LOCAL PUBLIC AGENCY (LPA)
QUALITY ASSURANCE PROGRAM

(Revised 2021)

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I. OVERVIEW

The Oregon Department of Transportation (ODOT) has implemented a Quality Assurance (QA) program approach that complies with the FHWA Guidelines for a QA program for construction projects on the National Highway System. The LPA has adopted ODOT's QA program as modified herein. The LPA Quality Verification Laboratory (or "QV Lab") is the Lane County Public Works Engineering and Construction Materials Testing Laboratory (Materials Lab). This program defines the responsibilities of the Contractor and LPA in order to satisfy the needs of the program.

The LPA recognizes that there are other benefits of developing and implementing Quality Assurance specifications into its construction program. These benefits include:

- To improve the overall quality of highway and bridge construction; and
- To ensure Contractor accountability for quality control in contracted work.

The success of the Agency's Quality Assurance program is dependent on three primary features. The first is the Laboratory Certification program, which is discussed in Section III. The second is the Technician Certification program in Section IV. The third feature is the specific product QC/QA testing plan detailed in Section VII.

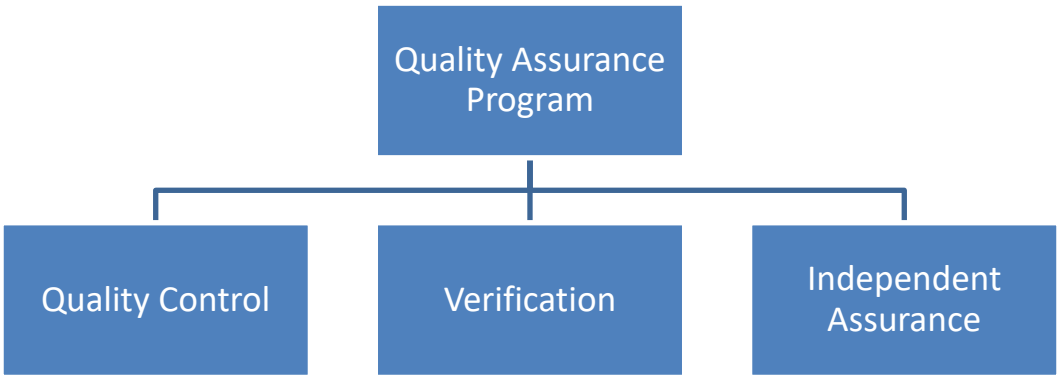
The LPA Quality Assurance Program is based on the ODOT Manual of Field Tested Procedures (MFTP) modified and adopted as follows:

- Introduction: Adopted as published in the MFTP, except as described in this document.
- Section 1 – Test Procedures: Adopted as published in the MFTP.
- Section 2 – Quality Assurance Program: Replaced by this document.
- Section 3 – Report Forms and Examples: Adopted as published in the MFTP, except as described in this document.
- Section 4, Subsection A – Source Review and Product Compliance: Adopted as published in the MFTP.
- Section 4, Subsection B – Field Tested Materials Small Quantity Guideline – Adopted as published in the MFTP for Contractor's Quality Control only. Otherwise does not apply to this LPA Quality Assurance Program. Verification of field tested materials is covered under Appendix C of this document.
- Section 4, Subsection C – Laboratory Samples: Adopted as published in the MFTP.
- Section 4, Subsection D – Field Tested Materials Guide: Adopted as published in the MFTP for Contractor's Quality Control only. Verification is deleted from the MFTP and replaced by Appendix C of this document.

- Section 5 – Field Tested Materials Guide (Type D & E Projects): Adopted as published in the MFTP for Contractor's Quality Control only. Quality Assurance column is replaced by Appendix C of this document.
- Quality Assurance (QA)

Quality Assurance is defined as: All those planned and systematic actions necessary to provide confidence that a product or service will satisfy given requirements for quality.

The LPA has developed its QA Program, which includes three separate and distinct sub-programs as illustrated below:



Quality Control (QC)

Quality Control is defined as: All contractor/vendor operational techniques and activities that are performed or conducted to fulfill the contract requirements.

The Contractor is responsible for providing quality control sampling and testing, furnishing material of the quality specified, and furnishing QL levels during aggregate production as needed to ensure compliance with the Contract. Quality Control testing operations will be performed by a Certified Technician. The certified technician, who performs the sampling and testing procedures, must sign the testing documentation.

- Contractor quality control inspection and testing will be used by the Contractor to help manage and control their work in order to ensure compliance with the Contract.

An accredited materials lab will perform testing for all source/compliance tests. The ODOT Central Materials Lab or another agreed upon accredited materials lab will perform testing for those non-field tested items associated with construction products (e.g. asphalt's, emulsions, tack, etc.).

Verification

Verification is defined as: Sampling and testing performed to validate the quality of the product.

Verification inspection and testing will be used for Contract compliance verification and LPA acceptance of work, products and materials incorporated into the project.

Verification samples are taken randomly at a minimum of the frequencies identified in Appendix D: LPA Field Tested Materials Assurance Guide (FTMAG) and tested by LPA Quality Verification Laboratory to verify that products meet required specification(s).

Independent Assurance

Independent Assurance is defined as: Activities that are an unbiased and independent evaluation of all the sampling and testing procedures used in the acceptance program.

The Independent Assurance (IA) Program uses a combination approach requiring laboratory certification, technician certification, proficiency samples, and where possible, split samples of verification or QC tests. The ODOT Construction Section certifies quality control and quality assurance testing laboratories and technicians.

The LPA Independent Assurance Program consists of a systematic approach that is both time-based and project based. Project based IA will be used on projects constructed on the National Highway System (NHS), regardless of funding source, and on all other federally funded LPA projects. The project based component ensures that all federally funded LPA projects will have the verification testing evaluated independently as required herein. Non-NHS and non-federally funded LPA projects will be encompassed within the time-based IA program.

When “project based” IA is required, it will be performed in accordance with the frequencies stated in the Appendix D: LPA Field Tested Materials Assurance Guide (FTMAG).

The time-based component of IA will be performed, regardless of the number of tests, material quantities or projects performed annually. The time-based component is based on evaluating the LPA’s Quality Verification Laboratory which:

- Maintains its ODOT Certification.
- Requires and ensures key staff maintain ODOT Certifications for all field and laboratory materials testing disciplines performed on behalf of the LPA.
- Participates in the ODOT Laboratory Proficiency Program.

All LPA Quality Verification Laboratory staff will be required to perform the minimum of one IA test annually for each discipline they possess a certification and perform

verification and acceptance testing for. This annual requirements can be accomplished by the following:

- Annual proficiency testing samples prepared and administered by ODOT through the ODOT Laboratory Proficiency Program.
- The practical component associated with obtaining a new ODOT certification or renewal of same.
- IA testing performed on federally funded and NHS projects.
- Random split samples taken from any LPA project where the LPA and IA laboratory compare results using the parameters set forth herein.

In the event the LPA Material Verification Laboratory staff are unable to accomplish the required annual IA testing parameters using the above noted methods, the LPA will coordinate with the IA Laboratory to schedule an agreeable time and location to perform the outstanding testing between October 15th and December 15th of the respective year.

The Quality Assurance Testing, both Verification and Independent Assurance, will be performed by a Quality Assurance Laboratory designated by the LPA Agency in compliance with 23 CFR 637.

LPA designates the ODOT Region 2 Materials Laboratory as its Independent Assurance Laboratory. In the event the ODOT Region 2 Laboratory is unable to perform IA testing, a differing ODOT Regional Laboratory or an ODOT certified private laboratory, with technicians certified in the applicable test procedures will be used. Acceptable laboratory accreditations include:

- ODOT Laboratory Accreditation
- AASHTO Accreditation

Quality Assurance Program Components

Third-Party Resolution

Third-Party Resolution is used when the LPA's Quality Verification test results conflict with the Contractor's ongoing Quality Control test results and when verification requirements are not met or the conflict cannot be resolved. Third-Party Resolution can be requested by either the Contractor or the Project Manager.

- Third-Party Resolution testing shall be performed by the ODOT Construction Section's Central Materials Laboratory which may provide third-party dispute resolution options (or an ODOT certified alternate Third-Party laboratory). This is normally done by testing the quality verification production backup samples, but may include other resolution techniques or procedures as determined by the Agency's technical expert for the corresponding specification section.

The test result(s) of the Third-Party Resolution Laboratory performing dispute resolution materials testing for any or all disputed test results will be considered the actual test results and will therefore be used for acceptance of the material.

Third-Party Resolution testing may also be needed when the LPA's Quality Verification test results conflict with the IA test results.

Certification Advisory Committee

The certification programs (both Technician and Laboratory Certifications) for ODOT's Quality Assurance program will be overseen by a Certification Advisory Committee. The purpose of this committee is to review and provide general oversight to the certification programs. The committee will be responsible for establishing policy as related to the certification programs and will also be responsible for reviewing allegations concerning abuse by technicians. The Certification Advisory Committee will perform other duties as required to successfully implement and continue the Certification Programs. A meeting of the committee may be called at any time by the Chair of the Certification Advisory Committee or by written request of at least two members of the Committee. A majority of the members of the Committee shall be present for transaction of official business.

Membership of the Certification Advisory Committee will include the following:

- ODOT Construction and Materials Engineer (Chair)
- ODOT Pavements Services Engineer
- ODOT Quality Assurance Engineer
- ODOT Structural Services Engineer
- ODOT Laboratory Services Manager
- APAO Executive Director or Representative
- OCAPA Executive Director or Representative
- AGC Heavy Highway Representative
- Industry "At Large" Representative (appointed by Committee)

Random Samples

The Quality Assurance Program is based on theoretical conditions and the application of statistical acceptance procedures. Sampling shall be by simple random, stratified random or systematic means as specified.

To obtain a representative sample, a reliable system of random sampling shall be employed. Some work, like process control, lends itself quite well to the use of the Random Units Table and the Random Sample Location forms that ODOT has developed. ODOT TM 400 Determining Random Sampling and Testing Locations is available to assist with random number determinations and test site locations. Random Sampling is the preferred method to assure that the samples are representative and to eliminate

sampling bias. In other work, like Verification or Independent Assurance, it may be difficult to apply random numbers to sample selection. In this case, it is imperative that the samples are taken at locations or times, which do not have an identifiable pattern, and are completely random and without bias.

ODOT Approved Commercial Aggregate Product Program

The ODOT quality assurance program allows some freedom for commercial sources to establish their own quality control plan that is tailored to the operation of the specific commercial source. The commercial supplier is required to submit a written quality control plan to the appropriate Region Quality Assurance Coordinator for approval. All testing for the approved quality control plan is required to be performed by a certified technician in an ODOT certified laboratory. Specific details on ODOT Approved Commercial Aggregate Product Program may be found in Appendix A of the ODOT MFTP, which is posted on the ODOT website at: https://www.oregon.gov/odot/Construction/Pages/Manual-of-Field-Test-Procedures.aspx.

The LPA will allow the use of ODOT-approved commercial aggregate products for LPA projects when applicable. When the Contractor is submitting a product admissible to the ODOT Approved Commercial Aggregate Product Program, the Contractor shall be responsible for coordinating with ODOT to the release of the relevant testing and material approval documentation to the LPA. LPA will verify ODOT's written approval of the commercial aggregate product proposed by the Contractor for use on the project.

When materials being proposed and submitted by the Contractor to the LPA are inadmissible to above referenced ODOT Approved Commercial Aggregate Product Program, the Contractor shall provide relevant laboratory testing results, performed within 30 days of the submittal, which represent the submitted material for initial acceptance. LPA will perform subsequent verification testing during production to determine the materials continued use and acceptance for incorporation into the project.

II. ROLES AND RESPONSIBILITIES

Contractor

The Contractor's responsibilities are to:

- Furnish a written quality control plan (See Appendix A, for minimum requirements);
- Furnish and incorporate materials/products which are of the quality specified;
- Provide ODOT certified technicians and laboratories as required;
- Perform quality control of all materials/products used on LPA construction projects;
- Sample and test materials using appropriate devices and procedures;
- Furnish QL when required;
- Sample and provide splits to LPA upon request, witnessed by an agency representative;
- Properly document, sign and deliver test results as requested, on ODOT forms according to Section 3 criteria; and
- Retain splits of all QC samples until PM determines that the split samples may be discarded or 90 days after the issuance of Third Notification. However, if there are any pending claims or disputes, keep the samples until such claims or disputes are resolved.

Project Manager (PM)

The Project Manager has the authority and responsibility to enforce the provisions of the contract. The PM's Quality Control Compliance Specialist (QCCS) is involved with the project QA activities and is experienced and certified in all areas of field testing and documentation. The QCCS is required to maintain certification in CAgT, CEBT, CAT 1, CDT and QCT. Certification in CAT II, CCT and CMDT are recommended.

The Project Manager is responsible to ensure that:

- The project meets the requirements specified in the plans and specifications.
- All required tests are performed, documented, and submitted. The PM is also responsible for informing the quality assurance personnel of project schedules, current quantities, and anticipated sampling requirements so verification testing can be accomplished.
- The Contractor's QC program meets required standards. This is accomplished by performing inspections of Contractor's personnel, testing procedures, and testing equipment.
- The Contractor and Quality Assurance Laboratory is notified in writing within 5 working days of an IA/Verification sample's completion, as to which backup samples may be discarded or that an investigation is in progress. Upon the

completion of an investigation inform the Contractor, in writing, as to which backup samples may be discarded. Written notification will identify the Lot/Sublots, include the IA test results and if required the resolution of an IA investigation.

The PM, with the assistance of the QCCS, the LPA Quality Verification Laboratory and the project inspectors, is responsible to perform the following duties including, but not limited to:

- Maintain uniformity in construction and testing activities;
- Witness Sampling for IA and verification testing;
- Perform all required IA and verification testing;
- Properly document sampling and testing on ODOT or LPA equivalent forms according to Section 3 criteria;
- Verify calibration of all nuclear moisture density gauges used by the LPA for Verification and Acceptance;
- Troubleshoot construction problems related to materials;
- Recommend changes to mix designs;
- Retain all split portions of IA and Verification samples splits until no longer needed (typically Third Note, unless the Project Manager requests another timeline in writing);
- Ensure third-party dispute resolution is provided, according to the QA program, when necessary.

ODOT Construction Section

As otherwise noted in this QA plan, the ODOT Construction Section's duties include:

- Support of the QA program by coordinating training and certification for technicians and by certifying all testing labs associated with ODOT construction projects;
- Administer the proficiency sample program;
- Administer the ODOT Approved Commercial Aggregate Product Program;
- Provide third-party dispute resolution, according to the QA program;
- Utilize the QA Steering Committee to establish and ensure statewide consistency in the QA Program.

III. LAB CERTIFICATION PROGRAM

Overview

The Construction Section (CS) developed this laboratory certification program to support the Oregon Department of Transportation's (ODOT) Quality Assurance Program for Construction Materials. This program recognizes three categories of laboratories that will test materials for ODOT and LPA construction projects: Quality Control, Quality Assurance, and Dispute Resolution. To ensure that laboratories consistently provide quality test results, they shall be certified according to this Program.

Program Description

Quality Control Laboratories

Quality control of construction materials is the responsibility of the Contractor. Laboratories performing quality control testing may be the Contractor's own, the material supplier's or an independent testing laboratory.

The ODOT Central Laboratory will certify all quality control laboratories for those test methods necessary to perform quality control tests of construction materials for ODOT and LPA construction projects. An outline of the on-site inspection process and laboratory certification criteria is found in the "On-Site Laboratory Inspection Criteria". This certification will be valid for one year. If a laboratory's certification expires and the laboratory has a continued need to test materials for ODOT or LPA construction projects, the laboratory shall apply for re-certification.

This laboratory certification process is designed to provide a "snapshot" of the quality of a laboratory. The ODOT Central Laboratory or its authorized representative will examine the laboratory's testing equipment for accuracy and conformance to specifications. If the laboratory's equipment is properly calibrated and within specifications, and if the laboratory meets all other conditions specified in the Lab Certification Program and On-Site Inspection Criteria section, ODOT will certify the laboratory as competent and able to test materials for LPA construction projects.

Quality Assurance Laboratories

Quality assurance is the responsibility of LPA. Quality Assurance Laboratories perform Independent Assurance (IA) and/or Verification tests in coordination with quality control laboratories performing quality control tests of materials for LPA construction projects. This provides LPA with an independent analysis of the quality control test results to ensure that the results of quality control tests are valid.

Quality Assurance Laboratories for Local Public Agency projects may be the ODOT Central Laboratory, the Agency's own lab or a contracted independent lab.

Quality Assurance Laboratories perform Independent Assurance (IA) and/or Verification tests during production of materials. For projects constructed on the NHS, regardless of funding source, and on all other federally funded LPA projects, the laboratories performing the IA testing shall not be the same lab that performs the verification testing. These laboratories perform a portion of the tests that the quality control laboratories perform. The quality control and quality assurance test results are compared to each other to determine the reliability of the quality control testing program.

The ODOT Central Laboratory will certify all quality assurance laboratories for those test methods necessary to perform quality assurance tests of construction materials for ODOT and LPA construction projects. This certification will be valid for one year. If a laboratory's certification expires and the laboratory has a continued need to test materials for ODOT and LPA construction projects, the laboratory shall apply for re-certification. An outline of the on-site inspection process and laboratory certification criteria is located under the "On-Site Laboratory Inspection Criteria" section.

This laboratory certification process is designed to provide not only a "snapshot" of the quality of a laboratory, but also an evaluation of the laboratory's performance in maintaining quality and consistency. ODOT Central Laboratory inspectors will examine the laboratory's testing equipment for accuracy and conformance to specification. In addition, the quality assurance laboratory is required to participate in the ODOT Central Materials Laboratory Proficiency Sample Program, see Section V, page 28. If the laboratory's equipment is properly calibrated and within specifications, and if the laboratory meets all other conditions specified in the "On-Site Laboratory Inspection Criteria" section, then ODOT will certify the laboratory as competent and able to perform independent assurance and/or verification tests of materials for ODOT construction projects.

Dispute Resolution Laboratories

When Verification and IA test results conflict and the conflict cannot be resolved; or the Contractor disputes the Verification test results; a neutral Dispute Resolution Laboratory will test the material in question. The test results of the Dispute Resolution Laboratory will decide the dispute.

The ODOT Central Laboratory or an ODOT certified lab selected by the LPA (for LPA projects) will perform all third party and dispute resolutions unless a potential for conflict of interest exists.

In the event that the ODOT Central Laboratory acts as the Quality Assurance Laboratory, and that the dispute is therefore between the Quality Control Laboratory and ODOT Central Laboratory, the ODOT Central Laboratory will defer its dispute resolution duties to a certified laboratory agreed upon between LPA and the Contractor.

The ODOT Central Laboratory shall certify dispute Resolution Laboratories, other than the ODOT Central Laboratory.

Any Laboratory which has run Independent Assurance, Verification or Quality Control testing on the material under dispute is considered to have a conflict of interest and shall not perform Dispute Resolution on its own tests.

On-site Laboratory Inspection Criteria for Quality Control and Quality Assurance Laboratories

A laboratory desiring information and/or an application package for ODOT laboratory certification may contact the ODOT Central Laboratory at the following address:

Oregon Department of Transportation
Construction Section, Materials Laboratory
Attn: Lab Certification Coordinator
800 Airport Road SE
Salem, OR 97301-4798
Telephone (503) 986-3087

Laboratories requesting ODOT certification shall make arrangements to receive an on-site inspection. Forms will be included in the application package to facilitate the laboratory's response to this requirement. These forms are available electronically at the following URL address:

https://www.oregon.gov/odot/Construction/Documents/lab_app_pkt_cert.pdf

It is the responsibility of the requesting laboratory to have their lab clean, organized and in complete operating order at the time of inspection. All equipment must be readily available and accessible. The ODOT Laboratory Certification Team does not search for stowed equipment. In addition an authorized representative must be present at the time of inspection to answer questions or respond to identify and present equipment. Failure to meet this criterion or to find unorganized, unkempt facilities may result in a canceled inspection.

On-Site Inspection

The Lab Certification Inspector will visit each laboratory whose application for certification has been accepted. The laboratory inspector will evaluate the laboratory using criteria A through H listed below. A discussion of the criteria follows:

A. Requirement: The laboratory shall maintain facilities (fixed or mobile) for proper control of the laboratory environment. This criterion is used to evaluate the laboratory's physical ability to provide an appropriate environment in which to test

materials. General requirements include: the facility shall be physically able to function as a laboratory (e.g. adequate power, water, lighting, floor space etc.) and to have the capability of maintaining temperatures that are specified in the test methods for which the laboratory is seeking certification.

B. Requirement: The laboratory shall maintain facilities for proper storage, handling, and conditioning of test specimens and samples. This criterion is used to evaluate a laboratory's physical ability to store samples and keep them organized. The laboratory shall maintain separate areas on its premises to store samples and splits of samples in an organized manner so that samples are not lost or discarded and may be found at a future date. In addition, the laboratory shall have facilities for the conditioning of samples as required by any test method for which the laboratory seeks certification.

C. Requirement: Calibration certificates held by laboratories shall meet the requirements of ISO/IEC 17025 and shall include appropriate statements of uncertainty. Laboratories shall use accredited calibration service providers. The laboratory shall maintain necessary calibration equipment and reference standards. A laboratory shall have, on hand, calibration and verification equipment necessary to ensure the accuracy of its equipment. Such equipment could include calibration weights for scales or balances; manometers for the verification of vacuum pumps; thermometers etc.

D. Requirement: The laboratory shall maintain equipment conforming to specification requirements necessary for the testing performed. This criterion is used to ensure that the laboratory's testing equipment conforms to the specifications listed in the test methods for which the laboratory is seeking certification.

E. Requirement: The laboratory shall demonstrate adequate care when recording and processing data and test results. This criterion is used to evaluate the laboratory's ability to produce accurate test reports. The laboratory shall have procedures in place that facilitate the timely and accurate recording of data and the ultimate accuracy of its test reports.

F. Requirement: The laboratory shall demonstrate proper techniques for selection, identifying, handling, conditioning, storing, and retaining test samples. This criterion is similar to criteria B but is concerned with the laboratory's internal policies and procedures rather than its physical capabilities in regards to the above activities. The laboratory shall have policies and procedures in place to ensure that its personnel and technical staff have the ability to select, identify, handle, condition, store, and retain test samples as required by the test methods for which the laboratory is seeking certification.

G. Requirement: The laboratory shall include the laboratory's name and address and the name(s) of the technician(s) performing the test(s) on their test reports. This criterion is used to ensure that the above information appears on the laboratory's

test reports that are submitted to ODOT. In addition to the above, the technician's certification card number shall be entered on all test reports.

H. Requirement: The laboratory shall have on site at the time of inspection and during production operations, a copy of the current MFTP and all equipment (except items listed as mobile equipment) necessary to perform the test methods for which they have requested certification. The ODOT Lab Certification inspection team has a Color Coded Tagging System, which identifies lab equipment that has met the certification criterion. The unique Colored Tag is valid for a 1 year period and starts from the date of the Final Report. (Note: Not all testing equipment is tagged; reference the appropriate test procedure to identify required equipment.)

Mobile equipment for additional test procedures may be added at a later date provided the following conditions are met:

- The laboratory must demonstrate adequate workspace and electrical system to operate required equipment.
- If equipment is new, the laboratory must provide copies of invoices that include the make, model and serial number of the equipment.
- If the equipment is rented or borrowed, it must come from another ODOT certified laboratory and provide the make, model and serial number as well as the number and color of the ODOT inspection tag.

Mobile Equipment

1. Ignition oven
2. Gyratory compactor
3. Field concrete equipment

Preliminary Report

The ODOT Lab Certification Inspector will prepare a preliminary report of findings and present it to the laboratory manager at the conclusion of the on-site inspection. The preliminary inspection report will list all discrepancies for each test method in which the laboratory has requested certification. The inspector will discuss each discrepancy noted in the preliminary report with the laboratory manager in sufficient detail so that the laboratory manager understands the scope of the problem(s) and what corrective action is required in order to obtain certification for the test method(s) in question. When the inspector and the laboratory manager have covered all of the deficiencies, both parties will sign the preliminary report. These signatures indicate that both parties have read the report and understand its contents. The inspector will leave the original copy of the report with the laboratory manager and place a copy in the laboratory's permanent file.

The laboratory inspector will immediately (same or next day) fax or hand delivers a copy of the report to the Project Manager and the region QA personnel for their files and general information.

Laboratories are expected to correct all deficiencies within thirty-days so that a certification may be issued. If a laboratory needs more than thirty-days to correct deficiencies, the laboratory shall notify the laboratory inspector, in writing, explaining why additional time is needed. The laboratory will not be certified until all deficiencies are corrected.

If the ODOT Lab Certification Inspector within the thirty-days receives no response to the preliminary report allowed, then the laboratory will be immediately decertified until the deficiencies are corrected or a written response has been received.

Final Report

Once all of the deficiencies have been corrected the ODOT Lab Certification Inspector will prepare a final report of findings and mail it to the laboratory.

The laboratory inspector will mail copies of the final report to the Project Manager and the region QA office.

Certificate of Laboratory Certification

The ODOT Central Laboratory will prepare a Certificate of Laboratory Certification for a laboratory when the laboratory has met the requirements listed in “On-Site Laboratory Inspection Criteria”, Pg. 11 and has corrected all deficiencies noted by the inspector. The certificate will be mailed to the laboratory with the final report of findings. The Certificate will include the type of certification, laboratory name, test methods the laboratory has been certified to perform, color of the inspection tag and the Construction Section Manager’s signature. This Certificate is proof of a laboratory’s ODOT certification for the listed test methods and may be presented as such to any ODOT Project Manager.

The laboratory inspector will mail copies of the Certification with the final report to the Project Manager and the region QA office.

Certificates of Laboratory Certification are valid for one-year from the date of the inspection.

Follow Up On-Site Inspections

If at any time during a laboratory’s term of certification, the Project Manager or region QA personnel suspect that any of the Contractor’s laboratory equipment, conditions outlined under Requirement H or the laboratory building itself are out of specification, the Project Manager or region QA personnel may request an additional on-site inspection. The Project Manager or region QA personnel will contact the Lab Certification Inspector and schedule the follow up on-site inspection.

If the follow up on-site inspection reveals that the laboratory is deficient in one or more areas, the laboratory inspector will immediately decertify the laboratory for those test methods affected by the deficient equipment or facilities. The laboratory inspector will recertify the laboratory following correction of all deficiencies. A laboratory may not perform materials tests using test methods for which it has been decertified.

Laboratory Decertification

A quality control, quality verification or quality assurance laboratory may have its entire certification or its certification for specific test methods revoked by ODOT if it is found to not conform to the specifications and standards of its ODOT certification. A laboratory that has had its certification revoked for a specific test method(s) may not test materials that require the use of such revoked test certification(s). A laboratory that has had its entire certification revoked shall promptly cease testing materials for ODOT construction projects.

A laboratory that has had its certification partially or entirely revoked may seek reinstatement by demonstrating conformance to the ODOT Laboratory Inspection requirements.

In addition, any laboratory/company intentionally misrepresenting the status of their certification or falsifying test results will be subject to disciplinary action up to a one-year suspension of their certification. Any allegation regarding the practices of a certified laboratory will be made in writing to the Certification Advisory Committee. The Certification Advisory Committee will investigate the complaint and take appropriate disciplinary action. In all cases, the parties involved in the complaint will be provided an opportunity to appear before the committee before any actions are taken.

IV. TECHNICIAN CERTIFICATION PROGRAM

Introduction/Background

The Quality Assurance Program requires all personnel and laboratories performing testing on LPA projects to be certified. The level of certification is dependent on the specific type of testing to be performed. The Certification Advisory Committee, described in Section I, of the QA Program, will provide approval and general oversight for the certification programs. Specific direction and administration of the individual certifications will be provided by ODOT unless other groups are specifically referenced in the description of the individual certifications.

The Oregon Department of Transportation is a member of the Western Alliance for Quality Transportation Construction (WAQTC), which consists of 11 western states committed to the quality of our transportation systems. WAQTC has developed a technician-training program, which is comprised of instructional, and student modules used to assist in the training process of material field-tested procedures. ODOT has adopted the training packages for all certifications except for ODOT specific certifications and those controlled by entities other than WAQTC such as QCT, CCT, CMDT and CAT II.

The purpose of the Technician Certification Program is to ensure technicians performing testing have a minimum level of knowledge in the area of certification.

Technician Certifications

Following is a summary of the approved Technician Certifications and the associated certification durations:

Certification Discipline	Initial Certification	Renewal of Certification
CSTT	5 years	5 years
CCT	3 years	3 years
CMDT	3 years	3 years*
CAT-II	3 years	3 years
CAgT	3 years	5 years
CEBT	3 years	5 years
CDT	3 years	5 years
CAT I	3 years	5 years
ACI Grade 1	5 years	5 years
QCT	Concurrent with ACI Grade 1	

*To be eligible for CMDT recertification by taking only the recertification exam, the technician must have:

- Submitted a minimum of one dense ACP mix design meeting the requirements of the Contractor Mix Design Guidelines and ODOT TM 330, for each year of certification and

- Participated in the CMDT Proficiency program for each year following the initial certification year.

Certified Aggregate Technician (CAgT):

A CAgT performs a variety of tests on soils and aggregates including; sieve analysis, fracture, sand equivalency, and other tests. A CAgT also performs other duties as required by current specifications for soils and aggregate materials.

Certified Embankment and Base Technician (CEBT):

The CEBT performs testing of soils and aggregates for establishing the relative maximum density and optimum moisture for use in compaction testing of sub grade soils and aggregate bases. A CEBT also determines the specific gravities of aggregate.

Certified Density Technician (CDT):

A CDT performs in-place density testing of soils, aggregates, and asphalt mixtures using the nuclear density gauge. In addition to certification, a CDT must be in compliance with state and federal training regulations, and state and federal regulations concerning radioactive materials as administered by their company's RSO. For soil, soil aggregate mixtures, and aggregates a CDT determines percentages of coarse and fine material, performs one-point testing and related calculations.

Certified Asphalt Technician I (CAT-I):

A CAT-I performs sampling and testing for ACP and EAC mixtures including AC content, maximum specific gravity, sieve analysis, void measurements, and other tests and duties as required by current specifications.

Certified Asphalt Technician II (CAT-II):

A CAT-II is responsible for managing the volumetric properties of asphalt mixes by controlling plant operations, for troubleshooting ACP sampling and testing processes, and for making appropriate adjustments to ACP production and lay down procedures.

Certification at CAT-II level is contingent on having successfully completed the CAT-I certification phase at least once.

Certified Mix Design Technician (CMDT):

A CMDT is responsible for preparing ACP and EAC Mix Designs, including all material testing and data analysis necessary to properly complete a design. A CMDT prepares designs for both dense and open graded mixtures.

Quality Control Technician (QCT):

A QCT performs testing of fresh Portland cement concrete including sampling, concrete temperature, slump, unit weight, air content, and fabrication of specimens for strength testing and performs other duties including calculating cement content and water-cement ratio as required by specifications.

QCT certification is obtained through the ACI Concrete Field Testing Technician - Grade 1 certification program, with the Oregon written Supplemental test, conducted by the Oregon Concrete and Aggregate Producers Association (OCAPA). QCT is only valid while the ACI Concrete Field Testing Technician – Grade Level 1 is valid.

Concrete Control Technician (CCT):

A CCT is responsible for preparing concrete mix designs, proportioning concrete mixtures to meet job requirements, and for making adjustments to the mix design as necessary to provide a concrete mixture of the quality required by specifications. A CCT certification is obtained through a training program conducted by OCAPA.

Concrete Strength Testing Technician (CSTT):

A CSTT is responsible for testing the compressive or flexural strength of hardened concrete cylinders or beams. The duties of a CSTT include proper capping of specimens (bonded and un-bonded), correct operation of breaking device and visual evaluation of broken specimens. Also, the CSTT is responsible to insure the proper handling, mold removal, logging and curing of field fabricated samples upon arrival at the laboratory**.** A CSTT certification may be obtained through a program conducted by Oregon Chapter of the American Concrete Institute.

Who Must Be Certified?

For all projects which the Quality Assurance Program applies, all personnel responsible for performing sampling and testing must be certified. All personnel performing the Quality

Control Compliance Specialist duties of reviewing test reports whether working for ODOT, a Contractor, a Consultant or for Local Agencies must be certified.

Certification Requirements

To obtain any of the above certifications, the technician will be required to pass a written and/or a practical test demonstrating a knowledge and understanding of how to perform the specific tests and of specifications applying to the material being tested. All tests shall be administered and evaluated only by evaluators approved by the Certification Advisory Committee Chair, or their designated representative.

To apply for the certification, the applicant will register either for one of the approved training classes, where the exam will be administered as part of the class, or submit an application to challenge the exam. The challenge applications will be submitted through the approved training program to facilitate scheduling. Appropriate fees will be charged for the challenge exams to cover scheduling, overhead and facility use. Applicants will be scheduled for examination through a cooperative effort between ODOT and the appropriate training program service provider.

All certifications shall be contingent upon the technicians signing a rights and responsibilities agreement. This agreement outlines the technician's rights and responsibilities along with the possible consequences of the abuse and/or neglect of these responsibilities. The technician will submit a signed agreement at the time they take the certification examination.

Examination Process

The Asphalt Paving Association of Oregon (APAO) and Oregon Concrete Aggregate Producers Association (OCAPA) currently perform the instructional phase, while ODOT maintains the certification and administration of the written and practical exam processes. The certification system is made up of three phases:

- Phase 1 - WAQTC written exam,
- Phase 2 - ODOT written exam and
- Phase 3 - combined ODOT and WAQTC performance exam.

During the exam process, only hand calculators are allowed, the use of computers is not permitted during any exam phase.

Challenge Process

A person may challenge the exam process if they feel that they have the knowledge and skills to be able to pass without attending formal training. If the person does not currently

possess a certification for that specific discipline and fails any of the following mentioned examination events, then that person must attend the formal training for that certification. If the person currently possess a certification for that specific discipline and fails any of the following mentioned examination events, then that person may challenge the failed examination event for that certification a second time. If the person fails the challenged event a second time, then the person must attend formal training for that specific discipline.

WAQTC Written Examination

a. Closed book
b. Consists of multiple modules, depending on the needed certification
c. Each module consists of 5 questions with multiple choice, true or false, and required calculations.
d. Written exam time lines vary depending on the needed certification. (1 to 1 ½ hours is given to complete the exam.)

ODOT Written Examination

a. Open book
b. Consists of multiple choices, true or false, and essay questions related to test procedures as well as specifications and completion of various ODOT forms.
c. Written exam time lines vary depending on the needed certification. (3 to 3 ½ hours is given to complete the exam.)
d. For CMDT certification, there are two written exams covering Dense and Open graded ACP, EAC and Aggregate Treatment applications. (4 hours is allowed for the Dense ACP exam and 2 hours for the Open ACP, EAC and Aggregate Treatment exam.)

ODOT /WAQTC Combined Performance Examination

a. Each participant will demonstrate proficiency in the designated test methods with prepared samples and will demonstrate the ability to apply specifications and ODOT specific requirements to the needed test and identify the quality of the material being tested.
b. The exam is open book but the technician may not use the performance exam checklist.
c. The performance examination for ODOT is performed in conjunction with the WAQTC performance exam. (4 ½ hours is given to complete the performance exam process with 4 hours actual lab time and ½ hour given to complete calculations.) The performance exam answers are graded based on completion of the required tests, accuracy of computations, application of the correct specifications, and the results of computations meeting the parameters set forth in the Independent Assurance Parameters section of the Quality Assurance Program.

d. During the performance exam the examinee may be asked to explain various steps of a procedure to reduce the full test time.
e. The performance exam checklist consists of yes and no blocks. In order to complete the checklist successfully, all of the yes blocks must be filled out.

In the event a participant fails the first attempt, a second attempt is given, if time permits, and after the exam proctor explains the correct procedure. Anyone failing a test method on the performance exam may repeat that trial during the day of the performance exam, depending on the timelines and the type of test. Repeat trials will be allowed in not more than 50% of the total test methods in that performance exam. If the participant fails on the second attempt the performance exam will stop and the participant will have to re-take the exam at the scheduling convenience of the Agency.

Passing Score – Written

a. Initial exam (first attempt) WAQTC: An overall score of 70% with a minimum of 60% on any one-test method.
b. Re-exam (second attempt) WAQTC: An initial exam overall score below 70% will require a re-exam on all test methods. An initial exam score above 70% overall, but below 60% on one or more test methods, will require a re-exam on only those test methods. In the case of a one-test method comprising the re-exam, the examinee must receive a score of 70%. In the case of more than a one-test method comprising the re-exam, the examinee must receive an overall score of 70% with a minimum of 60% on any one-test method.
c. Initial exam (first attempt and second attempt) ODOT: An overall score of 70% is required to successfully complete the exam requirement.
d. Initial exam (first attempt) ODOT exam:
    - For QCT supplemental, an overall score of 80% is required to successfully complete the exam requirement.
    - For the CCT and CMDT certification exams, an overall score of 75% is required to successfully complete the exam requirement.
    - For a re-exam (second attempt) for the ODOT QCT, CMDT and CCT exam, the participant must meet the same criteria as the initial exam first attempt.

Passing Score – Performance

a. All performance checklists must have 100% yes blanks checked and each test method must be performed within the designated time limit. Each examinee is allowed two attempts to complete procedures if time allows.
b. First attempt: Performing all the required tests, application of correct specifications and meeting the Independent Assurance Parameters are required to receive a pass rating. The grading is based on pass/fail of all associated tests performed under the desired certification.
c. Second attempt: The same criteria as the initial exam must be met.
d. For CMDT, an acceptable Level 2, 3 or 4 ACP design must be submitted along with verification materials, as described in Section 6 of the most recent edition

of the “Contractor Mix Design Guidelines for Asphalt Concrete”. A six-month period will be allowed for the mix design submittal from the date of the written exam.

Re-examination Policy – Written/Performance

Failure of any exam phase a second attempt will require attendance of the course for that qualification and passing the exam element failed on the second attempt if certification is still desired. In addition, on the date the certification exam was first taken a technician will have 120 days to complete the exam requirements for the desired certification. If the exam requirements are not met within the 120-day period and certification is still desired the technician will be required to perform the entire exam process again.

Applicants with Disabilities or Special Needs

Applicants with a disability or those having special needs should notify the Certification Advisory Committee Chair, or their designee, at the time application is made of what appropriate accommodations need to be made so that these can be planned for.

Disclaimer

Certification of an individual by the ODOT Technician Certification Program indicates only that the individual has demonstrated a certain level of competence on a written and/or practical examination in a selected field of activity. ODOT may require this certification of individuals performing activities specified in work contracts or other activities. ODOT and the Certification Advisory Committee make no claims regarding the abilities or competence of certified individuals. Each individual or organization utilizing certified individuals must make its own independent judgment of the competence of certified individuals. ODOT specifically disclaims any responsibility for the actions, or the failure to act, of individuals who have been certified through the ODOT Technician Certification Program.

To obtain certification may involve hazardous materials, operations and equipment. This program does not purport to address all safety or regulation concerns associated with the use of the procedures used. It is the responsibility of the users to use and establish appropriate safety and health practices and determine the applicability of regulatory limitations.

Documentation of Certification

Upon the successful completion of the examination(s), the participant’s name, home address, and/or company affiliation is registered in the official registry of certified technicians for the appropriate certification. ODOT Construction Section maintains the official registry. It is accessible on the internet at the following address:

https://highway.odot.state.or.us/cf/techcertdynamic/

It is anticipated that many technicians will hold multiple certifications. An official letter(s) indicating certifications(s) held will be provided after successful completion of the certification process.

Recertification

To remain current, a Certified Technician must obtain recertification before the expiration date of the certification. Recertification may only be obtained by passing the written and/or practical test required for that particular certification. A Certified Technician must apply for the individual certification for which they want to remain certified. The Certified Technician is responsible for scheduling their own written and/or practical comprehensive examination.

It should be noted that should a technician fail to successfully complete a Certification renewal in a specialty area, the technician will be considered disqualified in that area, only, until the requirements for Certification renewal have been successfully met, subject to the limitations set forth in this document.

Note: A certification extension may be provided upon written request to the QAE. The request should contain the reason for the extension, desired certification, and proof of future class attendance or challenge process through a registration of the training provider.

The length and conditions of any extension will vary and are at the discretion of ODOT.

Revocation or Suspension of Certification

The Certification Advisory Committee Chair for just cause may revoke technician Certifications at any time. Proposed revocations are sent to the individual in writing along with the individual's right to appeal the proposed revocation. A proposed revocation is effective upon receipt by the technician and will be affirmed, modified, or vacated following any appeal.

The reasons that certified technicians will be subject to revocation or suspension of their certifications are negligence or abuse of their responsibilities. The Certification Advisory Committee (CAC) may disqualify certified technicians for other reasons of just cause, which may or may not be specifically defined herein following the due process procedures outlined herein.

- Negligence is unintentional deviations from approved procedures that may or may not cause erroneous results. The following penalties are guidelines for findings of *negligence*: The first finding of *negligence* will result in a letter of reprimand being

sent to both the employee and the employer. Depending on the nature of the incident, the CAC could impose up to a 30 day suspension.

- The second significant incident during the certification period will result in the Quality Assurance Engineer (QAE) discussing the issue with the individual and their employer to establish a corrective action plan. Depending on the nature of the incident, the CAC could impose up to a 180 day suspension. The QAE will also notify the entire ODOT Quality Assurance staff of the issue.
- A third instance of neglect may result in permanent revocation of the Certification.

Abuse is knowingly deviating from approved procedures or when the technician should have known they were deviating from approved procedures. There are two levels of severity for *abuse*.

For Level 1 Abuse: The first finding may result in up to a 180-day suspension all of the certifications of the individual. A second instance (within the certification period) would result in a minimum of 180-day suspension of all certifications.

For Level 2 Abuse: the first finding will result in a 1-year suspension of all certifications of that individual. A second finding will result in permanent revocation of all certifications.

Revocations or suspensions for abuse or negligence in one certification area are considered revocations or suspensions in all certifications held by the technician.

Allegations of negligence or abuse are made to the Quality Assurance Engineer (QAE) in writing. The allegations will contain the name, address, and signature of the individual(s) making the allegation. The QAE will investigate all allegations. The QAE will decide if the incident is significant to warrant review by the Certification Advisory Committee (CAC). If the incident is given to the CAC for review, then the accused and the individual(s) making the allegation are given the opportunity to appear before the CAC to present any appropriate information. Within a 60 day period, all involved parties will receive a report of the findings in writing. Any warranted penalties will be imposed in accordance with guidance contained herein and according to the guidelines outlined under the Technician Compliant Process. Decisions regarding allegations of negligence or abuse may be appealed in writing to the Committee Chair. The Committee Chair will independently consider such written appeals but may rely on the advice and counsel of the Committee.

In all cases, the CAC will conduct the investigation into the allegations and make a recommendation to the ODOT Construction Engineer as to appropriate sanctions against the technician. All final decisions regarding suspension of certifications will be up to the ODOT Construction Engineer.

As ODOT is a member of the Western Alliance for Quality Transportation Construction, the certifications are honored by other member states. The Certification Advisory Committee will notify the other members of the WAQTC, or other participants in the TTQP, of anyone having a certification revoked or suspended.

Technician Complaint Process

The Oregon Department of Transportation's Technician Certification program is intended to assure qualified personnel are performing all materials testing for ODOT construction projects. In addition to certified technicians, the Agency needs a means to address concerns that are raised regarding those technicians not following approved procedures. The Technician Complaint Process will provide guidance on how to deal with these concerns.

It should be understood that the intent of the process is to resolve differences of opinion on appropriate procedures at the lowest possible level. Technicians are encouraged to work together to resolve any differences they might have.
Only when those issues cannot be resolved at the project level should they be raised to the level of filling an official complaint. It should be understood that in no way is the formal complaint process intended to remove any authority the Project Manager may have under an existing contract.

Any individual may file a complaint regarding testing procedures or practices. The first step when filing a complaint is to decide whether the issue is a case of "Neglect" or "Abuse". "Neglect" is unintentional deviations from approved procedures. "Abuse" Abuse is knowingly deviating from approved procedures or when the technician should have known they were deviating from approved procedures. The appropriate process for dealing with the issue is followed after a decision is made on the type of offence. The following pages outline the process for dealing with both Neglect and Abuse:

Complaint Process for Neglect

Again, neglect is much less severe than abuse and individuals are encouraged to resolve their differences at the project level so the project can continue forward in a positive fashion. The complaint process for neglect is intended primarily to allow a means of tracking the types of problems being encountered and also to look out for technicians who seem to have repeated instances of neglect.

Step 1**:** When an individual discovers a significant problem with a technician's procedures or testing process, that individual will personally point out the concern to the technician. The two individuals will work together to try to resolve the issue. They may need to refer to the Manual of Field Test Procedures or other contract documents to verify proper procedures.

If the two can agree on corrective action, the issue may be resolved at that level. If not, the Region QAC should be contacted for clarification. If discrepancies on correct procedures still exist, the issue will be brought to the ODOT Quality Assurance Engineer (QAE) for resolution.

Step 2: Once the problem is resolved, the individual who discovered the problem will send a short memo to the QAE describing the issue and the resolution.

Depending on the severity of the issue, the QAE may send a letter of reprimand to the technician and their employer and the CAC could impose up to a 30 day suspension.

Step 3: If a second significant incident is reported within the certification period for a specific technician, the QAE will discuss the issues with the technician and their employer and establish a corrective action plan to help the technician avoid further complaints. Depending on the nature of the incident, the CAC could impose up to a 180 day suspension. In addition, the CAC could require the technician to attend additional training and retake the particular certification exam before reinstatement as a certified technician. The QAE will also send out notice to all ODOT Quality Assurance staff of the issue. This notification is intended to help ODOT staff identify particular problems being encountered.

Step 4: If a third instance of neglect is reported within the certification period, the specific technician and his/her employer must meet with representatives from the Certification Advisory Committee (CAC) to discuss the issues.
The technician will be responsible for providing a plan of how they will correct their deficiencies and assure no further instances will occur. The CAC may gather further information to substantiate the claims. The CAC will review the information and could impose up to permanent revocation of the certification in question.

It should be noted that because of the potential for repeated offences of neglect, the CAC could at any point in the process make a determination that the successive instances no longer fit as neglect, but because of the repeated nature of an offense, may become an instance of abuse. If this occurs, the issue would be dealt with through the complaint process for abuse.

Complaint Process for Abuse

Because abuse is defined as intentional, the process for dealing with instances of abuse will be more formal and penalties more severe than for instances of neglect.

Step 1: If abuse is suspected, the issue shall be raised immediately to the ODOT Quality Assurance Engineer (QAE). The QAE will investigate the issue and make a preliminary determination on whether it actually is abuse or neglect. If the issue is determined to be abuse, move to step 2 below. If it is determined to actually be a case of neglect, move to step 1 of the process for dealing with neglect.

Step 2: The QAE will gather information regarding the incident from both the technician involved as well as the individual filing the complaint. The QAE will review the information and determine whether the incident is significant to warrant review by the Certification Advisory Committee (CAC). This review will be completed within 60 day of receipt of the complaint.

If the incident is determined to be “significant” the issue will be put on the agenda for the next CAC meeting.

Both the technician and the individual filing the complaint will be invited to attend the meeting to present any appropriate information. Insignificant issues will be handled directly by the QAE and a summary of the incident will be submitted to the CAC for their review.

Step 3: The CAC will determine the merits of the complaint and also the severity level of the abuse. Abuse will be identified as one of two different levels of severity.

Level 1 the least severe form of abuse. This level is identified as knowingly deviating from approved procedures or when the technician should have known they were deviating from approved procedures. The key component for Level 1 Abuse is there is no misrepresentation of the quality of material being incorporated in the project. This level of abuse could result in up to a 180 day suspension of all certifications held by the technician. The exact duration of the suspension will be set by the CAC depending on the circumstances encountered. A second instance (within the certification period) of Level 1 abuse would result in a minimum 180 day suspension of all certifications.

Level 2 abuse is much more severe. The distinguishing component of Level 2 Abuse is misrepresentation of the quality of material being tested. This level of abuse will be dealt with by a 1-year suspension of all certifications for the technician. A second instance of level 2 abuse will result in permanent revocation of all certifications.

Record Retention

Investigations, supporting exhibits, letters of expectation, CAC recommendations and other investigative correspondence will be kept on file according to the following guidelines:

- Negligence – records will be kept for a 5 year period starting on the date of the investigation.
- Abuse – records will be kept permanently.

At any time retained records may be used to support further allegations of negligence or abuse.

V. QUALITY ASSURANCE LABORATORY PROFICIENCY SAMPLE PROGRAM

OREGON DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SECTION

The Proficiency sample program is optional for Local Public Agencies, except as administered by the ODOT Central Lab.

Proficiency sample testing is an additional factor used to evaluate the performance of a Quality Verification (QV) laboratory and the Quality Verification (QV) laboratory technicians. It provides information not otherwise available from the on-site laboratory inspection (Section III) and a means of continued monitoring of testing personnel and testing equipment. The ODOT Construction Section requires QA Laboratories and QA laboratory technicians to participate in this Proficiency Sample-testing Program. Participation includes testing all applicable samples, which are to be distributed and completed within the specified time frame. The resulting data is analyzed by the ODOT Quality Assurance Engineer.

Proficiency samples are distributed by Construction Section at annual intervals as outlined in the Proficiency Sample Testing Plan in Table 1 of this Section. The Construction Section will distribute a minimum of one set of samples from each material test method listed in Table 1 for each of the QV laboratory technicians. The ODOT Central Laboratory and the QV laboratory technicians will perform the required testing listed in Table 1 on each set of samples. The distribution of proficiency samples is not intended to coincide with the on-site laboratory inspection. Proficiency sample test results will be submitted to the Quality Assurance Engineer within 30 days of receipt of the sample. The results will tabulate all of the testing results from the ODOT Central Laboratory and the QV laboratory technicians and statistically evaluate if any of the technician results are more than two standard deviations beyond the grand average value for each test method.

When a QV laboratory technician results are beyond two standard deviations of the grand average values, the Quality Assurance Coordinator (QAC) shall investigate the reason for the discrepancies and report the findings and actions taken to the ODOT Quality Assurance Engineer (QAE) within thirty days of issuance of a final report. The QAE will determine whether or not the findings warrant further action to address the testing deviations and identify steps that need to be taken to ensure that the technician is correctly performing the test. The QAE will be responsible for monitoring the technician testing results until there is confidence that the technician is following approved procedures.

When an ODOT Central Lab or LPA technician results are beyond two standard deviations of the grand average values, the ODOT Laboratory Services Manager or LPA technician’s manager shall investigate the reason for the discrepancies and report the

findings and actions taken to the ODOT Quality Assurance Engineer (QAE) within thirty days of issuance of a final report. The QAE will address the testing deviations, identify steps to be taken, and be responsible for monitoring results in the same manner as for a QV laboratory technician.

If an LPA QV laboratory technician, or ODOT Central Lab technician exceeds the two standard deviation limit on the next year's proficiency samples for the same material test method and is not able to provide the QAE with a satisfactory explanation for exceeding the limits; the technician will immediately perform a backup proficiency sample witnessed by the QAE or designated representative. The QAE will review the process that was followed from the previous year's investigation findings and make a determination if the technician is not following approved procedures. If the QAE finds that the technician is not following approved procedures the QAE will immediately suspend the technician from performing any QA or QV project work or third-party dispute resolution work involving the test method that has been identified. The QAE will identify what steps are necessary to allow the technician to resume testing for the failing test method.

TABLE 1 – Proficiency Sample-Testing Plan

January Distribution

TEST METHOD

Soil & Aggregate Sample

Bulk Specific Gravity – AASHTO T 85
Coarse Particle correction – AASHTO T 99
Max. Density – AASHTO T 99 Aggregate Base
Max. Density – AASHTO T 99 Soil

Sieve Analysis – AASHTO T 27/11
Sand Equivalent – AASHTO T 176
Fracture – AASHTO T 335
Wood Particles – ODOT TM 225
Elongated Pieces – ODOT TM 229

ACP Mixture Sample

Bulk Specific Gravity – AASHTO T 166, Method A
Max. Specific Gravity – AASHTO T 209
AC Content by Incinerator – AASHTO T 308
Mechanical Analysis of Extracted Aggregate- AASHTO T30
Fabrication of Gyratory Specimen – ODOT TM 326

A laboratory may obtain additional information on the Construction Section's proficiency sample-testing program by contacting the Construction Section at the following address:

Oregon Department of Transportation
Construction Section, Materials Laboratory
Attn: Quality Assurance Engineer
800 Airport Road SE
Salem, OR 97301
Telephone (503) 986-3061

VI. PRODUCT SPECIFIC QC/QA TESTING PLAN

The Quality Assurance Program consists of three distinct sub-programs. The Quality Control Program, the Verification Program and the Independent Assurance Program. This section provides specific details about how these programs work together to assure specification materials are incorporated into LPA projects. It also provides details on specific requirements of each of the programs for each of the materials utilized on LPA projects.

In general, the Contractor's quality control tests are obtained at the frequency outlined in Section 4(D). Agency verification tests for acceptance are run at a minimum of the frequency outlined in Appendix C LPA FTMAG. The Independent Assurance program takes steps to assure the quality of the QA program.

The following pages detail the Investigation Criteria, Quality Control, Verification and Independent Assurance requirements for each of the specific materials used on LPA projects.

Investigation Criteria

The intent of the investigation is to determine reasonable cause for the discrepancy and provide supporting documentation of materials failing to meet the conditions outlined for Verification, Independent Assurance and prior Quality Control testing. An investigation is required for all materials failing to meet these conditions because of the potential impact on the quality of the material produced or incorporated into the project.

Several resources are available to assist with the troubleshooting process and data collection. Appendix B (Troubleshooting Guide) provides some guidance through the evaluation phase based on material discipline and the associated tests. The guide is an evaluation tool and is not necessarily a complete listing of all potential areas to be investigated.

The investigation and the resolution of the discrepancy shall be documented on form (734-4040) and at a minimum will contain the following information:

- Clearly explain the issue under investigation. Provide the bid item number, material description, test procedure or process in question, associated Quality Verification or Quality Assurance testing reference's and date or timelines of the testing issue.
- Describe the steps taken to resolve the discrepancy and the associated information or test results gathered to support the findings.
- Provide a conclusion based on the findings.
- Describe recommendations or actions to be taken.

- Provide written notification to the PM, the LPA's QV Lab and Quality Control entity upon completion of the investigation. Ensure a copy of the investigation is maintained in the project files.

TABLE 1 – Independent Assurance Parameters Maximum Allowable Differences

Gradation Sieve Sizes with Assigned Tolerances	
Larger than No. 8	5%
No. 8	4%
No.10	4%
Larger than No. 200 and smaller than No. 10	2%
No. 200 with targets 10.0% or less	1.0%
No. 200 with targets greater than 10.0%	1.5%
Asphalt Content	0.40%
Fracture	5%
Wood Particles	0.05%
Elongated Pieces	
5:1 Ratio	2.0%
3:1 Ratio	4.0%
Sand Equivalent	8 points
Soil Curves – T 99/180 (Df)	
Maximum Density	3.0 lbs. per ft^3
Moisture	3.0%
Aggregate Base – T99/180 (Df)	
Maximum Density	3.0 lbs. per ft^3
Moisture	2.0%
Plant Mixed Moisture content	1%
Maximum Specific Gravity – Rice T-209	
Standard Gmm	0.020
Dryback GSSD (If required)	0.020
Bulk Specific Gravity of Lab fabricated specimens T-I66	0.032
Maximum Specific Gravity T-85	0.032
Air Content of Concrete T-152	0.5%

TABLE 1 – Independent Assurance Parameters Maximum Allowable Differences (Continued)

Slump of Concrete T-119	¾”
Temperature of Concrete T-309	3° F
Unit Weight of Concrete T-121	3.0 lbs. per ft^3

AGGREGATE PRODUCTION

Quality Control	*Verification*	*Independent Assurance*
Required	Required	Required

Quality Control

In the presence of a LPA Quality Verification Lab technician witness, the Contractor's QC technician shall sample the aggregates; place the sample in a proper container; label the sample as specified in Section 4(C); complete *ODOT* Sample Data Sheet (Form 734-4000); and provide the sample and form to the LPA Quality Verification Lab technician.

The Contractor's QC technician shall establish a random sampling and testing program and submit it to the PM prior to the start of production.

The Contractor's QC technician shall perform Quality Control sampling and testing required to ensure a quality product at the frequencies indicated in Section 4(D) of MFTP. Upon request, the Contractor shall deliver the test results to the PM by the middle of the following work shift.

Pre-produced aggregates shall be tested at the frequency applicable for the material and use as determined by the appropriate specification(s) and Section 4(D) of the MFTP (i.e. a 20,000 ton stockpile of aggregate base will require 10 QC tests and 1 QA test).

The Contractor is responsible for furnishing Quality Levels during aggregate production when specified. The Contractor's QC technician shall reject material that does not meet the specified quality and notify the PM of the disposition and quantities of those materials. All required tests, except for gradation, are considered pass/fail. Gradation is subject to statistical analysis as described in specifications Section 00165.

Backup samples for aggregates shall be a minimum of ½ the minimum mass shown in Table 1 of AASHTO R 90 for the appropriate Nominal Maximum size aggregate.

Verification

The LPA Quality Verification (QV) Laboratory will retain source/product compliance as stated in Section 4(A). The LPA QV Lab technician will witness the Contractor's QC technician sample and label the aggregate and take possession of the sample and form.

The LPA's QV Lab performs Verification tests, taken randomly, according to Appendix C LPA FTMAG. The LPA QV Lab will test and retain backup split samples taken by the Contractor's QC technician.

If Verification testing fails to meet the specifications, other than gradation, the LPA's QV Lab will immediately notify the PM. The PM will evaluate the results and resolve the discrepancy.

If Verification test results indicate that a material is out of specification for gradation, the LPA's QV Lab will notify the PM, who will determine if the stockpile QL meets the specifications. The PM will determine if the stockpile is acceptable.

Independent Assurance

The LPA QV Laboratory shall test the split of IA samples and provide the results to the PM the next workday. The PM will verify that the IA Laboratory test results and the LPA QV Laboratory test results are within IA parameters.

If the IA Laboratory's test results and the LPA QV Laboratory test results for IA samples are not within IA parameters, the PM will evaluate the results and resolve the discrepancy. See Investigation Criteria.

EARTHWORK

(Section 00330)

ESTABLISHING MAXIMUM DENSITIES

Quality Control	*Verification*	*Independent Assurance*
Required	Required	Required

Quality Control

The Contractor's QC technician is responsible for establishing maximum densities and optimum moisture content for each unique soil type and soil/aggregate mixture incorporated into the project. Backup samples shall be a minimum mass of (45 lbs) and retained until notified by the PM to discard.

Verification

The LPA QV Laboratory will establish maximum densities and optimum moisture contents for use in verification testing for each unique soil type and soil/aggregate mixture incorporated into the project.

Independent Assurance

The LPA QV Laboratory and the IA Laboratory will each test a split of the IA soil samples and provide the results to the PM within a 48 hour period, based on the time the sample was split. The PM will verify that the IA Laboratory's test results and the LPA’s QV Lab test results are within IA parameters.

If the IA Laboratory's test results and the LPA’s QV Lab test results are not within IA parameters, the PM will perform an investigation (see Investigation Criteria) evaluate the results and resolve the discrepancy.

COMPACTION

Quality Control	*Verification*	*Independent Assurance*
Required	Required	Required

Quality Control

The Contractor's QC technician shall establish a random sampling and testing program.

The Contractor's QC technician shall be on the project during performance of earthwork operations, as needed, to ensure that materials/products are in conformance with the specifications. The QC technician's duties include, but are not limited to, visual observation, sampling and testing. The Contractor shall rework all areas showing visual deflection. Sampling and testing procedures shall be performed at the frequencies indicated in Section 4(D) of the MFTP. The Contractor shall be prepared to deliver the test results to the PM within the following timelines based on the time the test information was collected in the field:

- By the beginning of the next work shift for T-99 Method A applications; or
- Within a 24 hr. period for T-99 Method D applications.

Upon request of the PM, the Contractor shall deliver the test results to the PM.

The Contractor's QC technician shall use the "one-point" method to establish the correct soil curve for each density test performed. If the soil does not match an established family of curves or a single curve, the Contractor shall establish a new curve for the soil, within a 48 hr. period, based on the time the sample was acquired. If use of the new maximum density curve results in a failing test, the Contractor shall take corrective action and retest until compaction is determined to meet the specifications, prior to construction of a new lift. Backup samples shall be all uncontaminated portions of materials removed from beneath the gauge to perform the "one-point".

If the equipment or material changes, the QC technician shall verify by testing that the specified densities are attained.

Verification

The LPA's QV Lab performs Verification tests, taken randomly, according to Appendix C LPA FTMAG.

When requested by the PM, or when the LPA technicians determines there is a change in material properties, the LPA's QV Lab technician will collect a "one-point" Proctor sample to compare to the established curves. If the "one-point" method does not match the established curves, the LPA's QV Lab will establish a new curve from the soil at the test location and provide the test results within a 48 hour period, based on the time the sample was acquired. The PM will notify the Contractor not to add new lifts until compaction is proven to meet the specified densities.

The LPA's QV Lab shall notify the Contractor and PM of the test results by the beginning of the next work shift for T-99 Method A applications and within a 24 hour period for T-99 Method D applications, based on the time the test information was collected in the field.

If the density test fails, the LPA's QV Lab shall identify the limits of failing compaction, notify the Contractor to take corrective action, and notify the PM. The PM will schedule a new Verification test. The PM will notify the Contractor not to add new lifts until the Verification tests demonstrate that specified densities exist.

Independent Assurance

The IA Laboratory Technician shall use nuclear density gauge(s) meeting the requirements of ODOT TM 304.

CONCRETE

(Sections 00440, 00512, 00540, 00559, 00660, 00754, 00755, 00756, 00758 and 00921)

Aggregate Production

Quality Control	*Verification*	*Independent Assurance*
Required See Aggregate Production details, page 35. Not required for commercial grade concrete.	Required See Aggregate Production details, page 35. Not required for commercial grade concrete.	Required See Aggregate Production details, page 35. Not required for commercial grade concrete.

Mixture

Quality Control	*Verification*	*Independent Assurance*
Required	Required	Required Not required for commercial grade concrete.

Quality Control

The Contractor's QC technician shall perform Quality Control sampling and testing required to ensure a quality product at the frequencies indicated in Section 4(D) of the MFTP. The Contractor shall be prepared to deliver the following test results to the PM within the following timelines:

- Plastic properties by the end of the work shift; and
- Concrete Strength within a 24 hours after the specified break date.

Upon request of the PM, the Contractor shall deliver the test results to the PM.

The Contractor's Quality Control (QC) plan shall identify the method used for standard curing, the type of capping system used in the strength testing of concrete cylinders and the size of cylinders to be cast.

Verification

The LPA's QV Lab performs Verification tests, taken randomly, according Appendix C LPA FTMAG. Cylinders cast will be 4 inch by 8 inch specimens, unless otherwise specified or the mix contains aggregate size of 1.5 inches or greater, in which case 6 inch by 12 inch specimens will be cast. Cylinders cast for strength verification will be delivered to the LPA's QV Lab for further testing.

If Verification testing fails to meet the specifications, the LPA's QV Lab will immediately notify the PM. The PM will evaluate the results and resolve the discrepancy.

Independent Assurance

The LPA QV Lab and IA Lab technicians will test the same portion of the same load. This testing will be for plastic properties and strength testing. The LPA QV Lab technician shall immediately report the results of the plastic properties testing to the IA Lab technician. The IA Lab technician will verify that the LPA's QV lab's plastic properties test results and that the IA Lab's plastic properties test results are within IA parameters.

If the LPA QV Lab's plastic properties test results and the IA Lab's plastic properties test results for the Verification sample are not within IA parameters, the LPA's QV Lab will evaluate the results, resolve the discrepancy and notify the PM of the resolution. The IA Lab test results of the plastic properties of the concrete or the investigation of IA issues will be given to the PM by the end of the work shift.

The LPA QV Lab and IA Lab technicians shall each make and cure three (3) cylinders in accordance with the specimen size stated above. Strength testing of the three concrete cylinders shall be in accordance with AASHTO T 22, using neoprene capping pads unless sulfur capping is required. The PM shall compare the LPA QV Lab's results for these cylinders to the IA Lab's test results, and to the ongoing Verification test results. The PM shall resolve discrepancies.

AGGREGATE BASE, SUBBASE, AND SHOULDERS

(Section 00641)

Aggregate Production

Quality Control	*Verification*	*Independent Assurance*
Required See Aggregate Production details, page 35	Required See Aggregate Production details, page 35.	Required See Aggregate Production details, page 35. Not Required for Shoulder Aggregate.

Establishing Maximum Densities

Quality Control	*Verification*	*Independent Assurance*
Required	Required Not Required for Shoulder Aggregate unless requested by the PM.	Required Not Required for Shoulder Aggregate.

Quality Control

The Contractor's QC technician is responsible for establishing maximum densities and optimum moisture content for each unique aggregate mixture type incorporated into the project. *Backup samples shall be a minimum mass of (45 lbs).*

Verification

The LPA QV Lab will establish maximum densities and optimum moisture contents for use in verification testing for each aggregate mixture incorporated into the project.

Independent Assurance

The IA Lab will test the split of the aggregate sample and provide the results to the PM the next day. The PM will verify that the IA Lab's test results and the LPA QV Lab’s test results are within IA parameters.

If the IA Lab and the LPA QV Lab test results are not within IA parameters, the PM will perform an investigation (see Investigation Criteria), evaluate the results and resolve the discrepancy.

Aggregate Mixture

Quality Control	*Verification*	*Independent Assurance*
Required	Required Not Required for Shoulder Aggregate unless requested by the PM.	Required Not Required for Shoulder Aggregate.

Quality Control

The Contractor's QC technician shall establish a random sampling and testing program and submit it to the PM prior to the start of production.

The Contractor's QC technician shall perform Quality Control sampling and testing required to ensure a quality product at the frequencies indicated in Section 4(D) of the MFTP. The Contractor shall be prepared to deliver the test results to the PM by middle of the following work shift. Upon request of the PM, the Contractor shall deliver the test results to the PM. Backup samples shall be a minimum mass shown in Table 1 of T 255 / T 265 and kept in an airtight container.

Verification

The LPA QV Lab performs Verification tests, taken randomly, according to Appendix C LPA FTMAG.

If the moisture content exceeds the limits according to specification, notify the Contractor to take corrective action, and notify the PM. The PM will schedule a new Verification test.

Independent Assurance

If the IA Lab’s test results and the LPA QV Lab’s test results for IA samples are not within IA parameters, the PM will perform an investigation (see investigation Criteria), evaluate the results and resolve the discrepancy.

Compaction

Quality Control	*Verification*	*Independent Assurance*
Required	Required Not Required for Shoulder Aggregate unless requested by the PM.	Required Not Required for Shoulder Aggregate.

Quality Control

The Contractor's QC technician shall establish a random sampling and testing program and submit it to the PM prior to the start of production.

The Contractor shall perform Quality Control sampling and testing required to ensure a quality product at the frequencies indicated in Section 4(D) of the MFTP. The Contractor shall be prepared to deliver the test results to the PM on the same day the testing is performed. Upon request of the PM, the Contractor shall deliver the test results to the PM.

The Contractor's QC technician shall also perform the following:

- Use the test procedures applicable for determination of the maximum density for this material indicated in Section 4(D) of the MFTP.
- Establish a rolling pattern to provide the specified compaction.
- Stop placement if the specified densities are not met.

Verification

The LPA's QV Lab performs Verification tests, taken randomly, according to Appendix C LPA FTMAG.

If the Verification density test fails, the LPA's QV Lab technician shall identify the limits of failing compaction, notify the Contractor and notify the PM. The PM will schedule a new Verification test. Do not add new lifts until the Verification test demonstrates that the specified densities exist.

Independent Assurance

The IA Technician will use nuclear density gauge(s) meeting the requirements of ODOT TM 304.

EMULSIFIED ASPHALT PRODUCTS / MATERIALS

(Sections 00710, 00711, 00712, 00715 and 00730)

Aggregate Production

Quality Control	*Verification*	*Independent Assurance*
Required See Aggregate Production details, page 35	Required See Aggregate Production details, page 35.	Required See Aggregate Production details, page 35.

Emulsified Asphalt Cement

Quality Control	*Verification*	*Independent Assurance*
Required	Not Required	Not Required

Quality Control

Sample all required materials as specified in Sections 4(C) and 4(D) of the MFTP. Complete ODOT Sample Data Sheet (Form 734-4000), place in the proper containers and label as specified in Section 4(C), and be prepared to deliver to the PM by the middle of the following work shift. Upon request of the PM, the Contractor shall deliver the test results to the PM.

EMULSIFIED ASPHALT CONCRETE PAVEMENT (EAC)

(Section 00735)

Aggregate Production

Quality Control	*Verification*	*Independent Assurance*
Required See Aggregate Production details, page 35.	Required See Aggregate Production details, page 35.	Not Required

Mixture Production

Quality Control	*Verification*	*Independent Assurance*
Required	Required	Not Required

Quality Control

The Contractor's QC technician shall establish a random sampling and testing program and submit it to the PM prior to the start of production.

The Contractor's QC technician shall perform Quality Control sampling and testing required to ensure a quality product at the frequencies indicated in Section 4(D) of the MFTP. The Contractor shall be prepared to deliver the test results to the PM by the middle of the following work shift. Upon request of the PM, the Contractor shall deliver the test results to the PM. Backup samples for aggregates shall be a minimum of ½ the minimum mass shown in Table 1 of AASHTO R 90 for the appropriate Nominal Maximum size aggregate.

The Contractor's QC technician is responsible for monitoring plant operation to ensure that specification materials are delivered to the project. Monitoring activities may include, but are not limited to, the following:

- Calibrate the asphalt plant
- Maintain an inventory of materials, including generated waste
- Control segregation in silo(s) and truck loading operations
- Reject any mixture that is visually defective. Inform the PM of the quantity and disposition of the rejected material.

- Sample all required materials as specified in Sections 4(C) and 4(D), (e.g. liquid asphalt, emulsion, cement, tack, etc.), place in the proper container and label as specified in Section 4(C), complete *ODOT* Sample Data Sheet (Form 734-4000), and deliver to the PM by the middle of the following work shift.

Verification

The LPA QV Lab performs Verification tests, taken randomly, according to Appendix C LPA FTMAG. An LPA QV Lab technician will witness a split sample taken by the QC technician and the sample will be given to the LPA QV technician for testing and retaining the backup sample.

If Verification testing fails to meet specifications, the LPA QV Lab will immediately notify the PM. The PM will evaluate the results and resolve the discrepancy.

Compaction

Quality Control	Verification	Independent Assurance
Not Required See specifications – 00735.46	**Not Required**	**Not Required**

POROUS ASPHALT CONCRETE & ASPHALT CONCRETE PAVEMENT

(Sections 00743 and 00744)

Aggregate Production

Quality Control	*Verification*	*Independent Assurance*
Required	Required	Required

Mixture Production

Quality Control	*Verification*	*Independent Assurance*
Required	Required	Required

Quality Control

The Contractor's QC technician shall establish a random sampling and testing program and submit it to the PM prior to the start of production.

The Contractor's QC technician shall perform Quality Control sampling and testing required to ensure a quality product at the frequencies indicated in Section 4(D) of the MFTP. The Contractor shall be prepared to deliver the test results to the PM by the middle of the following work shift. Upon request of the PM, the Contractor shall deliver the test results to the PM. Backup samples shall be a minimum mass of (45 lbs) or for Porous Asphalt Concrete (PAC), accepted under the Cold Feed Method, a backup sample of ½ the minimum mass shown in Table 1 of AASHTO R 90 for the appropriate Nominal Maximum size aggregate can be used.

The Contractor's QC technician is responsible for monitoring plant operation to ensure that specification materials are delivered to the project. Monitoring activities may include, but are not limited, to the following:

- Calibrate the asphalt plant
- Maintain an inventory of materials, including generated waste
- Control segregation in silo(s) and truck loading operations
- Monitor mix temperature

- Reject any mixture that is visually defective (e.g. graybacks, overheated, contamination, slumping loads etc.) Inform the PM of the disposition and quantity of rejected material
- Sample all required materials as specified in Sections 4(C) and 4(D) (e.g. liquid asphalt, emulsion, cement, tack, etc.), place in the proper container and label as specified in Section 4(C), complete *ODOT Sample Data Sheet* (Form 734-4000), and deliver to the PM by the middle of the following work shift.

Verification

The LPA's QV Lab performs Verification tests, taken randomly, according to the Appendix C LPA FTMAG. An LPA QV Lab technician will witness a split of the sample taken by QC technician that will be given to the LPA's QV Lab for verification testing and to retain as a backup.

If Verification testing fails to meet the specifications, the LPA's QV Lab will immediately inform the PM. The PM will evaluate the results and resolve the discrepancy.

Independent Assurance

The IA Laboratory shall test the split of IA samples and provide the results to the PM the next day. The PM will verify that the IA Laboratory's test results and the LPA's QV Lab test results are within IA parameters.

If the IA Laboratory's test results and the LPA's QV Lab test results for IA samples are not within IA parameters, the PM will perform an investigation (see Investigation Criteria), evaluate the results and resolve the discrepancy.

Compaction

Quality Control	Verification	Independent Assurance
Required	Required	Required

Quality Control

Dense Graded: The Contractor's QC technician shall establish a random sampling and testing program and submit it to the PM prior to the start of production.

The Contractor's QC technician shall perform Quality Control sampling and testing required to ensure a quality product at the frequencies indicated in Section 4(D) of the MFTP. The Contractor shall be prepared to deliver the test results to the PM on the same day the test is completed. Upon request of the PM, the Contractor shall deliver the test results to the PM.

The Contractor's QC technician shall also perform the following: (activities listed below are not exhaustive and are considered minimums).

- Establish a rolling pattern according to (TM-306) to provide the specified compaction
- Notify PM and CAT-II if rolling pattern is not being maintained
- Notify the PM and CAT-II if the specified densities are not achieved
- Monitor the mix temperature during laydown and compaction to keep the mix within the specifications
- Coordinate with the plant technician when changing lot
- Notify the PM when performing core correlations
- Notify the CAT-II of Control Strip Results
- Notify PM, CAT-I and CAT-II if any density results exceed 95%

Porous Asphalt Concrete: Compaction to a specified density is not required. See 00743.49 in the specifications.

Verification

Dense Graded: The LPA's QV Lab performs Verification tests, taken randomly, according to Appendix C LPA FTMAG.

The LPA's QV Lab selects random numbers for the test locations within the Contractor's sublot size. If Verification testing fails to meet the specifications, the LPA's QV Lab will immediately notify the Contractor and PM.

Failing verification requires retesting an additional verification within the next 2 shifts to confirm density specification and to isolate the original failure.

The PM will initiate an investigation. If the investigation determines there is non-specification material the PM will evaluate the test results using the Compaction Guidelines (Pg. 51) and perform resolution process as needed.

Porous Asphalt Concrete: None Required

Independent Assurance

Dense Graded: All parties involved in the testing process shall employ ODOT-certified technicians, use ODOT-certified labs and use nuclear density gauge(s) meeting the requirements of ODOT TM 304.

The LPA's QV Lab may elect to perform a gauge check as outlined in Appendix B and ODOT TM 304.

Porous Asphalt Concrete: None Required

Failing ACP Compaction Guidelines

LPA QV Density Results Failing:

PM determines the quantity of material represented by this verification. The PM should consider all material back to the last passing verification.

When cores are used, laboratory testing will be conducted by the third-party lab. The third-party can be initiated by the PM or Contractor.

ASPHALT CONCRETE PAVEMENT (STATISTICAL ACCEPTANCE)
(Section00745)

Aggregate Production

Quality Control	*Verification*	*Independent Assurance*
Required See Aggregate Production details, page 35.	Required See Aggregate Production details, page 35.	Required See Aggregate Production details, page 35.

Mixture Production

Quality Control	*Verification*	*Independent Assurance*
Required	Required	Required

Quality Control

The Contractor's QC technician shall establish a random sampling and testing program and submit it to the PM prior to the start of production.

The Contractor's QC technician shall perform Quality Control sampling and testing required to ensure a quality product at the frequencies indicated in Section 4(D) of the MFTP. The Contractor shall be prepared to deliver the test results to the PM by the middle of the following work shift. Upon request of the PM, the Contractor shall deliver the test results to the PM. Backup samples shall be a minimum mass of (45 lbs) or for Porous Asphalt Concrete (PAC), accepted under the Cold Feed Method, a backup sample of ½ the minimum mass shown in Table 1 of AASHTO R 90 for the appropriate Nominal Maximum size aggregate can be used.

The Contractor's QC technician is responsible for monitoring plant operation to ensure that specification materials are delivered to the project. Monitoring activities may include, but are not limited, to the following:

- Calibrate the asphalt plant
- Maintain an inventory of materials, including generated waste
- Control segregation in silo(s) and truck loading operations
- Monitor mix temperature

- Reject any mixture that is visually defective (e.g. graybacks, overheated, contamination, slumping loads etc.) Inform the PM of the disposition and quantity of rejected material
- Sample all required materials as specified in Sections 4(C) and 4(D) (e.g. liquid asphalt, emulsion, cement, tack, etc.), place in the proper container and label as specified in Section 4(C), complete *ODOT Sample Data Sheet* (Form 734-4000), and be prepared to deliver to the PM by the middle of the following work shift. Upon request of the PM, the Contractor shall deliver the test results to the PM.

Verification

The LPA's QV Lab performs Verification tests, taken randomly, according to Appendix C LPA FTMAG. An LPA QV Lab technician will witness a split of the sample taken by the QC technician and the samples will be given to the LPA's QV Lab for testing and retention of the back-up sample.

If Verification testing fails to meet the specifications, the LPA's QV Lab will immediately inform the PM. The PM will evaluate the results and resolve the discrepancy.

Independent Assurance

The IA Lab shall test the split of IA samples and provide the results to the PM the next day. The PM will verify that the IA Lab's test results and the LPA's QV Lab test results are within IA parameters.

If the IA Lab's test results and the LPA's QV Lab test results for IA samples are not within IA parameters, the PM will perform an investigation (see Investigation Criteria), evaluate the results and resolve the discrepancy.

Compaction

Quality Control	***Verification***	***Independent Assurance***
Required	Required	Required

Quality Control

Dense Graded: The Contractor's QC technician shall establish a random sampling and testing program and submit it to the PM prior to the start of production.

The Contractor’s QC technician shall perform Quality Control sampling and testing required to ensure a quality product at the frequencies indicated in Section 4(D) of the MFTP. The Contractor shall be prepared to deliver the test results to the PM on the same day the test is completed. Upon request of the PM, the Contractor shall deliver the test results to the PM.

The Contractor's QC technician shall also perform the following: (activities listed below are not exhaustive and are considered minimums).

- Establish a rolling pattern according to (TM-306) to provide the specified compaction
- Notify PM and CAT-II if rolling pattern is not being maintained
- Notify the PM and CAT-II if the specified densities are not achieved
- Monitor the mix temperature during laydown and compaction to keep the mix within the specifications
- Coordinate with the plant technician when changing lot
- Notify the LPA QAC and PM when performing core correlations
- Notify the CAT-II of Control Strip Results
- Notify PM, CAT-I and CAT-II if any density results exceed 95%

Verification

Dense Graded: The LPA’s QV Lab performs Verification tests, taken randomly, according to Appendix C LPA FTMAG.

The LPA’s QV Lab selects random numbers for the test locations within the Contractor's sublot size. If Verification testing fails to meet the specifications, the LPA’s QV Lab will immediately notify the Contractor and PM.

Failing verification requires retesting an additional verification within the next 2 shifts to confirm density specification and to isolate the original failure.

The PM will initiate an investigation. If the investigation determines there is non-specification material the PM will evaluate the test results using the Compaction Guidelines (Pg. 51) and perform resolution process as needed.

Independent Assurance

Dense Graded: All parties involved in the testing process shall employ ODOT-certified technicians, use ODOT-certified labs and use nuclear density gauge(s) meeting the requirements of ODOT TM 304.

The LPA’s QV Lab may elect to perform a gauge check as outlined in Appendix C and ODOT TM 304.

Failing ACP Compaction Guidelines

LPA QV Density Results Failing:

PM determines the quantity of material represented by this verification. The PM should consider all material back to the last passing verification.

When cores are used, laboratory testing will be conducted by the third-party lab. The third-party can be initiated by the PM or Contractor.

The PM can apply a price adjustment based on values entered into STATSPEC, or can use Form 734-3946 for a small number of sublots. The PM also has the ability per section 00165.50(c) to isolate material that is shown to be non-specification. Core density results or isolated non-specification material, will be evaluated as a separate lot per section 00165.40 or 00165.50(c).

APPENDIX A

CONTRACTOR QUALITY CONTROL PLAN

This plan is intended to provide a description of the personnel involved in the testing activities and identify the system or process for material Quality Control. The Quality Control Plan must contain at a minimum the following information.

- Include: Project Name, Contract Number and date of anticipated use and author of submitted plan.

- Provide office telephone, cellular phone & fax numbers for Contractor's superintendent & quality control manager.

- Describe personnel & methods to deliver accurate, legible & complete test results to designated agency representative, within required time limits.

- Designate who will provide required QL analysis.

- Describe location and methods for backup sample storage.

- Provide random numbers and include examples of your method for applying, to provide representative samples.

- Provide Technician and Lab Certifications for all equipment, laboratories, & technicians used to perform testing on and offsite for the project.

- Provide current Scale License and Certification for all weighting devices used on the project. Identify the location of the scales and type of scale e.g. platform, silo etc.

- For every material that has tolerances or limits for tests listed in the Manual of Field Test Procedures, provide:

    - Bid item & Specification Section number(s) for product to be used.
    - Source and supplier of material
    - Proposed production rate, methods & source of testing
    - Anticipated earliest date of use

- For each material supplier & subcontractor, provide:

    - Company name, address, & physical location.
    - Quality control contact name and telephone #.
    - Location, type, & quantity of materials to be used.

APPENDIX B

TROUBLESHOOTING GUIDE

The following information is a guide to assist in the evaluation of discrepancies that commonly occur between Independent Assurance test results and Verification test results. This information is only a guide and is not necessarily a comprehensive list of all potential areas to be investigated. A best practice is to consult the LPA QV Lab for help early in the troubleshooting process.

General

1. Check if the technician signing the report is the person performing the tests.
2. Check that the technician performing the testing is certified.
3. Check that the lab and equipment used are ODOT certified.
4. Check that the proper procedures and methods were performed.
5. Check all mathematics.
6. Check Balances for accuracies and functionality.
7. Check constant mass calculations if available, comparing moistures can also indicate incomplete drying of sample.
8. Contact LPA QV Lab, their involvement can significantly reduce time spent troubleshooting and getting to resolution.

AGGREGATE TESTING

Gradation

1. Check sample size meets minimum requirements.
2. Inspect sieves for deformed wires or torn fabric.
3. Compare both test results for sample initial wet weights, initial dry weights, after wash dry weights, individual sieve weights and any tare weights if used. May point to a transposed or incorrectly recorded weight. May point to a splitting error.
4. Check sieve loss calculations.
5. Are their screens overloaded?
6. Check to see if the hand sieving procedure shows equipment operating correctly.
7. Check wash loss. May point to error in initial dry weight.
8. Have the Contractor collect the sample and provide it to the LPA QV Lab; the LPA QV Lab will split the sample and the IA Lab will observe; the IA Lab to take possession of their portion of the split. This action might indicate equipment, procedural discrepancies and /or splitting issues.
9. If applicable, compare results to ongoing Stat spec mean values.

WOODWASTE TEST

1. Is the drying method burning up wood?
2. Check equipment used for the procedure for correct size and state of repair.

FRACTURE TEST

1. Did both parties test the same? (Splitting the sample or not splitting the sample.)
2. If samples not split, do F+Q+N match closely to the retained mass(s) for gradation?
3. Do both parties have approximately the same amounts of F, Q, and N? If not may indicate a difference in interpretation of fractured particles.
4. Have the Contractor collect the sample and provide it to the LPA QV Lab; the LPA QV Lab will split the sample and the IA Lab will observe; the IA Lab to take possession of their portion of the split. This action might reveal procedural discrepancies and if results do not vary from originals, may indicate difference introduced during splitting.

FLAT AND ELONGATED TEST

1. Did both parties test the same? (Based on individual screens during gradation analysis and summed up or material recombined and split out with one evaluation)
2. Does MS closely match the retained masses for gradation (+ No. 4 material)
3. Proper caliper ratio used by both parties?
4. Have the Contractor collect the sample and provide it to the LPA QV Lab; the LPA QV Lab will split the sample and the IA Lab will observe; the IA Lab to take possession of their portion of the split. May indicate differences introduced during splitting.
5. Check caliper for tight fit between points when closed and smooth operation of armature.

SAND EQUIVALENT TEST

1. Compare Sand reading, if significant differences present this is an indication a under sized Tin or insufficient compacting effort when filling Tin.
2. Did both parties test at the same moisture content?
3. Are the methods of shaking suspending all fines?
4. Check lab temperatures and SE stock solution’s age and the SE working solution’s age and temperature. When in doubt observe technician prepare new batch of working solution.

5. Have the Contractor collect the sample and provide it to the LPA QV Lab; the LPA QV Lab will split the sample and the IA Lab will observe; the IA Lab to take possession of their portion of the split.
   a. Look for vibration in surface where SE's tubes are set.
   b. Were all the fines put into suspension?
   c. Check shaking device for proper throw distance and proper number of strokes.
   d. Check irrigation wand to insure good fluid flow from both openings.
   e. Digital timer being used.
   f. Weighted foot assembly in good condition and properly lowered.
   g. Graduated marks properly read
6. Observe parties cleaning the +4.75mm (No. 4) material insuring fine particles are removed.
7. If results do not vary from originals, may point to a splitting issue.

SOIL/AGGREGATE RELATIVE MAXIMUM DENSITY AND OPTIMUM MOISTURE

1. Was the sample initially oven-dried (not allowed)? Separate samples at each point or re-compacted? Samples tested immediately or "marinated" moistures overnight?
2. Check plotting of data. Correct scale used. Dry densities plotted vs. dry basis moistures.
3. Check tare weights on molds/base plates. Collar removed?
4. Check mold volumes according to T 19; is there a significant difference from the standard volume?
5. Check surface on which samples were compacted. Is it unyielding surface?
6. Check constant mass on individual samples if available.
7. If available, check planning sheets for correct moisture addition calculations.
8. When held up to a light (or placed on a light table) do the two curve shapes match closely? Same shape, but one curve plots higher and to the left, indicates different compaction energy consistently applied to samples.
9. Was the passing No.4 or 3/4" material brushed off the retained No.4 or 3/4" material?
10. Have LPA QV Lab run a point at optimum moisture from their curve on the passing No.4 or 3/4" observe them perform the sample preparation and compaction procedure. Correct moisture computed and material properly mixed? Correct layers and layer heights? Hammer dropped from the correct height? Correct number of blows? Correct trimming and cleaning of mold? Moisture samples obtained correctly tested?

COARSE AGGREGATE BULK SPECIFIC GRAVITY TEST

1. Check thermometers.
2. How do values compare with pit history?
3. Were samples oven dried prior to soaking?

4. Do both parties have approximately the same G_{sa}? This indicates the difference is probably in interpretation of the SSD point. If these results are very different this points to weight in water error, so was empty basket weighed in water or "zeroed" in water?
5. Screen over a nested 1/4" and No. 4 sieve. Significant material passing the No. 4 indicates an error in screening of material.
6. Have the Contractor collect the sample and provide it to the LPA QV Lab; the LPA QV Lab will split the sample and the IA Lab will observe; the IA Lab to take possession of their portion of the split.

COMPACTION OF SOILS & PROCESSED AGGREGATE

There are no IA parameters for compaction. If verification for compaction fails see the troubleshooting tips below:

1. Is the correct curve being used? Is the correct density information being used?
2. Coarse Particles fit the rules for Method A or Method D? Fits curve used?
3. Observe testing in the field and look for the following: Random Representative location selected. Correct site preparation, drilling of the test hole, placement and seating of the gauge, data recorded.
4. For Soils. Observe proper fabrication of the one-point and look for the following: Proper screening of material, in-place moisture measured prior to addition of additional moisture if needed, proper compaction of sample in correct mold, stable surface for compaction of one-point?
5. Check Speedy moisture tester, balances and has density gauge been calibrated and calibration been verified by ODOT Region QA lab.

ACP TESTING

The following should be considered in addition to the items listed in the Aggregate section.

IGNITION OVEN – AC CONTENT

1. Was the correct calibration factor used?
2. Were calibration samples batched properly and calculations performed correctly?
3. Was companion moisture used or sample dried prior to testing?
4. Sample has a clean burn? Sample achieved constant mass?
5. Check basket weights. Check sample size.
6. Check gradation results. The coarse half of a split may have lower asphalt content than the fine half.
7. Is the Oven set at the correct temperature?
8. Does the manufacture scale drift test meet parameters?
9. Was the thermometer removed prior to Initial and Final Weighing?
10. Were the initial and final weights taken at the same temperatures?

11. Was the mix moisture removed from the initial mass reading?

RICE GRAVITY TESTING

1. Check tare weights of pycnometers and lids.
2. Check sample sizes.
3. Check pycnometers calibration numbers.
4. Check equipment. Proper vacuum pressure? Calibrated thermometer?
5. Is the “dry back” procedure appropriate for this material?
6. Check gradation results. The coarse half of a split will have a higher Rice Gravity than the fine half.

BULK GRAVITY TESTING

1. Check sample heights.
2. Check measured volumes compared to heights. Tallest specimen should have largest volume.
3. Check equipment. Suspension apparatus hanging free? Calibrated thermometers? Tank overflow? Damp towel for SSD?
4. Check compaction equipment. Proper gyrations, pressure, angle of gyration, compaction temp?
5. Observe testing. Swap samples and observe performing procedure. Watch immersion and SSD procedures. Is basket and wire assembly free floating?
6. If results do not vary from originals, may point to a splitting or compaction error.
7. If results vary from originals, may point to a technician or equipment error.

ACP DENSITY TESTING

There is no opportunity to rework ACP; therefore, it is imperative to troubleshoot density testing issues immediately.

Best Practice

Once the gauge has been initially ODOT calibrated, identify a location that can act as a reference, this site should be an area of flat concrete. Set the gauge on the flat concrete surface and scribe a line around the case. Take a four-minute test on the site and document the result. It is a good idea to paint the density on the concrete so that others may use it too. Test the gauge at this site prior to going to the project to assure that the gauge is still reading consistently. Performing Standard Counts on project site before starting daily work is required and running another set at mid shift helps to maintain consistent readings.

Project Manager

1. Has the Contractor's gauge calibrated or verified by the ODOT Region QA lab? Ask to see Cert.
2. Correct MAMD used? Core Correlation factor applied if needed?
3. Check the following correct; site preparation, placement and seating of the gauge, footprint marked, data recorded, rotation gauge.
4. Does the first sublot MDT match the JMF MDT within reasonable parameters? Specification is *50* kg/m^3 (3.0 lb/ft^3) this is really a large variation - check the asphalt content of the mixture.
5. If compaction is low, are there sufficient rollers of proper weight (according to specifications), to achieve compaction? Does compaction correlate with Voids i.e. high voids low compaction?
6. Is the mix tender? Seek help from LPA QV Lab. If needed, the PM may consult with ODOT Pavements.
7. Is rolling compacting the whole panel, not just the center? Consistent with Control Strip?
8. Is the lay down temperature correct according to the JMF or has temperature changed during production? Has there been a substantial change in lift thickness?
9. Is weather a factor (colder, wetter, or windy)?
10. Is the existing surface being paved on in question? I.e. paving over open graded ACP, PCC surfaces or extremely distressed existing pavement.
11. Does Coring need to be performed to validate in-place compaction? If needed, call the PM may consult with ODOT Pavements for guidance.

If any problems are found that cannot be resolved, the inspector or LPA QV Lab technician should contact the PM immediately. .

LPA QV

LPA QV lab is to verify compaction using separate, randomly selected sites. There is no direct comparison Independent Assurance parameter for nuclear density testing.

1. On the project, choose one or two sites at random and perform the normal tests on these sites with both the QC and LPA QV gauges. The average for each gauge when compared to the other should be within 2 lb/ft^3.
2. If the difference between the two gauges is greater than 2 lb/ft^3, the Contractor's QC technician should rerun the tests while the LPA QV Technician observes.
3. If the two gauges are not in agreement, re-standardize both gauges and re-shoot the location two shots in the same direction. If the gauges still do not compare, the LPA QV lab will immediately respond to site with a different certified gauge to compare to the initial QV and the QC gauges. The LPA QV Lab will continue to use the LPA QV gauge that was closest to the 2 lb/ft^3 parameters until the issue is resolved either by confirming the calibration using the ODOT Region calibration blocks and potential core correlation.
4. If either gauge is out of calibration, recalibrate prior to project testing.

5. If the gauges are in calibration. Core Correlation should be performed to remove gauge differences if deemed necessary by the PM, or if requested by the Contractor as per OSSC 00745.49 (b)(2)(b) or 00744 of the project Special Provisions as applicable.

Plastic Concrete Testing

General for All Concrete Tests

1. Was the test started within prescribed time limits of obtaining the sample?
2. Were the LPA QV and IA (and, if applicable, QC) samples taken from the same portion of the load?
3. Was the sample adequately recombined if taken from two parts of the load?
4. Was the concrete covered if ambient conditions were adverse?
5. Was all equipment used within specification/tolerance, clean and damp prior to test?
6. Was excess water removed from the sampling container prior to obtaining the sample?

Slump (T-119)

1. Once the test was started was it completed in the allotted 2 ½ minutes and immediately measured?
2. Does Equipment meet specification?
3. Tamping rod w/hemispherical tip
4. Flat, rigid, non-absorbent base, level and on a surface free of vibration or disturbance (not a warped water damaged piece of plywood)
5. Cone that is free of dents, rust damage and concrete build up on the inside
6. Correct amount of layers and quantity/volume in each layer?
7. Was each layer rodded 25 times extending into the preceding layer?
8. On the top layer, was a head kept above the top of the cone at all times?
9. Was the excess concrete cleaned away from the base of the cone prior to lifting?
10. Was the cone pulled too fast/slow?
11. Was the cone pulled straight with no twisting or lateral movement?
12. Was the measurement reading taken from the displaced original center?

Note: If mix has retained 1 ½ inch or larger aggregate, it must be removed by the wet sieve method prior to performing the test.

Air Content (AASHTO T-152)

1. Was the test started within 5 minutes of obtaining the sample?
2. Has the air meter gauge been calibrated within the last three months?

NOTE: The air meter calibration can be checked in the field.

3. Was the bowl filled in approximately equal 1/3 layers?
4. Was each layer rodded 25 times extending into the preceding layer?
5. Were the sides of the bowl tapped 10 to 15 times with a mallet after each layer had been rodded?
6. Was the cover seal moistened and seated properly on the bowl?
7. Was water injected into the petcocks and meter rocked until no air bubbles appeared?
8. Was air pumped into the initial air chamber until it passed the initial pressure setting (as determined in the calibration process) and allowed to cool? Was any air noted seeping out of open petcocks at this time?
9. Was initial gauge adjusted to initial air pressure before opening main air valve?
10. Were the sides of the bowl tapped “smartly” during release of main air valve?
11. During release of main air valve was there any air leaking out the sides due to an incomplete seal?

Temperature (AASHTO T-309)

1. Has the measuring device been calibrated or verified for accuracy within the last year?
2. Was there adequate concrete cover around the measuring device sensor (at least 3”)?
3. Was the concrete pressed around the measuring device at the surface?
4. Was the temperature recorded after a minimum of 2 minutes and the measuring device allowed to stabilize?

Unit Weight (AASHTO T-121)

Since the unit weight test is usually performed in conjunction with the air content test, see steps 3, 4 and 5 under the air content portion of this guide.

1. Check math
2. Was the dry mass of the measure accurately recorded?
3. Has the measure’s volume been accurately calibrated?
4. Was a strike off plate used to create a smooth surface free of voids and level with the rim?
5. Is the scale accurate? Cross check LPA QV and IA, (and, if applicable, QC) scales to field verify accurate measurement.

APPENDIX C

LPA Field Tested Materials Assurance Guide (FTMAG)

LANE COUNTY FIELD TESTED MATERIALS ASSURANCE GUIDE

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Progress Report. AND OPERATION	DESCRIPTION OF TEST	TEST METHOD			FORM ODOT 734-	FORM LC LC734-	Lane County and City of Eugene Verification Frequency Guidelines (Revised April 2021)	Independent Assurance
		ODOT	WAQTC	AASHTO				
SECTION 00330 - EARTHWORK								
Stone Embankment Material (See Sec. 330.16(a)) Soil and Soil/Aggregate Mixtures	*Gradation*						*1/Project or 1/Source/Year with Approved Source Documents on File with Lane County*	
Establishing Maximum Density (for Compaction)	*Density Curve*			*(1)(2) T 99 or T 180*	*3468*			See ODOT MFTP Section 4D
	Bulk Specific Gravity			*T 85*	*3468*		*1/Soil Type*	
(1) Per Agency requirements								
(2) Method A or D per Agency requirements	*Family of Curves*			*T 272*	*3468FC*			
Compaction	*Nuclear Gauge*			*T 310*		*1793*	*1/200'/Lane*	
	Coarse Particle Correction			*T 99/T 180*				
(3) Agency may report deflection testing in their daily field reports in lieu of using form LC734-1793DFR	*(3) Deflection Testing*	*TM 158*				*1793DFR*	*1 pass/Lane*	
	Contractor must demonstrate, by compaction testing or acceptable visual means, that the material, equipment, and process used for compaction achieves the specification requirements. If the material, equipment, or process changes, or conditions indicate a non-specification product, the Contractor must re-demonstrate that it is achieving the specifications requirements.							
Imported Topsoil (See Section 01040.14)	*Compliance*				*4000*		*1/Source and 1/Type of Soil*	
SECTION 00331 - SUBGRADE STABILIZATION								
Aggregate backfill	*Material must meet the requirements of Section 00331.10*						*1/Source/Year with Approved Source Documents on File with Lane County*	See ODOT MFTP Section 4D
Water	*Material must meet the requirements of Section 00340*						*Visual*	
Compaction by Nuclear Gauge				*T 310*		*1793*	*1/400 SQ.FT. (min. 4' wide)*	

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		ODOT	WAQTC	AASHTO				
SECTION 00390 - RIPRAP PROTECTION								
Fill Material & Riprap	*Material must meet the requirements of Section 00390*						*Visual*	See ODOT MFTP Section 4A
Filter Blanket	*Gradation See 00390.13*	*Material must meet the requirements of Section 00390*						
Grouted Riprap Sand	*Material must meet the requirements of Section 00390*							
Portland Cement	*Compliance*				*4000*		*Review Documentation for acceptance*	
SECTION 00405 - TRENCH EXCAVATION, BEDDING, AND BACKFILL								
TRENCH FOUNDATION -- Excavation below grade only								
Selected general backfill	*Material must meet the requirements of Section 00330.13*						*Visual*	See ODOT MFTP Section 4D
Selected granular backfill	*Material must meet the requirements of Section 00330.14*							
Selected stone backfill	*Material must meet the requirements of Section 00330.15*							
Other approved material	*Material must meet the requirements of Section 00405.11*							
Bedding								
Commercial 3/4" - 0 Aggregate	*Material must meet the requirements of Section 00641*						*Visual*	
Continuous cradle of Commercial Grade Concrete (See Section 00440)	*Material must meet the requirements of Section 00440*							

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		ODOT	WAQTC	AASHTO				
Pipe Zone Material								
Flexible Pipe	*Use the Listed Material requirements under Bedding*							
Rigid Pipe: Aggregate Base (1"- 0) or (3/4"-0) aggregate	*Material must meet the requirements of Section 00641*						*Visual*	
Sand/Gravel Blend	*Material must meet the requirements of Section 00405.14(d)*							
Trench Backfill								
Class A Backfill - Native or common Material	*Material must meet the requirements of Section 00330.43*							
Class B Backfill - 1"-0 or 3/4"-0 Granular Material	*Material must meet the requirements of Section 00641*							See ODOT MFTP Section 4D
Class D Backfill - Pit run, bar run material with or Sand/Gravel Blend	*Material must meet the requirements of Section 00405.14*						*Visual*	
Class E Backfill - Controlled Low Strength Stength Material	*Material must meet the requirements of Section 00442*							
Establishing Maximum Density *(1) Per Agency requirements* *(2) Method A or D per Agency requirements*	*Density Curve* *Bulk Specific Gravity* *Family of Curves*			*(1)(2) T 99 or T 180* *T 85* *T 272*	*3468* *3468* *3468FC*		*Soil: 1/Soil Type* *Granular Material: 1/Gradation or Source*	
Compaction	*Nuclear Gauge* *Coarse Particle Correction*			*T 310* *T 99/T 180*		*1793*	Trench Depth > 4' = Visual up to 4' depth, 1 test/100' length at 4' depth and top lift; Visual at intermediate depths (between 0 - 4')	

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		ODOT	WAQTC	AASHTO				
SECTION 00430 - SUBSURFACE DRAINS								
Granular Drain Backfill Material	*Sampling* *Reducing* *Sieve Analysis*			*T 2* *T 248* *T 27*		*1792*	*Visual*	See ODOT MFTP Section 4D
SECTION 00440 - COMMERCIAL GRADE CONCRETE								
Mixture	*Sampling* *Air Content* *Slump* *Concrete Temperature*		*TM 2*	*T 152* *T 119* *T 309*		*4000C*	*1 per each set of cylinders*	Not Required
Structural Items	*Strength*			*T 22 & T 23*		*4000C*	*(S) 1 Set/Day*	1/Project
Other Items (Except Visual Accept.)	*Strength*			*T 22 & T 23*		*4000C*	*(S) 1 Set/Day* *Pole Foundation: 1 Set/10yd^3 (min. 1/day)*	
(S) 1 Set Represents a minimum of 4 Cylinders								
SECTION 00442 - CONTROLLED LOW STRENGTH MATERIALS (CLSM)								
CLSM Mixture	*Mix Proportions* *Trial Batch* *Strength*			*T 22 & T 23*		*4000C*	*1/Project or Source*	Not Required
SECTION 00445 - SANITARY, STORM, CULVERT, SIPHON, AND IRRIGATION PIPE - INCLUDED WITH SECTION 00405								
SECTION 00460 - PAVED CULVERT END SLOPES								
Commercial Grade Concrete	*Material must meet the requirements of Section 00440*							

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		ODOT	WAQTC	AASHTO				
SECTION 00470 - MANHOLES, CATCH BASINS AND INLETS								
Commercial Grade Concrete	*Material must meet the requirements of Section 00440*							
Sump Backfill- Crushed or Uncrushed, well graded from 4"- 2" or 6"- 2" (See Section 00470.17)							*Visual*	See ODOT MFTP Section 4D
Base Drain Backfill- Aggregate Base Selected or Selected Granular Backfill	*Material must meet the requirements of Section 00470.17*						*Visual*	
Excavation, Backfill and Foundation Stabilization	*Material must meet the requirements of Section 00405*						*Visual*	
SECTION 00480 - DRAINAGE CURBS								
Aggregate Gradation	*Material must meet the requirements of Section 00480.11*						*Visual*	
Commercial Grade Concrete	*Material must meet the requirements of Section 00440*						*Visual*	See ODOT MFTP Section 4D
Dense Graded HMAC Mixture Level 2, 1/2" Dense	*Material must meet the requirements of Section 00744*						*Visual*	
SECTION 00641 - AGGREGATE SUBBASE, BASE, AND SHOULDERS								
Aggregate Production	*Abrasion*						*Visual*	
Aggregate Subbase								Not Required for Aggregate Subbase and Shoulders.
Grading	*Sampling*			*T 2*				
(See 00641.10)	*Reducing*			*T 248*			*1/Project or 1/Source*	
	Sieve Analysis			*T 27*		*1792*		
	Sand Equivalent			*T 176*				
Aggregate Base and Shoulders	*Abrasion*			*T 96*	*4000*			See ODOT MFTP Section 4D for Aggregate Base
	Degradation	*TM 208*						
Grading								
Aggregate Base (See 02630)	*Sampling*			*T 2*				
Aggregate Shoulder (See 02640)	*Reducing*			*T 248*				
Open Graded Aggregate Base	*(1) Sieve Analysis*			*T 27*		*1792*	*1/Project or 1/Source*	
(See 02630.11)	*(2) Sand Equivalent*			*T 176*				
(1) Perform at least 3 tests								
(2) May be waived by QAE	*Fracture*			*TP 61*		*1792*		

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		ODOT	WAQTC	AASHTO				
PLACEMENT								
Aggregate Base material only								
Plant Mix Applications Only								
Establishing Maximum Density & Optimum Moisture (Mix Design)	*Density Curve*			*(1)(2) T 99 or T 180*	*3468B*			
	Coarse Particle Correction			*T 99/T 180*			*1/Size per Source*	See ODOT MFTP Section 4D
(1) Per Agency requirements	*Bulk Specific Gravity*			*T 85*	*3468B*			
(2) Method A or D per Agency requirements								
Compaction	*Nuclear Gauge*			*T 310*		*1793*	*1 test/200'/Lane*	
(3) Agency may report deflection testing in their daily field reports in lieu of using form LC734-1793DFR	*(3) Deflection Testing*	*TM 158*				*1793DFR*	*1 pass/Lane*	
(Individual tests must meet Specification)								
SECTION 00642 - IN-PLACE CEMENT TREATED BASE								
SECTION 00643 - FULL DEPTH RECLAMATION								
Pulverized Material								
Gradation	*Compliance*						*Visual*	
Moisture Content	*Compliance*						*Visual*	
Establishing Maximum Density & Optimum Moisture (Mix Design)	*Density Curve*			*(1) T 99*	*3468*			
(1) Method A or D	*Coarse Particle Correction*			*T 99*			*1/Size per Source*	
	Bulk Specific Gravity			*T 85*	*3468*			
Additives								Not Required
Portland Cement	*Compliance*						*None needed if from QPL*	
	Content						*Based on Dry Weight of Reclaimed Material*	
Water	*Compliance*						*See Section 02020*	
Treated Material								
Compaction	*Nuclear Gauge*			*T 310*		*1793*		
(2) Agency may report deflection testing in their daily field reports in lieu of using form LC734-1793DFR	*(2) Deflection Testing*	*TM 158*				*1793DFR*	*1 pass/lane*	
SECTION 00651 - CEMENT TREATED BASE								
Aggregate	*Abrasion*			*T 96*	*4000*			Not Required
(See 02630.11)	*Degradation*	*TM 208*						
Grading								

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	Sampling			*T 2*				
	Reducing			*T 248*				
	(1) Sieve Analysis			*T 27*		*1792*	*1/Project or 1/Source*	
	(2) Sand Equivalent			*T 176*				
(1) Perform at least 3 tests								
(2) May be waived by QAE	*Fracture*			*TP 61*		*1792*		
Additives								
Portland Cement	*Compliance*						*None needed if from QPL*	
Water	*Compliance*						*See Section 02020*	
Cement Treated Material								
Establishing Maximum Density & Optimum Moisture (Mix Design)	*Density Curve*			*T 99 Method D*	*3468*		*1/Size per Source*	Not Required
	Coarse Particle Correction			*T 99*				
	Bulk Specific Gravity			*T 85*	*3468*			
Compaction	*Nuclear Gauge*			*T 310*		*1793*	*3 locations/3600 square feet, 2 tests at each location*	
Compressive Strength	*ASTM 1633 Method A*						*(1) 3 samples/day of production*	
(1) May be waived by QAE								
SECTION 00706 EMULSIFIED SLURRY SEAL SURFACING								
Aggregate Production								
	Sampling			*T 2*				
	Reducing			*T 248*			*1/Source*	
	Sieve Analysis			*T 27/T 11*		*1792*		
Emulsified Asphalt Cement								
Emulsified Asphalt	*Compliance*				*4000*		*Review Documents Submitted per Specifications*	Not Required
Polymer Modified Emulsion								
Additives	*Compliance*						*Review Documents Submitted per Specifications*	
Mineral Filler	*Compliance*				*4000*			
Material must meet the requirements of Section 00706.16								
SECTION 00730 - ASPHALT TACK COAT								
Tack	*Compliance*				*4000*		*Review Documentation for Acceptance*	Not Required

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		ODOT	WAQTC	AASHTO				
SECTION 00744 - ASPHALT CONCRETE PAVEMENT (ACP)								
Mix Design Verification								
	(1) Gyratory Specimen	*TM 326*				*2050GV*		
	Max. Specific Gravity			*T 209*		*2050*		
							1/Year/Mix or if asphalt source changes	
	Bulk Specific Gravity			*T 166*		*2050GV*	*Review Documentation for Acceptance*	
							(part of the annual verification of approved	
	Tensile Strength Ratio			*T 283*		*2050tsr*	*mix designs)*	
(1) Minimum 1/Project required for projects with 2000 tons or more and to be performed within first sublot	*Rut Susceptibility*	*TM 320*			*N/A*	*N/A*		
Gradation								
Ignition Method	*Calibrate Incinerator*	*TM 323*				*2327IC*	*1/JMF*	
	Sampling			*T 168*				
	Reducing			*R47*			*1/1000 tons*	
(Residual aggregate from AASHTO T 308)	*Sieve analysis*			*T 30*		*2277*		
Asphalt Content								
Ignition Method	*Calibrate Incinerator*	*TM 323*				*2327IC*	*1/JMF*	
	Sampling			*T 168*				
	Reducing			*R47*			*1/1000 tons*	
	Asphalt Content			*T 308*		*2277*		
RAP/RAS/RAM Percentage		*TM 321*				*2277*		
		(1) TM 322					*Review Documentation for Acceptance*	
							(part of the annual verification of approved	
	RAP Moisture			*T 329*			*mix designs)*	
	ColdFeed Moisture			*T 255/T 265*				
(1) Required at start of production and if meters fail to meet specification								

Not Required for Projects using less than 2,500 tons of ACP

See ODOT MFTP Section 4D for Projects using greater than 2,500 tons of ACP. Use IA parameters stated in: 00745 ASPHALT CONCRETE PAVEMENT-STATISTICAL ACCEPTANCE for all IA testing requirements for 00744.

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		ODOT	WAQTC	AASHTO				
Placement								Not Required for Projects using less than 2,500 tons of ACP
Maximum Density Test	*Max. Specific Gravity*			*T 209*		*2277*	*1/full day of paving*	
	MAMD	*TM 305*						
Thickness of Pavement	*Sticking Measure*	*TM 775*					*1 measurement/100' and at grade breaks*	
Compaction	*Nuclear Density*		*TM 8*			*1793A or 1793AMAMD*	*Projects <= 1000' in length 1/100'/Lane* *Projects > 1000' in length 1/200'/Lane* *Minimum of 4 tests per project*	See ODOT MFTP Section 4D for Projects using greater than 2,500 tons of ACP (Section 00745 as referenced above)
Smoothness Testing							*Visual - Straightedge 10% length and at manholes, intersections and joints*	
SECTION 00748 - PAVEMENT REPAIR								
Aggregate Base	*Material must meet the requirements of Section 00332.10*						*Visual*	
Compaction by Nuclear Gauge	*Material must meet the requirements of Section 00332*						*Projects > 1000' in length 1/200'/Lane*	Not Required
HMAC Compaction by Nuclear Gauge	*Material must meet the requirements of Section 00748*						*1/400 SQ.FT. (min. 4' wide) per lift*	
SECTION 00755 - CONTINUOUSLY REINFORCED CONCRETE PAVEMENT								
SECTION 00756 - PLAIN PORTLAND CEMENT CONCRETE PAVEMENT								
Mixture	*Sampling*		*TM 2*					
	Air Content			*T 152*				
	Slump			*T 119*		*4000C*	*1/per set of cylinders*	
	Yield			*T 121*				
	Concrete Temperature			*T 309*				
	Water/Cement Ratio		.	*T 121*			*Review Documentation for Acceptance*	1/per year
[S] 1 Set Represents a minimum of 4 cylinders	*Strength*			*T 22 & T 23*		*4000C*	*[S] 1 Set of Cylinders per 300 lane feet; min. 2 per full day of paving*	
Smoothness Testing *(Smoothness)*							*Visual - Straightedge 10% length and at manholes, intersections and joints*	
Thickness of Pavement	*Sticking Measure or measure height of forms prior to concrete placement*	*TM 775*					*1 measurement/100' and at grade breaks*	
SECTION 00850 - COMMON PROVISIONS FOR PAVEMENT MARKINGS								
Placement Evaluation "Retroreflectivity" *In-Place Procedure evaluates Durable and High Performance Pavement Markings*	*Contractor provides Evaluation of Retroreflectivty Using Hand-Operated Instrument per Section 00850.47*						*Review Documentation for Acceptance*	See ODOT MFTP Section 4D

Note: Visual inspection must be documented by the inspector in the Daily Progress Report

APPENDIX D

LPA Forms

Lane County Materials Testing Lab

Lane County Department of Public Works
3040 N. Delta Hwy, Eugene, OR 97408 (541) 682-6945

Sample #:

Project #: 36

PROJECT: CONTRACTOR:

LOCATION: MATERIAL TYPE:

SAMPLED: DATE: TIME: BY: SOURCE:

Aggregate Testing

Lab T 27/T 11
Cost T 176
TP 61

Sieve Analysis (AASHTO T 27/T 11)

Initial Dry Mass (A)		Dry Washed Mass (B)	

Sieve Size	Accumulative Weight (C)	% Retained	% Passing	Specifications
Pan		% Retained =(C/B)*100 % Passing =100-% Retained		
Sieve Loss % = [({AorB}-Pan)/{AorB}]*100%				<0.3
Base Agg: #10 / 1/4" (2.00mm / 6.3mm)				40-60
Fineness Modulus (FM)				

Date Tested By

Sand Equivalent (AASHTO T 176)

Clay Reading			
Sand Reading			
Sand Equivalent			
Average SE			
Min. Specified			

SE= SAND/CLAY

Date Tested By

Fracture (AASHTO TP 61)

Sieve Size				
Fractured Mass (F)				
Questionable Mass (Q)				
Non-fractured Mass (N)				
% Fracture*				
Specification				

*% Fracture =[(F+Q/2)/(F+Q+N)]*100

Date Tested By

☐ **Meets Specifications** ☐ **Does Not Meet Specifications**

Remarks:

Notified:

Date

Time

By

Reviewed By

Lane County Materials Testing Lab

Lane County Department of Public Works
3040 N. Delta Hwy, Eugene, OR 97408 (541) 682-6945

Sample #: _____

Project #: 36 _____

PROJECT: _____ CONTRACTOR: _____

LOCATION: _____ MATERIAL TYPE: _____

SAMPLED: DATE: _____ TIME: _____ BY: _____ SOURCE: _____

Aggregate/Soil Field Density Testing

☐ Base Aggregate ☐ Trench Densities ☐ Other: _____

Mat. ID	Material Source and Type	Max. Density	Opt. Moisture
A			
B			

Page ___ / ___ Pages

Test #	Mat. ID	Grade	Depth	Density	% Moisture	% Compaction	PASS	FAIL	Comments
Location:									
Location:									
Location:									
Location:									
Location:									
Location:									
Location:									
Location:									
Location:									
Location:									

Remarks: _____ Notified: _____

Technician: _____ Date: _____ Time: _____

Reviewed By _____

Lane County Materials Testing Lab

Lane County Department of Public Works

3040 N. Delta Hwy, Eugene, OR 97408 (541) 682-6945

Sample #: _____

Project #: _____

PROJECT: _____ CONTRACTOR: _____

LOCATION: _____ _____

SAMPLED: DATE: _____ TIME: _____ Page ____ of ____ Pages

Daily Field Report

☐ SOIL ☐ ASPHALT ☐ OTHER: _____

☐ AGGREGATE ☐ CONCRETE _____

Technician: _____

Lane County Materials Testing Lab

Lane County Department of Public Works
3040 N. Delta Hwy, Eugene, OR 97408 (541) 682-6945

Sample #: _____

Project #: _____

PROJECT: _____ CONTRACTOR: _____

LOCATION: _____ MATERIAL TYPE: _____

SAMPLED: DATE: _____ TIME: _____ BY: _____ SOURCE: _____

AC Field Density Testing

Page _____ of _____ Page(s)

Mix Design: _____ Lift: _____ Rice: _____ PCF

Test #	Location	Density	Density	Ave. Density	% Compaction	Comments

Average Compaction: _____

Remarks: _____ Notified: _____

Technician: _____ Date: _____ Time: _____

Reviewed By _____

Lane County Materials Testing Lab

Lane County Department of Public Works
3040 N. Delta Hwy, Eugene, OR 97408 (541) 682-6945

Sample #: _____

Project #: _____

PROJECT: _____ CONTRACTOR: _____

LOCATION: _____ MATERIAL TYPE: _____

SAMPLED: DATE: _____ TIME: _____ BY: _____ SOURCE: _____

AC Field Density Testing

Mix Design: _____ Lift: _____ Rice: _____ PCF

Test #	Location	Density	Density	Ave. Density	% Compaction	Comments
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					
	STA L/C/R PANEL					

Average Compaction: _____

Remarks: _____ Notified: _____

Technician: _____ Date: _____ Time: _____

Reviewed By _____

Lane County Materials Testing Lab

Lane County Department of Public Works
3040 N. Delta Hwy, Eugene, OR 97408 (541) 682-6945

Sample #: ______________

Project #: 36 ______________

PROJECT: ______________ CONTRACTOR: ______________
LOCATION: ______________ MATERIAL TYPE: ______________
SAMPLED: DATE: ________ TIME: ________ BY: ________ SOURCE: ______________

AC, FIELD DENSITY, MAMD

Mix Design: ______________ Lift: ________ MAMD: ________ lbs/ft^3

Lot/Sublot: ______________
Test Location: Density, lbs/ft^3
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
Notified: ______________ Average: ________
Date: ________ Time: ________ % Comp: ________

Lot/Sublot: ______________
Test Location: Density, lbs/ft^3
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
Notified: ______________ Average: ________
Date: ________ Time: ________ % Comp: ________

Lot/Sublot: ______________
Test Location: Density, lbs/ft^3
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
Notified: ______________ Average: ________
Date: ________ Time: ________ % Comp: ________

Lot/Sublot: ______________
Test Location: Density, lbs/ft^3
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
Notified: ______________ Average: ________
Date: ________ Time: ________ % Comp: ________

Lot/Sublot: ______________
Test Location: Density, lbs/ft^3
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
Notified: ______________ Average: ________
Date: ________ Time: ________ % Comp: ________

Lot/Sublot: ______________
Test Location: Density, lbs/ft^3
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
______________ ____ / ____
Notified: ______________ Average: ________
Date: ________ Time: ________ % Comp: ________

Remarks: ______________________________

Reviewed By: ______________

MAX. DENSITY (RICE)
AASHTO T209

SUPPLIER: _____ **MIX:** _____ **DATE:** _____

[PICK TWO AC CONTENTS,ONE ON EITHER SIDE OF ASSUMED MIX DESIGN CONTENT.]

	(a)	(b)	
AC CONTENT			
1. PYCH. + LID			
2. PYCH.+LID+SAMPLE			
3. PYCH.+LID+SAMPLE+H2O			
4. TEMP.			
5. SAMPLE @ SSD			
6. CAL. OF PYCH.(@77°F/ 25°C)			
7. RICE,Gmm= (2 - 1) / (5 + 6 - 3)			***SSD***
Non SSD			***DRY***

NOTE: UNIT WT. = LINE 7. x 997 kg/m3 (62.4pcf)

SSD DRY BACK **pan** **pan**

Time	(a)	1268.6	(b)	1269	Time
Final Wt					

Less than 0.5 gr. In 15 mins

Dryback Corr. = _____

EFFECTIVE SPECIFIC GRAVITY, Gse **ASPHALT:** _____ **SP.GR. @25°C, Gb:** _____

$$\text{SSD Gse} = \frac{100 - Pb}{\frac{100}{Gmm} - \frac{Pb}{Gb}}$$

where: Pb=AC content which Gmm was performed
Gb= spec. gr. of asphalt (25°C)= .996 x Gb(15.6°c)

SSDGse(a) = _____ **SSDGse(b)=** _____ ***SSD*** ***NOTE: Gse(a) & Gse(b) must be within+/- 0.012 of each other***

Gse(a) - Gse(b) =

dry Gse(a)= _____ **dry Gse(b)=** _____ Avg.dry Gse = _____

DESIGN EFFECTIVE SPECIFIC GRAVITY, Gse (design)

Gse (design)= [Gse(a) + Gse(b)] / 2= _____

CALCULATED MAX. SP. GR. (FOR DESIGN),Gmm(des)

$$\text{Gmm(des)} = \frac{100}{\frac{Ps}{Gse(des)} + \frac{Pb}{Gb}}$$

where: **Pb = AC content at which Gmm(des) is being calculated**
Ps = 100 - Pb
Gse(des) = design effective specific gravity
Gb = spec. gr. of asphalt (25°C)

%AC (Pb)								
Gmm(des)								

Gmm Dry _____

NOTE: each 0.5% diff in ac content should change Gmm by approx. 0.018.

AC Mix design Worksheet - Voids

Test Procedure:__________

Supplier: ________________ Mix: ________________ Date: ________

%OIL

Ht.

DRY:

WET:

SSD

BSG:*Gmb* — *Gmb= DRY/(SSD-WET)*

RICE:*Gmm*

VOIDS:*Va* — *Va=(G mm-Gmb)/Gmmx100*

%OIL

Ht.

DRY:

WET:

SSD

BSG:*Gmb* — *Gmb= DRY/(SSD-WET)*

RICE:*Gmm*

VOIDS:*Va* — *Va=(G mm-Gmb)/Gmmx100*

%OIL

Ht.

DRY:

WET:

SSD

BSG:*Gmb* — *Gmb= DRY/(SSD-WET)*

RICE:*Gmm*

VOIDS:*Va* — *Va=(G mm-Gmb)/Gmmx100*

Supplier: _____ Mix: _____

Oil: AC content % = Date: _____

TSR WORKSHEET (AASHTO T283)

Sample #								
DIA = Diameter (in)								
T= Thickness (in)								
A = Weight in Air (g)								
B = SSD Weight (g)								
C = Weight in Water (g)								
D = B - C = Volume (cc)								
E = A/D = Bulk Sp.Gr.= *Gmb*								
F = Max Sp.Gr. = *Gmm*								
G = ((F-E)/F)x100=%air Voids, *Va*								
Test Condition, W = Wet, D = Dry								
H = (DxG)/100 = Volume of Air								
70% saturation = (.70 x H) + A								
80% saturation = (.80 x H) + A								
I = Actual Saturated Weight								
J = I - A = Absorbed Water								
K = (J / H) x 100 = % Saturation								
L = Load on Dry Samples (lbs)								
M = (2 x L)/(T x DIA x 3.14) = St Dry								
N = Load on Wet Samples (lbs)								
O = (2 x N)/(T x DIA x 3.14) = St Wet								
TSR =	**(Avg St Wet / Avg St Dry) x 100**				/		x 100	

Visual comment: _____

Supplier: _____ Mix: _____

Oil: AC content % = Date: _____

TSR WORKSHEET (AASHTO T283)

Sample #								
DIA = Diameter (in)								
T= Thickness (in)								
A = Weight in Air (g)								
B = SSD Weight (g)								
C = Weight in Water (g)								
D = B - C = Volume (cc)								
E = A/D = Bulk Sp.Gr.= *Gmb*								
F = Max Sp.Gr. = *Gmm*								
G = ((F-E)/F)x100=%air Voids, *Va*								
Test Condition, W = Wet, D = Dry								
H = (DxG)/100 = Volume of Air								
70% saturation = (.70 x H) + A								
80% saturation = (.80 x H) + A								
I = Actual Saturated Weight								
J = I - A = Absorbed Water								
K = (J / H) x 100 = % Saturation								
L = Load on Dry Samples (lbs)								
M = (2 x L)/(T x DIA x 3.14) = St Dry								
N = Load on Wet Samples (lbs)								
O = (2 x N)/(T x DIA x 3.14) = St Wet								
TSR =	**(Avg St Wet / Avg St Dry) x 100**				/		x 100	

Visual comment: _____

AC WORKS SHEET

Supplier: _____ Date: _____

Mix Type **Level:** 1 2 3 4 **Size** _____ **Dense:**

Calculations For: Va, VMA, VFA, Pbe, P0.075/Pbe

								Required Specified Values
AC%	P_b							
Passing #200	$P_{0.075}$							
Rice	G_{mm}							
Bulk Gs.	G_{mb}							
Air Voids	V_a							
Agg. Bulk Gs.	G_{sb}							
Effective Gs.	G_{se}							
Asphalt Gs.	G_b							
% Stone	P_s							Minimum
	VMA							
	VFA							
Absorbed Asphalt	P_{ba}							
% Effective AC	P_{be}							
	$P_{0.075}/P_{be}$							

Remarks:

1. Yellow cells are for inputed data.
2. Blue cell autmaticaly calculate values.
3. Remarks in the remarks area are limited to three(3) lines and the text will automaticaly word wrap to the next line until the three lines are full.

Lane County Materials Testing Lab

Lane County Department of Public Works
3040 N. Delta Hwy, Eugene, OR 97408 Ph. (541) 682-6945

Sample #:
Project #:

PROJECT: CONTRACTOR
LOCATION: HMAC Supplier
SAMPLED: DATE: TIME BY Material Source
Lot Number Sublot Number TICKET NO. QUANTITY Ton
HMAC Type: Size in. Dense Open Level 1 2 3 4 Course Wearing Base Leveling

LAB Cost: ACI & SA Moisture T209

AC Content by Ignition & Sieve Analysis

1. Wet Weight of AC Mix - Pan =
2. Dry Weight of AC Mix - Pan =
3. Moisture Content [(L1 - L2) / L2] x 100 = %
4. Wet Weight of AC mix - Pan =
5. Dry Weight AC mix [L4 / (100 + L3)] x 100 =
6. Dry Weight (After Ignition) - Pan =
7. Weight of Burned Asphalt (L5 - L6) =
8. Asphalt Content (L7 / L5) x 100 = %
9. Correction Factor [Mix Design Number] = %
10. Corrected Asphalt Content (L8 - L9) = %

SIEVE SIZE	Accumulated Weight	Percent Retained	Percent Passing	Correction Factor	Corrected % Passing	Gradation Tolerance Min.	Gradation Tolerance Max.	Does Not Meet Specifications X
1 in								
3/4 in								
1/2 in								
3/8 in								
1/4 in								
#4								
#8								
#16								
#30								
#200								
PAN								
Asphalt Content (%) =								

Date Tested
Time:
By:

Notified:
Date:
Time:

Remarks:

Theoretical Maximum Density of Bituminous Mixtures (AASHTO T209A / ODOT Modified)

A Weight of Pycnometer and Lid (gr)
B Weight of Pycnometer, Lid & Sample (gr)
C Weight of Pycnometer, Lid, Sample & Water (gr)
D Temperature ^{O}F (ODOT Requires 77 F +-1.8 F)
E Weight Pycnometer + Water @ 77F

B - A

$$\frac{B - A}{[B - A + E - C]} = \text{Spec. Grav.}$$

T209 Spec. Grav. x 62.4 = Maximum Density PCF

BINDER IGNITION CALIBRATION

MIX: _____ **DATE:** _____

Trial 1

AC%(Pb) _____

INITIAL PAN+MAT		**INITIAL PAN**		**INIT.MAT (M1)**	
FIN. PAN MAT.		**FINAL PAN**		**FIN. MAT. (M2)**	
				Percent Loss (PL)	

Trial 2

AC%(Pb) _____

INITIAL PAN+MAT		**INITIAL PAN**		**INIT.MAT (M1)**	
FIN. PAN MAT.		**FINAL PAN**		**FIN. MAT. (M2)**	
				Percent Loss (PL)	

Trial 3

AC%(Pb) _____

INITIAL PAN+MAT		**INITIAL PAN**		**INIT.MAT (M1)**	
FIN. PAN MAT.		**FINAL PAN**		**FIN. MAT. (M2)**	
				Percent Loss (PL)	

AC%(Pb) _____

INITIAL PAN+MAT		**INITIAL PAN**		**INIT.MAT (M1)**	
FIN. PAN MAT.		**FINAL PAN**		**FIN. MAT. (M2)**	
				Percent Loss (PL)	

PL = [M1 - M2 X 100] - Pb
M1

AVG. MIX CORR. FACTOR, MCF =

	Trial 1		Trial 2		Trial 3		Avg.		
SIZE	**WT**	**%PASS**	**WT**	**% Pass**	**WT**	**% Pass**	**%Pass**	**DIFF.**	**TARGET**
1									
3/4									
1/2									
3/8									
1/4									
#4									
#8									
#16									
#30									
#200									
PAN									

Lane County Materials Testing Lab

Lane County Department of Public Works
3040 N. Delta Hwy, Eugene, OR 97408 (541) 682-6945

Sample #: _____

Project #: _____

PROJECT: _____ CONTRACTOR: _____

LOCATION: _____

SAMPLED: DATE: _____ TIME: _____ BY: _____

Concrete Testing

Field Testing

☐ PCC Pavement ☐ Curb & Gutter ☐ Manholes

☐ Sidewalk ☐ Pole Base ☐ Bridge Deck ☐ Bridge Bent: _____

☐ Footing: _____ ☐ _____

Class Specified: _____ Supplier: _____ Amount: _____ yd^3

Class Delivered: _____ Mix Design: _____ Ticket #: _____

Ambient Temp: _____ °F Weather: _____

Concrete Temp: _____ °F Spec: _____ °F

Slump: _____ in Spec: _____ in Water Added: _____ gal

Air Content: _____ % Spec: _____ % W/C Ratio: _____

Unit Weight: _____ lbs/ft^3 Relative Yield: _____ yd^3

Laboratory Testing

Lab Cost _____

Sample: ☐ Picked Up ☐ Delivered Date Received: _____

Size: ☐ 6" Cylinders ☐ 4" Cylinders ☐ Other: _____

Field Markings	Age at Break	Date of Break	Total Load (lbs)	Compressive Strength (psi)	Tested By	Notified

28 day Average: _____ psi

☐ **MEETS SPECIFICATIONS** ☐ **DOES NOT MEET SPECIFICATIONS**

Remarks: _____ REDI-MIX TRUCK SETTINGS:

AGG.:

SAND:

METER:

TRUCK #:

Checked By: _____

Batch Masses (lb)

Cement _____ lbs
Fly Ash _____ lbs
Coarse Agg. # 1 _____ lbs
Coarse Agg. # 2 _____ lbs
Fine Agg. (Sand) _____ lbs

Water Batched _____ lbs
Water Jobsite _____ gal
Total Add Water _____ gal = _____ lbs
Admixtures (Total oz) _____ oz = _____ lbs

Total Batch Mass _____ lbs

Field Tests

Ambient Temp. _____ °F
Concrete Temp. _____ °F
Slump _____ in
Air Content _____ %

Admixtures

_____ _____ oz
_____ _____ oz
_____ _____ oz
_____ _____ oz

(Approx. liquid conversions: 1 gal = 128 oz = 8.32823 lbs)

Unit Weight

Concrete + Pot (Gross) _____ lbs
- Pot Weight (Tare) _____ lbs
Concrete Weight = _____ lbs ÷ Pot Calibration _____ = _____ lbs/ft³

Yield

$$\frac{\text{Total Batch Mass}}{\text{Unit Weight}} = \frac{\_\_\_\_\ \text{lbs}}{\_\_\_\_\ \text{lbs/ft}^3} = \_\_\_\_\ \text{yd}^3$$

Cement Content

$$\frac{\text{Total Cement \& Fly Ash}}{\text{Yield}} = \frac{\_\_\_\_\ \text{lbs}}{\_\_\_\_\ \text{yd}^3} = \_\_\_\_\ \text{lbs/yd}^3$$

Water/Cement Ratio

Batch Mass − (Batch Mass / (1+ Free Moisture Factor)) = Agg. Free Water

(Free Moisture Factor = Agg. % Free Moisture / 100)

	Agg. % Free Moisture	Aggegate Free Water					
Coarse Agg. # 1	_____ %	_____	- (	_____	/ 1+	_____) =	_____ lbs
Coarse Agg. # 2	_____ %	_____	- (	_____	/ 1+	_____) =	_____ lbs
Fine Agg. (Sand)	_____ %	_____	- (	_____	/ 1+	_____) =	_____ lbs

A. Aggregate Free Water Total = _____ lbs
B. Water Added At Plant & Jobsite = _____ lbs
C. Admixtures Added = _____ lbs

$$\text{W/C Ratio} = \frac{\text{Total Free Water (A+B+C)}}{\text{Total Cement \& Fly Ash}} = \frac{\_\_\_\_\ \text{lbs}}{\_\_\_\_\ \text{lbs}} = \textbf{W/C Ratio} = \_\_\_\_\_$$

Checked By: _____ Date: _____

AC WORKS SHEET

Supplier: _____ Date: _____

Mix Type **Level:** 1 2 3 4 **Size** _____ **Dense:**

Calculations For: Va, VMA, VFA, Pbe, P0.075/Pbe

								Required Specified Values
AC%	P_b							
Passing #200	$P_{0.075}$							
Rice	G_{mm}							
Bulk Gs.	G_{mb}							
Air Voids	V_a							
Agg. Bulk Gs.	G_{sb}							
Effective Gs.	G_{se}							
Asphalt Gs.	G_b							
% Stone	P_s							Minimum
	VMA							
	VFA							
Absorbed Asphalt	P_{ba}							
% Effective AC	P_{be}							
	$P_{0.075}/P_{be}$							

Remarks:

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Lane County Materials Testing Lab

Lane County Department of Public Works
3040 N. Delta Hwy, Eugene, OR 97408 Ph. (541) 682-6945

Sample #:
Project #:

PROJECT: CONTRACTOR
LOCATION: HMAC Supplier
SAMPLED: DATE: TIME BY Material Source
Lot Number Sublot Number TICKET NO. QUANTITY Ton
HMAC Type: Size in. Dense Open Level 1 2 3 4 Course Wearing Base Leveling

LAB Cost: ACI & SA Moisture T209

AC Content by Ignition & Sieve Analysis

1. Wet Weight of AC Mix - Pan =
2. Dry Weight of AC Mix - Pan =
3. Moisture Content [(L1 - L2) / L2] x 100 = %
4. Wet Weight of AC mix - Pan =
5. Dry Weight AC mix [L4 / (100 + L3)] x 100 =
6. Dry Weight (After Ignition) - Pan =
7. Weight of Burned Asphalt (L5 - L6) =
8. Asphalt Content (L7 / L5) x 100 = %
9. Correction Factor [Mix Design Number] = %
10. Corrected Asphalt Content (L8 - L9) = %

SIEVE SIZE	Accumulated Weight	Percent Retained	Percent Passing	Correction Factor	Corrected % Passing	Gradation Tolerance Min.	Gradation Tolerance Max.	Does Not Meet Specifications X
1 in								
3/4 in								
1/2 in								
3/8 in								
1/4 in								
#4								
#8								
#16								
#30								
#200								
PAN								
Asphalt Content (%) =								

Date Tested
Time:
By:

Notified:
Date:
Time:

Remarks:

Theoretical Maximum Density of Bituminous Mixtures (AASHTO T209A / ODOT Modified)

A Weight of Pycnometer and Lid (gr)
B Weight of Pycnometer, Lid & Sample (gr)
C Weight of Pycnometer, Lid, Sample & Water (gr)
D Temperature ^{O}F (ODOT Requires 77 F +-1.8 F)
E Weight Pycnometer + Water @ 77F

B - A

$$\frac{B - A}{[B - A + E - C]} = \text{Spec. Grav.}$$

T209 Spec. Grav. x 62.4 = Maximum Density PCF

BINDER IGNITION CALIBRATION

MIX: _____ **DATE:** _____

Trial 1

AC%(Pb) _____

INITIAL PAN+MAT		**INITIAL PAN**		**INIT.MAT (M1)**	
FIN. PAN MAT.		**FINAL PAN**		**FIN. MAT. (M2)**	
				Percent Loss (PL)	

Trial 2

AC%(Pb) _____

INITIAL PAN+MAT		**INITIAL PAN**		**INIT.MAT (M1)**	
FIN. PAN MAT.		**FINAL PAN**		**FIN. MAT. (M2)**	
				Percent Loss (PL)	

Trial 3

AC%(Pb) _____

INITIAL PAN+MAT		**INITIAL PAN**		**INIT.MAT (M1)**	
FIN. PAN MAT.		**FINAL PAN**		**FIN. MAT. (M2)**	
				Percent Loss (PL)	

AC%(Pb) _____

INITIAL PAN+MAT		**INITIAL PAN**		**INIT.MAT (M1)**	
FIN. PAN MAT.		**FINAL PAN**		**FIN. MAT. (M2)**	
				Percent Loss (PL)	

PL = [M1 - M2 X 100] - Pb
M1

AVG. MIX CORR. FACTOR, MCF =

	Trial 1		Trial 2		Trial 3		Avg.		
SIZE	**WT**	**%PASS**	**WT**	**% Pass**	**WT**	**% Pass**	**%Pass**	**DIFF.**	**TARGET**
1									
3/4									
1/2									
3/8									
1/4									
#4									
#8									
#16									
#30									
#200									
PAN									

Lane County Materials Testing Lab

Lane County Department of Public Works
3040 N. Delta Hwy, Eugene, OR 97408 (541) 682-6945

Sample #: _____

Project #: _____

PROJECT: _____ CONTRACTOR: _____

LOCATION: _____

SAMPLED: DATE: _____ TIME: _____ BY: _____

Concrete Testing

Field Testing

☐ PCC Pavement ☐ Curb & Gutter ☐ Manholes

☐ Sidewalk ☐ Pole Base ☐ Bridge Deck ☐ Bridge Bent: _____

☐ Footing: _____ ☐ _____

Class Specified: _____ Supplier: _____ Amount: _____ yd^3

Class Delivered: _____ Mix Design: _____ Ticket #: _____

Ambient Temp: _____ °F Weather: _____

Concrete Temp: _____ °F Spec: _____ °F

Slump: _____ in Spec: _____ in Water Added: _____ gal

Air Content: _____ % Spec: _____ % W/C Ratio: _____

Unit Weight: _____ lbs/ft^3 Relative Yield: _____ yd^3

Laboratory Testing

Lab Cost _____

Sample: ☐ Picked Up ☐ Delivered Date Received: _____

Size: ☐ 6" Cylinders ☐ 4" Cylinders ☐ Other: _____

Field Markings	Age at Break	Date of Break	Total Load (lbs)	Compressive Strength (psi)	Tested By	Notified

28 day Average: _____ psi

☐ **MEETS SPECIFICATIONS** ☐ **DOES NOT MEET SPECIFICATIONS**

Remarks: _____ REDI-MIX TRUCK SETTINGS:

AGG.:

SAND:

METER:

TRUCK #:

Checked By: _____

Batch Masses (lb)

Cement _____ lbs
Fly Ash _____ lbs
Coarse Agg. # 1 _____ lbs
Coarse Agg. # 2 _____ lbs
Fine Agg. (Sand) _____ lbs

Water Batched _____ lbs
Water Jobsite _____ gal
Total Add Water _____ gal = _____ lbs
Admixtures (Total oz) _____ oz = _____ lbs

Total Batch Mass _____ lbs

Field Tests

Ambient Temp. _____ °F
Concrete Temp. _____ °F
Slump _____ in
Air Content _____ %

Admixtures

_____ _____ oz
_____ _____ oz
_____ _____ oz
_____ _____ oz

(Approx. liquid conversions: 1 gal = 128 oz = 8.32823 lbs)

Unit Weight

Concrete + Pot (Gross) _____ lbs
- Pot Weight (Tare) _____ lbs
Concrete Weight = _____ lbs ÷ Pot Calibration _____ = _____ lbs/ft³

Yield

$$\frac{\text{Total Batch Mass}}{\text{Unit Weight}} = \frac{\_\_\_\_\ \text{lbs}}{\_\_\_\_\ \text{lbs/ft}^3} = \_\_\_\_\ \text{yd}^3$$

Cement Content

$$\frac{\text{Total Cement \& Fly Ash}}{\text{Yield}} = \frac{\_\_\_\_\ \text{lbs}}{\_\_\_\_\ \text{yd}^3} = \_\_\_\_\ \text{lbs/yd}^3$$

Water/Cement Ratio

Batch Mass − (Batch Mass / (1+ Free Moisture Factor)) = Agg. Free Water

(Free Moisture Factor = Agg. % Free Moisture / 100)

	Agg. % Free Moisture	Aggegate Free Water					
Coarse Agg. # 1	_____ %	_____	- (	_____	/ 1+	_____) =	_____ lbs
Coarse Agg. # 2	_____ %	_____	- (	_____	/ 1+	_____) =	_____ lbs
Fine Agg. (Sand)	_____ %	_____	- (	_____	/ 1+	_____) =	_____ lbs

A. Aggregate Free Water Total = _____ lbs
B. Water Added At Plant & Jobsite = _____ lbs
C. Admixtures Added = _____ lbs

$$\text{W/C Ratio} = \frac{\text{Total Free Water (A+B+C)}}{\text{Total Cement \& Fly Ash}} = \frac{\_\_\_\_\ \text{lbs}}{\_\_\_\_\ \text{lbs}} = \textbf{W/C Ratio} = \_\_\_\_\_$$

Checked By: _____ Date: _____