**DESIGN A/E NOTE - GUIDE SPECIFICATION CONVENTIONS**

**Color-highlighted text**

**Yellow: Editor’s Notes. Comments inserted into the text are addressed to the A/E, not the Contractor. Editor’s Notes are formatted as hidden text. Editor’s Notes are not identified with an update. Do not print Editor’s Notes in issue for distribution to Bidders/Contractors.**

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**Red: Text updated in 1st quarter. April – June.**

**Strikethrough text and highlighting (not text) in previously issued quarters are deleted. Only 1st quarter highlighted updated text is indicated.**

**Turquoise: Text updated in 2nd quarter. July – September.**

**1st quarter updated text remains highlighted.**

**Pink: Text updated in 3rd quarter. October – December.**

**1st and 2nd quarter updated text remain highlighted.**

**Bright Green: Text updated in 4th quarter. January – March.**

**1st, 2nd and 3rd quarter updated text remains highlighted.**

**Text Editing**

**Select options [in brackets] and edit <notes> before issuing specifications for distribution to Bidders/Contractors.**

**Delete Strikethrough text.**

**Tip: To delete strikethrough text, choose Edit on Menu bar, click Find, Find tab, More (Search Options opens), select All, click Format, Font, check Strikethrough, OK.**

**Click Replace tab, Replace All, OK, Close. Save.**

**Delete all highlighting of text from issue to be distributed to Bidders/Contractors.**

**Tip: To delete highlighting, locate cursor at beginning of Section and block all text in Section, press Shift + Control + End, click No Highlight icon on Formatting toolbar. Save.**

**IMPORTANT: Retain month and year under section title on first page indicating updated Guide Specification Section issue used.**

**Note: This** page **will not print when Hidden text is unchecked as indicated in Editor’s Notes Tip.**

IF THE HIDDEN GUIDE SPECIFICATION CONVENTIONS DO NOT APPEAR PRECEEDING THIS

NOTE, TURN THEM ON AS FOLLOWS.

**FOR MICROSOFT WORD 2000 and 2003**, CLICK ON SHOW/HIDE ICON IN MENU BAR OR CHOOSE

TOOLS IN MENU BAR. THEN CLICK OPTIONS, VIEW TAB, UNDER FORMATTING MARKS, CHECK

HIDDEN TEXT.

**FOR MICROSOFT WORD 2007,** CLICK ON MICROSOFT OFFICE ICON LOCATED IN UPPER LEFT

CORNER OF MENU BAR. CLICK ON WORD OPTIONS AT BOTTOM OF DROP DOWN. THEN CLICK

ON DISPLAY. CHECK THE HIDDEN TEXT BOX.

**FOR MICROSOFT OFFICE 2010,** CLICK ON FILE BUTTON LOCATED IN UPPER LEFT CORNER OF

MENU BAR. IN THE DROP DOWN, CLICK ON OPTIONS, AND A WORD OPTIONS BOX WILL

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THE GUIDE SPECIFICATION CONVENTIONS SHOULD NOW BE VISIBLE IN THE DOCUMENT.

(Delete this note before printing.)

SECTION 01 45 00

QUALITY CONTROL

(Edited from DeCA June 2022 Design Criteria)

1. GENERAL۞
   * + 1. SUMMARY
          1. Section Includes:

Quality control.

Field engineering.

Sample forms and reports.

* + - 1. REFERENCES
         1. The publications listed below form a part of this Specification to the extent referenced. The publications refer to the text by the basic designation only.

American Society for Testing and Materials (ASTM).

ASTM C 1077: Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

ASTM D 3666: Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials.

ASTM D 3740-08: Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

ASTM E 329-08: Specification for Agencies Engaged in Construction Inspection and/or Testing.

ASTM E 543-08a: Specification for Agencies Performing Nondestructive Testing.

* + - 1. SUBMITTALS
         1. Refer to Division 01 Section Administrative Requirements for procedures.
         2. Submittal Schedule:

Provide the indicated quantity by the delivery date.

* + - * 1. Submittal List:

Reference Submittal Item Quantity Action

1.4 Quality Control Plan X R

1.4 Complete Submittal Register and Schedule X R

1.4 Quality Control Report X I

1.4 Testing Plan and Log X I

1.4 Monthly Summary Report of Field Tests X I

1.4 QC Meeting Minutes X I

1.4 Rework Items List X I

1.4 QC Certifications X I

1.4 QC Punch List X I

X Submit quantity specified in Division 01 Section Administrative Requirements.

R Review each submittal, mark to indicate action taken, and return.

I Submittal is for information or record purposes only. No action will be taken.

* + - 1. QUALITY CONTROL (QC)
         1. QC Program Requirements:

Establish and maintain a QC program as described in this Section. The QC program consists of a QC Organization, a QC Plan, a Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review and approval, and QC certifications and documentation. The program provides materials, equipment, workmanship, fabrication, construction, and operations which comply with the requirements of this contract. The QC program covers project construction operations on-site and off-site.

* + - * 1. QC Organization:

QC Manager:

Duties: Provide a QC organization and on-site Manager at the work site to manage and implement the QC program. Restrict the duties and responsibilities of the QC Manager to managing and implementing the QC program only. Require the QC Manager to attend the Coordination and Mutual Understanding Meeting, conduct the QC meetings, perform the three phases of control, and perform submittal review and approval. Submittal review and approval includes those designated for Contracting Officer approval. The QC Manager shall review all submittals for conformance with the contract documents and sign off on the review. Perform required testing and prepare QC certifications and documentation required in this contract. The QC manager shall be on site all times work is being performed. The QC Manager is solely responsible for quality of work and ensuring all work is performed in compliance with the contract documents. The QC Manager shall have authority to require corrective action on work site. The QC Manager shall report directly to an officer or other top level official of the firm. The QC Manager shall not be the same individual as, nor be subordinate to, the project superintendent, the project Manager, or any other on-site personnel.

Qualifications:

Projects Under $5M: The on-site QC manager from this firm must have a minimum of 5 years experience as engineer, QC Manager, Project Manager, or architect on similar size and type construction contracts.

Projects Over $5M: The on-site QC manager shall be from an independent firm that specializes in construction quality control over-site, and must have as a minimum of 5 years experience as QC Manager on commercial construction projects of similar size and type construction contracts.

Provide resume. Submit to Contracting Officer for approval, at least 2 weeks prior to placing the QC on site.

Alternate QC Manager Duties and Qualifications: Designate an alternate for the QC Manager at the work site to serve in the event of the designated QC Manager's absence. The QC Manager’s period of absence may not exceed two weeks at any one time, and not more than 30 work days during a calendar year. The qualification requirements for the alternate QC Manager are the same as for the QC Manager.

Submit resume to Contracting Officer for approval. Indicate qualifications, experience in area of responsibility, and frequency as alternate QC Manager.

* + - * 1. Quality Control (QC) Plan.

Requirements: Within ten (10) from Notice to Proceed, provide for approval by the Contracting Officer, a QC plan that covers both on-site and off-site work and includes the following:

A chart showing the QC organizational structure and its relationship to the production side of the organization.

Names and qualifications, in resume format, for each person in QC organization.

Duties, responsibilities, and authorities of each person in the QC organization.

A listing of outside organizations such as, architectural, consulting engineering, and testing lab firms employed by the contractor and a description of the services these firms will provide.

A letter signed by an officer of the firm appointing the QC Manager and Alternate Manager and stating that he/she is responsible for managing and implementing the QC program as described in this contract. Include in this letter the QC Managers' authority to direct the removal and replacement of non-conforming work.

Procedures for reviewing, approving, and managing submittals. Provide name(s) of the person(s) in the QC organization authorized to review and certify submittals prior to approval.

Testing laboratory information required by paragraph entitled "Accredited Laboratories" or "Testing Laboratory Requirements," as applicable.

A Testing Plan and Log that includes the tests required, referenced by the specifications paragraph number requiring the test, the frequency, and the person responsible for each test.

Procedures to identify, record, track, and complete rework items.

Documentation procedures, including proposed report formats.

A list of the definable features of work. A definable feature of work is a task that is separate and distinct from other tasks and requires separate control requirements. As a minimum, if approved by the Contracting Officer, consider each section of the specifications as a definable feature of work. However, at times, there may be more than one definable feature of work in each section of the specifications.

A submittal register and schedule shall be submitted no later than 90 calendar days from NTP. The submittal register shall show a schedule of all submittals tied to the approved project schedule for proper project planning. The submittal register shall be managed by the QC manager and updated monthly.

Preliminary Work Authorized Prior to Approval: The only work authorized to proceed prior to the approval of the QC Plan is mobilization of storage and office trailers and surveying subject to Division 01 Section Temporary Facilities and Controls.

Approval: Obtain approval of the QC Plan prior to the start of construction. The Contracting Officer reserves the right to require changes in the QC Plan and operations as necessary to ensure the specified quality of work. The Contracting Officer reserves the right to interview any member of the QC organization at any time to verify his/her submitted qualifications.

Notification of Changes: Notify the Contracting Officer, in writing, of any proposed changes, including changes in the QC organization personnel, a minimum of seven calendar days prior to a proposed change. The Contracting Officer must approve proposed changes and reserves the right to deny the proposed change.

* + - * 1. Construction Management Plan:

Participate in the development of a Construction Management Plan, which will aid all project participants by detailing the communication and administrative procedures used to implement this contract.

The plan will include forms and formats to be used and appropriate instructions, specific addresses for mailing and delivery, and identification of expected decision points in the project. Nothing in the plan will replace the contract.

At the Pre-performance Conference, the Contracting Officer will furnish a draft of the plan to the Contractor for his review, markup, and comment. The Contractor and the Government Authorized Technical Representative will meet to review suggested revisions.

The Contracting Officer or Government Authorized Technical Representative will furnish one copy of the final approved plan for the Contractor's use.

* + - * 1. Coordination and Mutual Understanding Meeting:

After submission of the QC Plan, but prior to the start of construction, meet with the Contracting Officer to discuss the QC program required by this contract. The purpose of this meeting is to develop a mutual understanding of the QC details. This includes forms used for documentation, administration for on-site and off-site work, and the coordination of the contractor's management, production, and QC personnel with the Contracting Officer. As a minimum, the contractor's personnel required to attend include the Project Manager, Project Superintendent, QC Manager, Assistant QC Manager, and QC Specialist. The QC Manager prepares the minutes of the meeting, and both the Contractor and the Contracting Officer signs this document.

* + - * 1. QC Meetings:

After the start of construction, the QC Manager conducts weekly QC meetings at the work site with the project superintendent. The QC Manager prepares minutes of the meeting. Provide a copy to the Contracting Officer within 2 working days after the meeting. The Contracting Officer or Government Authorized Technical Representative may attend these meetings. Notify the Contracting Officer at least 48 hours before each meeting. This meeting requirement is solely for quality control and is in addition to the weekly construction meeting held by the Government Authorized Technical Representative or Contracting Officer and the QC manager’s preparatory meetings. As a minimum, accomplish the following at each meeting:

Review the minutes of the previous meeting.

Review the schedule and the status of work:

Work or testing accomplished since last meeting.

Rework items identified since last meeting.

Rework items completed since last meeting.

Review the status of submittals:

Submittals reviewed and approved since last meeting.

Submittals required in the near future.

Review the work scheduled in the next week and documentation required. Schedule the three phases of control and testing:

Preparatory phases required.

Initial phases required.

Follow-up phases required.

Testing required.

Status of off-site work or testing.

Documentation required.

Establish completion dates for rework items.

Resolve QC and production problems.

Address items that may require revising the QC Plan.

Changes in QC organization personnel.

Changes in procedures.

* + - * 1. Three Phases of Control: The QC Manager performs the three phases of control to ensure that work complies with contract requirements. The three phases of control cover both on-site and off-site work and include the following for each definable feature of work:

Preparatory Phase: Notify the Contracting Officer at least 2 work days before each preparatory phase meeting. Conduct the meeting with the Government Authorized Technical Representative, QC specialist, the Superintendent, the foreman responsible for the definable feature of work, and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials. The Contracting Officer or Government Authorized Technical Representative may attend. The QC Manager shall coordinate with the Safety officer and ensure all associated Activity Hazard Analysis are prepared for approval and reviewed prior to the meeting. The QC Manager shall ensure all necessary submittals and items are procured and ready for this associated definable feature of work. The QC Manager prepares minutes of the meeting. Provide a copy to the Contracting Officer within 2 working days after the meeting. This meeting requirement is solely for quality control and is in addition to other quality meetings. Perform the following prior to beginning work on each definable feature of work:

Review the progress of other construction activities and preparations for the particular activity under consideration at each meeting, including requirements for the following:

Contract documents.

Options.

Related changes to the contract.

Interface requirements.

Sequences.

Status of submittals.

Off-site fabrication issues.

Housekeeping.

Status of RFI’s.

Purchases.

Deliveries.

Shop drawings, product data, and quality-control samples.

Possible conflicts.

Compatibility problems.

Time schedules.

Approved construction schedules

Weather limitations.

Manufacturer's recommendations.

Warranty requirements.

Compatibility of materials.

Acceptability of substrates.

Temporary facilities.

Space and access limitations.

Governing regulations.

Inspecting and testing requirements.

Required performance results.

Recording requirements.

Protection.

Review each paragraph of the applicable specification sections.

Review the Contract Drawings.

Submittal and approval of appropriate shop drawings and submittals for materials and equipment. Verify receipt of approved factory test results, when required.

Review the testing plan and provide the required QC testing.

Examine the work area to ensure the completion of the required preliminary work.

Examine the required materials, equipment, and sample work to ensure that they are on hand and conform to the approved samples, shop drawings and submitted data.

Review the safety plan and appropriate activity hazard analysis to ensure the compliance of applicable safety requirements and the submittal of required Material Safety Data Sheets (MSDS).

Discuss construction methods.

Record significant discussions, agreements, and disagreements of each meeting. Promptly distribute the record of the meeting to everyone concerned, including the Contracting Officer.

Proceed with the installation only after successfully concluding the meeting. Initiate whatever actions are necessary to resolve impediments to performance of work and reconvene the meeting at the earliest feasible date.

Initial Phase: Notify the Contracting Officer at least 2 work days before each initial phase. When construction crews are ready to start work on a definable feature of work, conduct the initial phase with the Government Authorized Technical Representative, QC specialist, the superintendent, and the foreman responsible for that definable feature of work. Observe the initial segment of the definable feature of work to ensure that the work complies with contract requirements. Document the results of the initial phase in the daily Contractor Quality Control Report. Repeat the initial phase for each new crew to work on site, or when specified quality is below acceptable levels. Perform the following for each definable feature of work:

Establish the quality of workmanship required.

Resolve conflicts.

Review the Safety Plan and the appropriate activity hazard analysis and ensure compliance to applicable safety requirements.

Ensure that the approved laboratory performs the required tests.

Follow-up Phase: Perform the following for on-going work daily, or more frequently as necessary until the completion of each definable feature of work and document in the daily Contractor Quality Control Report:

Ensure the work is in compliance with contract requirements.

Maintain the quality of workmanship required.

Ensure that the approved laboratory performs the required testing. Notify the Contracting Officer or Government Authorized Technical Representative within 48 hours prior to performance of the test.

Ensure that rework items are being corrected.

Additional tests directed by the Contracting Officer to establish materials and installation comply with the contract documents.

Notification of three phases of control for off-site work: Notify the Contracting Officer at least two weeks before the start of the preparatory and initial phases.

* + - * 1. Deficiencies:

QC Manager shall ensure new features of work are not built on deficient work. Deficient work shall be corrected prior to a deficiency being covered up.

All deficiencies, including failed tests or inspections, shall have a correction date proposed and tracked by the QC Manager. The corrective date shall be as soon as reasonably possible.

On Phase transitions or final inspections, the QC Manager shall generate a punchlist and enforce corrective action and track progress down to a minimal punchlist with only minor items remaining prior to requesting Government acceptance of the phase of work or Substantial Completion.

Issue Elevation Process:

Coordinate with field on deficiency or unresolved issue or non- compliance issue and document in daily and request correction thru deficiency log

QC reviews and advises on correction as soon as possible.

If issue is not resolved within a reasonable amount of time, CO may reserve right to direct contractor to correct or withhold 10% of payment or full amount of the pay associated pay activity

* + - * 1. Testing:

Except as stated otherwise in the specification sections, perform sampling and testing required under this contract.

Testing Laboratory Requirements: Provide an independent testing laboratory or establish a laboratory qualified to perform sampling and tests required by this contract. When the proposed testing laboratory lacks accreditation by an acceptable accreditation program, as described by the paragraph entitled "Accredited Laboratories," submit recommended testing agency to the Contracting Officer for approval. Provide certified statements signed by an official of the testing laboratory attesting that the proposed laboratory meets or conforms to the following requirements:

Perform sampling and testing under the technical direction of a Registered Professional Engineer (P.E.) with at least 5 years of experience in construction material testing.

Laboratories engaged in testing of concrete and concrete aggregates meet the requirements of ASTM C 1077.

Laboratories engaged in testing of bituminous paving materials meet the requirements of ASTM D 3666.

Laboratories engaged in testing of soil and rock, as used in engineering design and construction, meet the requirements of ASTM D 3740.

Government will evaluate laboratories engaged in inspection and testing of steel, stainless steel, and related alloys according to ASTM A 880. Laboratories shall meet the requirements of ASTM E 329.

Laboratories engaged in nondestructive testing (NDT) meet the requirements of OSHA and EPA.

Accredited Laboratories: Acceptable accreditation programs are the National Institute of Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHTO) program and the American Association for Laboratory Accreditation (A2LA) program. Furnish to the Contracting Officer, a copy of the Certificate of Accreditation, Scope of Accreditation and latest directory of the accrediting organization for accredited laboratories. The scope of the laboratory's accreditation must include the test methods required by the contract.

Inspection of Testing Laboratories: Prior to approval of non-accredited laboratories, the proposed testing laboratory facilities and records may be subject to inspection by the Contracting Officer. Records subject to inspection include equipment inventory, equipment calibration dates and procedures, library of test procedures, audit and inspection reports by agencies conducting laboratory evaluations and certifications, testing and management personnel qualifications, test report forms, and the internal QC procedures.

Capability Check: The Contracting Officer retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing.

Test Results: Cite applicable contract requirements, tests, or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. The independent testing laboratory shall provide an electronic copy to the Government Authorized Technical Representative, on all test reports as well as the QC Manager. A testing laboratory representative authorized to sign certified test reports must sign test results. Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the QC Manager. Furnish a summary report of field tests at the end of each month. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month. Track failed tests until reworked and passed or accepted by the designer of record. Ensure corrections are performed in a timely reasonable manner.

* + - * 1. Special Inspections:

Retain third-party quality assurance agencies to conduct the special inspections required by the Project Building Code indicated in Division 01 Section Summary of Work. The inspecting agency shall provide reports of the special inspections directly to the Contracting Officer. These inspections are in addition to the inspections specified elsewhere in the Contract Documents.

The quality assurance agencies shall supervise qualified personal that are Registered Professional Engineers and demonstrate competence, to the satisfaction of the Contracting Officer, for inspection of the particular type of construction or operation requiring special inspection. Quality assurance agencies and professional engineers are subject to written approval of the Contracting Officer.

Quality assurance agencies shall conduct special inspections indicated in Statement of Special Inspections as indicated on **[Drawings] [or] [attached schedule and forms]** and, in individual Specification Sections, and as follows:

Verify that manufacturer maintains detailed fabrication and quality-control procedures and review the completeness and adequacy of those procedures to perform the Work.

Notify Contracting Officer and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.

Submit a certified written report of each special inspection and similar quality-control service to Contracting Officer with copy to Contractor.

Submit a final report of special inspections at Substantial Completion, which includes a list of unresolved deficiencies.

Interpret inspections and state in each report whether inspected work complies with or deviates from the Contract Documents.

Re-inspect corrected work.

* + - * 1. QC Certifications:

Contractor Quality Control Report Certification: Each Contractor Quality Control Report must contain the following statement: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report."

Invoice Certification: Furnish a certificate to the Contracting Officer with each payment request, signed by the QC Manager, attesting that as-built drawings are current and attesting that the work for which Contractor requests payment, including stored material, is in compliance with contract requirements.

Completion Certification: Upon completion of work under this contract, furnish a certificate to the Contracting Officer signed by the QC Manager attesting that "Contractor has completed, inspected, tested the work and is in compliance with the contract."

Each Contractor submittal must contain the following statement: "On behalf of the Contractor, I certify that this submittal is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report."

* + - * 1. Documentation:

Contractor Quality Control Report: Provide reports for each day of work and for every seven consecutive calendar days of no-work and on the last day of a no-work period. Submit to the Government Authorized Technical Representative by 10 AM (local) the first workday following the date of the report. Account for each calendar day throughout the life of the contract. Report the work using terminology consistent with the construction schedule. QC Manager must prepare, sign, and date Contractor Quality Control Reports and include the following information:

Identify the control phase and the definable feature of work.

Results of the Preparatory Phase meetings held including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report for this definable feature of work the topics listed in the paragraphs and subparagraphs titled "Three Phases of Control"

Results of the Initial Phase meetings held including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report for this definable feature of work Indicate in the report for this definable feature of work the topics listed in the paragraphs and subparagraphs titled "Three Phases of Control."

Results of the Follow-up Phase inspections held including the location of the definable feature of work. Indicate in the report for this definable feature of work that the work complies with the contract as approved in the Initial Phase and Contractor performed required testing. Include a list of who performed the tests.

Results of the three phases of control for off-site work, if applicable, including actions taken.

List the rework items identified, but not corrected by close of business.

List the rework items corrected from the rework items list along with the corrective action taken.

Include a "remarks" section in this report to document pertinent information including directions received, quality control problem areas, deviations from the QC plan, construction deficiencies encountered, QC meetings held, acknowledgment of as-built drawing updates, corrective directions given by the QC Organization, and corrective actions taken. Notify the Contracting Officer or Government Authorized Technical Representative of any construction deficiencies immediately upon discovery.

Contractor Quality Control Report certification.

Provide in the project website, electronically signed by the Contractor’s QA representative and the Government Authorized Technical Representative. Refer to Division 01 Section Project Web Site for other requirements.

Testing Plan and Log: As Contractor performs tests, record on the "Testing Plan and Log" the date the test results sent to the Contracting Officer. Include remarks and acknowledgment of use of an accredited or approved testing laboratory. Attach a copy of the updated "Testing Plan and Log" to the last daily Contractor Quality Control Report of each month.

Rework Items List: Maintain a list of work that does not comply with the contract, identifying what items Contractor needs to rework, the date the item discovered, and the date Contractor corrected the item. There is no requirement to report a rework item corrected on the same day of discovery. Attach a copy of the "Contractor Rework Items List" to the last daily Contractor Quality Control Report of each month. Take responsibility for items on this list needing rework including those identified by the Contracting Officer.

Record ("As-Built") Drawings: The QC Manager shall review the as-built drawings as required by Division 01 Section Closeout Procedures. Ensure as-built drawings are kept current on a daily basis and marked to show deviations made from the contract drawings. Initial each deviation and each revision. Upon completion of work, furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

Sample Report Forms:

Contractor Quality Control Report.

Contractor Quality Control Report Continuation Sheet.

Government Quality Assurance Report.

Testing Plan and Log.

* + - 1. FIELD ENGINEERING
         1. Summary:

This Article specifies administrative and procedural requirements for field engineering services.

* + - * 1. Examination:

Verify layout information shown on the drawings, with existing benchmarks, before proceeding to lay out the work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.

Existing Utilities and Equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of underground utilities and other construction.

Coordinate between trades.

* + - * 1. Performance:

Work from lines and levels established by the drawings. Establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to locate each element of the project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale drawings to determine dimensions.

Advise the entities engaged in construction activities of marked lines and levels provided for their use.

As construction continues, check control lines for every major element for line, level, and plumb.

Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids, and locations, and control lines and levels required for mechanical and electrical work.

Existing Utilities: Furnish information necessary to adjust, move, or relocate existing structures, utility poles, lines, service, or other appurtenances located in or affected by construction. Coordinate with local authorities having jurisdiction.

1. PRODUCTS (Not Used)
2. EXECUTION (Not Used)

END OF SECTION

| **CONTRACTOR PRODUCTION REPORT**  **(ATTACH ADDITIONAL SHEETS IF NECESSARY)** | DATE |
| --- | --- |

| CONTRACT NO. | TITLE AND LOCATION | REPORT NO. |
| --- | --- | --- |

| CONTRACTOR | SUPERINTENDENT |
| --- | --- |

| AM WEATHER | PM WEATHER | MAX TEMP:  º F | MIN TEMP:  º F |
| --- | --- | --- | --- |

| **WORK PERFORMED TODAY** |
| --- |

| **WORK LOCATION AND DESCRIPTION** | **EMPLOYER** | **NO.** | **TRADE** | **HOURS** |
| --- | --- | --- | --- | --- |
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| JOB SAFETY | **WAS A JOB SAFETY MEETING HELD THIS DATE? 🞏YES 🞏NO**  (If YES attach a copy of the meeting minutes)  **WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? 🞏YES 🞏NO**  (If YES attach copy of completed OSHA report)  **WAS TRENCHING/SCAFFOLD/HV ELECTRICAL/HIGH WORK DONE?  🞏YES 🞏NO**  (If YES attach statement or checklist showing inspection performed)  **WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE 🞏 YES 🞏NO**  **ENVIRONMENT** (If YES attach description of incident and proposed action) | TOTAL WORK HOURS ON JOB SITE THIS DATE |  |
| --- | --- | --- | --- |
| CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT |  |
| TOTAL WORK HOURS FROM START OF CONSTRUCTION |  |

|  |  |  |
| --- | --- | --- |
| LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED |  | SAFETY REQUIREMENTS HAVE BEEN MET |
|  |  |
| EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB | | |
|  | | |
| CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INCLUDE NUMBER OF HOURS USED TODAY | | |
|  | | |
| REMARKS | | |
| CONTRACTOR/SUPERINTENDENT DATE | | |

FORM 01400-1 6/91

SHEET OF

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CONTRACTOR QUALITY CONTROL REPORT**  (ATTACH ADDITIONAL SHEETS IF NECESSARY) | | | | | | | DATE | |
| PHASE | Y‑YES, N‑NO, SEE REMARKS  BLANK - NOT APPLICABLE | | IDENTIFY DEFINABLE FEATURE OF WORK, LOCATION AND LIST PERSONNEL PRESENT | | | | | |
| **P**  **R**  **E**  **P**  **A**  **R**  **A**  **T**  **O**  **R**  **Y** | THE PLANS AND SPECS HAVE BEEN REVIEWED. | |  | | | | | |
| THE SUBMITTALS HAVE BEEN APPROVED. | |
| MATERIALS COMPLY WITH APPROVED SUBMITTALS. | |
| MATERIALS ARE STORED PROPERLY. | |
| PRELIMINARY WORK WAS DONE CORRECTLY. | |
| TESTING PLAN HAS BEEN REVIEWED. | |
| WORK METHOD AND SCHEDULE DISCUSSED. | |
|  |  | |  | | | | | |
| **I**  **N**  **I**  **T**  **I**  **A**  **L** | PRELIMINARY WORK WAS DONE CORRECTLY. | |  | | | TESTING PERFORMED & WHO PERFORMED TEST | | |
| SAMPLE HAS BEEN PREPARED/APPROVED. | |  | | |
| WORKMANSHIP IS SATISFACTORY. | |
| TEST RESULTS ARE ACCEPTABLE. | |
| WORK IS IN COMPLIANCE WITH THE CONTRACT. | |
|  |  |
| **F**  **O**  **L**  **L**  **O**  **W**  **-**  **U**  **P** | WORK COMPLIES WITH CONTRACT AS APPROVED IN INITIAL PHASE. | |  | | | TESTING PERFORMED & WHO PERFORMED TEST | | |
|  |  |  | | |
| REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS) | | | | | | REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST) | | |
| **REMARKS**  On behalf of the contractor, I certify that this report is complete and correct and equipment and materials used and work performed during the reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report. | | | | | AUTHORIZED QC MANAGER AT SITE | | DATE | |
| **GOVERNMENT QUALITY ASSURANCE REPORT** | | | | | | DATE | | |
| QUALITY ASURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT | | | | | | | | |
|  | |  |  | GOVERNMENT QUALITY ASSURANCE REPRESENTATIVE | | | | DATE |

FORM 01400‑1 6/91 *(Back)*  Sheet Of

(Sample of Typical Contractor's Test Report)

**TEST REPORT**

STRUCTURE OR BUILDING: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

CONTRACT NO.: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DESCRIPTION OF ITEM, SYSTEM, OR PART OF SYSTEM TESTED: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DESCRIPTION OF TEST: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

TITLE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SIGNATURE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM, OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR

QUALITY CONTROL INSPECTOR: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DATE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

REMARKS: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **STANDARD REPORT FORMS AND USE** | | |
| **Form Number** | **Form Title** | **Form Use** |
|  | Compaction Test Data Sheet | Soil compaction tests. (Note 1) |
|  | Field Water Content and Density Tests, Data Sheet | Field density tests and respective moisture contents. |
|  | Field Density and Grading Analysis Test (Washington Dens‑o‑Meter Method) | Field density tests and gradation. |
| DD 1206 | Sieve Analysis Data | Sieve analysis data sheet for soils. |
|  | Mechanical Analysis Test Data | Sieve analysis data sheet and hydrometer data sheet for soils. |
|  | Gradation Curves | Gradation graph for soils and aggregates. (To include specification limits) |
|  | Soil Moisture Content | Moisture content sheet for soils and/or aggregates. |
|  | Specific Gravity and Absorption Test Data Sheet | Specific gravity and absorption test for soil and aggregates. |
| DD 1209 | Atterberg Limits Determinations | Test and graph for Atterberg limits tests. |
|  | Gradations of Blended Aggregate | Aggregate blending computation work sheet. |
| DD 1217 | Bituminous Mix Design ‑ Aggregate Blending | Aggregate blending sheet for asphaltic concrete. |
|  | Asphaltic Concrete Mix Design Report | Asphaltic mix design and aggregate grading. |
|  | Extraction Text, Hot Mix Asphalt and Concrete | Extraction test and grading sheet (include fracture face tests if specified). |
| DD 1218 | Marshall Method ‑ Computation of Properties of Asphalt Mixtures | Marshall Test form. |
|  | Daily Plant Inspection Report - Asphalt | Asphalt plant production form (self carboning). |
|  | Screen Analysis of Concrete Aggregates | Gradation test form for aggregates (self carboning). |
|  | Mortar Strength of Fine Aggregate Data Sheet | Flexural and compressive strength test form for mortar. |
|  | Report of Concrete Mixture Design | Mix design sheet for contractor mix submittal. |
|  | Transit Mix Concrete Control Record | Transit or plant mix concrete report (can be substituted by other report with Contracting Officer's approval). |
|  | Concreting Operations Record | Daily report for concrete placing and batch information (self carboning). |
|  | Data Sheet ‑ Compressive and Flexural Strengths of Concrete | Compressive and/or flexural strength testing (include averages per specification). |
|  | Concrete Cylinder Test Record | Compressive strength testing for standard cured and field cured samples. |
|  | Statistical Evaluation of Concrete Compression Tests | Summary sheet of concrete tests. Form can be used for flexural strengths if revised to conform to proper days specified. A separate sheet is to be used for each mix design. |
|  | Test Data on Absorption and Moisture Condition of Masonry Blocks. | Absorption and moisture condition tests of masonry units. |

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| **Backfills, Subgrade, Subbase, and Base Course Material** | | |
| **Material** | **Test** | **Minimum Sampling and Testing Frequency** |
| Backfill for foundations and walls, trenches, streets, roads, and sidewalks | Gradation (Note 1) | 1 every 380 m3 (500 CY) or 1 per day for quantities exceeding 20 m3 (25 CY)/lift. |
| In‑Place Density (Note 2/12) | 1 every 380 m3 (500 CY) or 1 per day for quantities exceeding 20 m3 (25 CY). |
| Moisture‑Density Relationship (Note 3) | 1 prior to start of backfilling operations, 1 every 20 densities and any time material type changes. |
| Pipe Bedding | Gradation (Note 1) | 1 every 75 m3 (100 CY) |
| Subgrade | In‑Place Density (Note 2/12) | 1 every 1670 m2 (2000 sy) of each type subgrade material. |
| Moisture‑Density Relationship (Note 3) | 1 for every 20 densities for each material. |
| Gradation | 1 for every moisture‑density. |
| Subbase and Base | Gradation (Note 1) | 1 sample every 750 m3 (1000 CY). |
| In‑Place Density(Note 2/12) | 1 sample every 750 m3 (1000 CY). |
| Moisture‑Density Relationship (Note 3) | 1 initially and every 20 density tests. |

| **Asphaltic Concrete and Pavements** | | |
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| **Material** | **Test** | **Minimum Sampling and Testing Frequency** |
| Mix Design (by Contractor) | Submittal | Design Mix (include test results)(Note 4):  Blended Aggregate: 45 kg (100 lbs.)  Asphalt: 3.9 L (1 gal.)  Mineral Filler: 4.5 kg (10 lbs.) |
| Asphalt (including and prime and tack coat) | Sample and certification.  (viscosity, flash point, penetration) | Submit a 1-quart sample material certification with test results for each shipment or lot of asphalt. Retain a duplicate 1-quart sample until completion of Work. |
| Aggregates (from bins or source not to exceed 1/2") | Gradation | 1 test prior to start of paving operation and every 360 t (1500 tons) or 750 m3 (1000 CY). |
| Fractured Faces | Same as gradation. |
| LA Abrasion | 1 test prior to start of paving and 1 test every 9070 t (10,000 tons) thereafter. |
| Specific Gravity | Same as gradation. |
| Asphaltic concrete (including asphalt treated base) | Marshall Method Test | 1 test (set of 2 specimens) per day for more than 90 t (100 tons) and 1 per 2720 t (3000 tons) thereafter. |
| Specific Gravity | 1 per each Marshall Test. |
| Extraction | 1 test per day for more than 90 t (100 tons) and every 900 t (1000 tons) thereafter. 1 test for each Marshall Method. |
| Gradation (Note 5) | 1 per each extraction test. |
| Fracture Faces(Note 5) | 1 per each extraction test. |
| Cored or sawed specimens | Perform complete test (thickness, percent voids ‑ total mix, percent voids - total filled with bitumen, in‑place density and bulk specific gravity) on each cored or sawed sample. (Note 12) | Take 1 set of 3 cored sawed specimens from locations in the pavement of each test batch from which Marshall specimens were prepared. Where joints were formed with previously placed new pavement, take one specimen from longitudinal joint. If no longitudinal joints, take specimen from transverse joint. Specified density ‑ not more than 20% of all tests may fall below the specified density. |

| **Portland Cement Concrete** | | |
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| **Material** | **Test (Note** 6) | **Minimum Sampling and Testing Frequency** |
| Mix Design (by Contractor) | Submittal | Mix design for each class of concrete in accordance with ACI 211. Include all material, tests, and certifications below. Also, include proportions; slump, air content, and water cement ratio (include certification of compatibility for more than one admixture). |
|  | Strength tests at 7, 28, and 90 days and for paving mixes include flexural strengths at 7, 14, 28, and 90 days if specifications require for control. Plant Data ‑ include compressive strength data used to establish the standard deviation for each class of concrete with a minimum of 30 tests each, if available. Refer to ACI 214. |
| Portland Cement and Pozzolan | Chemical and Physical tests | Manufacturer's certificate of compliance with a test report for each delivery or lot. Submit a 4.5 kg (10 lb.) sample for every other certification. |
| Admixtures | Certification of compatibility and samples | Submit 1-quart samples during progress of Work upon request by Contracting Officer. Submit certification including test results for each lot. |
| Water | Sample and test | Sample and/or water quality test if requested by the Contracting Officer. |
| Coarse Aggregate (for each grading size) (Note 7) | Gradation | 1 test every 380 m3  (500 CY) of concrete. |
| Deleterious | 1 test initially and thereafter when appearance makes the material suspect. (For concrete pavements see Technical Provisions.) |
| Abrasion | 1 every 4540 t (5,000 tons) of aggregate. |
| Moisture, specific gravity and absorption (Note 8) | 1 initially and every 190 m3 (250 CY) thereafter. 1 moisture test prior to any batching and more frequently if hauling and storage does not provide a consistent moisture content. |
| Fine Aggregate (Note 7) | Gradation and fineness modules | 1 every 190 m3 (250 CY) of concrete. |
| Deleterious Substances | (same as coarse aggregate). |
| Moisture, specific gravity and absorption (Note 8) | (same as coarse aggregate). |
| Concrete | Slump | Conduct test every 40 m3 (50 CY) and more frequently if batching appears inconsistent. Conduct with strength tests. |
| Entrained Air | Conduct with slump test. |
| Ambient and concrete temperatures | Conduct with slump tests. |
| Unit weight, yield, and water cement ratio | Conduct with strength tests. Check unit weight and adjust aggregate weights to insure proper yield. |
| Flexural strength and evaluation of results. | For concrete pavements, take one set of 8 beams every 230 m3 (300 CY) of concrete with a minimum of 1 set per day. Test two beams at 7 days, two at 14 days, two at 28 days, and two at 90 days. Evaluate per specifications. |
| Compressive strength and evaluation of results per ACI 214. (includes unit weight of each cylinder) | For all concrete over 8 m3 (10 CY), take one set of 3 cylinders every 115 m3 (150 CY) for each class concrete. Test one cylinder at 7 days and two at 28 days. Maintain a plot and statistical evaluation in accordance with ACI 214 for compressive strength results. Make field cure cylinders when in-situ strengths need be ascertained. |
| Batching and mixing equipment tests | Contract Compliance | Contractor compliance with ASTM C 94 "Standard Specifications for Ready Mix Concrete", with documentation, reports, and certification of compliance. |
| Curing Compound | Certification and submittal | Initially submit a 1-gallon sample with certification and test results for each lot and type of curing compound. |
| Vibrators | Frequency and amplitude | Check frequency and amplitude initially and at any time vibration is questionable. |

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| **Masonry** | | |
| **Material** | **Test** | **Minimum Sampling and Testing Frequency** |
| Concrete Masonry Units (Note 9) | Dry shrinkage (Note 10) | 1 set of 3 per 10,000 units and manufacturer's certification and test report. |
| Airdry condition (Note 11) | Same as dry shrinkage. |
| Absorption | Same as dry shrinkage. |
| Compressive strength | Same as dry shrinkage. |
| Unit Weight | Same as dry shrinkage. |
| Mortar and grout | Gradation | 1 test every 2,000 units (daily). |
| Compressive | 1 set of 3, every 2,000 units (1 test at 7 days and 2 tests at 28 days). |

**NOTES:**

1 All acceptance tests shall be conducted from in‑place samples.

2 Additional tests shall be conducted when variations occur due to the contractor’s operations, weather conditions, site conditions, etc.

3 Classification (ASTM D‑2487), moisture contents, Atterberg limits and specific gravity tests shall be conducted for each compaction test if applicable.

4 Materials to be submitted only upon request by the Contracting Officer.

5 Tests can substitute for same tests required under "Aggregates" (from bins or source), although gradations will be required when blending aggregates.

6 Increase quantities by 50 percent for paving mixes and by 100 percent for Government testing of admixtures. Include standard deviation for similar mixes from the intended batch plant and data from a minimum of 30 tests, if available. Refer to ACI 214.

7 A petrographic report for aggregate is required with the sample for source approval. If the total amount of all types of concrete is less than 150 m3 (200 CY), service records from three separate structures in similar environments which used the aggregates may substitute for the petrographic.

8 Aggregate moisture tests are to be conducted in conjunction with concrete strength tests for w/c calculations.

9 For less than 1,000 units, the above test may be waived at the discretion of the Contracting Officer and acceptance based on manufacturer’s certification and test report.

10 Additional tests shall be performed when changes are made either in the manufacturing processes or in materials used in the production of the masonry units.

11 If adequate storage protection is not provided at the jobsite, additional tests shall be made to determine that the allowable moisture condition has not been exceeded before the blocks can be placed in the structure.

12The nuclear densimeter, if properly calibrated, may be used but only to supplement the required testing frequency and procedures. The densimeter shall be calibrated and is recommended for use when the time for complete results becomes critical.