

SECTION 014010QUALITY ASSURANCE TESTING AND INSPECTION SERVICESPART 1 – GENERAL

1.1 STIPULATIONS

- A. The specifications sections "General Conditions of the Construction Contract", "Special Conditions", and "Division 1 - General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 GENERAL

- A. All testing and inspecting specifically called for and/or described in this section of the specifications are referred to as Quality Assurance Services and are the responsibility of the Quality Assurance Agency. Except as hereinafter specified, Quality Assurance Services will be performed without expense to the Contractor. The Quality Assurance Agency is an independent testing and inspecting agency engaged by the Department through the Professional. Testing required because of changes in materials or proportions at the request of the Contractor shall be at the Contractor's expense. The Professional may engage more than one Quality Assurance Agency to perform services. Whenever the word "Contractor" is used it shall be interpreted to mean Prime Contractor or Contractors as applicable.
- B. Work Not Included: Quality Control Testing to be performed by the Contractor is specified in Section 014000.

PART 2 – PRODUCTS (Not Used)PART 3 – EXECUTION

3.1 RESPONSIBILITIES AND DUTIES OF THE CONTRACTOR

- A. The use of Quality Assurance Services shall in no way relieve the Contractor of its responsibility to furnish materials and construction in full compliance with the plans and specifications or to perform Quality Control Testing where specified.
- B. To facilitate Quality Assurance Inspection or Testing, the Contractor shall:
 1. Secure and deliver to the project site, without cost, representative samples of materials it proposes to use and which are required to be tested under Paragraph 3.4, 'Tests and Inspections'.
 2. Furnish such casual labor as is necessary to obtain and handle samples at the project or at other sources of material.
 3. Provide means of safe access to work areas, provide conditions that allow testing and inspection to take place, provide materials for testing as requested, patch test sites when completed and furnish incidental labor and assistance necessary for inspectors of the Quality Assurance Agency to perform their tests and inspections.

3.2 AUTHORITY AND LIMITATIONS OF QUALITY ASSURANCE AGENCY

- A. Personnel representing the Quality Assurance Agency will not act as foremen nor perform other duties for the Contractor.
- B. Work will be checked as it progresses, but failure to detect any defective work or materials shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate the Department or the Professional for final acceptance.

- C. The Quality Assurance Agency is not authorized to revoke, alter, relax, enlarge, or release any requirements of the specifications, nor to approve or accept any portion of the work.
- D. The Quality Assurance Agency shall report all test and inspection results to the Professional, the Department and the Contractor immediately after they are performed. Selection and frequency of tests shall be at the discretion of the Professional and the Department. All reports shall be uploaded to e-Builder within 24 hours of when the inspection occurs, test is conducted, test results obtained or similar service was conducted.
- E. Written reports of each inspection, test or similar service shall include but not be limited to:
1. Date of issue.
 2. Project title and number.
 3. Name, address and telephone number of testing agency.
 4. Dates and location of samples and tests or inspections.
 5. Names of individuals making the inspection or test.
 6. Designation of the Work and test method.
 7. Identification of product and specification section.
 8. Complete inspection or test data.
 9. Test results and an interpretation of test results.
 10. Ambient conditions at the time of sample taking and testing.
 11. Comments or professional opinion as to whether inspected or tested work complies with Contract Document requirements.
 12. Name and signature of Quality Control Agency inspector.
- F. When it appears that any material furnished or work performed by the Contractor fails to fulfill contract requirements, the Quality Assurance Agency shall report such deficiency to the Professional, the Department and the Contractor.

3.3 CONTRACTOR'S FAILURE TO MEET CONTRACT REQUIREMENTS

- A. The Department and the Professional reserve the right to reject any items which do not meet the requirements of the plans and specifications and will require the contractor to replace these items and bear all expenses in connection with such replacements.
- B. The Contractor shall pay all costs incurred in providing additional testing and/or analysis (including engineering fees) required because of deficient test results or construction not in compliance with requirements of the Contract Documents.

3.4 TESTS AND INSPECTIONS

- A. Tests and inspections listed below may, at the discretion of the Professional and the Department, be performed by an independent Quality Assurance Agency engaged by the Department through the Professional, without expense to the Contractor. The Department reserves the right to change this list at any time.

SECTION 1

<u>REQ'D BY¹</u>	<u>DESCRIPTION OF TEST OR INSPECTION</u>	<u>REFERENCED STANDARD</u>	<u>IBC REFER- ENCE²</u>
	BITUMINOUS PAVING		
DGS	Field inspection of construction procedures		

<u>REQ'D BY¹</u>	<u>DESCRIPTION OF TEST OR INSPECTION</u>	<u>REFERENCED STANDARD</u>	<u>IBC REFER- ENCE²</u>
DGS	Bulk Specific Gravity...of Compacted Bituminous Mixtures...	ASTM D1188 or D 2726	
DGS	Density of Bituminous Concrete in Place by Nuclear Method	ASTM D 2950	
DGS	Thickness or Height of Compacted Bituminous Paving Mixture Specimens	ASTM D 3549	
	CONCRETE		
IBC	1. Inspection of reinforcing steel, including prestressing tendons, and placement	ACI 318: 3.5, 7.1-7.7	1913.4
IBC	2. Inspection of reinforcing steel welding, in accordance with Table 1704.3, Item 5b	AWS D1.4; ACI 318: 3.5.2	
IBC	3. Inspection of bolts to be installed in concrete prior to and during placement of concrete, where allowable loads have been increased or where strength design is used	ACI 318: 8.1.3, 21.2.8	1911.5 1912.1
IBC	4. Inspection of anchors installed in hardened concrete	ACI 318: 3.8.6, 8.1.3, 21.2.8	1912.1
IBC	5. Verifying use of required design mix	ACI 318: Ch. 4, 5.2-5.4	1904.22, 1913.2, 1913.3
IBC	6. At the time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, determine the temperature of the concrete	ASTM C172, C31; ACI 318: 5.6, 5.8	
IBC	7. Inspection of concrete and shotcrete placement for proper application techniques	ACI 318: 5.9, 5.10	1913.6, 1913.7, 1913.8
IBC	8. Inspection for maintenance of specified curing temperature and techniques	ACI 318; 5.11-5.13	1913.9
IBC	9. Inspection of prestressed concrete: a. Application of prestressing forces b. Grouting of bonded prestressing tendons in the seismic-force-resisting system	ACI 318: 18.20 ACI 318: 8.18.4	
	10.		
	11.		
IBC	12. Inspect formwork for shape, location and dimensions of the concrete member being formed.	ACI 318: 6.1.1	
DGS	Review Contractors' design mixes, Certificates of Compliance and material test reports		
DGS	Compressive Strength of Cylindrical Concrete Specimens ²	ASTM C39	

<u>REQ'D BY¹</u>	<u>DESCRIPTION OF TEST OR INSPECTION</u>	<u>REFERENCED STANDARD</u>	<u>IBC REFER- ENCE²</u>
	MASONRY		
DGS	Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry, Annex A7 Compressive Strength ⁶	ASTM C780	
DGS	Method of Sampling and Testing Grout ⁶	ASTM C1019	
	Level 1 Special Inspection		
IBC	1. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.	Art. 1.5 ⁵	
IBC	2. Verification of f'_m and f'_{AAC} prior to construction except where specifically exempted by this code.	Art. 1.4B ⁵	
IBC	3. Verification of slump flow and VSI as delivered to the site for self-consolidating grout.	Art. 1.5B.1.b.3 ⁵	
IBC	4. As masonry construction begins, the following shall be verified to ensure compliance: a. Proportions of site-prepared mortar b. Construction of mortar joint c. Location of reinforcement connectors, prestressing tendons and anchorages d. Prestressing technique e. Grade and size of prestressing tendons and anchorages	Art 2.6A ⁵ Art 3.3B ⁵ Art 3.4, 3.6A ⁵ Art 3.6B ⁵ Art 2.4B, 2.4H ⁵	
IBC	5. The inspection program shall verify: a. Size and location of structural elements b. Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction. c. Specified size, grade and type of reinforcement, anchor bolts, prestressing tendons and anchorages. d. Welding of reinforcing bars e. Preparation, construction and protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F) f. Application and measurement of prestressing force	Art 3.3F ⁵ Sec 1.2.2(e) ⁴ , 1.16.1 ⁴ Sec 1.15 ⁴ , Art 2.4, 3.4 ⁵ Sec 2.1.9.7.2, 3.3.3.4(b) ⁴ Art 1.8C, 1.8D ⁵ Art 3.6B ⁵	Sec 2104.3, 2104.4
IBC	6. Prior to grouting, the following shall be verified to ensure compliance: a. Grout space is clean b. Placement of reinforcement and connectors and prestressing tendons and anchorages c. Proportions of site-prepared grout and prestressing grout for bonded tendons d. Construction of mortar joints	Art 3.2D ⁵ Sec 1.13 ⁴ , Art 3.4 ⁵ Art 2.6B ⁵ Art 3.3B ⁵	
IBC	7. Grout placement shall be verified to ensure compliance with code and construction document provisions a. Grouting of prestressing bonded tendons	Art 3.5 ⁵ Art 3.6C ⁵	

REQ'D BY¹	DESCRIPTION OF TEST OR INSPECTION	REFERENCED STANDARD	IBC REFER- ENCE²
IBC	8. Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed	Art 1.4 ⁵	Sec 2105.2.2, 2105.3
	Level 2 Special Inspection		
IBC	1. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified	Art 1.5 ⁵	
IBC	2. Verification of f'_m and f'_{AAC} prior to construction and for every 5000 square feet during construction	Art. 1.4B ⁵	
IBC	3. Verification of proportions of materials in premixed or preblended mortar and grout as delivered to the site	Art. 1.5B ⁵	
IBC	4. Verification of slump flow and VSI as delivered to the site for self-consolidating grout	Art. 1.5B.1.b.3 ⁵	
IBC	5. The following shall be verified to ensure compliance: a. Proportions of site-prepared mortar, grout and prestressing grout for bonded tendons b. Placement of masonry units and construction of mortar joints c. Placement of reinforcement, connectors and prestressing tendons and anchorages d. Grout space prior to grouting e. Placement of grout f. Placement of Prestressing grout g. Size and location of structural elements. h. Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction. i. Specified size, grade and type of reinforcement, anchor bolts, prestressing tendons and anchorages. j. Welding of reinforcing bars. k. Preparation, construction and protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F). l. Application and measurement of prestressing force.	Art 2.6A ⁵ Art 3.3B ⁵ Sec 1.15 ⁴ , Art 3.4, 3.6A ⁵ Art 3.2D ⁵ Art 3.5 ⁵ Art 3.6C ⁵ Art 3.3F ⁵ Sec.1.2.2(e), 1.16.1 ⁴ Sec. 1.15 ⁴ Art. 2.4, 3.4 ⁵ Sec. 2.1.9.7.2, 3.3.3.4 (b) ⁴ Art. 1.8C, 1.8 ⁵ Art. 3.6B ⁵	2104.3, 2104.4
IBC	6. Preparation of any required grout specimens and/or prisms shall be observed	Art 1.4 ⁵	2105.2.2 2105.3
	STEEL CONSTRUCTION		
IBC	1. Material verification of high-strength bolts, nuts, and washers: a. Identification markings to conform to ASTM standards spec in the approved CDs. b. Manufacturer's Certificate of Compliance required	AISC 360, Section A3.3 and applicable ASTM material standards	

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IBC	2. Inspection of high-strength bolting: a. Snug-tight joints b. Pretensioned and slip-critical joints using turn-of-nut with matchmarking, twist-off bolt or direct tension indicator methods of installation. c. Pretensioned and slip-critical joints using turn-of-nut without matchmarking or calibrated wrench methods of installation (N/A; DGS requires twist-off bolt or direct tension indicator)	AISC 360, Section M2.5	1704.3.3
IBC	3. Material verification of structural steel and cold-formed steel deck: a. For structural steel, identification markings to conform to AISC 360 b. For other steel, identification markings to conform to ASTM standards specified in the approved CDs c. Manufacturer certified test reports	AISC 360, Section M5.5 Applicable ASTM material standards	
IBC	4. Material verification of weld filler materials: a. Identification markings to conform to AWS specification in the approved CDs b. Manufacturer's Certificate of Compliance required	AISC 360, Sect A3.5 and applicable AWS A5 documents	
IBC	5. Inspection of welding: a. Structural steel 1) Complete and partial penetration groove welds 2) Multi-Pass fillet welds 3) Single-pass fillet welds > 5/16" 4) Plug and slot welds 5) Single-pass fillet welds < 5/16" 6) Floor and deck welds b. Reinforcing steel: 1) Verification of weldability of reinforcing steel other than ASTM A 706 2) Reinforcing steel-resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special reinforced concrete shear walls, and shear reinforcement 3) Shear reinforcement 4) Other reinforcing steel	AWS D1.1 AWS D1.3 AWS D1.4 ACI 318: Section 3.5.2	1704.3.1 1704.3.1
IBC	6. Inspection of steel frame joint details for compliance with approved CDs: a. Details such as bracing and stiffening b. Member locations c. Application of joint details at each connection		1704.3.2
DGS	Liquid Penetrant Examination	ASTM E165	
DGS	Guide for Magnetic Particle Examination	ASTM E709	
DGS	Practice for Ultrasonic Contact Examination of Weldments	ASTM E164	
DGS	Guide for Radiographic Examination	ASTM E94	

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IBC			
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IBC			
	SEISMIC RESISTANCE		
IBC	Professional to determine requirements.		1705, 1707, 1708
	WIND REQUIREMENTS		
IBC	Professional to determine requirements.		1706
	GENERAL OVERVIEW OF QC TESTING		
DGS	Review of Contractor QC Testing and Reports		

SECTION 2

<u>REQD BY¹</u>	<u>DESCRIPTION OF TEST OR INSPECTION</u>	<u>REFERENCED STANDARD</u>	<u>IBC REFER- ENCE²</u>
IBC	1.		
IBC	2.		
IBC			

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IBC	4.		
IBC	5.		
IBC	1.		
IBC	2.		
IBC	3.		
IBC	4.		
IBC	5.		
IBC	6.		
IBC	7.		
IBC	1.		
IBC	2.		
IBC	3.		
IBC			
IBC			

<u>REQD BY¹</u>	<u>DESCRIPTION OF TEST OR INSPECTION</u>	<u>REFERENCED STANDARD</u>	<u>IBC REFER- ENCE²</u>
	ENGINEERING SERVICES		
DGS	Review of Contractor QC Test Reports.		
DGS	Review of Contractor QC Soil Bearing Test Reports.		
DGS	On-site Engineering Consultation ⁷		
DGS	Office Engineering Consultation ⁷		

Footnotes:

1. "DGS" are tests required by DGS and "IBC" are test required by Chapter 17 of the 2009 International Building Code.
2. IBC 2009.
3. Not used.
4. Refers to reference ACI 530/ASCE 5/TMS 402.
5. Refers to reference ACI 530.1/ASCE 6/TMS 602.
6. Concrete, mortar or grout molds are to be made by QA Agent under Special Inspection hours.
7. Principal(s) shall be Registered Professional Engineer(s). The Engineer making decisions and recommendations shall be a Registered Pennsylvania Professional Engineer.

END OF SECTION