

SAMPLING AND TESTING



OVERVIEW

NOTES:

This chapter provides a high-level overview of the Department's Quality Assurance Program. Refer to the [Field Testing Guide](#) for specific project field testing and IA procedures.

Refer to "Conventions Used in this Manual", in Chapter 1, for terminology used in this chapter and/or the order of precedence of contract documentation.

Sampling and testing on roadway construction projects ensures that materials and construction methods conform to plans and specifications. Consistent sampling and testing procedures are necessary to ensure quality materials and construction techniques are provided to the Department. The Contractor and Resident Engineer should discuss the appropriate corrective actions when materials or construction methods do not conform to the plans or specifications.

In accordance with Title 23 Code of Federal Regulations (CFR) 637B, the Department maintains a Quality Assurance Program for materials incorporated into a contract. The components of this FHWA-compliant QA program are:

- Quality Control.
- Acceptance.
- Independent assurance.
- Tester qualifications.
- Lab certification.
- Dispute resolution.

The Contractor defines its Quality Control program relating to the production of the material. The Department's Quality Assurance Program assures specification material to the taxpayer by utilizing an owner (taxpayer)-tester acceptance method. The program also defines the acceptance testing process, the Independent Assurance (IA) Program, tester qualifications, lab certification and the dispute resolution process.

QUALITY CONTROL

Subsection 106.04, "(Control of Material) Samples and Tests", of the Standard Specifications, defines the materials on which the Contractor is required to perform quality control testing. All Contractor testing is considered "pre-testing" to ensure that the material meets specifications. Although NDOT inspectors and/or field testers can monitor and observe Contractor tests, they cannot perform tests for the Contractor. The test results must be submitted daily to the Resident Engineer. If materials originate from a commercial source, the Contractor furnishes test results performed during production of those materials.

QUALIFICATIONS

The Contractor's testers are required to be NAQTC- and/or WAQTC-qualified per Subsection 106.04 of the Standard Specifications. Testers must provide proof of qualifications to the Resident Engineer. Tests performed by non-qualified personnel will be considered invalid and will not be included in the required minimum frequency.

RECORDS

The Contractor is required to complete daily reports of test results for each day the associated work is performed. The Contractor is not required to use NDOT test report forms, but all applicable test report data must be included on their form. The Contractor's lab shall maintain copies of all field test reports. The Contractor shall submit test results to the Resident Engineer on a daily basis. The Resident Engineer will review the test reports and return

any report with errors or omissions to the Contractor for corrections. The Resident Engineer will maintain a file of contractor test results and will submit the test results to the Construction Division's Quality Assurance Section.

EQUIPMENT AND LAB CALIBRATION

For the required tests, Contractor labs shall have equivalent equipment to NDOT field labs. Deviations from equivalent testing equipment must be coordinated in advance with the Construction Division's Quality Assurance Section. The Contractor is required to calibrate their lab once a year or any time the lab is moved. Documentation of the calibration shall be kept in the lab for review by the Resident Engineer.

QUALITY ASSURANCE PROGRAM

The Department's Quality Assurance Program is overseen by the Construction Division's Quality Assurance Section. The two major sampling and testing components that comprise the program are project acceptance and independent assurance.

PROJECT ACCEPTANCE TESTING

Project acceptance testing (field testing) is performed on the materials during the progress of construction to ensure that material quality and consistency are being maintained for materials to be permanently incorporated into the contract. In addition, some materials are accepted by the Department by submission of Certificates of Compliance from the contractor and/or producer of the material or products listed on the Qualified Products List (QPL).

The Department is responsible for all acceptance testing; with few exceptions, contractor test results are not used for acceptance. Project acceptance tests are performed by the Construction Crew Testers and/or the Materials Lab. The tests are to be conducted at the appropriate locations and times, using methods as defined in the specifications. The incorporation of untested and unaccepted materials without approval or written permission can be deemed unacceptable and unauthorized, and payment can be withheld/withdrawn in accordance with Subsection 106.04, "(Control of Material) Samples and Tests", of the Standard Specifications.

In the event acceptance tests reveal materials that do not comply with the specifications, the Resident Engineer may have the material retested. The purpose of the first retest of the unaccepted material is to determine if the sampling and testing methods were correctly performed. The retest must be taken from the same acceptance point and on the same material. The Resident Engineer will ensure the contractor has taken corrective action before any additional retests are completed. The Resident Engineer will ensure the Contractor is making constructive efforts to correct the processing of their material. Avoid repetitive testing of the same material in order to get the material to pass.

INFORMATIONAL TESTING

Some materials will require informational testing outside the regular project acceptance testing frequencies. Informational testing is performed after the Contractor has submitted their test results to the Resident Engineer.

The following are examples of informational testing conducted by NDOT testers including but not limited to:

- Aggregates to be submitted for mix designs.
- Aggregates produced for stockpile.
- Moisture content of aggregates.
- Hydrated lime in marinated aggregate.
- Cement treated base mixtures.
- Concrete cylinders other than the 28-day curing period.
- Material taken outside the specified acceptance point.

MATERIAL CERTIFICATIONS

Certifications are required for all materials for which field testing cannot be performed.

CERTIFICATES OF COMPLIANCE

Subsection 106.05, "(Control of Material) Certificates of Compliance", of the Standard Specifications, allows certain materials to be incorporated in the work if accompanied by a Certificate of Compliance. Material should not be incorporated into the work without submission of an acceptable Certificate of Compliance. A manufacturer produces and signs a Certificate of Compliance, indicating that the material meets the specification requirements of each corresponding section of the Standard Specifications (e.g., Section 703, "Bituminous Materials").

Certificates are sent to the Materials Division's Lab Services Section. The Resident Engineer will provide a copy of the certificate to inspectors overseeing the item being incorporated into the work. The certificate is retained in the field office records. The manufacturer should also provide the Resident Engineer with any warranties, guarantees, instruction sheets or parts lists for products incorporated into the work.

'BUY AMERICA' CERTIFICATION

For construction contracts using federal funds, the federal government requires that steel and iron materials used in the project be manufactured in the United States. This requirement is called "Buy America." In accordance with Subsection 106.12, "(Control of Material) Buy America", of the Standard Specifications, the Contractor must follow to comply with provisions of "Buy America." The Resident Engineer must request a "Buy America" certificate from the contractor. The "Buy America" certificate states that the steel and iron materials were manufactured in the United States.

"Buy America" requirements do not apply to minimal quantities of foreign iron and steel materials incorporated into the work. The specifications will state the quantity limits of foreign materials that may be incorporated into the work. If the Contractor plans to incorporate foreign iron and steel materials, the Resident Engineer documents the quantities of foreign material incorporated into the work to verify that the value of foreign iron and steel does not exceed the maximum amount allowed by the specifications.

The Resident Engineer will include a discussion of the "Buy America" requirements in the Pre-construction Conference for federal-aid projects.

QUALIFIED PRODUCTS LIST

The Qualified Products List (QPL) is a list of manufactured products that the Department has evaluated and determined suitable for use on NDOT projects. Products listed on the QPL can be used only as listed on the QPL and installed only as recommended by the manufacturer. The QPL applicable to a contract is the one published at the time of contract advertising.

The Contractor's use of a product from the QPL does not preclude the material from having to meet acceptance testing or certification requirements. The contractor may use the products listed on the QPL, or the contractor may request to use an equivalent product not on the list.

NOTE: Non-QPL items must go through the submittal/approval process prior to use.

NUCLEAR TESTING PROGRAM

The information in this section provides important information relating to the Department's Nuclear Testing Program and is not inclusive of all policies and procedures required for use of nuclear testing devices. Proper training and qualifications are required before operating, storing or transporting nuclear density gauges. The Resident Engineer is responsible for ensuring compliance with the program when nuclear gauges are in use for the contract.

The Nevada Radiation Control Program enforces NRS 459.010, 459.290 and NAC 459, and it is the state radiation regulating and control agency that provides the Department with its radioactive materials licenses (Carson City, Las Vegas, Reno and Winnemucca).

The Construction Division's Quality Assurance Section is responsible for policies and procedures that are specific to the Department's radioactive materials licenses. The Corporate Radiation Safety Officer (CRSO), located in the Construction Division headquarters, is responsible for maintaining the policies and procedures mandated by each license. The District Radiation Safety Officer (DRSO), located in each District IA Lab, is responsible for enforcing the program's policies and procedures.

The District IA Lab assigns Troxler nuclear density gauges to construction crews on an as-needed basis. The Resident Engineer is responsible for security, use, transportation and care of this equipment during the assignment period. Use extreme care in handling this equipment, especially while transporting it.

TRAINING AND QUALIFICATIONS

Every year, Resident Engineers receive a list of personnel whose certification will be expiring and a posting of the next training class. The Resident Engineer is responsible for deciding who to send for certification/re-certification. All certified operators and transporters are required to have current monitoring badges.

TRANSPORTATION CERTIFICATION (YELLOW CARD)

Individuals must maintain the following minimum requirements to transport the nuclear density gauges:

- Attend a 4-hour safety /HAZMAT class every 3 years.
- Pass a Safety Exam.

OPERATION AND TRANSPORTATION CERTIFICATION (WHITE CARD)

Each first-time candidate for qualification and certification and anyone with an expired certification card must complete the following minimum requirements:

- Attend a 40-hour training class.
- Pass a safety exam.
- Pass an operation and safety exam.
- Qualify through the Nevada Field Sampling and Testing Qualification Program (NFSTQP).

To maintain qualification, the individual must:

- Attend a 4-hour safety/HAZMAT class every 3 years before certification expires.
- Pass a safety exam.
- Maintain NFSTQP certification.

OPERATION

The Department uses Troxler Nuclear Density Gauge Models 3440, 3450 and the 4640-B for conducting density and moisture tests. Find the directions for operating the gauge and taking tests in Nevada Test Methods as defined in the Construction Division's [Synopsis of Materials Division Testing Manual for Field Testing](#).

IMPORTANT: Only qualified personnel may operate the gauges. Field testers will comply with operating instructions as provided by NDOT qualification training.

The Department provides radiation monitoring badges quarterly to all personnel qualified to transport and operate the gauges. If qualified transport personnel pick-up a gauge, they are assigned a visitor badge by the DRSO to transport the gauges.

GAUGE REPAIR, MAINTENANCE AND CALIBRATION

Transporters and operators are not authorized to provide any maintenance or repairs to the gauges. Operators will keep the gauge and gauge box clean, free of construction material and dry. *Under no circumstances will the field testers try to fix a gauge.*

For repair and maintenance, nuclear density gauges require special handling by trained individuals. If the gauges require maintenance or repair, immediately contact the District IA Lab to determine the repair level.

PERIODIC PREVENTIVE MAINTENANCE SCHEDULE

To be completed by the DRSO:

- Inspection and inventory: Twice a year (November and May)
- Leak tests: Annually (November)
- Calibration: Every 2 years, even if currently being used on an active project
- Source rod inspections: Every 2 years, or when gauge repairs are required

INSPECTIONS

The Nevada Radiation Control Program enforces the proper use, storage and transportation of nuclear devices. It will periodically inspect the program at any time and in any location, both announced and unannounced, and it may inspect field testers on the job.

For contract site inspections:

- Expect the Radiation Control Program inspector to visually observe from a distance and then approach the tester to ask detailed questions to confirm that the tester is following all rules, laws and regulations.
- Give full cooperation to the inspector.
- Ask the inspector for a business card and identification from their authority.
- Notify the DRSO immediately after the inspection is completed.

The District IA Lab will also conduct inspections in the lab trailer and on the contract.

GAUGE PROCUREMENT

The gauges are permanently stored in the District storage area. When a construction crew needs a gauge, it contacts the DRSO to coordinate required duration and specific needs. The DRSO will then transfer the gauge to the construction crew and complete the proper paperwork.

When the construction crew is finished with the gauge, it returns the gauge with the required transport documents to the DRSO. The Resident Engineer is responsible for picking up and dropping off the gauges to the DRSO.

TESTING PERFORMED BY OTHER DIVISIONS

MATERIALS DIVISION

Testing performed by the Materials Division can be either project control or source acceptance, depending on the material and tests run, in accordance with the applicable section(s) of the Standard Specifications.

When submitting samples and/or material certifications to the Materials Division, verify that they are accompanied by a completed form for the appropriate transmittal. (Incomplete/inaccurate transmittals will result in delayed test results.) Go to

the Construction Division SharePoint site's Forms library

<https://nevadadot.sharepoint.com/sites/040/FormServerTemplates/> for transmittal forms.

AGGREGATE LAB

- Borrow, select borrow, aggregate base, backfill, granular backfill, MSE backfill, drain backfill, riprap, riprap bedding, top soil, screenings, de-icing sand, plantmix bituminous surface aggregates, Portland cement concrete aggregates

BITUMINOUS LAB

- Dense-graded and open-graded plantmix bituminous surface mix designs, dense-graded plantmix bituminous surface behind the paver samples

STRUCTURAL LAB

- Concrete cylinders, reinforcing steel, metal fence posts, guideposts, chain link fence, corrugated metal pipes, tensioning strand, concrete aggregates, slurry backfill, concrete cores

ASPHALT LAB

- Refinery samples, asphalt cement, bituminous emulsion, bituminous cutback

CHEMICAL LAB

- Paint, traffic beads, water, hydrated lime, guideposts, metal fence posts, chain link fence, sign posts, corrugated metal pipe, wire mesh, fly ash, cement

PAVEMENT ANALYSIS SECTION

- Final concrete pavement samples of Portland cement concrete pavement

GEOTECHNICAL LAB

- Borrow, select borrow, aggregate base, granular backfill, MSE backfill

STRUCTURES DIVISION, NON-DESTRUCTIVE TESTING SECTION

- Structural steel: Inspection and testing during fabrication, welding, erection and/or paint application
- Post tensioning: Strand installation and testing, grouting

TESTING DISPUTES, RESOLUTION

CONTRACTOR

There may be instances when the contractor does not agree with the Department's test results. All Department personnel will strive to resolve test disputes quickly to ensure the quality of materials. Subsection 106.04, "(Control of Material) Samples and Tests", of the Standard Specifications, describes a procedure for the Contractor to follow when disputing the Department's test results.

If the Contractor requests independent testing or any other testing, an NDOT representative must be present during sampling and testing. If the Contractor provides independent testing, the Resident Engineer will notify and consult the Materials Division.

NDOT

When a test is questioned or disputed:

1. The Resident Engineer will first conduct the test using a different tester on the same crew. If the results are still in dispute, then the Resident Engineer will immediately request an audit from the District IA Lab.

2. If the results of the District IA Lab and field tester do not match, then each party will perform an additional audit. This second audit will consist of the District IA Lab and field tester running the test, side-by-side and with their own equipment. The District IA Lab tester will then review audit findings and recommendations with the Resident Engineer and field testers for implementation.

If these steps do not resolve the dispute, then the Resident Engineer and District IA Lab will contact the Quality Assurance Engineer to arrange for a three-way split that includes the Materials Division for referee testing.

INDEPENDENT ASSURANCE PROGRAM

The Independent Assurance (IA) Program is federally mandated by FHWA in accordance with 23 CFR 637B. The IA sampling and testing program independently verifies the reliability of the results of field sampling and acceptance testing for all personnel associated with NDOT contracts. The Construction Division manages and runs the IA Labs, which are located in each District facility. Each District IA lab is responsible for performing independent assurance testing on all projects within the District. To ensure an independent check on the field crew testing procedures, the District IA Lab and its testers are not associated with any field crew testing personnel. IA Lab test results are not used for acceptance testing on any contract nor to determine the quality and acceptability of the materials and workmanship directly.

District IA Lab testers sample each contract uniformly throughout the construction period. Since sampling depends on how much material has been produced or processed since the previous sampling, IA testers stay informed of the work on each contract with close coordination with the field crew testers and organize their work efficiently. The Resident Engineer shall keep the District IA Lab informed of any schedule changes and coordinate testing requirements throughout the duration of the contract.

RESPONSIBILITIES OF THE IA LAB

The IA Lab is responsible for auditing field testers in accordance with the [Minimum Required Samples and Tests: Independent Assurance \(IA\)](#) frequency table. This includes but is not limited to:

- Verifying that all personnel testing on NDOT projects possess the necessary Nevada Field Sampling and Testing Qualification Program (NFSTQP), Nevada Alliance for Quality Transportation Construction (NAQTC) or Western Alliance of Quality Transportation Construction (WAQTC), and Nevada Concrete Qualification Program (NCQP) or American Concrete Institute (ACI) qualifications.
- Maintaining testing consistency throughout the state by verifying that the Department's testing procedures are utilized and performed correctly by testing personnel.
- Performing inspections on field labs to verify that the equipment meets the requirements of the test methods and is in good working condition.
- Performing visual audits, including but not limited to:
 - Sampling procedures.
 - Sample splitting procedures.
 - Sample preparation.
 - Testing procedures.
 - Calculations.
 - Reports.
 - Equipment use and procedures.
 - Field books and files (lab).
- Performing direct split audits.

- Verifying that field lab safety procedures are being followed.
- Reporting the audit findings.
- Discussing the audit with the individual(s) whose testing is being audited and with the Resident Engineer before leaving the job site (if corrective action is necessary).
- Performing follow-up audits as necessary.

Additional responsibilities of the IA Lab include but are not limited to:

- Providing training and certification for field crew testers for the NFSTQP/NCQP written and performance exams.
- Performing annual field lab safety inspections.
- Performing annual field lab inventories.
- Performing DRSO responsibilities.
- Reviewing field crew test reports for accuracy and completeness.
- Acquiring and distributing testing equipment to field testers as needed.
- Assisting in annual equipment budget requests.
- Providing equipment repair and maintenance.

REPORTING REQUIREMENTS

The field lab shall provide their completed test reports on visual and/or direct split samples to their District IA Lab within 24 hours of test completion. Audit results shall be reported within 14 calendar days of receiving each sample.

Refer to Table 4-1 for audit tolerances for all visual and/or direct split samples.

TABLE 4-1: IA AUDIT TOLERANCES

TEST	CONTROL	TOLERANCE RANGE (PLUS OR MINUS)
Sieve Analysis	Percent Passing 3 in. to 1 in. sieves	7%
	Percent Passing 3/4 in. to 3/8 in. sieves	6%
	Percent Passing No. 4 Sieve	5%
	Percent Passing No. 8 to No. 16 sieves	4%
	Percent Passing No. 20 to No. 50 sieves	3%
	Percent Passing No. 60 to No. 200 sieves	2%
Fractured Face	Percent Fractured Faces	7%
Sand Equivalent	Sand Equivalent Value	4%
Atterberg Limits	Plasticity Index	3
Density	Calculated Maximum Density	3 lbs/cu.ft.
Slump	Slump of Concrete	1 inch
Air Content	Percent of Air in Concrete	0.5%
Unit Weight	Pounds per cubic foot	1.5 lbs
T.M.D. (Rice)	Density	3 lbs/cu.ft.
Ignition Oven	Bitumen Ratio	0.3%
Absorption	Percent Absorption	0.5%
CV	Cleanliness Value	4.0%

When split samples vary more than the allowable tolerances, the IA Lab will confirm that tester(s) are following proper testing procedures. The IA Lab testers will obtain and test an additional follow-up audit. If the follow-up audit still confirms unsatisfactory results, a meeting with the tester, Resident Engineer, the District IA Lab and the Construction Division's Quality Assurance Engineer will occur. If deficiencies still continue the Construction Division's Quality Assurance Engineer will meet with all parties to determine the appropriate resolution.

SAMPLING AND TESTING FREQUENCIES

Every material incorporated into the project must be tested and accepted based on a sampling frequency for testing in order to ensure quality materials are incorporated into the work and to meet federal requirements. These frequencies have been established based on what is necessary to help ensure consistency of the quality materials. If these frequencies are not met, federal funding for the project could be withheld. Processes to assist the Resident Engineer in meeting the required frequencies are handled by the Materials Division and the Construction Division.

The Materials Division prepares and sends the Resident Engineer a Materials Sampling and Testing Checklist, which should include all materials required for sampling and identifies products and/or materials that may be accepted by a Certificate of Compliance for each contract.

The Construction Division's Quality Assurance Section receives the Materials Checklist Letter and generates the Acceptance Testing Summary Sheet (ATSS), which defines the minimum required number of tests for each material defined on the Materials Checklist. Both of these documents are generated and will be distributed to the Resident Engineer before construction begins. The ATSS is a working document and shall be filled out monthly by the Resident Engineer and the District IA Lab until the contract is completed. The District IA Lab forwards the updated ATSS monthly to the Resident Engineer, and this information must be included in the Resident Engineer's monthly updates. For more information, refer to the ATSS process memo located in the Quality Assurance Documents library on the Construction Division SharePoint site [<https://nevadadot.sharepoint.com/sites/040/QAQC%20Section/Forms/QAQC%20Section.aspx>].

The [Minimum Samples and Tests: Project](#) and [Minimum Samples and Tests: Independent Assurance \(IA\)](#) frequency tables define the requirements for sampling and testing of materials. Sampling frequencies shown are the minimum requirements. The sampling frequency may be increased to ensure adequate control and may vary on some projects according to unique conditions.

Except as provided in Subsection 106.05, "(Control of Material) Certificates of Compliance", of the Standard Specifications, all materials are inspected and/or tested for acceptance before incorporating into the work.

IMPORTANT: Any changes to the frequencies defined in the ATSS must be discussed with the Quality Assurance Engineer prior to making changes. The Resident Engineer must address the reason for not meeting the Minimum Required Tests on the ATSS appropriately in the notes to address why the testing was not performed (e.g., small quantity).

There may be cases in which the Resident Engineer may accept the material on substantial compliance and not require the minimum frequency be met due to a small quantity. (Notify the District IA Lab if small quantity acceptance is being used.) A small quantity is defined as the material being 10 percent or less of the Minimum Required Tests for that particular material:

EXAMPLE:

Bit Ratio is required every 1,000 tons: $1000 \times .10 = 100$ tons

If the project quantity is less than 100 tons, the minimum required frequencies can be waived by the Resident Engineer.

TESTER QUALIFICATION PROGRAM

In accordance with 23 CFR 637B, NDOT testers performing work on a contract shall be certified under an approved program. The Department utilizes the following programs:

- NFSTQP
- NCQP

The tester qualification programs include a written and performance examination, which requires that testers successfully complete the entire qualification program to perform tests. These qualifications are valid for 5 years.

Every year, Resident Engineers receive a list of personnel whose qualifications will be expiring and a posting of the next training class. The Resident Engineer decides who to send for certification/re-certification. It is the Resident Engineer's responsibility to ensure adequate staffing to perform the necessary testing for the assigned contracts. Names of NFSTQP-qualified technicians are listed on the [Construction Division Training Database](#).

Consultants and Contractors certify their testers under the following programs:

- NAQTC [<http://www.naqtc.unr.edu>]
- WAQTC [<http://waqtc.org>]
- ACI [<https://www.concrete.org>]

It is the Resident Engineer's responsibility to ensure valid certification.

All qualifications carry inherent rights and responsibilities. These responsibilities include performing and reporting test results with accuracy and precision expected of the employee in accordance with the required NDOT test procedures outlined in the Construction Division's [Synopsis of Materials Division Testing Manual for Field Testing](#). Each tester will sign the NDOT Responsibilities Agreement for Field Testing form when qualifying for NFSTQP and NCQP certification. Failure to follow the testing qualifications and requirements may result in suspension from testing duties or other penalties.

FIELD LAB FACILITIES AND EQUIPMENT

The field labs belong to the Equipment Division and are assigned by the Construction Division to each individual Construction Crew. The lab trailers are on a 20-year replacement program through the Equipment Division. The Equipment Division, the Construction Division and the Architecture Division work closely to ensure that an acceptable lab facility is procured through the Equipment Division's Annual Budget.

The Resident Engineer uses and is responsible for maintaining these lab trailers and the equipment assigned to the lab. Only appropriate materials and equipment are authorized in the field lab. The Resident Engineer is responsible for enforcing this policy. The District Engineer is responsible for the security of the field lab when stored by the District. The Contractor is responsible for the field lab security at the job site.

The Construction Division also has spare labs, including emulsion trailers, for the crews to use if needed. The Construction Division is responsible for all the equipment and use of the trailers; any requests for availability and/or to utilize these trailers are made through the District IA Lab.

LAB EQUIPMENT PROCUREMENT

The Construction Division is responsible for procuring the required lab equipment. If the equipment exceeds \$5,000, it is requested on the annual budget and distributed accordingly. If it is under \$5,000, the Construction Division procures the necessary lab equipment and distributes it accordingly. For testing equipment under \$1,000 and certain testing supplies (such as wheelbarrows, shovels, pliers, screwdrivers, cylinders, wrenches, etc.), the Resident Engineer submits Form 072-002 (Combination Request for Supplies, Equipment and Shipping Record, or "Requisition 51") to the Assistant District Engineer who then submits the request to the Equipment Division's Headquarters Stockroom or the applicable District Stockroom. For any equipment that is not available through the stockrooms, request the equipment from the District IA Lab or the Construction Division's Quality Assurance Section.

A list of approved equipment utilized in a field lab can be found on NDOT form 040-020 (Inventory of Testing Equipment).

LAB REMOVAL AND SETUP

Due to the nature of projects across a vast geographic area, the periodic relocation of lab trailers may be warranted to provide for more efficient sampling and testing of materials.

For assistance or more information, contact the District IA Lab or the Construction Division's Quality Assurance Engineer.

RESIDENT ENGINEER

- Prepare the lab trailer to move to the next location for the next project. This includes but is not limited to securing all equipment inside the lab trailer from falling and breaking during the move.

- Contact the Equipment Division Superintendent with sufficient notice and cc: the Construction Division's Quality Assurance Engineer and the District IA Lab. Include in the request any shed(s) and/or cargo container(s) that need to be moved to the new lab location.
- Ensure that the local equipment shop is notified that the lab is being moved and that a safety check of the trailer is needed to verify it has working brakes, brake lights, tires etc., before the transport driver arrives.
- Remove and disconnect the power, water and portable holding tank either by the Contractor in accordance with Section 628, "Mobilization", of the Standard Specifications, or District Services, before the transport driver arrives.
- Ensure that all equipment, stairs, jack-stands, tie downs, etc., outside of the lab trailer are moved to the new lab location prior to the transport driver arriving.
- Meet the transport driver at the existing lab trailer location and follow the transport driver to the new lab trailer location, assisting the transport driver to verify the lab trailer is delivered to the correct location.
- After the lab trailer has been removed from the former location, ensure that all garbage and construction material has been disposed of properly, leaving the old lab site in the same or better condition than it was found, while satisfying any stormwater requirements.
- Once the transport driver delivers the lab trailer to the new location, set up the lab trailer. This includes but is not limited to:
 - Placing the jack stands in the appropriate locations, leveling the lab trailer and securely tying down the lab trailer with tie-downs. (If commercial movers are used, this task is their responsibility.)
 - Placing the stairs so they are level and flush with the lab trailer.
 - Setting up all the lab equipment in the appropriate places inside and outside of the lab trailer.
- Ensure that the lab trailer has water, gas and electricity.

CONTRACTOR

- In accordance with Section 628 of the Standard Specifications, provide a level and secure facility with utilities, potable water and a waste water holding tank for the lab trailer.

EQUIPMENT DIVISION

- Schedule the move using Department or commercial movers. If commercial movers are used, all necessary permits are required for tear down and set-up of the field lab trailer.

CONSTRUCTION DIVISION'S QUALITY ASSURANCE SECTION

- Maintain an inventory of field lab locations.

LAB CALIBRATION

The Materials Division is responsible for scheduling equipment calibration for the field labs and will contact the Resident Engineer to schedule the annual calibration and complete the calibration at the field lab site. Any time a lab is moved, the Resident Engineer is responsible to contact the Materials Division's Lab Services Section to recalibrate the lab trailer equipment.

The lab trailer must be set-up, operational, and fully equipped before the scheduled calibration. (Failure to set-up the lab trailer properly will result in the calibration being rescheduled.) Once calibration is completed, a report is sent to the Resident Engineer and the Construction Division's Quality Assurance Section. Any equipment that does not pass calibration will be repaired or replaced in coordination with the District IA Lab.

LAB EQUIPMENT REPAIR, MAINTENANCE AND REPLACEMENT

The Resident Engineer is responsible for maintaining a clean and safe lab facility. For any necessary structural or mechanical repairs on the lab trailers, contact District Services. For repair or replacement of equipment, contact the District IA Lab.

INVENTORIES

An inventory of all testing equipment for each lab trailer is conducted once a year (in June) by the Resident Engineer assigned the lab trailer and reported on NDOT form 040-020 (Inventory of Standard Testing Equipment - Construction Field Labs). Equipment assigned to the lab trailer should not be transferred to another trailer without permission from the District IA Lab.

For equipment greater than \$5,000, the District IA Lab will schedule and complete inventories for the Equipment Division once a year.

AGGREGATE SOURCES

Aggregate materials for a project come from a material source, commonly called a pit. The material source can be either privately owned or publicly owned. During project development, Materials Division staff locates material sources that most economically meet the project needs.

On most NDOT construction projects, the material sources are designated in the plans and specifications. In some situations, the contractor may want to use an alternate site, or expand the limits or boundaries of an approved site. When this situation occurs, the Resident Engineer must confirm that the material is acceptable for use on the project. Source acceptance is determined by the Materials Division, based on test results of aggregate samples collected by the Resident Engineer. The Contractor shall allow at least 30 days for completion of the additional sampling and testing. For sampling and testing guidance, refer to the [Materials Sampling and Testing Frequencies](#) page on the NDOT Internet site. The Contractor shall comply with the requirements stated in the Standard Specifications for furnishing materials from a source not identified in the contract documents. Fulfilling the requirements for an alternate source may require additional time that the Contractor must consider so that the project is not delayed.

The contract documents list the Contractor's requirements regarding the material supply. Refer to Section 106, "Control of Materials", of the Standard Specifications for information relative to material sources, state-furnished materials, material storage and defective materials.

A Contractor may process and stockpile aggregate before incorporating the material into the work. When this happens, the contractor may request payment of the stockpiled material. The Resident Engineer's Survey Crew Chief measures the stockpile, documents the measurement, and the Resident Engineer completes NDOT form 040-015 (Request for Payment for Materials on Hand). The Resident Engineer processes the request for payment only if the contractor's informational test results show conformance with specifications. For additional guidance on measurement and payment of stockpiled material, refer to Subsection 109.06, "(Measurement and Payment) Partial Payment", of the Standard Specifications, and Chapter 24 of the [Documentation Manual](#).

STATE-PROVIDED SOURCES

After the contractor proposes a material source, the Resident Engineer will consider the following:

- Source location and access roads
- Right-of-way limits of source
- Haul routes on city or county roads and related requirements, such as weight restrictions
- Improvements that need to be removed, reset, adjusted, or protected, such as power lines or fences

- Slopes to maintain
- Conformance with environmental restrictions
- Avoidance areas

The Contractor shall produce and stockpile materials before incorporating into the work in a manner that reduces segregation or degradation of the materials. When stockpiling different aggregate types in the same general area, the Contractor must provide a means to separate the stockpiles. Walls may be used to separate aggregate types.

The following are common stockpiling methods:

- Construct stockpiles at the end of production belts.
- Haul the produced material from production belts to stockpiles.

The Contractor typically constructs stockpiles as follows:

- **Stockpile Area:** Before starting production, the contractor levels the storage or stockpile area and, if necessary, spreads and compacts a leveling course of the material to be stockpiled. This provides a uniform surface on which to place the stockpile material. If the contractor plans to request payment for stockpiled materials, the Resident Engineer's Survey Crew Chief establishes elevations on the stockpile storage surface before stockpile construction.
- **Stockpile Placement:** When stockpiling material as it leaves the production belt, the Contractor shall minimize material handling with equipment. When using a dozer for spreading, the repeated abrasive action may segregate and degrade the material. When transporting material to the stockpile, the Contractor shall unload it so that the spreading equipment at the stockpile location will mix the material. For example, "belly-dump" vehicles are unloaded parallel to each other and the dumped loads are leveled before dumping a second layer of material. "End-dump" vehicles are unloaded in a similar manner. "End-dump" vehicles should only be unloaded on horizontal surfaces, not on the stockpile edge, to reduce excessive material segregation.

The Contractor may request stockpile payment for materials produced. The Resident Engineer's Survey Crew Chief measures the stockpile and documents the measurement, and the Resident Engineer completes NDOT form 040-015, (Request for Payment for Materials on Hand.) The Resident Engineer processes the request for payment only if the Contractor's informational test results show conformance with the contract documents. For additional guidance on measurement and payment of stockpiled material, refer to Subsection 109.06, "(Measurement and Payment) Partial Payment", of the Standard Specifications, and Chapter 24 of the [Documentation Manual](#).

COMMERCIAL SOURCES

At a commercial source, the material supplier shall test the material being produced to verify conformance with the requirements of the contract documents and provide copies of the test results to the Resident Engineer. Concrete aggregate sources must undergo annual testing to confirm that they are acceptable for use on NDOT contracts. This sampling and testing process is called "source acceptance." The Resident Engineer consults with the Materials Division to confirm that the material source proposed for use by the Contractor has received source acceptance approval.

The Contractor may request stockpile payment for material at a commercial source. The stockpile must be separated from other stockpiles and clearly labeled for the NDOT contract. The Resident Engineer's Survey Crew Chief measures the stockpile and documents the measurement, and the Resident Engineer completes NDOT form 040-015 (Request for Payment for Materials on Hand). The Resident Engineer processes the request for payment only if the Contractor's informational test results show conformance with the contract documents. For additional guidance on measurement and payment of stockpiled material, refer to Subsection 109.06, "(Measurement and Payment) Partial Payment", of the Standard Specifications, and Chapter 24 of the [Documentation Manual](#).

