

PACKET

MAR 21

2016

Stone's Bridge

**MASSACHUSETTS HISTORICAL COMMISSION
MASSACHUSETTS PRESERVATION PROJECTS FUND**

APPLICATION – ROUND 22

Due Date: **March 23, 2016**

Postmark is accepted. Please respond to all items and refer to the Instructions. **Live signatures are required and must be in blue pen.**

SECTION I – PROJECT OVERVIEW

A. Property Information

1. PROPERTY NAME: Full correct name as listed in the *State Register of Historic Places*. Insert common name in parentheses, if applicable.

Property Name: _____

Address: _____

City/Town: _____ Zip: _____

Is this property individually listed in the
National Register of Historic Places? Yes No

Is this property located in an historic district? Yes No

Name of District _____

Type: Local NR

Date of construction _____ Original Architect _____

Congressional District: _____

State Senate District: _____

State Representative District: _____

On a separate attachment, please provide a location map and directions.

2. PROPERTY USE

a. Check all that apply in both columns:	Present	Proposed
Religious	<input type="checkbox"/>	<input type="checkbox"/>
Institution	<input type="checkbox"/>	<input type="checkbox"/>
Museum	<input type="checkbox"/>	<input type="checkbox"/>
Public: Non-Government	<input type="checkbox"/>	<input type="checkbox"/>
Public: Government	<input type="checkbox"/>	<input type="checkbox"/>
Park: Monument or Historic Landscape	<input type="checkbox"/>	<input type="checkbox"/>
Archaeological Site	<input type="checkbox"/>	<input type="checkbox"/>

Other: (Explain) _____

b. Describe current use and how it may change as part of this project by providing a separate attachment marked "Property Use."

c. The property is currently barrier-free (accessible). Yes No

Explain: _____

B. Applicant Information

Nonprofit Organization* Municipality

***Nonprofit organizations ONLY: 501(c)(3) IRS determination letter is required. Attach a copy of your current operating budget, attach a separate sheet with your organization's existing endowment information (if applicable), and fill out/attach the state's W-9 Request for Taxpayer Identification and Certification form (see Appendix G).**

1. APPLICANT: (Entity which will receive grant funds and/or manage the project.)

Organization: _____

Street: _____

City/Town: _____ Zip: _____

Tel. No. _____ Fax. No. _____

E-mail Address: _____

(in blue pen)

BY – Authorized Signature: _____

Name: _____

Title: _____

Date: _____

2. OWNER(S): (If applicant is not owner, applicant **MUST** obtain owner's signature signifying owner's authorization of proposed grant project.)

Name: _____

Street: _____

City/Town: _____ Zip: _____

Tel. No. _____ Fax. No. _____

E-mail Address: _____

(in blue pen)

BY – Authorized Signature: _____

Name: _____

Title: _____

Date: _____

3. PROJECT PARTICIPANTS: name ALL who will be involved, if grant is awarded.

a. Local Project Coordinator

Name & Title: _____

Organization: _____

Tel. No. _____ Cell No. _____ Fax No. _____

E-mail Address: _____

Address: _____

For Development Projects ONLY: is the lead Architect/Engineer named below currently (or will be) under contract to provide professional design services starting July 2016, if grant is awarded?

YES NO If NO, must explain: _____

b. Architect or Landscape Architect (for historic landscapes) - primary Architect

Name: _____ Tel. No. _____

Firm: _____ Cell No. _____

Address: _____

c. Engineer

Name: _____ Tel. No. _____

Firm: _____ Cell No. _____

Address: _____

d. Other (e.g., Preservation Consultant or secondary Architect)

Name: _____ Tel. No. _____

Firm: _____ Cell No. _____

Address: _____

SECTION II – PROJECT AUTHORIZATION

A. Project Contact – if different from p.3, is this your preferred mailing address? YES NO

LOCAL PROJECT COORDINATOR (Name & Title) _____

Address _____

City/Town _____ Zip _____

Telephone No. _____ Fax No. _____ Cell No. _____

E-mail address: _____

B. Authorization

Indicate on a SEPARATE SHEET the name, title and address of who is authorized to:

- | | |
|--|--|
| 1) execute a contract with the MHC | 5) arrange for grant funding acknowledgment |
| 2) oversee and report on procurement | including the project sign |
| 3) enter into contracts for project work | 6) administer and disburse funds for project |
| 4) prepare progress and completion reports | 7) sign the preservation restriction |

C. Certificate of Authorization

The Directors of the _____ on _____ at which a quorum
Name of Organization/Municipality Date of vote or election
was present, the following resolution was adopted:

VOTED: That

Name of Contract Signer (i.e., Authorized Signatory)

His/Her Title

of this corporation be and he/she is hereby authorized to execute a contract, enter into contracts for project work, sign preservation restrictions, and disburse funds or designate appropriate persons to do so.

A true copy. ATTEST:

Signature of Clerk/Secretary of Corporation (in blue pen)

Address of Organization/Municipality

Signing Date

I hereby certify that I am the Clerk of

the _____, that _____ is the
Name of Organization/Municipality Name of Contract Signer/Authorized Signatory

duly elected _____ of said corporation, and that the above vote has not
His/Her Title

been amended or rescinded and remains in full force and effect as of the date of this Application.

Signature of Clerk/Secretary of Corporation (in blue pen)

D. Preservation Restriction and Statement of Intent

If an MHC Preservation Restriction (PR) in Perpetuity currently EXISTS, please include this attachment. Applicant, in this instance, does NOT need to provide a legal opinion or letter of intent.

- Attach a photocopy of the currently existing Preservation Restriction as well as a current Assessor's map and any legally recorded plot plans or surveys that may exist.

If an MHC Preservation Restriction in Perpetuity DOESN'T EXIST, see instructions for important information concerning these three mandatory attachments.

- Attach the legal opinion prepared by Applicant's attorney that includes deed of record.
- Attach a letter of intent to execute & record the required PR (interior and exterior of building/ resource & associated land) signed by the owners and others with interest in the property such as mortgage holders. **If applicant is not the owner of the resource and/or land that the resource sits on, applicant MUST include letter of intent from property owner(s) signifying acceptance of the terms of the Preservation Restriction agreement.**
- Attach a current Assessor's map **and** any legally recorded plot plans or surveys that may exist.

E. Assurance of Compliance

In consideration of and for the purpose of obtaining matching funds from the Massachusetts Historical Commission, _____ (hereinafter called "Applicant-Recipient") hereby agrees that it will comply with the following:

1. Equal Employment: In compliance with the provisions of the Governor's Code of Fair Practices, Executive Order 227, and Chapter 151B of the Massachusetts General Laws as amended, the applicant shall not discriminate in employment because of race, color, religion, national origin, ancestry, age, sex, or handicap.
2. Audit/Access to Records: In compliance with Executive Order 195, the MHC, the Governor, or his designee, the Secretary of Administration and Finance, the State Auditor or his designee shall have the right at reasonable times and upon reasonable notice to examine the books, records, and other compilations of data of (contractors) which pertain to the performance of the provisions and requirements of this contract.
3. Financial Management: Adequate financial management and record-keeping systems (meeting generally accepted accounting principles) will be maintained which provide efficient and effective accountability and control of all property, funds, and assets, including a comparison of actual outlays with budget estimates. Accounting records will be supported by source documentation. Documentation provided to the Massachusetts Historical Commission will adequately demonstrate project expenditures.
4. Administration: Matching funds will be administered in conformance with all applicable state and local laws, regulations, policies, requirements, and guidelines, including those related to civil rights, equal employment opportunity, and universal access, and policies and procedures of the Massachusetts Preservation Projects Fund Program administered by the Massachusetts Historical Commission.
5. Matching Share: Adequate financial resources will be available for performance (including necessary experience, organization, technical qualifications, and facilities) to complete the proposed project or a firm and binding commitment, arrangement, or ability to obtain such will be made.
6. Conflict of Interest: The applicant and contractors shall not knowingly employ, compensate, or arrange to compensate any employee of the Commission during the term of this agreement, unless such arrangement is permitted under the provisions of M.G.L. c. 268A.
7. Preservation Restriction: The applicant will record an interior & exterior preservation restriction and maintenance agreement in perpetuity under the provisions of M.G.L. Chapter 184, sections 31-33, except that Pre-Development grant recipient organizations shall agree to a specific duration based on the amount of funds provided. If applicant is not the sole owner, written consent must be obtained from all owners/mortgagees and included with the Application.
8. Contracts: The applicant will enter into a standard written contract with the MHC which sets forth mutual obligation, the scope of work, and state administration requirements. Also, the applicant will execute appropriate contracts with its contractor(s).
9. Project Work Standards: The applicant agrees the project work will meet the Secretary of the Interior's "Standards for the Treatment of Historic Properties" and, if applicable, "with Guidelines for the Treatment of Cultural Landscapes."
10. Project Period/Project Sign: The applicant will comply with the required completion schedule for the project and display a project sign at work site. The Project Sign will be in accordance with MHC specifications.

Who prepared cost estimates? Name _____

Occupation _____

**Contingency costs are not eligible. Total should equal Total Project Cost on the previous page.*

Note: Development project contractors cannot be pre-selected. MHC requires an open selection process in the selection of preservation contractors/conservators paid with state grant funds.

c. Acquisition Projects:

Acquis. Cost \$ _____

For Acquisition Projects, see Instructions.

Attach current professional appraisal.

In cases where funds are requested to acquire the property in order to prevent demolition or destruction, the applicant must demonstrate that they are the developer of last resort. Attach your statement.

4. PROJECT PERIOD

See Project Schedule for allowed project duration.

Beginning Date (not before July 1, 2016) _____

End Date (not after June 30, 2017) _____

B. Grant Request

1. If applying for a 50% Match:

Funding Requested \$ _____ (50%)

Applicant Share \$ _____ (50%+)

Total Project Cost (TPC) \$ _____ (100%)

If grant amount requested is for a component of a larger project, please indicate overall project cost. \$ _____

2. If establishing an Endowment:

Funding Requested \$ _____ (75%)

Applicant Share \$ _____ (25%)

Total Project Cost (TPC) \$ _____ (100%)

Endowment Commitment \$ _____ (25% of TPC)

The endowment fund must be created with new funds.

PLEASE NOTE: Due to current limited funding, the endowment option is unlikely to be offered. Make certain to complete the 50% option above.

C. Matching Share Source(s)

Source: _____ Amount: _____

Kind: _____ Date available: _____

Attached is a commitment letter from _____

Source: _____ Amount: _____

Kind: _____ Date available: _____

Attached is a commitment letter from _____

Source: _____ Amount: _____

Kind: _____ Date available: _____

Attached is a commitment letter from _____

NOTE: Applicants must be prepared to have funds available greater than their share in order to have an adequate cash flow for the needs of the project during research or construction. Matching funds equal to or greater than 75% of the estimated total project cost for the grant-assisted portion of the project MUST be in place at the time the Application is submitted.

Applicants applying for Endowment Fund option must provide a letter of commitment and vote. Please see Appendix, "Endowment Fund" for further information.

SECTION IV – PROJECT EVALUATION

As a separate attachment, address the following selection criteria individually for all types of applications: Pre-Development, Development, and Acquisition. Your responses to each lettered item should be no more than half a page each. See selection criteria and guidance statements listed in Instructions, Section IV.

THIS SECTION IS THE BASIS OF MHC REVIEW AND IS CRITICAL TO A SUCCESSFUL APPLICATION.

- A. Level of Significance**
- B. Potential for Loss or Destruction**
- C. Administrative and Financial Management Capabilities**
- D. Appropriateness of Proposed Work**
- E. Statement of Financial Need**
- F. Extent and Nature of Public Support**
- G. Consistency with Preservation and Revitalization Plans***
- H. Use of Traditional Materials**
- I. Compliance with relevant state laws and executive orders***
- J. Geographic Distribution***
- K. First Time Grants***

*MHC determines these criteria. You may address if you wish. Responses are not mandatory.

SECTION V – TECHNICAL PLANNING/SURVEY

A. Technical Planning:

This section should be organized as an attachment, according to the following outline:

- | | |
|----------|---|
| Part I | Brief overview statement |
| Part II | Research and conditions summary (include current photos) |
| Part III | Planning |
| Part IV | Draft RFP (pre-development projects) or outline plans and specifications
(development projects) for proposed grant-assisted work (include supporting photos) |

See Instructions, Section V, for guidance

B. Ground Disturbance: (Submit statements per Instructions)

C. Procurement Requirements (see Appendix)

Method of Procurement: (check only one; municipalities must use municipal bidding)

- Municipal Bidding
- Small Purchase
- Competitive Bids

MPPF Round 22 APPLICATION CHECKLIST

In order for your Application to be considered complete, ALL of the following items must be included with your request. This completed checklist must also be submitted as part of the Application.

SECTION I – PROJECT OVERVIEW

- A. Property Info**
 - A. (1) Property Name
 - Location Map and Directions
 - A. (2) Property Use—including “Property Use” statement (separate attachment)
- B. Applicant Info**
 - B. (1) (2) Applicant & Owner Information & for Nonprofits ONLY:
 - 501(C)(3) IRS Determination Letter
 - Current Operating Budget
 - Existing Endowment Disclosure
 - W-9 “Request for Taxpayer Identification Number and Certification” Form
 - B. (3) Project Participants

SECTION II – PROJECT AUTHORIZATION

- A. Project Contact** – Local Project Coordinator
- B. Authorization** (separate attachment)
- C. Certificate of Authorization**
- D. Preservation Restriction (PR) & Statement of Intent**
 - If perpetual MHC Preservation Restriction exists:*
 - Legally recorded copy of currently existing PR
 - Current Assessor’s Map & any legally recorded plot plans or surveys that may exist
 - If perpetual MHC Preservation Restriction does NOT exist:*
 - Legal opinion prepared by Applicant’s attorney
 - Deed of record
 - Letter(s) of Intent to execute & record required PR signed by owner(s) & mortgage holder (if applicable)
 - Current Assessor’s map & any legally recorded plot plans or surveys that may exist
 - & for Municipalities:*
 - Certified copy of vote to enter into PR
- E. Assurances of Compliance**
 - E. (19) Letter(s) of Support from local historical commission & local historical district commission (if applicable)

SECTION III – GRANT REQUEST

- A. Proposed Scope of Work**
 - A. (1) (2) Type & Project Description
 - A. (3) Cost Estimate and Preparer
 - A. (4) Project Period
- B. Grant Request**
- C. Matching Share Source(s)**
 - Letter(s) of Commitment

SECTION IV – PROJECT EVALUATION (separate attachment)

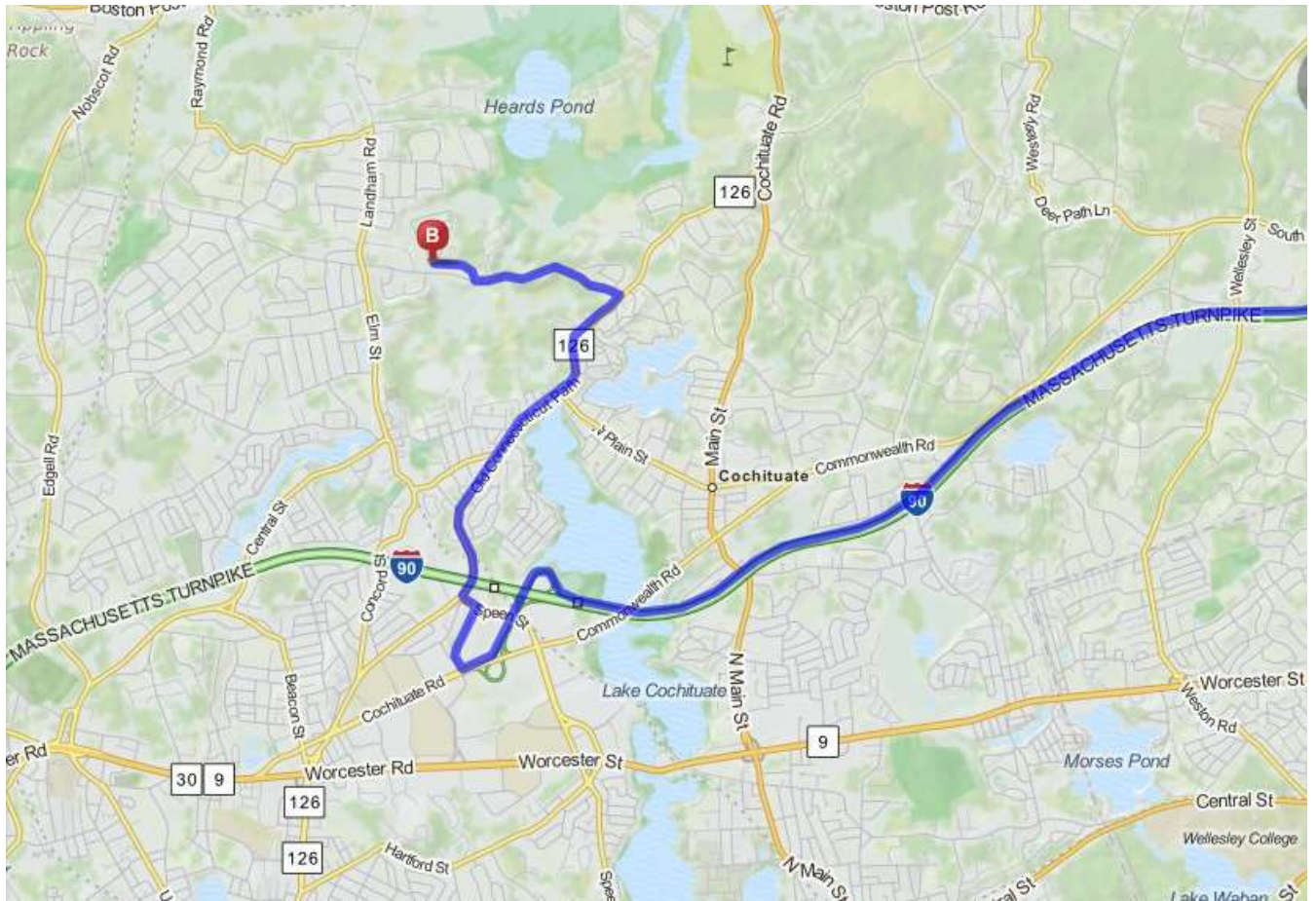
- A. Level of Significance**
- B. Potential for Loss or Destruction**
- C. Administrative and Financial Management Capabilities**
- D. Appropriateness of Proposed Work**
- E. Statement of Financial Need**
- F. Extent and Nature of Public Support**
- H. Use of Traditional Materials** (dev. projects)

SECTION V – TECHNICAL PLANNING/SURVEY

- A. Technical Planning**
 - A. (Part I) Technical Planning – Brief Overview Statement
 - A. (Part II) Technical Planning – Research and conditions summary, includes conditions survey (includes current photos)
 - A. (Part III) Technical Planning – Planning
 - A. (Part IV) Technical Planning – Draft RFP (pre-development) or outline plans and specifications (development)
- B. Ground Disturbance** (separate attachment)
- C. Procurement Requirements**
 - Currently existing MHC inventory form
 - Color digital image (on CD) & 8 x 10 Photo displaying the front façade of resource
 - Photos of both the exterior AND interior to support the request for MPPF funds and overall conditions survey

SECTION I – PROJECT OVERVIEW

A. Property Information: Location.



Go north on I-93 N/US-1 N/MA-3 N/Southeast Expy N. 1.0 mi

Merge onto I-90 W/Massachusetts Tpke W via EXIT 20 toward Worcester (Portions toll). 18.7 mi

Merge onto Cochituate Rd/MA-30 W via EXIT 13 toward Framingham. 1.0 mi

Turn right onto Leggatt McCall Connector Rd. at next light

Turn left onto Speen St.

Turn right onto Old Connecticut Path (Rt. 126). Cross from Framingham into Wayland.

Turn left onto Stonebridge Rd.

Bear right to stay on Old Stonebridge Rd, (Stonebridge Rd continues to the left over new bridge into Framingham).

Follow down to River and Stone's Bridge is in front of you at river.

2. Property Use. b. Presently the bridge is closed to pedestrians as it is unsafe to walk out on to it. After it is stabilized and the side rails are restored, it will be open for passive recreation, particularly viewing the Sudbury River and fishing. Stone's Bridge no longer extends to the embankment on the Framingham side of the river. It ends in the river and will not be rebuilt to cross the river.

SECTION II-PROJECT AUTHORIZATION

B. Authorization

Nan Balmer, Town Administrator located at 41 Cochituate Road, Wayland, MA is authorized to:

- 1) execute a contract with the MHC
- 2) sign the preservation restriction

Stephen Kadlick, DPW Director, also located at 41 Cochituate Road,, Wayland MA is authoroized to:

- 1) oversee and report on procurement
- 2) enter into contracts for project work
- 3) prepare progress and completion reports
- 4) arrange for grant funding acknowledgment including project sign
- 5) administer and disburse funds for project

SECTION IV - PROJECT EVALUATION

A. Level of Significance

Stone's Bridge is historically significant as a rare dry-laid stone bridge still standing after more than 150 years despite being constructed without the use of mortar. Built in 1857- 1858 to replace wooden structures dating back to the mid-1600's, Stone's Bridge is located at a river crossing that has accommodated horses, carts, cars, Revolutionary War soldiers and Henry David Thoreau. In March 1775, British spies crossed a wooden bridge at this site when on a tour of observation in preparation to march British regulars into the country. In addition, this bridge is part of the General Knox Trail with a plaque at the entrance to the bridge memorializing the passage of General Knox in the winter of 1775 to deliver a train of artillery from Fort Ticonderoga to General George Washington to use to force the British Army to evacuate Boston. The current stone bridge was built ca. 1858 and mentioned by Henry David Thoreau in his journal when he visited it in 1859. In 1955, the bridge was damaged by Hurricane Diane. However, the bridge was preserved due to the efforts of the Wayland Historical Society and community support, and a new bridge for car traffic was built farther upstream. At that time, the washed-out portions of Stone's Bridge were repaired and the Framingham approach was removed and replaced by an end support that now dead-ends in the river. The Sudbury River was re-routed to flow under the new bridge and to the west of the repaired Stone's Bridge. Since that time, the bridge has been used for passive recreation such as sightseeing and fishing. The Town of Wayland recently purchased an abutting property to create a conservation area, which includes the bridge, along the Sudbury River.

B. Potential for Loss or Destruction

In 2012 engineers from Structure's North Consulting Engineers Inc. examined Stone's Bridge and determined that the bridge's parapet walls and edges of arches lean and will continue to do so until they reach a point of instability. This has already started to occur at the south face of the bridge, where stones are buckling outward from the parapet and edges of the arches. According to the engineers the vertical sides of the bridge are irregular and have undergone out-of-plane deviations as the parapet walls are bulging and the sides of the bridge are

spreading apart. In some places, these movements, which include the vertical edges of the arches themselves, are more than 6- to 8-inches. On the underside of each arch one can see oriented widenings of head joints that follow lineal orientations that run circumferentially to the arch. These are in essence longitudinal structural “cracks” in the unmortared structure that directly correspond to above-noted out-of-plane deviations of the side walls. Some of the widenings total more than 8”, which again correspond to the summed widths external deviations. Where the widenings occur, there is a loss of chinking and an eventual loss of soil. In addition to the overall spreading movements, there are localized bulges in the sidewalls where the stonework has become unstable and has moved out. In addition, the vegetation growing on the bridge is contributing to the loosening of stones. However, it is recommended that the vegetation not be removed unless done in conjunction with restoration efforts because the roots of the vegetation are filling in spaces between the stones of the bridge and the death and decomposition of the root systems could further destabilize the stones.

C. Administrative and Financial Management Capabilities

The Local Project Coordinator is Stephen Kadlik, DPW Director and he will attend the July 13, 2016 Workshop meeting. At the Wayland Town Meeting on April 13, 2015 the town voted in favor of committing \$480,000 in Community Preservation Act Funds to restore the first two arches of Stone's Bridge. Attached are the legal opinion, statement of intent letter, a copy of the order of taking for the property and the Compliance and Authorization forms. An RFP will be completed by April ?, 2016 for a design professional to produce draft and final approved construction documents as well as permitting by the August 31, 2016 deadline in the MPPF Round 22 Schedule.

D. Appropriateness of Proposed Work and

H. Use of Traditional Materials

The proposed project meets the Department of the Interior's Standards for the treatment of historic properties in that Stone's Bridge will be preserved by taking the necessary steps to sustain the existing form, integrity, and materials of the bridge. The structure no longer serves

as a bridge because the west approach was removed after Hurricane Diane in 1955. Since that time, the bridge has been and will continue to be used for passive recreation and there are no plans to use it as a bridge. This is the first step of a two stage project where only the first two of the four arches will be restored in this first stage. The plan is to remove all vegetation from the sides and top of the bridge and remove the existing soil mass down to the top of the bridge and pier structures. At the dry-laid arch sections, the dry-laid masonry arches and lower walls will be restored. The plan is to fully document and dismantle the bulged and leaning parapet walls and ends of arches, wet-chink and partially underpin the ends of the piers to restore solid bearing, and replace stones that are missing and reconstruct the dismantled masonry elements to match their original configurations. The structure will then be covered with filter fabric that turns up against the side parapet walls to create containment for fill. The concrete core will be inspected and repaired, cleaning and coating or removing rusted reinforcing and grout. Throughout the bridge, the soil mass will be reinforced to counter the spreading effects, provide proper drainage, and restore parapet walls, top grade and railings. A biaxial geogrid will be laid over the top of the fill and a transversely oriented uniaxial geogrid atop that. Finally the wooden guard rails will be removed and replaced with aesthetically appropriate but properly structured wooden guards designed to meet code.

E. Statement of Financial Need

Both Framingham and Wayland are committed to the preservation of Stone's Bridge. The Town of Wayland has demonstrated its commitment by the Town Meeting vote to commit nearly half a million dollars to the first half of restoring Stone's Bridge. This grant will greatly improve the likelihood of the two communities working successfully together and bolster future attempts to fund the restoration of the second half of the bridge. The two communities worked together in 2012 to apply for a small grant from the Sudbury, Assabet and Concord Wild and Scenic River Stewardship Council and the Wayland Historical Commission was awarded \$2,500 to fund the removal of river borne debris under the bridge.

The engineer's report hypothesizes that most of the lateral spreading causing much of the destabilization of the stones was a result of the car traffic that passed over the bridge until the

1950s. Once restored, the lateral spreading will be unlikely to recur since the bridge is no longer used for car traffic. In addition, vegetation has contributed to the destabilization of individual stones but vegetation will be less likely to find a foothold on the bridge once the gaps between the stones are eliminated through restoration and re-chinking and a filter fabric is installed.

F. Extent and Nature of Public Support

Attached please find letters of support from the following community leaders:

Wayland Historical Commission

Wayland Board of Selectmen

Wayland Conservation Commission

Framingham Historical Commission

Sudbury, Assabet and Concord Wild and Scenic River Stewardship Council

SECTION V – TECHNICAL PLANNING/SURVEY

A. Technical Planning

Part I Brief Overview. Stone’s Bridge was constructed as an east-west crossing of the Sudbury River on the former alignment of what is now Old Stonebridge Road, which continued west into what is now Potter Road in Framingham. The bridge straddles the town line between Wayland and Framingham which is in the river, leaving more than half of the remaining bridge within the boundary of Wayland and the rest in Framingham. Due to reconfiguration of Stonebridge Road after the 1955 Hurricane Diane and the 1957 re-routing of the Sudbury River, the end of the bridge that was attached to the Framingham embankment is now in the river with no west bank attachment.

For the second half of the 20th century, Stone’s Bridge was open to pedestrians and fishermen; however due to its poor condition and broken railings it has been closed by the Wayland Department of Public Works. The goal of this project is to stabilize the arches in order to preserve one of the few remaining dry-laid stone arch bridges for its historical and scenic value and as a place for passive recreation – fishing.

Part II Research and Conditions. Stone’s Bridge, a four-arch, stone dry-laid structure, has been researched extensively to determine when it was constructed (1857-1859), which towns paid for the construction, and how it was maintained. The inventory file (WAY.901, FRM.911) at the MHC is lengthy and has been added to since the initial documentation in the 1970s. A new form, consolidating some of that information as well as the 2012 conditions assessment, was prepared as part of this project and is attached.

In 2012 the Wayland Historical Commission worked with John Wathne of Structures North to assess Stone’s Bridge and propose methodology for preservation of the bridge. The main task is to stabilize the arches. The Structures North report is based on visual observation, test pits and probes. The components of the structure include the stones forming the vaulted arches, the earthen deck or top, and the wood railing along both sides of the top surface.

The stone arches are made of the large granite blocks laid in the 1850s when the bridge was constructed. They are destabilized so that the condition of the construction is poor.



Stone's Bridge – underside of two arches

The structural engineers report states that the bridge was constructed as follows:

1. A combination of buried rubble and solid cap stones were dry laid as footings within the riverbed, and then 3-foot wide by 15-foot long vertical piers were dry-stacked atop the footings from which the arches would immediately spring up from each side. The riverbed was of variable depth, with exposed bedrock under the east end of the bridge, and a muddy bottom at the center. One still to this day detects a decrease in depth as one approaches the bridge's west end, as this was the original west embankment before the main flow was re-directed further west.
2. Arched wooden forms were then constructed between the piers to support the construction of single wythe rough cut stone arches that were chinked and dry laid on top of them.
3. The wedge-shaped "valleys" between the arches were partially filled in with angular stone rubble to help stabilize the arches, and wedge shaped trust blocks would have been created at the ends to help prevent the line of arches from spreading. After some initial filling, the wooden arch forms could have been removed.
4. Using the completed arch spans as a base, the parapet walls were constructed along the sides and splayed wing walls were constructed to create approach ramps at the ends.

5. Earth was then placed over the arch structure up to the tops of the parapet walls in order to create the level surface for a roadway. According to our test pits, little or no attempt other than chinking (wedging of small, usually angled stones into joints) seems to have been made to seal the stone construction against pass-through water flow and sifting of soil. This being said, the original builders seem to have been at least marginally successful in containing the soil as there are few detectable sink holes on the surface.

6. The modern-era pier at the west end appears to have been constructed by building a three-sided “box” of semi wet laid stone walls within dunnage or containment forms, with the fourth side of the box being the far abutment of the westernmost arch. This box was then filled with bar reinforced concrete. The stone masons were clever to hold back the mortar from the outer faces of the stone walls [s]o that they ... would not [be] easily detected ... when viewing the partially mortared pier and the unmortared bridge together as a whole.

7. Dimensional, sawn wooden fence railings presently bound the grassed-in top surface of the bridge which now serves as a small park. These are probably a several-generations-later replacement to the original railing system.

And the conditions are as follows:

According to the structural engineer’s report the following conditions were noted during investigation:

- The vertical sides of the bridge are irregular and have undergone out-of-plane deviations as the parapet walls are bulging and the sides of the bridge are spreading apart. In some places, these movements, which include the vertical edges of the arches themselves, are more than 6- to 8-inches.
- On the intrados (underside) of each arch one can see oriented widenings of head joints that follow lineal orientations that run circumferentially to the arch. These are in essence longitudinal structural “cracks” in the unmortared structure that directly correspond to above-noted out-of-plane deviations of the side walls. Some of the widenings total more than 8”, which again correspond to the summed widths external deviations.
- Where the widenings occur, there is a loss of chinking and an eventual loss of soil. We experienced such soil loss first hand when we excavated one of our test pits near but not directly over one of these widenings and encountered a cavity within the soil at the side of the test pit that quickly turned into a sink hole.
- In addition to the overall spreading movements, there are localized bulges in the sidewalls where the stonework has become unstable and has moved out. The worst of this is along the south side of the bridge where there is massive vegetation growth.
- There are also places where stones are missing or chinkers have fallen out, revealing cavities within the arch and sidewall construction.

- At the west end's concrete pier, stones are becoming detached from the north face and, to a greater extent, south face (the far west face seems basically intact). Behind the fallen stones, one can see concrete and a few rusted rebars. At the south face, a significant patch of stones has moved out by as much 12" creating an earth filled pocket that is supporting the base of a tree.
- In addition to the structural masonry issues, the residential grade split rail wooden fencing the circles the top of the bridge is insufficient, rotting and in places falling over. This does not meet code and is a potential hazard to anyone who might lean on it.

Part III Planning. The Structures North report estimated that stabilization of the bridge will cost between \$750,000 and \$950,000. The Wayland Historical Commission requested Historic Preservation funds from the Community Preservation Fund to begin with stabilization of two arches. 2015 Annual Town Meeting allocated \$480,000 for this work. These funds will be used to hire an engineering firm to develop the design and specifications for bid documents, manage the permitting and administer the construction. It is anticipated that these costs (not eligible for the grant) will be around \$50,000. Although this phase will only address the first two eastern most arches, the design will be for the entirety of the bridge, including all four arches. The Wayland Historical Commission anticipates requesting funds to preserve the second two arches (partially in Framingham) after this phase has been completed.

The funds have been available since July 1, 2015. At this time the Permanent Municipal Building Committee is preparing an RFP from engineering firms for design, specs, and permitting based on the methodology outlined in the Structures North report and the Secretary of Interior's Standards for Preservation. Permits from both Framingham and Wayland Conservation Commissions will be required.

Part IV Development Projects. Outline plans are itemized in the Structures North Report and state the following:

"Considering the existing construction and its present condition, we recommend that repairs be done in a way that is sympathetic to the original construction while providing the needed improvements in longevity and repair while allowing the bridge to structurally function in the same manner that it traditionally has. This can be done in the following manner:

Throughout-

Remove vegetation and soil fill.

1. Remove all vegetation biological matter from the sides and top of the bridge, especially at the south, upstream face. This will inevitably result in the partial collapse of some of the facing stones in the parapet walls and end pier.
2. Remove the existing soil mass down to the top of the stone and concrete bridge and pier structures.

At the Dry-Laid Arch Sections-

Restore dry-laid masonry arches and lower walls.

3. Fully document and dismantle the bulged and leaning parapet walls and ends of arches.
4. Wet-chink and partially underpin the ends of the piers to restore solid bearing.
5. Re-chink the remaining piers from the outside, the remaining walls from both sides, and the arches from above, and replace stones that are missing.
6. Reconstruct the dismantled masonry elements to match their original configurations, up to the top of the lower top course of the parapet walls.
7. Cover the structure with filter fabric that turns up against the side parapet walls to create containment for fill.

At the West Pier Section-

Restore west-end pier.

8. Document and remove all loose and shifted stones.
9. Inspect and repair exposed portions of the concrete core, cleaning and coating or removing rusted reinforcing and grout injecting cracks.
10. Reinstall all removed and missing stones, wet bonding and pinning them back into place.
11. Additionally pin any other potentially loose stones and grout any voided collar joints encountered.
12. Create a surface bonded mortar topping layer over the concrete to positively pitch the top of the pier into unmortared westernmost arch construction, and cover the parging with a pre-formed drainage composite.

Throughout-

Reinforce the soil mass to counter the spreading effects on the bridge, provide proper drainage, and restore parapet walls, top grade and railings.

13. Place 6" to 12" of compacted structural drainage fill over the entire structure with the top to roughly align with the bottom parapet course and lay a biaxial geogrid over the top of the fill and allow extra grid length to fold up over the top of the lower parapet course.
14. Place additional compacted structural fill up to the top of the lower parapet course and flop the biaxial geogrids up over the top of the fill and add a transversely oriented uniaxial geogrid atop the flopped uniaxial grid ends, extending out to onto the lower parapet course.
15. Wet-lay the top parapet course over the lower course and the uniaxial geogrid with grids and mortar recessed by 4".
16. Compact 6" of structural fill over uniaxial geogrid and then add up to 6" loam.

17. Replace removed wooden guard rails with aesthetically appropriate but properly structured wooden guards designed that meet code.”

Elevation and section drawings to assist in laying out the scope of work are attached.

Appendices – Stone’s Bridge MPPF Application

1. MHC Survey Form F – Stone’s Bridge
2. Color Photos – 8” x 10”
3. Color Photos – 4” x 6”
4. Structures North Assessment Report
5. Mass DOT Structures Investigation Field Report completed May 2015
6. Letters of Support

**WAYLAND – STONE’S BRIDGE – MPPF
APPLICATION - 2016**

