procedures are followed in the area of construction administration.

Resident Engineers can authorize and approve contract changes that do not exceed \$200,000. They can also suspend work and accept work on behalf of the Department. However, one of the most important duties of the Resident Engineer is to keep a project moving and maintain control. All highway projects (especially the larger ones) tend to get bogged down from time to time due to a major design change or differing site condition. Regardless of the cause, it's up to the Resident Engineer to lead the project team and contractor through the obstacle as most Resident Engineers are empowered with a wide range of authority so they can do just that.

The Resident Engineer should not make unilateral decisions that have a major effect on project scope, schedule, or construction costs. Under ADOT's project management process, the Resident Engineer is a member of the project management team assembled for that project. The project management process covers the entire life of the project from development and design through construction and maintenance. Administration of the project is a team effort and all decisions must be made within the framework of the project management process. The Resident Engineer should confer with other team members when making decisions affecting project scope, schedule, or budget. The Resident Engineer should realize that the Department is a large organization and that other groups that do not actually participate in building the project play an important role in achieving the final goal.

Suspension of Work

Due to the potential ramifications that it may cause to the progress and overall success of the project, suspension of work by the Department needs to be carried out in a most judicious manner and can either result from actions made on the part of the contractor, adverse weather, or unsafe/undesirable conditions of public interest. Reasons for suspension of work may include:

- Negligence by the contractor resulting in unsafe conditions for either the workers on-site or the general public, as described in Standard Specifications 107.07, project time will continue to be charged.
- Non-conformance of the construction activities with respect to the contract documents time will continue to be charged.
- Extended project delays outside of the contractor's control as described in Section 108.08 of this manual.

In the unlikely situation where a project is required to be halted or suspended for any reason, the Resident Engineer should reach out to the State Construction Engineer or the Assistant State Construction Engineer for guidance as it relates to charging time and contractor compensation.

When a stop work order is issued, the State Construction Engineer and Assistant State Construction Engineer must be copied.

105.03 Plans and Working Drawings

The definition of what constitutes working drawings or shop drawings can be found in Subsection 101.02 definitions for Plans. The Standard Specifications or the Special Provisions will specify when these types of drawings are required. The subsections of the Standard Specifications that require working drawings include:

Subsection	Drawing Description
601-3.02(A)	Falsework and Form Drawings and Calculations
601-3.02(C)	Formwork Drawings for Cast-in-place Bridge Girders
601-3.04(3)(b)	Deck Joint Assemblies Shop Drawings
602-3.01	Prestressed Concrete Shop Drawings
603-3.05	Timber Pile Splicing Detail
604-3.01	Structural Steel Fabrication Shop Drawings, Calculations, and Erection Details
605-3.01	Bar Bending Diagrams and Cut Sheets for Reinforcing Steel
606-3.01	Sign Structure Fabrication Shop drawings
608-3.01	Sign Panel Fabrication Shop Drawings (when supplements are needed)
609-1.03	Drilled Shaft Installation Plan
610-3.03	Painting Application Plan
701-1	Alternate Traffic Control Plan (when submitted by contractor)
730-4	Shop Drawings, Catalog Cut Sheets, Photometric Data Sheets for Lighting and Traffic Signal Equipment
732-3.01	The contractor changes in location and size of Electrical Conduit & Pull Boxes
734-2.01	Shop Drawings, Circuit Diagrams and Other Technical Information for Traffic Signal Controllers
806-3.01	Material and Equipment lists and Other Technical Information for installing Trees, Shrubs, and Plants
808-3.01	Material and Equipment lists and Other Technical Information for installing Water Distribution systems
808-3.05	Shop Drawings for Installation of Backflow Prevention Units
809-3.01	Material and Equipment lists and Other Technical Information for installing Sewerage Systems

There are specific time requirements in Subsection 105.03 for the Department's review of working drawings. If these time requirements are exceeded and result in a project delay, the contractor may be entitled to a contract time extension. It is important for the Resident Engineer to track drawing review times and minimize their effect on the contractor's progress.

The drawings are submitted in a reproducible format electronically to the Engineer for review. The Engineer may ask for up to three hard copies.

Some working drawings require the seal of the Professional Engineer (PE)—this means a Professional Engineer registered in the State of Arizona (see definitions in Subsection 101). The Department and the Arizona State Board of Technical Registration do not recognize out-of-state Professional Engineers. Do not accept working drawings stamped by out-of-state Professional Engineers.

105.04 Conformity with Plans and Specifications

Occasionally, contractors and Inspectors are uncertain when work is reasonably close to conformity. Although a definition of “Reasonably Close Conformity” is specified in Subsection 101, confusion still occurs. When a specific tolerance is described in the contract documents, there should be no confusion. The work is either in or out of specification. If the contractor claims they did not have to meet that specification on previous projects, then the issue is different. The issue is now the inconsistent enforcement of the contract specifications, which is something the Resident Engineer or District Engineer should handle.

When no tolerances or requirements are listed and the Inspector is dissatisfied with the workmanship or materials used, then the only recourse is to determine the industry standards for that type of work. Trade and material producer associations such as the Asphalt Institute, ACI, PCA, and AISC publish manuals that describe generally accepted practices for different types of construction work. The contractor is expected to follow accepted industry standards if the contract specifications are silent on a desired quality of materials or workmanship. For example, the Standard Specifications do not go into specific details on how to rake asphalt. This is covered in Asphalt Institute or National Asphalt Paving Association literature.

Some judgment is required in applying industry standards to the contractor’s work. Sometimes, local practices take precedence over industry standards when these practices are widely accepted by the contracting community.

The contractor has a duty to perform work in strict accordance with the plans and specifications, whether the Department inspects the work or not. The presence of an Inspector does not legally relieve the contractor of the responsibility to comply with all the contract requirements. Inspectors and Project Supervisors can’t catch everything. However, they do have a duty to point out defects in workmanship or materials to the contractor as soon as they recognize them.

On occasion, the Department accepts work at a reduced price that does not totally meet the specifications. This process usually involves the contractor submitting a proposal as described in Subsection 100 of this manual. The Resident Engineer then consults with the Designers and other technical experts regarding the merits of the contractor’s proposal. The Resident Engineer must examine the cost involved in accepting substandard work. This should include the life-cycle costs to the Department, especially any higher operational and maintenance expenses.

If the contractor's proposal is accepted, the Resident Engineer must document the acceptance by change order or letter agreement. Some form of documentation needs to take place.

Additionally, for federally funded projects, ADOT has a stewardship agreement with the FHWA which requires all work to be constructed in strict compliance with all plans and specifications, and materials sampled and tested in accordance with the ADOT Materials Quality Assurance Program. Any deviation from these requirements must be disclosed as an “exception” in the Final Materials Certification. The Final Materials Certification is completed in DocuSign and includes the Exception Report, Materials Sample Checklist, and Certification Log. The Resident Engineer and Materials Coordinator should document circumstances related to any exceptions at the time they occur for inclusion in the Final Materials Certification. For materials-related exceptions, contact the Regional Materials Engineer to ensure the exception is addressed properly to both minimize any decrease in quality or performance of the finished product and ensure consistent administration statewide. An Exception Report Template is available by contacting the Materials Group, and serves as a guide for properly documenting exceptions and includes examples for exceptions which are more common. A Materials Sample Checklist for each project may be downloaded from the Materials Group website. A Certification Log Template is available on the Materials Group website.

105.05 Restricted Performance Specifications

This is a seldom known and little-used specification which can save Resident Engineers and Project Supervisors much frustration when contractor field personnel keep trying to push construction tolerances to their limits. The most obvious example is the concrete foreperson who tries to save materials by forming and pouring everything 1/8 to 1/4-inch smaller in dimension. Clearly this is not the intent of the Project Plans or Standard Specifications. More subtle examples include equipment that arrives on the job site that is not correctly adjusted or designed to produce materials or a finished product in the middle of the tolerance range or at the target values specified.

105.06 Coordination of Plans, Specifications, and Special Provisions

This Subsection is used to resolve conflicting specifications or contract requirements found in different contract documents. The basic philosophy is that the project Special Provisions, Project Plans and Supplemental Agreements are site-specific and should take precedence over the more generic contract documents such as the Standard Drawings and Standard Specifications. In turn, these documents should take precedence over the MUTCD, AASHTO, and ASTM specifications when conflicts arise involving these documents.

On projects in which local government work is involved, city or county construction specifications are often cited as the requirement for certain portions of the work. When a discrepancy or conflict exists, the basic philosophy discussed above still applies; go from the site-specific to the more generic contract specifications. In the case of local government work, the order would be:

1. Supplemental Agreements
2. Special Provisions
3. Project Plans
4. City or County Standard Drawings
5. City or County Specifications
6. ADOT Standard Drawings
7. ADOT Standard Specifications

Keep in mind, local government specifications do not apply to general contract provisions such as bidding requirements, control of work, or prosecution and progress. In this case, the Special Provisions and ADOT's Standards Specifications apply exclusively.

Override Documents

There are some types of government documents that are not part of the construction contract that can override anything specified in the contract. State laws and federal regulations are examples. The contractor is not required to do anything that violates the law or a government regulation.

The more typical problem that a Resident Engineer or Project Supervisor encounters concerns prior agreements ADOT has made with other government agencies, local communities, or individuals. These could involve intergovernmental agreements (IGAs), 404 permits, Right-of-Way agreements, or environmental impact statements.

These documents obligate the Department to construct something or conduct construction operations in a certain way. When there is a conflict or discrepancy with the contract documents, a supplemental agreement is usually needed to bring the construction contract into compliance. For example, if the Project Plans show a 6 foot high noise wall and the Department has signed an IGA with the city to build a 8 foot high wall, the Resident Engineer must execute a supplemental agreement with the contractor to build the higher wall.

ADOT's Project Manager should be involved when these types of changes are needed. The Project Manager is responsible for coordinating and tracking these kinds of agreements on behalf of the Department.

105.07 Cooperation by Contractor

The intent of this subsection is to have someone from the contractor's staff who can represent the contractor at all times on site safety, traffic control, and quality issues. This representative does not need to be someone at the superintendent level. It's more important that this person be empowered to take immediate corrective action when instructed by the Department. If this person refuses or hesitates to take immediate action, then the only recourse may be to require the presence of a superintendent full-time on the project site.

105.08 Cooperation with Utility Companies

Utility relocation work is a common occurrence on most highway projects. In fact, several specifications have been set up to deal with utility related work. These subsections include:

Subsection	Description
104.06	Utility work done on the project by third parties under permit
105.08	Relocation work done by utility companies on the project site
105.12	Inspection of contractor's work by utility companies
107.15	Protecting utilities during construction

Subsection 105.08 deals with utility conflicts at the project when conflicting utilities are relocated by the utility company. The Department does its best to have all utilities that may conflict with the project work adjusted or relocated before the contract is awarded. The Department also tries to accurately represent what utilities are at the project site. Occasionally, utilities and utility work do conflict with the contractor's work.

Unless the Subsection 107.15 of the Special Provisions or Project Plans warn the contractor about specific utility work going on within the project, the contractor is generally entitled to additional compensation when utility work conflicts with project work. In addition, if the project's controlling item at the time is delayed, the contractor may be entitled to a time extension including costs for extended overhead.

Some utility conflicts are the result of utilities discovered by the contractor during construction that are not shown on the Project Plans or mentioned elsewhere in the contract documents. In these cases, the utility conflict is handled like a differing site condition (see Subsection 104.02 of this manual). Then the question is whether the contractor should have known about the utility and adjusted the construction work accordingly?

Utility conflicts can be a very costly matter for the Department. The Resident Engineer must take an active role in managing these situations. The Resident Engineer shouldn't hesitate to involve the Project Manager or ADOT's Utility and Railroad Section if help is needed in dealing with a utility company. The Utility and Railroad Section is responsible for coordinating proposed project work with utility and railroad companies, and preparing and processing agreements with these companies. See Subsection 107.15 of this manual for further information.

105.09 Cooperation Between Contractors

This subsection applies when:

- Two or more contractors are working at the same time on the same project
- Two or more contractors are working on different projects but have to tie their work together

Getting contractors to cooperate with each other can be challenging at times. Even with this subsection contractors may have difficulty cooperating. As soon as a contractor's access is restricted or the contractor has to perform work out of sequence, the contractor may attribute the difficulties to the adjacent contractor. Attempts by the Resident Engineer to order the contractors to cooperate may do nothing to diffuse the situation.

Resident Engineers must take a leadership role when contractors have difficulty cooperating. Anticipating areas of conflict and meeting ahead of time to resolve common issues are the best ways to keep contractors working together. Some Resident Engineers conduct regularly scheduled coordination meetings in an effort to get contractors to work together. Ultimately, if contractors do not cooperate and damage or hinder each other's work, it is usually the Department that ends up paying for the damages.

105.11 Authority and Responsibility of Project Supervisor and Inspectors

Project Supervisor

The Project Supervisor serves as the Lead Inspector for the project. The primary responsibility of the Project Supervisor is to oversee the Department's inspection operations at the site.

Most ADOT projects require a team of Inspectors, material testers, surveyors, and other specialists who must work together to inspect and document the project work. The Project Supervisor ensures that there is a single coordinated effort at the project site to effectively inspect and document the work. The Project Supervisor must handle other project oversight responsibilities such as safety, traffic control, and government regulation compliance.

Duties of the Project Supervisor include:

- Day-to-day inspection staffing and scheduling
- Project-wide monitoring of the contractor's operation and construction schedule
- Enforcing and explaining the Project Plans, Special Provisions, and other contract specifications
- Coordinating the documentation and payment of contract work
- Resolving site issues with the contractor's field staff
- Performing quality control over inspection work, site materials testing, and project documentation
- Maintaining the project as-built plans
- Interfacing with district surveyors, regional material labs, and other off-site ADOT groups that support the inspection and testing efforts for the project
- Inspecting and documenting the work as needed

One of the most important things the Project Supervisor can do on site is to anticipate the contractor's work, then figure out the inspection and testing requirements ahead of time.

The Project Supervisor should be the on-site expert for what is contained in the Project Plans, Special Provisions, and other contract documents. By proactively reviewing the plans and specifications, then discussing the contract requirements with the contractor's superintendent, the Project Supervisor can prevent many of the conflicts that arise between the Inspectors and the contractor's production staff. In most cases, these conflicts are either resolved ahead of time by the Project Supervisor or escalated to the Resident Engineer, limiting the Inspector's involvement. The Project Supervisor helps the Resident Engineer resolve site related issues with the contractor. The Project Supervisor does not have the authority to waive or alter the provisions of the contract, but can provide

valuable information on how an issue developed and conduct the necessary research (contact Project Designers, review contract documents, talk to ADOT technical sections, etc.) to get the issue resolved.

Inspectors

Inspectors have two important responsibilities. The first and primary responsibility is to require the contractor's work and site activities to conform to the contract plans and specifications. Plans and specifications describe in detail the work that is to be constructed including the materials to be used, the workmanship required, and certain construction procedures to be followed. The plans illustrate graphically the various elements and components of the project. The specifications describe in words the materials and workmanship required.

The second responsibility is to accurately document the level or degree of conformity of the contractor's work with the plans and specifications.

Inspection duties include:

- Observing and measuring the contractor's workmanship, materials, and methods for compliance with the plans and specifications
- Communicating to the contractor's field staff the contract requirements for work under construction or about to be constructed
- Assisting the contractor with reading and interpreting the plans and specifications
- Determining the intent of the specifications when necessary
- Documenting inspection observations and measurements including summaries of labor equipment and material usage
- Measuring work for payment
- Observing construction operations for general compliance with safety regulations, traffic control requirements, and construction-related government regulations (air quality, noise levels, erosion control, equipment licensing, federal aid requirements, etc.)

Inspecting Work in Progress

Although Inspectors are not required to inspect an item until it is complete, the Department encourages Inspectors to periodically observe and inspect work in progress to assist the contractor in avoiding rework and stoppages. The contractor should be notified of noncompliant work as soon as it is detected. If the contractor fails to correct the non-compliant work, a verbal notice, then a written noncompliance notice may be issued in accordance with Exhibit 105.11-1.

For example, the inspection of reinforcing steel for a bridge deck can take place once all the rebar has been completely installed and tied. However, should there be an error in the bar spacing in the bottom mat, considerable time and effort would be expended by the contractor to correct this deficiency. Simple periodic checks of the rebar placement operation by the Inspector could potentially avoid this problem.

When conditions arise at the project site that make compliance with the plans and specifications impractical or completely unreasonable, the Inspector should immediately notify the Project Supervisor or Resident Engineer.

The Inspector as a Buyer for the Taxpayers

The Inspector is the Department's point of acceptance for most contract work. The Inspector is also a buyer of construction work. The Inspector accepts work the contractor produces and then fills out a diary to pay for that work.

The Inspector's objective should be to get the expected value or quality for the price the Department is paying. In other words, the Inspector's job is to ensure the Department and taxpayers are getting what they're paying for. This doesn't necessarily assume dishonesty on the contractor's part. The Inspector is there to assist the contractor with the contract documents and review work in progress so that produced construction work meets or exceeds the Department's standard the first time. This is how inspectors get the best value for the taxpayers and help avoid the rework, contract disputes, work stoppages, confrontations, and high risk associated with after-the-fact acceptance.

Inspector and Contractor Relations

The Resident Engineer and Project Supervisors should keep in mind that the most important relationship at the project site is between the Department's Inspector and the contractor's foreperson or superintendent. Part of the Resident Engineer and Project Supervisor's responsibility is to ensure that this relationship is a productive and cooperative one.

Some Project Supervisors go out of their way to cultivate and protect this relationship by ensuring two-way communication and timely feedback between the parties. They should guard against confrontation by mediating disputes, resolving personality conflicts, and escalating issues quickly so that the effectiveness of the relationship is not diminished.

Subsection 104.01 discusses ways in which the Inspector can effectively get along and enhance his relationship with the contractor's staff and how to enhance the Inspector's relationship with the contractor.

Cooperation by Contractors

The contractor has a duty to cooperate with the Department's Inspectors (see Subsection 105.07).

The contractor must provide:

- Adequate warning about work requiring inspections (105.12 & 108.04)
- Adequate time for inspections to be completed (105.12)
- Accessibility to the work to be inspected including assistance (105.12)

The contractors often get so focused on their work that they often overlook their obligations to the Inspector. The Inspectors and the Project Supervisor should be proactive in bringing up potential inspection issues such as sufficient warning, adequate time to inspect, and suitable access to the work. Sometimes it requires constant reminding to get the contractor to be a little more accommodating. But keep in mind, if the contractor is producing high quality work efficiently, then the Department is getting what they want most from the contractor and the Inspectors should be a little more flexible about timing and access requirements. It's only when contractors are producing marginal work that they should be fully obligated to cooperate with the Inspectors.

105.12 Inspection of Work

Inspection Fundamentals

Inspection, in its purest form, is simply a measurement for compliance. Measuring is the act or process of regulating to a standard, while compliance means conformity in fulfilling official requirements.

When you inspect, you measure (or observe) something and then compare your measurements to the requirements of the work. The requirements are described in the contract documents (Project Plans, Special Provisions, Standard Specifications, etc.).

Construction work requirements can be divided into five elementary categories:

1. Layout
2. Material Properties
3. Dimensions
4. Workmanship
5. Performance

Any contract specification that describes construction work will fit into one of these five categories, and completely describe the work.

Inspectors can use this important information to greatly improve their effectiveness. This will be discussed in greater detail later. For now, let's more fully describe the five categories and suggest a memory aid so you can instantly recall them in the field:

Category	Examples Include	Mnemonic
Layout	location, elevation, grade, horizontal control and other survey related information	Let
Material Properties	type, gradation, strength, compaction, density, grade, certification, stability, prestress, binder content, temperature, cure time, and color	Me
Dimensions	spacing, length, width, thickness, height, clearance, slope, diameter, and other shape related information	Detect
Workmanship	finish, appearance, cure, edge and connection treatments, texture, and handling	With
Performance	smoothness, pressure test, bacteria count, pour rate, flow rate, waterproof, and mortar tight	Pride

Now you may ask, "How can remembering these five inspection categories make me a better Inspector?" As mentioned earlier, all five categories completely describe the requirements of any work to be constructed or even manufactured (such as aircraft engines, furniture, and circuit boards). When Inspectors are examining work under construction, they should continually ask themselves these five questions:

1. What are all the layout requirements for this work
2. What are all the material properties that materials used in this work must comply with
3. What are all the dimensional requirements for this work
4. What are the workmanship requirements
5. What are the performance specifications the completed work must meet, if any

Then the Inspectors search through the contract documents for all the answers to these five questions. This should be a systematic search by answering one question at a time. By following this approach, Inspectors will gain a thorough and complete understanding of the contract requirements for the work to be inspected.

Most Inspectors take the opposite approach to determining the work requirements. They search in the appropriate sections of the contract documents for any type of specification related to the work. They may find a material specification in one section, a dimensional requirement in another, and eventually they find all the specifications related to the work. Then they may see something at the site that doesn't look right and do a brute-force search of the contract documents to find the requirement the contractor must meet. After much effort, they eventually get an overall view of the work requirements.

Although there is nothing wrong with randomly searching the contract documents to catch all the work requirements, this approach alone leads to a greater chance of overlooking important contract requirements when inspecting unfamiliar work. The systematic approach described previously is a more complete way of capturing all the contract requirements for a particular item of work.

Both approaches should be used together—a random search of the contract documents followed by a review of the five questions. This is the best way to ensure Inspectors have a complete picture of all the contract requirements.

Construction Rework and Additional Inspections

Occasionally it is appropriate to charge the contractor for additional inspection work. To be fair, the Resident Engineer should be careful about how and when contractors are charged for additional inspections.

The Department's policy on back charging contractors is based on the belief that we are partners with the contractor. Both the Department and the contractor must be flexible in accommodating each other's schedule. The other belief is that sometimes contractors make honest mistakes. Back Charging the contractor for additional inspections done when fixing honest mistakes only adds insult to injury and is inappropriate.

Back Charging is appropriate when:

- The contractor chronically refuses to cooperate with the Department's Inspectors about adequate warnings for inspections that result in additional overtime expenses
- The contractor repeatedly makes the same mistakes and won't change construction methods to eliminate or reduce defects
- The contractor attempts to alter already accepted work without notice to or the approval of the Department's Inspectors

District Engineers will usually support back charges to the contractor only when there is documented evidence of a chronic lack of cooperation by the contractor. Some prior attempt must also have been made by the Field Office to resolve the issue with the contractor through the partnering escalation process.

When inspecting unique items of construction (such as electrical and mechanical equipment installations) Inspectors should take advantage of the experience and expertise of the equipment supplier. Often these people have their reputation to protect and will help the Inspector ensure the contractor installs and uses their equipment correctly. In addition, ADOT may have its own in-house experts who can assist the Inspector with reading and interpreting specialized contract requirements.

Why Document Inspection Work?

Many Inspectors question how much documentation of construction and inspection activities is needed. Some Inspectors question why they need to document at all. Others are unclear as to the value of good inspection records.

Unfortunately, there is not one good reason why it's important for Inspectors to document contract work and inspection observations. However, there are several reasons when looked at together that offer a compelling argument for good record keeping by Inspectors.

Reason 1:

Historical information on how the work was constructed is valuable in the future if a project has to be modified or rebuilt to solve a future transportation or traffic problem. Good inspection documentation will instill in future Planners and Engineers confidence in what is there and how well it is built. In addition, if there is a failure of a structure, pavement, or other project component, the Inspector's diaries can be helpful in ruling out possible modes of failure.

Reason 2:

Recording of an Inspector's observations and measurements provides valuable quality control information. This information can be used to identify performance trends, as well as determine a level of confidence in accepting work that may be marginal in other areas. More importantly, inspection documentation indicates to ADOT management, taxpayers, the FHWA, and other customers that there was an authentic compliance and quality control effort at the project site. This documentation also indicates how effective that effort was.

Reason 3:

Pay quantities are required to be measured and documented for contract payment and tracking purposes. Part of the Field Office's role is to pay the contractor for work performed. Inspectors are best suited for paying for contract work since they are the closest to the work. Good documentation of pay quantities is needed to avoid underpaying, overpaying, or double-paying the contractor for completed work.

Reason 4:

Regardless of the notice requirements in Subsection 104.03, contractors often notify the Department after the fact regarding additional compensation for work already performed. The Inspector's diary should represent a summary of the day's construction activities assigned to the Inspector. In addition to recording inspection observations and measurements, Inspectors should summarize labor, material, and equipment usage, delays, breakdowns, idle time, inefficiencies, work accomplished, and other important events that affect or explain the contractor's progress. Proficient record keeping by Inspectors has saved the Department thousands of dollars in overpayments to contractors for extra work performed.

Reason 5:

An Inspector's diary is a communication device or tool. It tells others what the Inspector did that day and what went on at the construction site. Documenting inspection work directly communicates the level of professionalism and conscientiousness an Inspector applies to his or her work. Inspectors—more than anyone else in a state highway agency—are expected to document their day-to-day work activities. Secretaries don't keep diaries, nor do Materials Engineers or highway maintenance workers. Only Inspectors are charged with the daily duty of recording the activities and events that surround them. The taxpayers of this state and the Department place a lot

of faith in their Field Inspectors to assure the quality and durability of our roads and bridges. A well-written, comprehensive diary is one of the best acknowledgments of that faith an Inspector can give.

Daily Project Diaries

The Resident Engineer is required to keep a daily diary on each project and each inspector and supervisor who is assigned responsibility for any project operation is required to keep a daily diary. Each inspector's diary should provide detailed information concerning the specific phase of work they are assigned to.

Entries should be on the appropriate form, written legibly, in ink and signed at the end of each day or entered into PEN. Dairies should be kept in such detail and manner that new personnel could take over the work at any time.

A partial list of items to be noted in a dairy is:

- Weather
- Orders given to the contractor
- Important discussion with the contractor or his representatives
- Official visitors and inspections
- Work or materials rejected and reasons
- Time of shutting down or resuming of work and explanations of the delays
- Work done by contractor's forces during the day, including the location of the work
- Accounting for any time spent by contractor's personnel or equipment on disputable items of work and especially any work, which might be the basis of a claim
- Arrival and departure of major equipment
- Record of important phone calls, conversations in the field and/or emails
- Unusual conditions, if any such as high water, bridge construction problems, slides, unsatisfactory sub grade or foundation conditions, detour conditions, etc. Care should be used when explaining hazardous conditions
- Progress of staking and surveys
- An up-to-date inventory of contractor's equipment and list of the contractor's work force
- If problems are noted, explain the steps taken to correct them

All diaries are the property of the Department and shall be filed as a part of the project records. A good diary can provide valuable information and evidence in the event controversies arise. There should be no personal information entered in the project diaries.

Construction Inspections with Quantlists

Construction Inspection Checklists AKA "Quantlist" have been developed to memorialize inspections at key points in the construction process. Quantlists also serve as a reinforcement to the Department's Standard Specifications and Construction Manual, while ensuring contractor quality and uniformity within their construction processes. quantlists assist inspectors in performing acceptance inspections on most disciplines involved in highway construction projects. Quantlists may also serve to assist new inspectors in learning what to look out for during an acceptance inspection. However, inspectors should not rely on the quantlist alone and must read all relevant contract documents to ensure necessary compliance.

At the ADOT Construction and Materials Group website you will find a downloadable guide titled “Quantlist: A Comprehensive Guide”, this guide provides a more detailed explanation on the following information.

What is a Quantlist

A quantlist is a quantitative checklist, which converts attribute information into a weighted number score according to the gravity or necessity of individual attributes and how the lack of completing said specific attributes may adversely affect the quality of a finished product. This in turn allows for an objective evaluation of construction processes and the review of specification changes. Each attribute in a quantlist references the most recent specification, each specification should be reviewed independently for additional details by the inspector prior to performing any acceptance inspection. The intent of a quantlist is to affirm quality requirements at the beginning of a project, assure construction processes are in control and stabilized throughout the duration of the project and that the final product meets the Departments quality goals. Quantlist attributes complement the Standard and Specifications, ADOT Construction Manual - Subsection 105.11 Authority and Responsibility of Project Supervisor and inspectors, 105.12 Inspection of Work, and inspectors daily diaries. In doing so, quantlists serve to reinforce the Department’s quality and craftsmanship requirements. It should be noted that quantlists were developed as an aid to the inspector and do not include all items to be inspected; inspectors should not rely on the quantlist alone and must read all contract documents to ensure necessary compliance.

Setting Expectations

One quantlist should be completed after each construction process change until the process is in control and stabilized to the satisfaction of the Engineer. Once the process is in control, the minimum number of quantlists must still be completed. Inspectors should always document any reason for reducing the quantlist frequency in their daily diary. Throughout the life of a project, the Resident Engineer and Project Supervisor should continuously track the project's quantlist frequency compliance.

Printable hard copies of all quantlists are available for inspectors to use in the field. However, quantlists can only be and must be completed in the PEN System on the daily diary associated with the work. It is not acceptable to only complete hard copies. Additionally, the inspector’s daily diary must identify that a quantlist has been completed and a quantlist must be reviewed by the Project Supervisor. Quantlist are to be completed at the required frequency. In order to obtain an accurate measurement of the contractor’s workmanship, the quantlist must capture the results of each attribute at the time of the inspection.

Quantlist Frequency

Each quantlists has its own specified time as to when it should be used to perform an acceptance inspection. These specified times vary greatly and should be strictly adhered to throughout the life of the project. The minimum quantlist frequencies can be found in the current Quantlists Versions and Minimum Quantlist Frequency chart. This information is available on the Construction & Materials Group, Quantlist web page on the ADOTNet or the internet. This guideline also shows the corresponding Standard Specification numbers and most recent versions of each quantlist.

Tracking Quantlist Frequency on a project

Quantlist frequency should be tracked and checked regularly by the Project Supervisors throughout the life of a project. The mandated frequency requirements are set by ADOT in Construction Bulletins 02-04, 06-01, 07-01 and are designed to meet the project documentation requirements set by the FHWA. It is paramount that the quantlist frequencies be consistently adhered to, failure to follow the mandated quantlist frequencies can cause issues with quality control on a project. Frequency compliance will be reviewed during the Department’s Internal Construction Quality Assurance Group audits, FHWA audits, and the Arizona Auditor General’s Office audits.

Quantlist Tracking Through Reports

Various statistical reports regarding past performance of completed quantlists that can be accessed on the ADOT Data Warehouse web page on the ADOTNet Reports will be found under “Pen / FAST Reports”, “Quantlist Tab Info”. The information gathered here can be compiled per project and by date utilizing the “Quantlist Frequency Table Processor” also found on the Construction and Materials, Quantlist web page.

Quantlist Scoring

Quantlist scoring is based on the severity of the attributes on the quantlist being used, e.g. an attribute requiring a certification of compliance or analysis will be weighed less than an attribute with a safety or environmental requirement. The weight definitions are as follows: Non Applicable (NA), Administrative, Minor, Major, and Critical each weight is assigned a value that is compiled after the quantlist is completed and submitted resulting in a percentage score.

After the submission of a quantlist a compliance percentage score will be displayed. Quantlist don't necessarily have a minimum passing score to be considered acceptable in the field. However, some projects may have a contractor Incentive associated with their overall quantlist scoring, this information will be found in the project specific special provisions. All narratives in a quantlist found to be in non-compliance, should be corrected by the contractor unless approved “as is” by the appropriate authority and Project RE.

Communicating Expectations With Your Contractor

Prior to a contractor starting work on any major construction disciplines, a pre-activity meeting should be held in accordance with a project's Special Provisions. The inspectors should obtain any and all current updated copies of quantlists that may be relevant to the discipline being inspected. The Project Supervisor and field inspector should discuss the Department's quality expectations for each attribute covered by the quantlists with the contractor during these pre-activity meetings.

Before Performing Acceptance Inspections

Prior to performing any Acceptance Inspection utilizing quantlists, inspection preparation is crucial. Inspectors should investigate and or review the discipline being inspected, even if the inspector is already familiar with the discipline being inspected; specifications change and may be updated without notice. This discipline review process can be accomplished by utilizing the project guiding documents and ADOT specifications, e.g. Project Special Provisions, Project Plans, ADOT Standard & Specification, C-Standards & SD-Standards, ITS Standards, Electrical Standards, ADOT Sampling Guide - Appendix C, Construction Bulletins, and Policy Procedure Directives - AKA PPDs.

The inspector should also discuss the Department's expectations with the contractor; discuss what narratives are on each of the quantlist with the contractor in a pre-activity meeting. Additionally, some contractors may request a copy of the finalized quantlist after each inspection. This should be a formal process for project tracking purposes, utilizing email or DocuSign works best, this process should also be addressed and agreed upon in the pre activity meeting. Finally, if the contractor has not requested an inspection, then notification of the upcoming inspection to the contractor should be formally issued at least 24 hours in advance, earlier if at all possible. Surprising the contractor with an inspection can cause resentment and partnering issues on a project; remember your job is not to catch the contractor making a mistake, but instead to assist the contractor in preventing mistakes from ending up in the final product. It is beneficial to both parties to be open and transparent when performing any type of inspection.

Performing Acceptance Inspections

If at all possible, all "Acceptance Inspections" should be performed with a contractor's representative present. Clearly establish and agree upon the limits of the inspection with the contractor's representative, i.e. where does the inspection start & stop and what you will be looking out for. Remember to take note of who the contractor's representative was (full name & position), what quantlist narratives were found to be deficient, along with the location of each deficiency if applicable. Taking photos of any areas of concern can be extremely useful in relocating the deficiency, when performing a reinspection, discussing issues with the Project Supervisor / RE, when notifying the contractor of a non compliance, and if a representative was not present during the Acceptance Inspection.

Following Acceptance Inspections

Review quantlist results with the contractor's representative. If a contractor representative was not present, the inspector should notify the contractor of any non-conformance items that were found in a timely manner. A concise description of the acceptance inspection should be documented in your daily diary. This description should include: Who requested the inspection or why Inspection is being performed, arrival time, ambient temperature, weather (sunny, cloudy, raining), the inspection location/limits, what discipline was being inspected, any non-conformance issues, what additional work was being performed within the immediate area, the contractor's representative present during the inspection, along with any discussions of note that were related to the acceptance inspection, and finally your departure time.

Non-conformance

For each Attribute the inspector is required to mark Yes, No, or NA (Non Applicable) under the compliance dropdown. If an Attribute is marked as "No" under the compliance dropdown, the inspector has the option to select "Follow Up Required" prompting a reinspection. If this follow up option is chosen, when creating a new quantlist of the same type you will be required and must perform a reinspection until the deficient attribute has been marked as "Yes" under the compliance dropdown. Followup inspections for each non-conformance attribute will also need to be documented within the inspectors daily diary capturing all of the aforementioned data. A followup quantlist should be completed (at a minimum) for any initial quantlist that was scored 'No' on any attribute(s) weighted 4 (major) or 8 (critical). All corrective actions should also be documented in the inspector's daily diary.

Once the contractor has corrected the nonconformance, the inspector should create a new quantlist and perform a reinspection. Inspectors should note all corrections made by the contractor in their daily diary under the section the quantlist is noted within.

If the contractor disputes a narrative requirement that has been marked as NO by the inspector, the inspector should immediately contact their Project Supervisor per the partnering escalation process. The Project Supervisor will then review the contractor's non-conformance request with the RE. If after review and only after contacting the appropriate authority, a Resident Engineer may decide to accept the non-conformity. In this instance the inspector should still select the NO option but must explain the justification as to why the non-conformance was accepted and noting the authorizing authority within their daily diary.

In the rare instance that a non-conformance was not corrected and was not accepted by the RE, the inspector will retain the default value of NO and should comment as to why the attribute was not corrected by the contractor within their daily diary. Remember to include facts only, no comments related to your personal feelings should be included within your Daily Diaries.

Independent Quality Assurance Inspections

The Quality Assurance Group (QA Group) is tasked with performing the independent reviews of statewide ADOT construction projects utilizing quantlists. The QA inspector will contact the unit for an updated contractors schedule. If any activities are of interest, an onsite visit will be scheduled with the Project Supervisor. These inspections are required by the Federal Highway Administration (FHWA) to ensure the funding provided is receiving the best quality product from the contractor and the field office.

Once an independent QA inspection has been conducted, any non-conforming attributes marked as "NO" on the quantlist will be discussed with the Resident Engineer and the Project Supervisor in an out-briefing. A QA inspector will then generate an initial QA Inspection Report, listing the non-conformities from the same quantlist completed during the initial inspection. The project Unit will have 14 calendar days (more time can be formally requested by the RE or project supervisor, reason as to why must be provided) to provide any missing documents or provide proof that any non-conforming items were corrected by the contractor. After the allotted time frame, the QA inspector will compile any updated information received from the Unit and/or may perform a re-inspection (if necessary) to create a new quantlist reflecting the efforts to correct the non-conformance issues found in the field.

Quantlist Correlation Inspections

Inspection quantlist attribute results between field inspectors and QA inspectors can vary considerably. Interpretation of quantlist attributes and the time frame at which quantlist inspections occur were found to contribute to these discrepancies. This variation in interpreting attributes can cause a number of issues on a project, such as, missed deficiencies not conforming to the Departments expectations, contractor QC / ADOT inspector frustration, and considerable frustration from contractors who are told they need to perform work one way by an inspector only to have another inspector tell them they need to do the same work in another way. To combat the issue of varraying interpretation of attributes and to achieve consistency throughout the Department, Quantlist Correlation Inspections have been implemented.

Quantlist Correlation Inspection is an inspection of a product using quantlists that are completed by a field inspector and the QA inspector at the same time and same location but independent from one another. The quantlists are then compared to each other for discrepancies in an attempt to identify the misinterpretation of a quantlist attribute.

These inspections can be extremely useful for new inspectors in learning how to look up quantlist related specifications and interpret these specifications and project documents. In addition, this process can be a useful tool for more seasoned inspectors, by establishing what the Department's conformance expectations are in relation to the work being performed on a project by the contractor. Additional Correlation Inspection information may be found in Construction Bulletin 07-01.

105.13 Removal of Unacceptable and Unauthorized Work

ADOT Inspectors can accept and reject contract work. They have a duty to immediately inform the contractor about any workmanship, methods, or materials that do not conform to the plans or specifications. When work or materials are rejected, the Inspector should make the reasons clear for the rejection. Whenever possible, don't just quote specifications; explain the reasons why it is important for the contractor to comply.

Be careful not to make a rejection look like a failure on the contractor's part. The Inspector should view rejected work as good intentioned work that was just misguided. The hardest part for most Inspectors who reject work is handling the contractor's response. Here are some points to keep in mind as you and the contractor try to work through the difficulties:

- Maintain your respect for the contractor's field staff. If it seems they are not listening or they are attempting to do things underhandedly, give them the benefit of the doubt. Often they are under pressure to produce and occasionally lose perspective of what is best in the long run for the project
- Listen to the contractor's explanation. Acknowledge that you understand why the work turned out the way it did
- Be supportive of the contractor's predicament. Instead of shifting the problem entirely to the contractor, express your willingness to work through this problem
- Avoid personality conflicts. If you make a rejection look like a test of wills between you and the contractor, somebody ends up losing every time. Instead, stay focused on both the work and the specifications, and avoid assigning or shifting blame
- If you and the contractor can't work out a mutually acceptable solution, escalate the problem quickly. Don't let a confrontation or the threat of one postpone corrective action

At a fundamental level, you should view the contractor as a partner and equal. No matter how tough things get, if you can fix this perspective solidly in your mind and behave accordingly, most contractors will feel you are treating them fairly and impartially. Truly seeing the contractor as a partner and equal will make you say the right things and behave honorably and professionally without having to think about specific behavior patterns to follow.

When work has been rejected, the contractor has several options:

- Immediately fix the problem
- Remove and replace the rejected work
- Submit a proposal as described in Subsection 100 of this manual for acceptance of the work (usually some type of alteration to the work is involved)
- Fix the problem later, but before other work is affected

The decision as to which option to pursue is entirely up to the contractor. However, as the contractor's partner, you should assist the contractor in working through this decision, but in no way should you assume any responsibility for making the decision. Often the contractor will ask what you would like them to do and try to shift the problem over to the Inspector. Be careful. Inspectors cannot direct the contractor's work. All you should do is advise them on what the plans or specifications require and avoid telling them how to achieve those requirements.

The management and direction of the work are the contractor's business. However, if methods are employed which the Inspector has reason to believe will be detrimental to the quality of the finished work, give notice to the contractor accordingly and immediately advise the Resident Engineer. The Inspector should not attempt to supervise the contractor's work or give any appearance of doing so.

Suggestions can also be dangerous. If the contractor relies on your suggestion and the work doesn't turn out as everyone expected, guess who the contractor is going to blame? Inspectors and Resident Engineers should be helpful while thoughtfully assessing the risks involved before giving advice to the contractor.

105.14 Load Restrictions

On Public Highways

The Arizona Revised Statutes require that all loads hauled on public roads in Arizona comply with the limits stipulated in the statutes (except those which are authorized in writing by the Transportation Board to exceed such limits). The Transportation Board has designated the Enforcement Section of the Motor Vehicle Division (MVD) as

its agency to administer this part of the law, determine policies pertaining to extra-legal loads, and grant permits for such loads and collect fees for the permits.

Any load restriction issues should be discussed with the contractor first. ADOT construction personnel are not expected to be MVD enforcement officers, but they are expected to notify and cooperate with the MVD when they believe anyone coming to or from the project site is violating legal load restrictions. ADOT maintains roads as well as builds them, and no one should be allowed to damage our pavements including our own contractors and Material Suppliers. The same applies to city and county roads.

Within Limits of Construction Projects

The following guidelines have been prepared for project personnel in allowing overweight vehicles to haul within the project. These guidelines may be considered written authorization for contractors to exceed legal loads. This written authorization is subject to modification or revocation by the Resident Engineer as provided below:

- Hauling overweight loads on subgrade and base courses (primed or unprimed) will be limited to an axle loading that will not result in undesirable stresses in the structures or the roadbed being crossed. Suitable cover and/or shoring must be provided over pipe culverts and small boxes to protect them from damage and excessive stress. A minimum of two feet of cover is required over any pipe or box culvert before crossing.
- Only legal loads will be allowed to cross bridges (including overpass structures) and hauling will be permitted only after the concrete has attained the anticipated compressive strength required by the specifications.
 - An exception is when structures have been designed in accordance with the "Bridge Construction Overload Policy" (contact ADOT Bridge Group) applied when economics, safety, or other reasons dictate that overload vehicles be allowed to haul excavation or borrow over bridge structures during construction.
 - When overloaded vehicles are used, it is standard practice to cushion the deck with a nominal thickness of twelve inches of suitable material to protect the deck. For additional information refer to the Bridge Design and Detailing Manual.
- Hauling operations over Lean Concrete Base (LCB) and Cement Treated Base (CTB) will be limited to legal loads.
- All hauling operations over new asphaltic concrete, asphaltic concrete finish course, or other types of bituminous mixtures will be limited to legal loads. (See #1 for prime coats)
- All hauling operations over new concrete pavement will be limited to legal loads. Absolutely no hauling will be permitted until:
 - The joints have been sealed
 - The concrete has obtained a compressive strength of at least 3,000 psi
 - The concrete has been in place for seven days
- Whenever practicable, hauling equipment will be routed so as to avoid concentrations of traffic (channelization) in any particular area.
- The weight of loads being hauled will be reduced, or all hauling operations will be suspended when, in the judgment of the Resident Engineer, continuation of the hauling operations being performed will result in distress to any part of the roadbed, base, or pavement structure.
- Special circumstances and conditions affecting structures that are not covered by these guidelines should be submitted in writing to the Structures Section for recommendation.
- Since hopper scales have become more common for weighing items such as AB and AC, a problem has developed in documenting and enforcing legal size loads. In the event this type of scale is proposed, it will be allowed if tare weights of individual hauling units are obtained and documented as follows:
 - Tare weight for each individual hauling unit will be considered acceptable if each unit has been tared within a twelve month period prior to or at the beginning of hauling operations.

- Tare weights must be provided by an authorized state employee. An acceptable document of tare weights will include (but not be limited to) the date a unit is tared, truck and trailer number, license plate number of each individual unit (or combination)
- Tare weight of each individual unit.

105.15 Maintenance During Construction

The contractor is expected to maintain finished work until it is accepted by the Department. This includes removing graffiti, sweeping sidewalks, maintaining landscaping, and repairing work hit by traffic.

The contractor may be reluctant to repair newly constructed work at their expense when damaged by the traveling public or by natural causes. However, both Subsection 105.15 and 104.04 place the responsibility of repairs on the contractor.

For example, guardrail and tubular markers have been hit on some projects only days after they were installed. The contractor is responsible for replacing these items at their expense until the roadway is accepted as part of either a partial or final acceptance in accordance with Subsection 105.20. Although the work itself may have been accepted by the Department, the responsibility of maintaining it does not shift to the Department until a formal acceptance of the project, or one of the following exceptions occur:

- The Department orders the roadway opened as specified in Subsection 105.18
- The Special Provisions specify payment for detour work per Subsection 104.04(A)
- Maintenance is required during winter shutdown per Subsection 104.04(B)
- The Resident Engineer orders the contractor to perform maintenance for public safety per Subsection 104.04(C)

Construction Bulletin 21-01 provides guidance to the Districts for when the Department will participate in the repair and when the contractor is to perform the repairs at their cost.

For example: The work to be performed for the project is in the median protected by the contractor's workzone. There is a guardrail hit and damaged on the outside shoulders which is not within the contractor's protected work area, the District should look to maintenance forces to repair this guardrail or pay the contractor to repair with an NFA change order.

105.18 Opening Sections of Project to Traffic

To help clarify when ADOT takes over responsibility for maintenance and repairs, project work can be divided into two general categories:

1. Work constructed under traffic
2. Work constructed away from traffic

Work Constructed under Traffic

In this situation traffic runs through the project exposing the work to potential damage by the traveling public. Common examples include shoulder improvements, lane widenings, and passing-lane construction. Lane closures and restrictions are used to control traffic, while phased construction is used to move traffic through different parts of the project. In most cases, a line of barricades and perhaps a small buffer zone are the only means that separate the traffic from the work.

In this case the contractor is responsible for maintaining and repairing work damaged by either the public or natural causes until formal partial or final acceptance is given. Regardless of what construction phases have been completed or what new lanes are opened to traffic, the contractor is still responsible until acceptance.

Work Constructed Away from Traffic

In this situation the work is physically separated from traffic and protected from damage. A detour may be used or the work may be on a new roadway alignment. Traffic cannot get to the area of work.

Under this scenario, the contractor is completely responsible for all damages and maintenance to the work until the roadway is opened to traffic. Of course, this includes maintaining any detours (Subsection 104.04).

When a roadway is opened to traffic, the responsibility for maintenance and repairs depends on why the road was opened.

- If the road is opened formally under a partial or final acceptance, then ADOT assumes responsibility.
- If the contractor (with Department consent) opens the road before all the work is completed or opens the roadway under a substantial completion described in Subsection 105.19, the contractor is still responsible for maintenance and repairs until final acceptance. This also applies to work constructed under traffic.
- If ADOT orders the road opened ahead of its scheduled opening, the Department assumes responsibility, regardless of the condition of the work.
- If the contractor has fallen behind schedule and ADOT orders the road opened after its scheduled opening date, the contractor is responsible for all maintenance, repairs, and traffic control until acceptance.

There are two reasons why the Department holds the contractor responsible for maintenance and repairs until some type of formal acceptance is given. The first has to do with damage to the work by the contractor's own operations. Until all work is completed, the Department does not want to get into a situation in which it has to determine whether damage done to existing work was done by the contractor or by traffic passing through the project. The second reason involves liability for the project. By assuming maintenance and repairs responsibilities, the Department is implying acceptance of the project. This can leave ADOT liable for the work before final inspection or acceptance has been made.

105.19 Substantial Completion

Substantial completion should not be confused with partial or final acceptance. Substantial completion is a point reached in the project where enough work has been completed to stop contract time. Subsection 105.19 defines what work needs to be finished to reach substantial completion. Substantial completion does not necessarily imply acceptance of the work. When the contractor reaches substantial completion, the Resident Engineer holds a final inspection. The final inspection has four objectives:

1. To determine if the project is in fact substantially complete as defined by 105.19
2. To review the completed project work for compliance with the plans, specifications, and the requirements of the district, local government, FHWA, or other important project stakeholders
3. To determine if the traffic can safely travel through the completed work
4. To develop a punch list of items that need to be completed before final acceptance

The Resident Engineer should invite, as a minimum, the District Engineer, the FHWA representative (if the project contains federal aid), local government representatives (when applicable), the Project Manager, the Maintenance Foreperson, and the contractor's superintendent.

The Resident Engineer and the inspection staff should try to be as thorough as possible during the final inspection, leave no stone unturned; check everything. contractors allocate equipment and staff to finish the project based on

the size and complexity of the Department's punch list. What contractors find most frustrating is how punch lists tend to grow after the final inspection. During the final inspection, there should be ADOT Inspectors and Engineers crawling all over the place so a thorough and complete punch list can be developed at the outset.

Substantial completion does not imply acceptance. It does not relieve the contractor of the obligation to finish the rest of the work nor does it relieve the contractor of the duty to maintain and repair work until acceptance.

Once the final inspection is complete, the Resident Engineer should write a letter to the contractor disclosing the results of the final inspection. If project time is stopped, the Resident Engineer should indicate the number of accumulated project days. If a punch list has been developed, the Resident Engineer should attach it. The Resident Engineer should close the letter with a statement to the effect that the contractor is still responsible for maintenance and repairs of any project work until final acceptance.

Within five working days after substantial completion is reached, the Resident Engineer must complete the DocuSign template "ADOT Start/ Completion Memo". The substantial completion notice will be distributed to a list of individuals who opt and/or require this notification. When ADOT's Field Reports Section receives this notice, the completion date is input in the Completion Memo field in the FAST - Contract Card. . The completion date should be input into the End Date field in CPE, by the Field Office.

No traffic control shall be paid after substantial completion is given per 701.403(F) or after contract time has expired.

105.20 Acceptance

Acceptance is another important project milestone. This is the point at which all of the work has been completed to the extent that the Department is willing to assume responsibility. We are taking delivery; the work is ours.

This is the Department's last chance to have the contractor fix any problems, repair any damage, or perform any cleanup (see Subsection 104.14). Once the work has been formally accepted any repairs or alterations to that work will require a supplemental agreement.

Since the responsibility for the work shifts from the contractor to the Department, it is very important for the Resident Engineer to make certain that all the required contract work has been completed in accordance with contractor documents. This includes all punch list items and any cleanup work. Any performance tests should be rerun if possible, and the work should be re inspected for any signs of unusual wear, damage, deterioration, or missing hardware.

Keep in mind that the Department can always re-inspect the work even after a final inspection has been performed (see Subsections 105.19 and 105.04). Final inspections are used to determine substantial completion and may not result in final acceptance of the work.

Acceptance Letter

Once all the working drawings are submitted and accepted and all the punch list items and follow-up inspections are complete, the Resident Engineer should write an acceptance letter for the District Engineer's signature. Any assessment of liquidated damages should be discussed and any conditions attached to the acceptance. If there are any unresolved contract issues, they should be summarized as well. It is important to write a final acceptance letter. The letter clearly outlines when responsibility for the work shifts from the contractor to ADOT. Utilize the DocuSign template "Final Acceptance for Construction" to submit the letter. This will ensure all the pertinent individuals receive it. The distribution list includes FHWA on federal aid projects, Field Reports, BECO and many others. When ADOT's Field Reports Section receives this notice, the Final Acceptance date is input in the Acceptance Letter field in the FAST - Contract Card.

Requests for partial acceptance should be disapproved. Disapproval shall be in writing noting reasons for rejection including citing Construction Bulletin 15-04: Partial Acceptance.

Final Acceptance

The final acceptance process can become administratively complex and tedious for the Resident Engineer. Here is a partial list of the things the Field Office should do in preparation for a final acceptance and close-out of the project.

Inspection Before Acceptance:

- The contractor cleanup of: detours, roadway, contractor's yard and processing sites, and adjacent private land should be completed. Pay particular attention to oil and air filters, material wrappings, crew trash, lumber fragments, AC, striping tape, and survey stakes/flagging
- Develop a punch list. This must be participated in by all project personnel, including the Electrical, Water, Utility, and Landscape Inspectors
- Utilities should be connected and working
- Salvage items are to be removed to a final location
- Any intergovernmental agreements drafted as part of the project must have been complied with. Contact the Project Manager
- Refer to 105.19

Accepting a Project:

- Remember that a project should not be accepted until all materials have been verified as acceptable. This includes certifications, but it also means that concrete poured toward the end of the project must have the cylinders broken before acceptance
- All quantity surveys and measurements must be completed (and preferably undisputed)
- All paperwork needs to be completed. Payrolls must be corrected, quantities checked and submitted to the contractor, and force accounts transmitted and approved
- Letters of acceptance should have been received from landowners, pit owners, etc
- All keys, etc. are to be handed over to the state, utility, or local municipality
- All bills must be paid such as electricity, water, and royalties
- Money is to be deducted for re-surveying, damaged salvage items or other property, or for liquidated damages
- As-built plans must be received and verified by project personnel
- The contractor or manufacturer must conduct meetings on how to operate, adjust, and maintain systems such as the irrigation system or a pump station
- All operating manuals and instruction sheets are to be accepted at the office
- All warranties and guarantees should be transferred to ADOT (or other final owner) as if they were the original purchaser, as specified
- ADOT specifications require the contractor to provide a 6-month warranty for in-service operation of electrical and mechanical components. This should be noted in the project acceptance letter, and a copy should be forwarded to the owner/operators of all the new equipment, along with the Operator's Manual. Include a cover letter that tells these people to route all ADOT complaints/claims through the Resident Engineer
- Final acceptance should only be given when all punch list items have been completed, and the Resident Engineer is satisfied that all of the contractor's field work is completed. The Resident Engineer should contact both the District Engineer and the Maintenance Foreperson before writing the acceptance letter in case either wants to make one last tour of the project. The Maintenance Foreperson should accept the project before the District Engineer

- Final acceptance should not be given until all working drawings have been submitted and accepted in accordance with subsection 105.03
- Project Close-Out, Refer to Chapter 12

105.21 Administrative Process for the Resolution of Contract Disputes

This subsection is intended to be used on projects that are not partnered or when an issue on a partnered project has not been resolved to the contractor's satisfaction through the escalation process.

Notice Requirements

Subsection 104.03 requires the contractor to notify the Department regarding any work disputes or potential contract claims as soon as they arise. The Resident Engineer needs to be careful about notice requirements. Many inexperienced Resident Engineers have been caught off guard by claims filed for work already completed.

Failure to give adequate notice can be grounds for denying any additional compensation. Resident Engineers try to get the claims disallowed based on lack of notice (Subsection 104.03). However, it is the Department's policy to review any contract claim or issue under dispute, even if the contractor did not provide the notice requirements specified in Subsection 104.03. The Department will consider noncompliance with 104.03 as part of the decision to accept or deny the claim.

The Resident Engineer should inform the contractor of the notice requirements. If the contractor appears to be ignoring the notice requirements, then write a letter advising and warning the contractor of the consequences. Often the Department's contractual interests in a claim can be severely compromised because the Field Office staff did not know that the current work was under dispute and had no opportunity to both mitigate costs and adequately document the work. If in doubt, bring the issue to a head and escalate it (if you must). Most importantly, be proactive and up front with the contractor on any potential project issues.

Often the courts and arbitrators give the contractor much latitude in what constitutes notice. The contractor does not necessarily need to follow the Department's exact procedures in order to meet the written notice requirements. In some cases, a summary in the weekly meeting minutes or a contractor's letter requesting clarification has been interpreted as meeting the notice requirements. The best the Resident Engineer can do is find out the course of action the contractor intends to pursue when a dispute or issue arises.

Dispute-Resolution Process

Subsection 104.03 of this manual outlines the dispute-resolution process for partnered projects. The process is slightly different for projects that are not partnered. The main difference is that there are no escalation meetings. In their place are formal reviews by the Resident and District Engineers.

The dispute-resolution process and time lines are summarized below:

1. The contractor gives verbal notice in accordance with 104.03
2. The Resident Engineer and contractor have two days to resolve the issue
3. After two days, the contractor gives written notice in accordance with 104.03(A)
4. The Resident Engineer reviews written notice with the District Engineer and both attempt to informally resolve the issue within seven days
5. After seven days, the contractor provides a dispute resolution submittal in accordance with 104.03(A) and 105.21
6. The Resident Engineer conducts a formal review within 10 days
7. After the Resident Engineer's review, the contractor has 15 days to request a review by the District Engineer

8. The District Engineer must conduct a review meeting within 15 days of the contractor's request.
9. The District Engineer has 15 days to make a decision after the review meeting
10. After the District Engineer has made a decision, the contractor has 15 days to request a review by the State Engineer
11. The State Engineer must conduct a review meeting within 15 days of the contractor's request
12. The State Engineer has 15 days to make a decision after the review meeting
13. The contractor has 15 days to accept the State Engineer's decision
14. After that, the contractor has up to 15 days to file for arbitration or mediation if the contractor does not agree with the decision (the contractor may file for litigation up to 2 years after the State Engineer's decision)

The Resident Engineer should notify the contractor in writing of the result of each review at each level. If the Department denies the contractor's claim, the Resident Engineer should explain the next step and specify the time limits the contractor has for initiating the next step. The intent of the written notification is to avoid any misunderstandings the contractor may have regarding the status of the claim.

The State Engineer is the highest level a claim or dispute can go within the Department. The Director or Deputy Director does not review unresolved issues or contract claims. However, they typically do provide input to the State Engineer when an issue has been escalated to that level, and the State Engineer does discuss review decisions with the Director before they are rendered.

On federal aid projects, the FHWA should be included in the issue resolution process. See Subsection 107.04 of this manual for further information.

105.22 Arbitration of Claims and Disputes

Contract claims are merely unresolved contract changes. Upon project completion, issues arise on a project for a variety of reasons and can be classified as listed below.

Contractor Practices

- Inadequate investigation before bidding
- Incomplete cost estimating
- Unbalanced bidding
- Bidding below costs and over optimism
- Poor planning and use of the wrong equipment
- Failure to follow authorized procedures

Owner's Practices

- Changes in plans and specifications
- Inadequate time for bid preparation
- Inadequate bid information issued by the owner
- Excessively narrow interpretation of plans and specifications
- Restrictive specifications
- Contract requirements for socioeconomic objectives unrelated to the construction process

Personnel Factors

- Perception of being treated unfairly
- Win-lose attitudes of construction personnel

Institutional Factors

- Lowest bid requirements
- The contracting process

A construction claim involves two key elements: entitlement—which refers to the merit of the claim, and quantum—which refers to the time and costs involved. The contractors can claim just about anything, there are no restrictions in the Standard Specifications for what a contractor can or cannot claim. Of course, what damages, if any, a contractor can collect depend on the merits of the claim and the degree to which the Department is responsible. Contractors cannot ordinarily refuse to do work under a claim unless the work is clearly outside the scope of the contract. The contractor must rely on the remedies in the contract to settle questions of time and costs.

Claims Analysis

The analysis of a contract claim follows the same approach described in Subsection 104.02 for analyzing contract changes. The entitlement element of the claim involves answers to the first two questions regarding what has changed and who caused the change. The quantum element involves answers to the last two questions regarding the impacts of the change and the costs.

Analyzing claims can become a tedious and cumbersome process. This is especially true of delay claims and earthwork claims; the two most expensive types of contract claims on transportation projects. ADOT's Construction Group can assist in claims analysis and preparation. If necessary, outside professional help may also be used by the Department in seeking satisfactory claims resolution. Although the Resident Engineer and Project Supervisor must still direct the preparation of a contract claim, they should be free from extensive and time-consuming forensic analysis so they can proactively run their current projects.

The Claim Defense Package

One of the best ways to present an effective claim defense and to ensure that all the necessary documentation has been assembled and presented is to create a claim defense package. This package can be in the form of a simple bound pamphlet. It should contain all of the appropriate claim information from an overview of the contractor's position to an in-depth cost analysis.

The following format has been used successfully by many Field Offices and is recommended as a good foundation for your claim defense.

Claim Documentation

Accurate and complete documentation is a key element in the successful settlement of contract claims. It has been said that the side with the best documentation wins 90 percent of claim disputes, and that winning a construction claim without good documentation is an uphill battle.

Documentation includes such things as copies of the original contract documents, any addenda, project schedules, inspection diaries, correspondence, telephone conversations, lab memos, pay records, and supplemental agreements. One of the very best forms of documentation is a picture, which can be extremely effective. Since all districts now have video equipment, still photographs can be supplemented by video. A 5- to 10-minute recording while driving through a project on a weekly basis will establish a project time record showing equipment, personnel, and material use as the project progresses. The result is a video "as-built" of the project.

Many claims are dropped or never pursued beyond the notice of claim when the contractor discovers that ADOT has sufficient documentation to successfully defend its position. One case in point is a claim filed by a contractor

demanding payment for removal of an unsuitable portion of a bridge deck. At this point, ADOT requested a meeting to discuss the claim with the contractor. When the contractor's representatives arrived, they were confronted with an enlarged photograph that showed the contractor's staff frantically shoveling water and sloping off the bridge deck during a heavy rainstorm. The contractor dropped the \$59,028.55 claim on the spot.

When a contractor indicates that a claim may be filed or when it becomes obvious that a claim is imminent, project personnel should enhance their documentation. Section 108 should be used as a guide when preparing claim documentation. This activity will discourage the contractor from filing speculative claims and will facilitate the achievement of agreeable settlements at the project level. Usually claims which are settled at the lowest level are the least costly to the Department. Far less time and effort are required to produce good documentation, including pictures, than to try to defend a debatable claim without them.

Claims Against Design Consultants

Because of the large number of highway and bridge projects administered by the Department in recent years, the services of outside Designers and other consultants have been used more often than in the past. As a result, the Department has experienced more claims filed by contractors based upon purported errors in plans and specifications created by consultants. Any resulting litigation, however, is brought against the Department. At that point, the right to pass damages on to the consultant comes into play.

It is the position of the Department to seek recovery from consultants when a claim is based on a wrongful act of the consultant. In order to recover actual (not merely potential) damages, legal liability must be shown. This could cause a problem as to the issue of liability, especially when ADOT personnel engage in settlement negotiations with a contractor. One way the Department can be protected against the awkward possibility of having to prove the liability issue is to offer the consultant the choice of:

- Approving the settlement
- Taking over the defense of the case and agreeing to hold the Department harmless before any settlement is concluded

If the consultant declines to take either course, then the Department will be free to proceed with the case and will be required to show only potential liability in order to support its claim against the consultant.

The Department requires the Resident Engineer and Project Manager to notify all outside consultants as soon as a design related claim arises. The consultant must be given the opportunity to participate and become involved in all aspects of the claim, even to the extent of offering the defense of the claim as stated above.

The Resident Engineer must coordinate all indemnity claims against design consultants with the Project Manager, who will involve the Engineering Consultants Section. There should be a consensus among the Resident Engineer, District Engineer, and Project Manager regarding the recovery of damages from design consultants. If federal aid is involved, the FHWA should be notified of all potential claims against design consultants. The Assistant State Engineers for both Design and Construction must approve any indemnity claims against design consultants.