

Maine Medical Center
Bean 2 Roof Addition
For Construction
Issued for Permit

PERKINS+WILL
C140135461 (MMC) /152168.00 (P+W)
June 14, 2013
February 07, 2014

SECTION 01 46 00.2 - PROGRAM OF STRUCTURAL TESTS AND INSPECTIONS

For compliance with the 2009 International Building Code

Project: Maine Medical Center – Bean 2 Roof Addition

Location: Maine Medical Center
22 Bramhall Street
Portland, ME 04102

Owner: Maine Medical Center
22 Bramhall Street
Portland, ME 04102

Architect of Record (AOR): Perkins+Will Architects.
225 Franklin Street, Suite 1100
Boston, MA 02110
Phone: 617-478-0300

Structural Engineer of Record (SER): Simpson Gumpertz & Heger Inc.
41 Seyon St., Building 1, Suite 500
Waltham, MA 02453
Phone: 781-907-9000

This program of structural tests and inspections is submitted as a condition for issuance of the building permit in accordance with the 2009 International Building Code (IBC).

The following firms, agencies, or individuals (hereinafter referred to collectively as *agents*) will perform the tests and inspections under the direction of the SER:

Abbreviation	Agent
AOR	Architect of Record – Perkins+Will Architects
SER	Structural Engineer of Record – Simpson Gumpertz & Heger (SGH)
SI	Special Inspector – Simpson Gumpertz & Heger (SGH)
GE	Project Geotechnical Engineer – N/A
TL1	Testing Lab #1 – S.W. Cole Engineering, Inc (SW Cole)
CMQC	Construction Manager Quality Control – Suffolk Construction
FQC	Fabricator Quality Control (To Be Determined)

The abbreviations will be used on the attached pages to identify which agent is performing the particular tests or inspections.

In accordance with Section 1704 of the International Building Code 2009, the Special Inspector shall be employed by the owner or the owner's agent. The Special Inspector shall be qualified to perform tests and inspections described in this program. The Special Inspector shall be responsible for implementing all of the tests and inspections described in this program. The tests and inspections described in this plan do not relieve the contractor of responsibility to maintain the quality of the work.

The following categories of structural tests and inspections, if checked, are included in the program for structural tests and inspections for this project. The specific tests and inspections required for each checked category are listed on the page noted opposite the category.

Category

- In-situ bearing strata for footings
- Controlled structural fill (prepared fill)
- Pile foundations
- Pier foundations
- Cast-in-place concrete construction
- Precast concrete construction

Category

- Steel construction
- Masonry construction
- Wood construction
- Curtain walls (wall panels and veneers)
- Light gauge metal framing
- Special cases

The following items of construction, if checked, are specified in the contract documents on a performance basis. Their structural design will be reviewed by the SER and their construction is included in the program for tests and inspections on the attached sheets:

- Curtain walls
- Precast concrete components
- Post-tensioning steel
- Structural steel connections
- Metal buildings
- Light gage metal framing
- Wood roof trusses
- Spray-Applied Fire Resistant Material

The following items are excluded from this program of structural tests and inspections because they are designed by other structural engineers not under the aegis of the SER; the SER was not retained to provide performance specifications for their design. These other structural engineers may be assigned by the owner, architect, or construction contractor, as applicable, to be special SER's for their respective designs and to provide a program of structural tests and inspections for their respective designs.

Curtain walls and cladding systems

Light gage metal framing

Prepared by the Structural Engineer of Record:
Name: John H. Thomsen, IV, PhD, P.E. (ME # 11120 - Civil)

Signature: _____

Firm: Simpson Gumpertz & Heger Inc.

Date: _____

Registration Seal

Steel Construction – IBC Section 1704.3

Item	Agent	Criteria/Scope
1. Fabricator Certification/ Quality Control Procedures (IBC 1704.2.1)	FQC, CMQC, SI, TL1	<ul style="list-style-type: none"> • Review plant quality control procedures. • Inspect plant storage and handling procedures. • Confirm that approved submittals are in the plant and are being used for fabrication. • Review welders' certifications. • File welder certifications and any other quality assurance documentation as required by building department. • The foregoing certification requirements will be waived if the structural steel fabricator is certified by the American Institute of Steel Construction's Quality Certification Program for Structural Steel Fabricators and the fabricator submits evidence of this certification, certifies that the work is performed in accordance with the construction documents, and provides quality control records specific to the project.
2. Fabricator Inspection (IBC 1704.2.1)	FQC, CMQC, SI, TL1	<ul style="list-style-type: none"> • Inspect fabrication and fabricated steel per items 2, 3, and 4 below at two separate plant visits scheduled at beginning of fabrication and at approx. 80% complete, or as directed by the SER. • The foregoing certification requirement will be waived if the structural steel fabricator is certified by the American Institute of Steel Construction's Quality Certification Program for Structural Steel Fabricators and the fabricator submits evidence of this certification and certifies that the work is performed in accordance with the construction documents. • Review prequalification test report for the shop coat of paint applied to slip critical connections to comply with Class A or B per RCSC Specification as required.
3. Material Certifications	FQC, SI, TL1	<ul style="list-style-type: none"> • Review mill reports, certificates, and identification markings of all structural steel, bolts, nuts, and washers for compliance with the ASTM Specifications required by the Contract Documents and by AISC LRFD Specification Section A3. • Inspect certificates of weld filler material for compliance with the AWS Specifications required by the Contract Documents and by AISC LRFD Specification Section A3.

<p>4. Bolting</p>	<p>FQC, CMQC, TL1</p>	<ul style="list-style-type: none"> • Prior to releasing containers of fastener assembly components for incorporation into the work, verify bolt, nut, and washer diameters and material grades for compliance with the Contract Documents requirements. • Inspect a random sample of at least 25% percent of all bolts in pre-tensioned connections. Inspect a random sample of at least 25% of all bolts in bearing-type, snug-tightened connections. All inspections shall be made per the RCSC Specification. The required quantities of bolts to be inspected may be modified at the discretion of the SER. • For all connections using A490 bolts, verify that the grade marks on the nuts are visible on the exterior sides of the connections. Verify that only grade DH or DH3 nuts are used with A490 bolts. • Observe and record the method used to achieve bolt tension. • For bolts to be pre-tensioned, field test no fewer than three complete fastener assemblies of each combination of diameter, length, grade, and lot with a tension calibrator following the procedure to be used in the work. Verify that the pre-tensioning method develops a pretension that is equal to or greater than 1.05 times the pretension specified in Table 8.1 of the RCSC bolt specification. The number of tests required may be increased at the discretion of the SER or inspector. • Inspect daily wrench calibration procedures if applicable.
<p>5. Field Welding</p>	<p>FQC, CMQC, TL1</p>	<ul style="list-style-type: none"> • Perform weld inspections and tests per Chapter 6 of AWS D1.1. Weld inspectors shall be certified per AWS D1.1. • Perform visual inspections of all welds for conformance with the contract documents and erection drawings with the applicable visual inspection requirements of AWS D1.1. Review with SER scope of visual inspection as work progresses. • Frequency of testing by ultrasonic or magnetic particle testing methods of other welds as follows: <ol style="list-style-type: none"> 1. 5% of partial penetration groove welds 2. 100% of welds subject to tension (hangers, etc.)

		<ol style="list-style-type: none"> 3. 100% of all complete joint penetration walls, multi-pass fillet welds, and single-pass fillet welds greater than 5/16 in. 4. 10% of all other welds including deck and floor plate welds 5. 100% of all remade welds 6. additional inspection as determined by inspector and/or SER if defects are revealed.
6. Structural Framing, Details and Assemblies	FQC, CMQC, TL1	<ul style="list-style-type: none"> • Inspect member sizes, milled surfaces, and installation and connection details for compliance with approved shop drawings and with Contract Documents. • Verify columns are plumb within AISC tolerances. • Verify columns and beams have correct piece marks and located and oriented per appropriate drawings.
7. Base Plate Grouting and Anchor Rods	FQC, CMQC, TL1	<ul style="list-style-type: none"> • Observe grouting operations to verify that grout is of flowable consistency and is consolidated beneath column base plates without air voids. • Test column base plate non-shrink grout cubes restrained from all sides per ASTM C109, and for shrinkage/expansion properties per ASTM C1090. Test 3 cubes per day during grouting operations. • Verify that washer plates on anchor rods are welded to column base plates.
8. Metal Decking	FQC, CMQC, TL1	<ul style="list-style-type: none"> • Review mill reports for all deck material delivered to the site. • Verify gauge, width, type (profile) of deck, and orientation for conformance with approved shop drawings and with Contract Documents • Verify welder certifications. • Inspect placement for proper installation of approved screws, puddle welds, other mechanical fasteners (if any), and accessories for compliance with SDI, AWS D1.3, and the Contract Documents. • Inspect placement of deck reinforcement at openings and other discontinuities for compliance with approved shop drawings and with Contract Documents. • Inspect repair of damaged galvanized finish for compliance with Contract Documents.
9. Field-Installed Shear	FQC, CMQC,	<ul style="list-style-type: none"> • Perform inspection of stud installation to verify location, diameter, quantity, installation of studs, and ferrule removal is

Connectors	TL1	<p>in accordance with the Contract Documents and that the installation is in compliance with AWS D1.1 Chapter 7.</p> <ul style="list-style-type: none"> • Daily preproduction testing: per AWS D1.1 Section 7.7 except that five studs are to be tested and that the studs are to be capable of bending 45 degrees from vertical without weld failure. • Visual inspection of production stud installation per AWS D1.1 Section 7.8. • Continuous testing during installation (in addition to the testing required by studs that do not pass the visual inspection): A minimum of two hammer stud bend tests on each structural member at 1/3 points on the span. If a failure occurs, every stud on the structural member is to be tested. Retest all studs that are replaced.
10. Expansion Anchors	FQC, CMQC, TL1	<ul style="list-style-type: none"> • Inspect installation of each anchor. • Verify that existing reinforcing steel is not cut when drilling holes for anchors. • Verify anchor diameter, markings, seating of washer, embedment, and torque of anchors.
11. Adhesive Anchors	FQC, CMQC, TL1	<ul style="list-style-type: none"> • Verify that existing reinforcing steel is not cut when drilling holes for anchors. • Inspect anchors holes prior to installation of adhesive. Verify that holes are prepared in accordance with the manufacturer's instructions, are free of dust and debris, and have the embedment depth indicated on the contract documents. • Verify that adhesive material is in accordance with the contract documents. Verify that the material is stored, mixed, injected, and cured in accordance with the manufacturer's instructions. • Verify that the anchor rod material, nut, and washer materials, lengths, diameters, embedments, and finishes are in accordance with the contract documents.

Cast-in-Place Concrete Construction – IBC Section 1704.4

Item	Agent	Criteria/Scope
1. Formwork Geometry	FQC, CMQC, TL1	<ul style="list-style-type: none"> • Inspect formwork for shape, location, and dimensions of the concrete member being formed and for conformance with ACI 301 Section 2 and ACI 318 Sections 6.1, 6.3, and 6.4.

		<ul style="list-style-type: none"> Inspect all formwork size, geometry, and finishes for conformance with Contract Documents.
2. Reinforcement Installation	FQC, CMQC, TL1	<ul style="list-style-type: none"> Inspect location, size, condition, and placement of all reinforcement, reinforcement supports, inserts, and accessories for conformance with approved shop drawings and with Contract Documents. Inspect placement of all reinforcement for compliance with ACI 318 Sections 7.3, 7.4, 7.5, 7.6, and 7.7 and ACI 301 Section 3.3.
3. Bolts and Embedded Items in Concrete Exposed to Tension and Shear	FQC, CMQC, TL1	<ul style="list-style-type: none"> Inspect embedded items for conformance with Contract Documents prior to concrete placement. Verify that embedded items are located correctly.
4. Mix Design	SER, FQC, TL1	<ul style="list-style-type: none"> Review mix design for conformance with contract documents. (SER) Review ready-mix plant tickets for conformance of mix with project specifications. (TL1)
5. Materials Certification	FQC, CMQC, TL1	<ul style="list-style-type: none"> Review in-plant all materials, manufacturer's certifications, and mill reports for conformance with contract documents. Maintain records of all material certificates, mill reports of all concrete mix constituent materials and steel reinforcement.
6. Batching Plant	FQC, CMQC, TL1	<ul style="list-style-type: none"> Review plant quality control procedures for material storage and handling comply with ACI 301 Sections 4.1.3, 7.1, and 7.2. Review that plant procedures for establishing mix design strength comply with ACI 301 Sections 4.1 and 4.2 and with ACI 318 Sections 5.1, 5.2, 5.3, 5.4, and 5.8. Inspect plant to ensure compliance of mix constituents with the requirements of ACI 318 Chapter 3 and ACI 301 Sections 4.2 and 7.2. Inspect that mixing and ready mix equipment and vehicles comply with ACI 318 Section 5.7 and 5.8 and with ASTM C 94. Maintain records of all ready-mix truck contents and dispatch times.

7. Sampling of Fresh Concrete and Evaluation of Concrete Strength	TL1	<ul style="list-style-type: none"> Collect and test concrete samples per ACI 318 Section 5.6 (minimum of four cylinders for each 150 cy of concrete or 5,000 sf of slab or wall area placed) but not fewer than four cylinders for each day's pour. Measure slump (ASTM C 143), temperature (ASTM C 1064), weight, (ASTM C 138), and air content (ASTM C 173) for all concrete sampled for strength. For pumped concrete, measure at point of deposit.
8. Concrete Placement	FQC, CMQC, TL1	<ul style="list-style-type: none"> Prior to allowing ready-mix trucks to deposit concrete, review batch-plant ticket to verify concrete mix compliance with project specifications, temperature, batching time, and number of mixing drum revolutions. Reject concrete that has been mixed for more than 90 minutes or 300 drum revolutions. Maintain records correlating concrete batching information with location of placement in the finished work. Inspect all concrete placements for compliance with ACI 318 Section 5.9 and 5.10; and ACI 301 Sections 5 and 7.3. Inspect for conformance with all approved hot and cold weather concrete placement procedures.
9. Curing and Protection	FQC, CMQC, TL1	<ul style="list-style-type: none"> Inspect all placements for conformance with Contract Documents, ACI 318 Sections 5.11, 5.12, and 5.13, and with curing and protection procedures approved by SER.
10. Laboratory Evaluation of Concrete Strength	TL1	<ul style="list-style-type: none"> Test for conformance to specifications in accordance with ACI 318 Section 5.6 and IBC Section 1905.6 As a minimum, perform compression tests on one cylinder at 7 days and two cylinders at 28 days.
11. Adhesive Dowels	FQC, CMQC, TL1	<ul style="list-style-type: none"> Verify that existing reinforcing steel is not cut when drilling holes for dowels. Inspect dowel holes prior to installation of adhesive to verify that holes are free of dust and prepared in accordance with the manufacturer's instructions and have the embedment depth indicated on the contract documents. Verify that adhesive material is in accordance with the contract documents. Verify that the material is stored, mixed, injected, and cured in accordance with the

		<p>manufacturer's instructions.</p> <ul style="list-style-type: none"> Verify that the dowel material, lengths, diameters, embedments, and finishes are in accordance with the contract documents.
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Spray-Applied Fire Resistant Material

Item	Agent	Criteria/Scope
1. Material Specifications	FQC, AOR, TL1	<ul style="list-style-type: none"> Review material product data for conformance to the Project Specifications.
2. Laboratory Tested Fire Resistance Design	AOR	<ul style="list-style-type: none"> Review UL fire resistive design for each rated beam, column, or assembly.
3. Schedule of Thickness	FQC, AOR	<ul style="list-style-type: none"> Review approved thickness schedule.
4. Surface Preparation	FQC, TL1	<ul style="list-style-type: none"> Inspect surface preparation of steel prior to application of fireproofing
5. Application	FQC, TL1	<ul style="list-style-type: none"> Inspect application of fireproofing.
6. Curing and Ambient Condition	FQC, TL1	<ul style="list-style-type: none"> Verify ambient air temperature and ventilation is suitable for application and curing of fireproofing.
7. Thickness	FQC, TL1	<ul style="list-style-type: none"> Test thickness of fireproofing (ASTM E605). Perform a set of thickness measurements for every 1,000 SF of floor and roof assemblies and on not less than 25% of rated beams and columns.
8. Density	TL1	<ul style="list-style-type: none"> Test the density of fireproofing material (ASTM E605).
9. Bond Strength	FQC, TL1	<ul style="list-style-type: none"> Test the cohesive/adhesive bond strength of fireproofing (ASTM E736). Perform not less than one test for each 10,000 SF.

References

1. ACI 301-05, Standard Specifications for Structural Concrete.
2. ACI 318-05, Building Code Requirements for Structural Concrete.
3. ACI 530.1 / ASCE 6 / TMS 602 – 05, Specifications for Masonry Structures.
4. AISC LRFD, Third Edition, Load and Resistance Factor Design Specification for Structural Steel Buildings.
5. ASTM A 6–04a, Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use.
6. ASTM A 568– 03, Specification for Steel Sheet, Carbon and High-Strength, Low-Alloy, Hot-Rolled and Cold Rolled, General Requirements For.
7. ASTM C 31–98, Practice for Making and Curing Concrete Test Specimens in the Field.
8. ASTM C 94–94, Specification for Ready-Mixed Concrete.
9. ASTM C 109–98, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).
10. ASTM C 138–92, Test Method for Unit Weight, Yield and Air Content (Gravimetric) of Concrete.
11. ASTM C 143–97, Test Method for Slump of Hydraulic Cement Concrete.
12. ASTM C 172–90, Practice for Sampling Freshly Mixed Concrete.
13. ASTM C 173–94, Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
14. ASTM C 231–97, Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
15. ASTM C 567–91, Test Method for Unit Weight of Structural Lightweight Concrete
16. ASTM C 1064–86, Test Method for Temperature of Freshly Mixed Portland Cement Concrete.
17. ASTM C 1090–96, Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic Cement Grout.
18. ASTM C 1314–97, Test Method for Constructing and Testing Masonry Prisms Used to Determine Compliance with Specified Compressive Strength of Masonry.
19. AWS D1.1– 96, Structural Welding Code – Steel.
20. International Building Code, 2003
21. PCI MNL–116-85, Manual for Quality Control for Plants and Prestressed Concrete Products.
22. RCSC– 2000, Specification for Structural Joints Using A325 or A490 Bolts.