

# WYDOT



## INDEPENDENT ASSURANCE (IA) MANUAL

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## Introduction

The Independent Assurance (IA) Program is a systems approach which is an independent verification of equipment, sampling, and testing procedures and provides continuity to the Quality Assurance (QA) and the Wyoming Materials Testing Certification (WMTC) programs; in accordance with 23 CFR ( Code of Federal Regulations) Part 637, Subpart B, entitled Quality Assurance Procedures for Construction.

Independent Assurance (IA) evaluates sampling and testing procedures and equipment for acceptance and verification testing. IA testing supplements the acceptance sampling and testing but is not used directly for acceptance of materials. Acceptance and verification samples and tests are the basis of materials acceptance. IA evaluations are used to assure that sampling and testing procedures, including test equipment, are within acceptable tolerance limits (see Comparing Test Results section). A comparison of the project test results with IA test results, when in close conformity, gives assurance that project sampling and testing is valid. If the results are not within the acceptable tolerance limits, corrective action must be taken by project personnel, such as checking equipment for damage, repair or replacement of equipment, calibration of equipment, reviewing sampling and testing procedures, or other corrective action as necessary.

The IA program is system based and covers Soils and Aggregates, Hot Plant Mix (HPM), and Concrete. The IA Program will be managed by the Materials Program. The Independent Assurance Inspector(s) (IA Inspectors) will be WYDOT personnel based out of the Field Services section of the Materials Program or a representative contracted by the Materials Program, who will conduct Independent Assurance activities. System IA includes witnessing Acceptance Technicians sample materials, reduce samples, and test materials, as well as conducting comparison tests.

The intent is to evaluate qualified and certified technicians performing acceptance testing, including WYDOT personnel, contractors, and consultants, a minimum of once per calendar year, in performance of test procedures in each area of certification in which they are testing, by observations and split samples. The testing equipment shall also be evaluated by using calibration checks, observations and split samples.

IA evaluations are independent of project scheduling, tester certification and correlation of project specific testing technicians.

During the process of evaluating the testing technicians and equipment, the goal is for the IA Inspectors to make a presence on all projects in which the plan quantities exceed the following:

Hot Plant Mix	5000 TON
Base	5000 TON
Embankment	5000 CY
Cover Coat	100,000 SY
Portland Cement Concrete Pavement	500 SY
Structural Concrete	100 CY

Testing procedures performed at the Materials Program central laboratory and any consultant laboratories that are AASHTO accredited are not subject to the IA Program. Field laboratories are not considered accredited even if their central lab is accredited, and are therefore subject to the IA Program.

Resident engineers will have the responsibility of providing the Materials Program with a list of testing technicians, including contact/ mailing information, for all testers (WYDOT personnel, contractors, and consultants) that will be performing acceptance testing on each project. Contact information will include employer's name and mailing address. Contractors and consultants shall provide this information at or prior to the preconstruction conference and the Materials Program needs to be notified as soon as the information becomes available. It will then be the responsibility of the IA Inspector to coordinate with each testing technician for evaluation in each discipline of certification. When testers not on the original list show up on a project, the Materials Program needs to be notified as soon as possible, preferably before any acceptance testing commences.

In the interest of improving testing quality, IA inspectors retain the right to evaluate technicians conducting non-acceptance quality control testing at their discretion.

The test results of the split samples will be utilized by WYDOT as additional information for a project and shall not be used as a verification or acceptance test result. This information is considered independent of the requirements of 23 CFR (Code of Federal Regulations) Part 637, Subpart B, entitled Quality Assurance Procedures for Construction and although portions of it may be included in an Annual IA Report, its inclusion in the report is not considered mandatory.

## Testing Personnel

Any individual, including qualified technicians, performing Quality Acceptance sampling and testing, verification testing, and/or Quality Control sampling and testing that is used in an acceptance decision will be evaluated by Materials Program IA Inspector personnel at a minimum of once per calendar year. This evaluation will include checking each tester's certification card or qualified tester card, observation of sampling and testing procedures, and split sample testing.

Each tester will be given three opportunities to compare with established tolerances during an evaluation.

The evaluation will be an observation of the testing technician's sampling procedures, collection of a split sample with the IA Inspector, and comparison of the split sample test results. The testing technician will have 7 days to complete the testing of the split sample and for comparison, submit the results to:

Wyoming Department of Transportation  
Materials Program  
Atten: Field Services Supervisor  
5300 Bishop Blvd  
Cheyenne WY, 82009

Comparison results will be forwarded to the resident engineer and to the testing technician's place of employment for non-WYDOT personnel. If the split sample test results fall outside the 'Acceptable Tolerance Limits', a second IA evaluation will be conducted.

Prior to the second IA evaluation, the IA Inspector will go through the testing procedures with the testing technician and look for areas that may have caused the results to be out of the 'Acceptable Tolerance Limits'. The second IA evaluation will include visual inspection of testing equipment, observation of sampling, collection of a split sample with the IA Inspector, and observation of the entire test procedure along with comparison of the split sample test results. Comparison results will be forwarded to the resident engineer and to the testing technician's place of employment for non-WYDOT personnel. If the split sample test results fall outside the 'Acceptable Tolerance Limits', a review of the test procedures and equipment will be performed immediately to determine the source of the discrepancy. A Letter of Notification will also be sent to the resident engineer and to the testing technician's place of employment for non-WYDOT personnel. Prior to a third evaluation, additional efforts will be made to determine if testing issues are due to procedures or due to equipment. Possible methods to determine this is to have the testing technician conduct tests on a different set of equipment or have the IA inspector conduct tests on the testing technician's equipment. When the deficiencies have been addressed a third IA evaluation will be conducted.

The third IA evaluation will include visual inspection of testing equipment, observation of sampling, collection of a split sample with the IA Inspector, and observation of the entire test procedure along with comparison of the split sample test results. Comparison results will be

forwarded to the resident and to the testing technician's place of employment for non-WYDOT personnel. If the split sample test results fall outside the 'Acceptable Tolerance Limits', a review of the test procedures and equipment will be performed immediately to determine the source of the discrepancy. A Letter of Notification will also be sent to the resident engineer and to the testing technician's place of employment for non-WYDOT personnel. For acceptance testing, the testing technician will be required to test alongside another testing technician until he/she can satisfactorily demonstrate to the IA Program that all deficiencies have been addressed and corrected. Corrective action may be procedural corrections or repairing or replacing faulty testing equipment. Upon notification of corrective actions, resolution will be determined by utilizing an additional split sample and having the results fall within the Acceptable Tolerance Limits.

Some testing technicians may be evaluated more than once during the year even though they may have received acceptable evaluations. Once a testing technician receives an acceptable evaluation, they are considered acceptable for the remaining portion of the year. If they do not compare on one of the later evaluations, efforts will be made to determine the cause, however the full three step process will not be initiated. Initial focus will be on the condition of the testing equipment.

## Testing Equipment

It will be the responsibility of WYDOT field offices, contractors and consultants to maintain calibration records for all equipment listed below that is being used for acceptance testing. Verification/Calibration Forms will be provided in the Materials Testing Manual. The requirements for, and frequency of, equipment calibrations are shown in WYDOT's test procedures, as referenced below in '**Calibration Standards and Frequencies for Lab Equipment.**'

Although split sample testing frequencies are based on a minimum of one per tester per year, the intent is to exceed the minimum frequency in an attempt to evaluate all equipment used to perform verification and/or QC sampling and testing in making an acceptance decision. In addition to split samples, the evaluation will include checking and reviewing calibration records, visual inspection and recording current equipment condition. Acceptable tolerance limits for the comparison of test results from split samples are shown in '**Acceptable Tolerance Limits for Independent Assurance**' under **Comparing Test Results.**

IA Inspector's findings will be documented and submitted to WYDOT and consultants/contractors.

Equipment that has not been properly calibrated or verified or has a calibration or verification that has expired will not be used.

### Calibration Standards and Frequencies for Lab Equipment

Equipment	Requirements	Minimum Frequency When In Use
Air Meter (Type B)	Calibrate	3 months
Slump Cone	Check Critical Dimensions	12 months
Mechanical Shaker	Check Sieving Time	12 months
Sieves	Check Physical Condition	6 months
Scales	Verification with Class 4 Weights	every move
Ovens	Check Temperature Settings	6 months
Sand Cone Calibration Container	Calibrate	12 months

### High Speed Inertial Profiler (HSIP)

High Speed Inertial Profiler (HSIP) equipment is required to be certified annually through the High Speed Inertial Profiler Certification offered by the Materials Program.

### Nuclear Gauges

Nuclear gauges are sent out by the Materials Program annually for calibration.

## Sampling and Testing Frequency

IA samples are independent, and with the exception of embankment check curves and volumetric samples, are not to be taken in conjunction with any project required acceptance or verification samples. IA samples are in addition to the number of acceptance or verification samples set up on project. The IA samples can be taken at the same time as acceptance or verification samples however they have to be a separate, independent sample.

All IA sampling will be conducted in the presence of the IA inspector.

With the exception of fresh concrete testing, the WYDOT field tester and contractor/consultant tester will each have seven (7) days to submit test results from the split sample to the IA Inspector. Fresh concrete results will be recorded at the time of testing by the IA inspector.

The split sample will be tested at the Materials Program in Cheyenne and evaluated to determine if the samples are within established tolerances.

IA sampling and testing will be performed at the frequency established below in ‘**Frequencies and Activities.**’

### Frequencies and Activities

#### **Embankment:**

Requirement: One Split Sample/Tester/Year (min)

This is a split sample. The IA Inspector will be present during the sampling. The IA sample will be taken at the same station and as close as possible to the field sample. The IA Inspector will observe and insure that all sampling is done according to (Sec. 212.0) of the Materials Testing Manual.

Check curve tests may be a split sample with the project control sample required per Form T-128 Construction Test Requirements as long as the IA Inspector is present during sampling.

#### **Liquid Limit, Plastic Limit and Plasticity Index:**

Requirement: One Split Sample/Tester/Year (min)

This is a split sample conducted in conjunction with a gradation test. The IA Inspector will be present during the testing of the material. The IA Inspector will observe and insure that all testing is done according to (Sec. 812.0 and 813.0) of the Materials Testing Manual.

In lieu of a split sample, IA inspectors retain the right to provide a proficiency sample whereas the Materials Lab will provide predetermined samples for testing. The tester’s proficiency sample results will then be evaluated by the Materials Program in Cheyenne to determine if the sample is within established tolerances.

**Aggregate Gradation: (PMP, PCCP, Concrete, Crushed Base, Cover Coat)**

Requirement: One Split Sample/Tester/Year (min)

A split sample will be obtained from the point of acceptance. If concrete aggregate is sampled, one coarse and one fine gradation will be required. IA gradations are not to be part of a lot, and shall not be used as a verification or acceptance test result. The IA Inspector will insure that the sample is taken according to (Sec. 804.0) of the Materials Testing Manual.

**Density:**

One Core Set/Tester/Year (min)

The IA Inspector will be present during the coring operations to randomly select a location for IA cores. IA cores are not to be part of a lot, and shall not be used as a verification or acceptance test result. The IA cores are in addition to the required seven core sets. Three (3) cores will be taken at a location determined by the IA Inspector (one for the WYDOT field tester, one for the contractor/consultant tester, and one for the IA Inspector). All tests shall be taken according to (Sec. 415.0) of the Materials Testing Manual. The IA Inspector's core will be tested by the Materials Program in Cheyenne and evaluated to determine if the samples are within established tolerances.

**Hot Plant Mix: (Check Design - Mix Volumetrics)**

IA volumetric sampling and testing does not have minimum testing requirements since by specification, the testing may be completed off-site at an AASHTO-accredited laboratory and as stated earlier, any consultant laboratories that are AASHTO accredited are not subject to the IA Program. However in the interest of quality and for informational purposes, the intent is to collect IA volumetric samples on a portion of the Level of Control 2 projects which require project volumetric samples and testing. When the projects are sampled, the IA Inspector will coordinate with project personnel to be present and observe the scheduled required volumetric sampling. At the sampling location, in addition to the required three samples for the project, an additional IA sample will be taken.

A split sample of hot plant mix will be taken at the paver in the presence of the IA Inspector. The IA samples will consist of one 6 inch diameter by 12 inch cylinder cans for a Marshall Mix design and a total of two 6 inch diameter by 12 inch cylinder cans for a Superpave mix design. All samples will be sampled according to (Sec. 410.0) of the Materials Testing Manual. The IA sample will be tested by the Materials Program for Mix Volumetrics and compared to the required test results from the contractor/consultant tester.

**Structural Concrete / Silica Fume Modified Concrete:**

One Split Sample/Tester/Year (min)

Sampling, Slump, Unit Weight, Air content, Making Cylinders

A sample of fresh concrete will be split with the testing technician. The sample shall be obtained according to (Sec. 477.0) of the Materials Testing Manual. The IA Inspector will insure that all sampling and testing procedures are followed properly. Side by side testing will be done on Slump, Unit Weight, and Air content. Strength Tests (cylinders) will also be cast by the testing technician and the IA Inspector will observe the procedure. The purpose of the strength test cylinders is to evaluate the procedure of making the test specimen. The actual strength testing of the specimen is not part of IA and is evaluated through AASHTO accreditation. All test results will be evaluated by the Materials Program in Cheyenne to determine if the samples are within established tolerances.

Based on the minimum frequency, potentially there could be no split sample testing of silica fume modified concrete placements. This is not the intent and due to the nature of silica fume modified concrete placements, efforts will be made to evaluate as many as possible of these placements.

**Portland Cement Concrete Pavement:**

One Split Sample/Tester/Year (min)

Sampling, Slump, Unit Weight, Air content, Making Cylinders

A sample of fresh concrete will be split with the testing technician. The sample shall be obtained according to (Sec. 477.0) of the Materials Testing Manual. The IA Inspector will insure that all sampling and testing procedures are followed properly. Side by side testing will be done on Slump, Unit Weight, and Air content. Strength Tests (cylinders) will also be cast by the testing technician and the IA Inspector will observe the procedure. The purpose of the strength test cylinders is to evaluate the procedure of making the test specimen. The actual strength testing of the specimen is not part of IA and is evaluated through AASHTO accreditation. All test results will be evaluated by the Materials Program in Cheyenne to determine if the samples are within established tolerances.

## Comparing Test Results

The Materials Program will perform a prompt comparison of the test results obtained by the individual being evaluated and the IA Inspector. Acceptable tolerance limits for the comparison of test results from split samples are shown below in ‘Acceptable Tolerance Limits for Independent Assurance.’

### Acceptable Tolerance Limits for Independent Assurance

<b>Soils &amp; Aggregate</b>	
<b>Procedure</b>	<b>Tolerance</b>
Embankment	
Maximum Density	+/- 2.0 pcf
Optimum Moisture	+/- 2.0%
All Gradations:	<u>%Passing</u>
> No. 4	5%
≤ No. 4 - 100	5%
No. 200	1.5%
Liquid Limit	+/- 3.0 from the average <sup>1</sup>
Plastic Limit	+/- 4.0 from the average <sup>1</sup>
<b>HPM</b>	
<b>Procedure</b>	<b>Tolerance</b>
Density	
Cores	+/- 1.5 pcf
<b>Concrete</b>	
<b>Procedure</b>	<b>Tolerance</b>
Slump less than or equal to 6 inches	1.0 inch
Slump greater than 6 inches	1.5 inch
Air Content	0.5 %
Unit Weight	1.5 pcf
Fineness Modulus	0.2

<sup>(1)</sup>If it is a proficiency type sample then the average would be the average of all tests conducted on the sample. If it is one split sample, then the average would be the average of the field result and WYDOT's result.

If the comparisons of the test results do not comply with the tolerances, a review of the test procedures and equipment will be performed immediately by the IA Program to determine the source of the discrepancy. Subsequent evaluations will be required.

Identify and incorporate corrective actions as appropriate.

The Materials Program will document and report test results from all samples involved in the IA Program.

## **Annual Report of IA Program Results**

The Materials Program will compose and submit an annual report to the Federal Highway Administration (FHWA) Division Administrator summarizing the results of WYDOT's systems approach IA program. This report identifies:

- The number of sampling and testing personnel evaluated including:
  - Percentages for WYDOT, contractor and consultant personnel
- Number of IA evaluations found to be acceptable and/or unacceptable.
- A discussion of significant problems with testing procedures or equipment and results outside the tolerance limits.
- A summary of any significant system-wide corrective actions taken.
- A summary of profilers certified through the Materials Program
- A summary of the projects that were visited by the IA Inspectors, including a brief description of the project type, such as reconstruction, overlay, structure replacement, etc.