



Materials sampling and testing methods and documentation procedures prescribed in chapter 8 of the CMM are mobilized into the contract per [standard spec 106.3.4.1](#) and [standard spec 106.3.4.3.1](#).

## 8.10.1 CONTROL OF MATERIALS

### 8.10.1.1 Approval of Materials Used in Work

The service life of a highway is dependent upon the quality of the materials used in its construction, as well as the method of construction. Control of materials is discussed in [standard spec 106.1](#). The spec provides that only materials conforming to the requirements of the contract must be used, and the contractor is responsible for furnishing materials meeting specified requirements. Only with permission of the engineer can the contractor provide materials that have not been approved, as long as the contractor can provide evidence that the material will be approved later. The department's intention is to hold payment of items until the required materials information is provided by the contractor.

The standard specs encourage recovered and recycled materials to be incorporated into the work to the maximum extent possible, consistent with standard engineering practice. [Standard spec 106.2.2](#) and Wisconsin statute 16.754 require the use of American made materials to the extent possible. On federally funded projects, all steel products must be produced in the United States, and manufacturing and coating processes must be performed in the U.S. These "Buy America" requirements are discussed in [CMM 2.28](#).

### 8.10.1.2 Contractor and Department Designated Materials Persons

[Standard spec 106.1](#) requires the contractor to designate a dedicated materials person (CDMP) who will be responsible for submitting all contractor materials information to the engineer. The department should also designate a dedicated materials person (WDMP) who will be in direct contact with the contractor's designee.

The department should provide a project-specific sampling and testing guide (E-Guide) to the contractor at the preconstruction conference. The E-Guide is created from the following site:

<http://www.atwoodsyste.ms.com/sysportal.htm>

Both the CDMP and WDMP should review the E-guide, and before work operations supplement the guide to ensure that the testing methods and frequencies and material documentation requirements are correct per contract.

The CDMP is responsible for:

- Establishing methods and work expectations with the WDMP
- Working with WDMP to ensure project-specific testing guide is correct before operations begin
- Submitting all required materials information from prime contractor and subcontractors
- Providing all QMP test data and control charts
- Communicating materials requirements to subcontractors
- Dealing with all materials-related concerns from the WDMP.

## 8.10.2 APPROVAL OF MATERIALS

All materials used in a project are subject to the engineer's approval before incorporation into the work. Approval of materials is discussed in [standard spec 106.3](#). Approval is generally accomplished by material tests and/or analysis. This can be done by using approved product lists, certification, or sampling and testing. Unless the contract specifies otherwise, the contractor must follow manufacturer's recommended procedures for products incorporated into the work. Refer to [CMM 8.45](#) for details of acceptance types.

## 8.10.3 QUALITY MANAGEMENT PROGRAM

Sampling and testing on WisDOT projects is performed according to the Quality Management Program (QMP). QMP is presented in [CMM 8.30](#) and the following CMM sections.

## 8.10.4 INDEPENDENT ASSURANCE PROGRAM

The Independent Assurance Program (IAP) is an element of the Quality Management Program intended to ensure that test data from project acceptance testing is reliable, including sampling procedures, testing procedures, and testing equipment. Quality verification (QV), quality assurance, (QA), and quality control (QC)

are integral parts of the IAP. Further information about the Independent Assurance Program can be found in [CMM 8.20](#).

#### **8.10.4.1 Quality Verification (QV)**

Quality verification (QV) sampling is done by a department representative, and is taken independently from the quality control samples to validate the quality of the material.

#### **8.10.4.2 Quality Assurance (QA)**

Under the quality assurance (QA) program, a department representative observes sampling and testing performed by the contractor, by testing split samples. Further detail about quality verification and quality assurance is provided in [CMM 8.20](#).

#### **8.10.4.3 Quality Control (QC)**

Quality control for materials testing includes all contractor/vendor operational techniques and activities that are performed or conducted to fulfill the contract requirements.

### **8.10.5 NONCONFORMING MATERIALS**

#### **8.10.5.1 General**

The department does not want material not meeting contract specifications incorporated into the work. [Standard spec 106.5](#) gives the engineer the authority to either reject nonconforming materials or to allow the nonconforming materials to remain in place. If materials are found to be unacceptable before or after placement into the work, the engineer may reject the materials, and the contractor must remove the materials from the site at no cost to the department. Materials that have been tested and approved at their source or otherwise previously approved, but have become damaged or contaminated before use in the work, are also subject to rejection by the engineer.

To ensure consistency in the decisions made for acceptance of non-conforming material or workmanship, the engineer should involve the region oversight engineer before finalizing any decision. This will help keep central office informed about contractor or material problems that may require action with a change in specifications or discipline of a contractor. If any technical questions remain about the acceptance or rejection of nonconforming materials refer to the appropriate technical expert in the Bureau of Technical Services.

#### **8.10.5.2 Nonconforming Materials Allowed to Remain in Place**

##### 8.10.5.2.1 Deciding Whether or not to Allow Material to Stay in Place

Good engineering judgment is required when making decisions on nonconforming materials. The engineer may choose to approve nonconforming materials, allow them to remain in place, and adjust the contract price. When making the decision to direct the contractor to remove and replace the materials versus leave the materials in place, it's important to consider the following:

- Long-term consequences on quality and durability.
- Implications on the project's life cycle costs, service life, serviceability, and maintenance.
- Socioeconomic, environmental, and aesthetic considerations.
- Impacts on traffic, staging, and construction timeframes.

##### 8.10.5.2.2 Deciding Whether or Not to Apply Price Reduction

After the engineer has decided to allow nonconforming materials to remain in place, he or she must carefully evaluate each situation in deciding whether to take a price reduction. The goal is to achieve consistency statewide in administering price reductions for nonconforming materials that are allowed to remain in place. Results of retests and related quality tests should be considered. The following list includes some examples of the types of factors the engineer must consider to decide if a price reduction is warranted and how much it should be:

- Has the contractor been conscientious to provide quality by carefully controlling materials and construction operations?
- Has the contractor been proactive and made good use of QC data to maintain and improve quality?
- Did the engineer provide the contractor with non-conforming test results within the contractual timeframe, if specified?
- If timeframes are not specified, did the engineer provide non-conforming test results in time for the contractor to make process or materials corrections?
- Upon becoming aware of a materials quality problem, has the contractor responded quickly to correct it?

- Is the nonconforming test an isolated incident or a recurring situation?
- How does the nonconforming test compare to the rest of the project data:
  - Have material test results been well within specification requirements or consistently at the very limit of what is acceptable?
  - How many tests are nonconforming vs. how many tests have passed?
  - How far out of spec is the non-conforming test?

### 8.10.5.3 Price Reductions Specified in the Contract with Administrative Items

If price reductions are included in the specifications or special provisions for certain nonconforming items, the price reductions should be administered using the appropriate 800 series administrative items. Since the price reductions are included in the contract language, the engineer can add the 800 series items to the contract without going through the complete change order process. Approval by a DOT representative and contractor representative are not necessary, though it's good practice to communicate the changes to all parties. Further guidance on the 800 series administrative items is provided in [CMM 2.38](#).

For payment of nonconforming items with associated administrative items, pay for the installed quantity and bid price of the work item under the original bid item. The pay reduction will be accounted for using the administrative item. Compute the price reduction by multiplying the quantity of nonconforming material by the original unit price and the percent price reduction. The pay units of all administrative items are DOL. Document all calculations, and pay for the (negative) total calculated price reduction as the pay quantity, with 1 dollar as the pay unit.

#### Example 1

- Contractor placed total of 19,000 SY of Concrete Pavement 9 inch
- 670 SY (12' x 500') is 1/8" - 1/2" under plan thickness
- [Standard spec 415.5.2](#) directs to pay 80% contract price for this range (20% reduction)
- Bid unit cost is \$35/SY

Using original bid item, pay 19,000 SY at \$35/SY = \$655,000

Compute price reduction = 670 SY x \$35 x -0.20 = -\$4,690

Add the administrative item 804.6005 Nonconforming Thickness Pavement to the contract, with unit price of \$1.00

Pay quantity of -\$4,690

Net pay = \$655,000 - \$4,690 = \$650,310

Paying for nonconforming items this way allows for clean tracking of as-built quantities. The use of administrative items can easily be tracked to monitor specific items that are frequently the target of price reductions. This can help the department develop improved specifications and construction methods.

### 8.10.5.4 Price Reductions Not Specified in the Contract

If specific price reductions are not outlined in the contract specifications or special provisions, [standard spec 106.5](#) gives the engineer the option to take a price reduction on nonconforming materials allowed to remain in place. The engineer has latitude to decide whether a price reduction is appropriate, and what amount the price reduction should be.

For payment of nonconforming items, use full quantity and bid price of the work item. Apply the price reduction by submitting a change order that creates a new item with the same bid item number but with the supplemental description "price reduction - nonconforming material - (reason)". In Example 2 below, the supplemental description for the new item is "price reduction - nonconforming material - gradation." Pay a negative quantity of the nonconforming material. The unit price is the price reduction percentage multiplied by the original unit price, as shown in the example below.

#### Example 2

- Contractor placed total quantity of 4,600 tons of base aggregate dense 1 1/4-inch
- Unit price \$9.00/ton
- 450 tons out of gradation on a particular sieve
- The engineer allowed the material to remain in place and apply a 20% price reduction.

Using the original bid item, pay the full 4,600 tons at \$9.00/ton = \$41,400  
 Submit a change order creating item 305.0120 with supplemental description "price reduction - nonconforming material - gradation" and unit price of \$1.80 (20% x \$9.00)  
 Pay quantity of -450 tons.  
 Resultant price reduction is -\$810 (-450 tons x \$1.80)  
 Net pay = \$40,590

Price reduction guidelines for noncontractual items are provided in the following section.

### 8.10.6 NONCONTRACTUAL PRICE REDUCTION GUIDELINES

The guidelines below do not provide guidance on the engineer's initial decision to either reject the nonconforming material or allow it to remain in place. After that initial decision has been made, these guidelines are intended aid the engineer in deciding whether a price reduction is appropriate, and what price reductions to consider.

Except for HMA, the guidelines themselves are not contractual, but they are intended to aid the engineer in administering [standard spec 106.5](#) on nonconforming materials.

#### 8.10.6.1 Nonconforming Concrete (Masonry, Pavement, or Ancillary)

The engineer must justify and document the incorporation of any nonconforming materials into the project. The engineer must determine the quantity of nonconforming material. Only one price adjustment will be applied to a given quantity of material. If the quantity in question is subject to more than one of the following conditions, apply the adjustment with the greater price reduction.

##### 8.10.6.1.1 Slump

0.25" out of specification.....	2% price reduction
0.50" to 0.75" out of specification .....	5% price reduction
1.00" to 1.75" out of specification .....	25% price reduction
2" or more out of specification .....	Remove & replace or 50% price reduction

If the engineer elects to take a slump test for slipform pavement, do not take a price reduction if both of the following are met:

1. Result of slump test is less than 4-inches.
2. Pavement meets edge slump spec as defined in [standard spec 415.3.11.8.4](#).

##### 8.10.6.1.2 Air Content

0.5 % or more above specification .....	10% price reduction <sup>[1]</sup>
0.1% to 0.4% above specification .....	5% price reduction <sup>[1]</sup>
0.1% to 0.5% below specification .....	20% price reduction
0.6% to 1.0% below specification .....	30% price reduction
More than 1.0% below specification .....	Remove & replace or 50% price reduction

<sup>[1]</sup> On QMP projects, evaluate strength data. If strengths are acceptable, do not take a price reduction for high air content. Contractor is responsible to provide additional strength data, if necessary.

##### 8.10.6.1.3 Temperature (for Concrete Masonry Only)

Concrete outside the specified temp range.....	25% price reduction
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For high temperatures, consider the effectiveness of the contractor's temperature control plan and the contractor's compliance with their temperature control plan before taking a price reduction.

##### 8.10.6.1.4 Time Limit

Use of concrete after time limit exceeded .....	25% price reduction
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##### 8.10.6.1.5 Gradation

If air, slump, and strength (if applicable) meet specifications, but aggregates are nonconforming, apply one of the two following price reductions:

1. 10% price reduction on the CY cost of the aggregate material invoice price.

2. 5% price reduction on the bid item unit price, if the aggregate invoice price is not available.

### 8.10.6.2 Nonconforming Bases and Subbases

All conditions of [CMM 8.45](#) must be met. The engineer must justify and document the incorporation of any nonconforming materials into the project. The engineer must determine the quantity of nonconforming material. Only one price adjustment will be applied to a given quantity of material. If the quantity in question is subject to more than one of the following conditions, apply the adjustment with the greater price reduction.

#### 8.10.6.2.1 Gradation

Apply to Base Aggregate Dense <sup>[2]</sup>, Base Aggregate Open Graded, Backfill Granular, Backfill Structure, & Subbase.

- ≤ 3% out on any sieve ..... 5% to 10% price reduction
- > 3% to ≤ 5% out on any sieve ..... 10% to 20% price reduction
- > 5% out on any sieve ..... Remove & replace or 20% to 40% price reduction

<sup>[2]</sup> Do not apply these price reduction guidelines to the Base Aggregate Dense 3-inch material.

#### 8.10.6.2.2 Fracture

Apply to Base Aggregate Dense & Base Aggregate Open Graded.

- < 5% out of specification ..... 5% to 10% price reduction
- > 5% to < 10% out of specification ..... 10% to 20% price reduction
- > 10% out of specification ..... Remove & replace or 20% to 40% price reduction

#### 8.10.6.2.3 Wear, Soundness, Freeze-Thaw, or Plasticity

Apply to Base Aggregate Dense, Base Aggregate Open Graded, Backfill Granular, Subbase, & Select Crushed Material.

- Non-conformance identified before placement..... Nonconforming material must not be used.
- Non-conformance identified after placement..... Remove & replace or 50% price reduction

### 8.10.6.3 Nonconforming Prestressed Girders

The engineer must justify and document the incorporation of any nonconforming materials into the project. The engineer must determine the quantity of nonconforming material. Only one price adjustment will be applied to a given quantity of material. If the quantity in question is subject to more than one of the following conditions, apply the adjustment with the greater price reduction.

Any girder judged to be structurally or otherwise unacceptable by WisDOT staff or agent thereof due to low strength, cracking, breakage, honeycombing or other deficiency will be rejected and replaced. (Note that honeycombing with exposed strand automatically falls in this category.)

Any girder judged to be acceptable but deficient by WisDOT staff or agent thereof due to any of the following problems will be subject to the pay deductions listed below. These guidelines for standard deductions are intended to be applied to typical problem severity in the majority of cases. In occasional cases where problem severity is lower or higher than typical, the pay deduction may be decreased or increased, respectively. Depending on the nature of the problem, repairs may or may not be required as a condition of acceptance. Standard deductions shown represent a percentage of bid price for the prestressed girder item.

- Compressive strength below required level at required test age – 20% deduction
- Misalignment of form and soffit joints – 1/8 inch or greater on flat surface – 10% deduction
- Inadequately sealed joints with significant mortar washout – 10% deduction

- Cracking/spalling caused by fabrication, curing or delivery problems – 10% deduction
- Dimensional Tolerances – deviation outside values specified in 503.3.2.1.1 – 10% deduction
- Honeycombing – judged to be repairable – 20% deduction
- Curing temperature – violation of any specified criteria in 503.3.2.2.1 – 20% deduction
- Broken/cracked flanges judged to be acceptable/repairable – 20% deduction
- Shipping girder prior to achieving required strength without permission of project engineer – 20% deduction

#### 8.10.6.4 Nonconforming Miscellaneous Items

The engineer must determine the quantity of nonconforming material. Only one price adjustment will be applied to a given quantity of material. If the quantity in question is subject to more than one of the following conditions, apply the adjustment with the greater price reduction.

##### 8.10.6.4.1 Items Requiring Special Guidance

If any of these items are nonconforming, consult personnel in the area of the Bureau of Technical Services that specializes in the item for guidance. Examples of items in which it may be unacceptable to leave the nonconforming item in place, even at a reduced cost, include the following:

- Bar steel reinforcement.
- Anchor bolts.
- High strength bolts.
- Geotextile fabric type MS.
- Piling and pile coating.

##### 8.10.6.4.2 Minor Nonconformance

If the material does not conform to the requirements of the contract, but is expected to substantially fulfill the needs of the project, apply one of the following two price reductions:

1. 20% price reduction on the bid item unit price.
2. 50% price reduction on the material (invoice) cost.

##### 8.10.6.4.3 Major Nonconformance

When the material does not conform to the requirements of the contract and is insufficient to fulfill the needs of the project, but will be allowed to remain in place, the engineer should not pay for the item.

##### Example:

Test results for riprap fabric are returned after the riprap has been placed, and fabric is significantly outside of the specifications. The engineer may allow the fabric to remain in place, but will not pay for it.

#### 8.10.7 MATERIALS FOUND ON THE PROJECT

In the interest of conservation of aggregates or other materials required in construction of the project, [standard spec 104.8](#) permits the contractor, with approval of the engineer, to use materials encountered in excavation of the roadway in lieu of materials normally furnished by the contractor from outside sources.

Materials removed will be measured as roadway excavation subject to replacement with other materials by the contractor, if they are deemed suitable for construction of embankments, backfills, and other appurtenances required in the contract. When a material removed from the roadway is used by the contractor in lieu of a material normally furnished, agreements should first be made between the contractor and the engineer relative to methods of measurement, quantities of material, shrinkage factors, etc., when appropriate.

It will be the general rule not to permit removal of materials from areas of the roadway beyond the vertical and horizontal limits of excavation. In the general interest of the project, however, and with the specific approval of the engineer, aggregates and other granular materials may be removed from within the right of way beyond the roadway grading limits for specific uses under the contract.

Removal and use will require the execution of a contract change order covering excavation and measurement of the material, restoration of the area, and adjustment in the unit price of the item of work. The unit price of the item will be adjusted to allow the state the benefit of the reasonable value of the material removed from the right of way and used in the work. Any materials required for restoration of the excavation area of the right of way beyond roadway grading limits must be furnished by the contractor at the contractor's expense. Under the provisions of this subsection materials found on the project may only be used on the project. Sale of materials for use on other projects or contracts or for purposes other than those required under the contract are not contemplated.