

**Q4810**  
**STEAMTOWN NATIONAL HISTORIC SITE**  
**150 South Washington Avenue**  
**Scranton, PA 18503**

**SCOPE OF WORK**

At Steamtown NHS, there is an ongoing project to restore the Boston and Maine #3713 locomotive to operational condition for use in hauling the Steamtown excursions to outlying destinations. During the required boiler inspection procedure, it was discovered that the entire firebox and outer wrapper sheet were no longer usable due to corrosion, sheet cracking, and oversize staybolt sleeve holes. The thermic siphons were badly cracked and there were questionable repairs made to them. All of these items were removed by a previous contractor. A new firebox, outer wrapper and flush patch at the water inlet will be constructed using current National Board Inspection Code (NBIC), National Society of Mechanical Engineers (ASME), Federal Railroad Administration (FRA) Part 230 regulations and guidelines.

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**SECTION 1: GENERAL INTRODUCTION**

The work to be done will include removal of existing boiler portions, including the inner side firebox sheets, outer side sheets, crown sheet and thermic siphons. The work will include forming and fabricating new components and reusing some existing components. There will be repair work done to areas damaged by previous contractors. Fastening components together will be accomplished using hot rivets, welding, and bolting.

Normal work hours for contracts and services are from 7:30 am until 5:00 pm unless authorized by the Contracting Officer prior to award or start of work.

The Contractor shall furnish all labor, supervision, tools (hand, powered and specialized), supplies, construction equipment, and services required to complete the work herein unless otherwise specified herein.

## **SECTION 2: DEFINITIONS OF PARTICIPANTS AND OTHER TERMS**

- GOVERNMENT - Steamtown National Historical Site
- CONTRACTOR- Successful bidder
- CO . Government Contracting Officer
- COR- Contracting Officer's Representative

## **SECTION 3: SPECIFICATIONS;**

Contractor shall provide all labor, supervision, standard and specialized tools, supplies and equipment required to rebuild the boiler of the B&M #3713. This includes specialized tooling required for welding, cutting, riveting, flanging, forming and fastening of boiler components. Contractor and the employees of the contractor shall become fully qualified and prove their proficiency of the operation of lifting devices prior to operating the overhead crane and forklifts unsupervised by Steamtown. Any specialized tools that are fabricated from Steamtown NHS material while working on the project shall become the property of Steamtown NHS when the project is completed. Any specialized tools that are made while working on the project shall not leave Steamtown NHS property without approval and documented with written receipt by Steamtown NHS and signed by the contractor.

All welding procedures shall be approved by Steamtown NHS and shall follow all applicable welding codes. All boiler firebox staybolts and boiler braces shall be applied according to original Boston and Maine #3713 locomotive drawings and standard B&M shop standards. Sheet layouts shall be performed following published procedures. Sheet layouts shall be approved by Steamtown NHS before any holes are drilled. Any engineering questions shall be reviewed and approved by Steamtown NHS and third party engineers selected by Steamtown NHS before the work in question has begun. Any deviation from the original supplied B&M drawings or Boston and Maine RR shop practices shall be approved by Steamtown NHS and engineers selected by Steamtown NHS before work continues. Steamtown NHS shall establish quality check points when work will be checked. Work shall be approved at these check points before work progresses.

The contractor shall be responsible for:

3A: Boiler Liner and repair at boiler check valve location

1. Preparing flush patch joint for welding following proper welding procedure.
2. Applying proper pre weld heat source to satisfy proper welding procedure.
3. Welding flush patch per proper welding procedure.
4. Post weld stress relieve per proper welding procedure.
5. X-ray of weld joint area per proper welding procedure.
6. Preparing edge of liner for cold caulking.
7. Aligning liner to hole pattern.
8. Bolting liner tight to boiler shell;
  - a. Remove one bolt at a time, ream rivet hole to nominal size plus 1/16+
9. Hot riveting liner to shell removing one bolt at a time.
10. Cold caulking liner edge to boiler barrel per B&M standard practice.

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3B: Steam Dome

1. Cleaning of mating surfaces on dome and boiler barrel.
2. Preparing edge of dome for cold calking process.
3. Aligning dome rivet holes with boiler barrel rivet holes.
4. Checking for proper fit up of dome to barrel.
5. Bolting dome tight to barrel in every rivet hole.
6. Removing one bolt at a time and reaming rivet holes to nominal rivet size plus 1/16+.
7. Hot riveting dome to boiler using crisscross pattern.
8. Cold caulking dome to boiler barrel.

3C: Firebox General

1. Removing existing firebox inside and boiler outside side sheets . discard.
2. Checking location of rear tube sheet;
  - a. Move if necessary and restrain in place against movement.
3. Checking location of door sheet;
  - a. Move if necessary and restrain in place against movement.

3D: Firebox Rear Tube Sheet

1. Cutting out tube entire bundle hole pattern from rear tube sheet per accepted flush patch application procedure.
2. Fabrication new tube bundle flush patch using correct hole size and location per B#M #3713 drawing.
3. Fit new tube sheet patch to rear tube sheet.
4. Weld tube sheet flush patch to tube sheet using designated welding procedure;
  - a. Restrain if necessary to prevent warping of the tube sheet or flush patch.

3E: Firebox Door Sheet

1. Checking for proper location of door sheet per B&M #3713 drawings.
2. Checking upper flange geometry for proper alignment relationship to crown sheet and front tube sheet per B&M #3713 Drawings;
  - a. Correct if necessary.
3. Checking alignment of door opening;
  - a. Correct if necessary.

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### 3F: Boiler Outer Side Sheets

1. Laying out of sheet perimeter, staybolt hole pattern and washout hole pattern per B&M #3713 drawing following published layout procedure.
2. Checking perimeter and staybolt hole pattern.
3. Forming of boiler side sheets sheet per B&M #3713 drawings and templates made from existing backhead sheet and throat sheet.
4. Rough trimming to perimeter layout.
5. Drilling staybolt holes (undersize).
6. Fitting sheet to existing backhead sheet and throat sheet.
7. Checking location of staybolt hole pattern.
8. Trimming sheet to final perimeter layout.
9. Drilling %key+mudring rivet holes 6-8 places for temporary bolts.
10. Drilling backhead and throat sheet rivet holes (undersize for final reaming at hot rivet assembly).
11. Drilling ream side sheets at mudring, throat sheet and backhead.
12. Riveting side sheets at throat sheet and backhead.
13. Line drilling and line reaming mudring rivet holes.
14. Drilling, threading and installing all boiler washout plug sleeves per B&M Drawings.

### 3G: Firebox Inner Side Sheets

1. Laying out of firebox side sheet staybolt hole pattern and perimeter per B&M #3713 drawings using published method.
2. Checking staybolt and perimeter layout.
3. Forming side sheet bend per B&M #3713 drawing and templates made from existing backhead sheet and throat sheet.
4. Rough trimming and fitting side sheets to firebox door sheet and rear tube sheet.
5. Checking for proper location of staybolt pattern layout.
6. Rough trimming sheet for proper fit up.
7. Drilling staybolt hole pattern per B&M #3713 drawings (undersize).
8. Trimming and fitting side sheets to door sheet and rear tube sheet.
9. Checking hole layout before final trimming.
10. Drilling %key+mudring rivet holes 6-8 places only.
11. Bolting through %key+mudring rivet holes.
12. Tack-temporary welding of firebox side sheets to door and rear tube sheets.

### 3H: Crown Sheet (material currently in stock at Steamtown NHS)

1. Laying out of crown sheet perimeter and staybolt pattern per B&M #3713 drawings using published layout method.
2. Checking staybolt and perimeter layout.
3. Roll forming crown sheet per B&M #3713 drawings.
4. Rough trimming perimeter.
5. Drilling staybolt holes (undersize).
6. Trimming and fitting crown sheet to rear tube sheet, door sheet and firebox inner side sheets.
7. Temporary welding of crown sheet to firebox side sheets, rear tube sheet and firebox door sheet.

## Glossary

**Backhead:** Rearmost sheet of the boiler. The outer opening for the firebox door is on the backhead.

**Backhead Brace:** Component of boiler that supports flat areas of backhead, connected at one end to the boiler barrel, the opposite end to staybolts on the backhead or tube sheet.

**Boiler Barrel or Shell:** The large round sections of the boiler that are forward of the firebox.

**Crown sheet:** A plate that makes up the ceiling of the firebox. The siphon flanges are welded to the crown sheet.

**Dome Course:** The round section of the boiler to which the steam dome is mounted.

**Door sheet:** The rearmost sheet of the firebox proper. The inner part of the firebox door hole is on the door sheet.

**Flexible Staybolt:** A staybolt that has a ball on one end to allow for greater flexibility in its application.

**Flexible Staybolt Sleeve:** A fitting that is welded to the outside of the boiler that has a spherical seat machined into the inner diameter. This seat supports the ball end of the flexible staybolt.

**Firebox Side Sheet:** Plates of steel that make up the right and left sides of the firebox extending from the door sheet to the throat sheet, and from the outer wrapper to the mud ring.

**Flush Patch:** A replacement of a bad section of boiler that once applied, will be made even with its surrounding surfaces.

**Line ream / thread:** To use one continuous reamer or tap between two holes to assure perfect alignment.

**Liner:** A plate used to reinforce portions of the boiler barrel or flat plate, typically where oversized hole penetrate the shell.

**Mud Ring:** The rectangular steel component that surrounds the lower part of the firebox. This connects the firebox with the outer side sheets, throat sheet and backhead.

**Outer Side Sheets:** Steel plates that make up the outer vertical portion of the firebox end of the boiler.

**Outer Wrapper:** The curved plate that is directly above the firebox. The radial crown sheet staybolts are attached at one end to the outer wrapper.

**Rear tube sheet:** A plate that makes up the front wall of the firebox. The boiler tubes and flues are attached at the rear to the rear tube sheet.

**Staybolt:** A threaded steel bolt that maintains the proper distance between the inner and outer sheets of the firebox, outer wrappers, side sheets, throat sheet, rear tube sheet, and backhead.

**Steam dome:** The formed steel component that is positioned at the highest point on the boiler. This is where the driest steam is and from where most steam is taken from to power the locomotive and appliances.

**Throat Sheet:** The formed lower rear section of the dome course. This connects the dome course to the mud ring.

**Thermic siphon:** A water circulating component of the firebox that connects the lower section of the rear tube sheet to the crown sheet which promotes water circulation through thermic convection.

#### **SECTION 4: SAFETY PRECAUTIONS AND PROGRAMS**

- The contractor shall strictly adhere to all precautions necessary for the safety and health of his employees.
- While working the contractor shall establish emergency and fire exits from the work area.
- The contractor shall be prepared to administer first aid to injured personnel. Seriously injured personnel shall be treated immediately or evacuated without delay.
- The contractor shall notify the Parks Safety Officer and COR of any injuries that occur on park property.
- The contractor shall strictly adhere to precautions necessary for the safety of Visitors, NPS Volunteers, NPS Staff, general public using the city sidewalks, and other persons working within their work areas.
- The contractor shall maintain clear and protected walkways for Visitor use while working within buildings.

##### Contracting Officer's Representative

Bruce Mowbray, Preservation Specialist  
Steamtown National Historic Site  
150 South Washington Avenue  
Scranton, PA 18503  
Cell 570-650-1316  
Fax; 570-340-5310

##### Secondary Point of Contact

Barbara Klobucar, Supervisory Exhibit Specialist  
Steamtown National Historic Site  
150 South Washington Avenue  
Scranton, PA 18503  
Phone; 570-340-5366; Fax; 570-340-5310

#### **SAFETY REQUIREMENTS**

##### SUMMARY

The work of this section consists of establishing an effective Accident Prevention Program and providing a safe environment for all personnel and visitors.

**ACCIDENT PREVENTION PLAN:** Submit an Accident Prevention Plan in compliance with the requirements of this specification and the Section ~~5~~ Submittal Procedures.

- Submit to the Contracting Officer for review a minimum of seven (7) calendar days before the Preconstruction conference. The Contracting Officer will review the proposed Plan.
- If the plan requires any revisions or corrections, the Contractor will resubmit the Plan within ten (10) calendar days. No progress payments will be made until the Plan is accepted.

### QUALITY ASSURANCE

- Comply with contract clauses entitled "Accident Prevention" and "Permits and Responsibilities". In case of conflicts between federal, state, and local safety and health requirements, the most stringent shall apply.
- All equipment and tools shall meet all applicable OSHA requirements. Equipment or tools not meeting OSHA requirements will not be allowed on the project sites.
- Failure to comply with the requirements of this section and related sections may result in suspension of work.
- Safety Supervisor: Contractor shall designate a responsible supervisor to oversee and carry out the safety program. Safety Supervisor shall have a minimum of three (3) years experience overseeing project safety on similar projects. Submit the following information:
  - a) Company name;
  - b) Employee name and telephone numbers (landline and mobile)
  - c) Proof of Experience: Provide contact information for Owner of a minimum of three (3) projects, performed in the last three (3) years for which this individual performed safety supervision tasks. Provide the following:
    - 1) Project name and address;
    - 2) Owner's name and telephone number

### QUALIFICATIONS OF EMPLOYEES:

- All employees must be physically qualified and able to perform their assigned duties in a safe manner.
- Do not allow employees to perform work whose ability or alertness is impaired because of prescription or illegal drug use, fatigue, illness, intoxication, or other conditions that may expose themselves or others to injury.
- Operators of vehicles, mobile equipment, hoisting equipment, and hazardous plant equipment shall be able to understand signs, signals, and operating instructions, and be fully capable of operating such equipment.
- Provide operating instructions for all equipment.
- Newly hired operators shall be individually tested by an experienced operator or supervisor to determine if they are capable of safely operating equipment.

### ACCIDENT REPORTING

#### **REPORTABLE ACCIDENTS:**

A project reportable accident is defined as death, occupational disease, traumatic injury to employees or the public, fires, and property damage by accident in excess of \$100. Notify contracting officer immediately in the event of a reportable accident. Within 7 days of a reportable accident, fill out and forward to Contracting Officer an Accident/Property Damage Report (Form CM-22). Form may be obtained from the Contracting Officer.

### ACCIDENT PREVENTION PLAN

The Plan shall be written to comply with Occupational Health and Safety Act (OSHA) requirements and shall reflect project specific requirements (a generic plan is not acceptable) including but not limited to the following:

- Name of Safety Supervisor to carry out the program.
- Weekly and monthly safety meetings.
- First aid procedures.
- Outline of each phase of the work, the hazards associated with each major phase, and the methods proposed to provide for property protection and safety of the public, National Park Service personnel, and Contractor's employees. Identify the work included under each phase.
- Training, both initial and continuing.
- Planning for possible emergency situations, such as floods, fires, cave-ins, slides, explosions, power outages, and wind storms. Such planning shall take into consideration the nature of construction, site conditions, and degree of exposure of persons and property.

### PROJECT SAFETY

Contractor shall ensure the safety of his employees, Government personnel, the public and the project site at all times.

FORM CM-22 . Accident/Property Damage Report . FOLLOWING 2 PAGES

<b>DSC - CONTRACTOR ACCIDENT/PROPERTY DAMAGE REPORT</b>		Record Date: _____	
Name: _____		Trade: _____	
Birth date: _____		_____	
Date of Accident: _____		Time of Accident: _____	
Contractor: _____			
Project: _____		Location: _____	
Description of Accident: (BE SPECIFIC. DESCRIBE WHAT HAPPENED, WHERE.):			
What was employee doing when injured?			
Specific body parts injured?			
Type of injury (i.e. Puncture, sprain, fracture, illness, etc)			
First Aid? Yes    No		Medical Clinic? Yes    No	
_____		_____	
Hospitalized? Yes    No		_____	
Is time loss expected?    Yes    No    How long?			
_____			

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Environmental  
Factors:

Property Damage  
Involved?                      Yes                      No                      Describe:

Estimated dollar amount of  
Damages:

Corrective Action Taken:

Contractor Reporting: \_\_\_\_\_ Date: \_\_\_\_\_

Project Inspector Reporting: \_\_\_\_\_ Date: \_\_\_\_\_

**ATTACH COPIES OF ANY ADDITIONAL INFORMATION (& photos)**

COMMENT