SCOPE OF WORK

Doon Mill Ruins Restoration

Old Mill Road, Kitchener

Masonry Restoration and Stabilization

Prepared For

City of Kitchener
200 King Street West, Kitchener
(c/o LHC Heritage Consulting)

Prepared By

Tacoma Engineers Inc.
176 Speedvale Avenue West, Guelph, Ontario

Project No. TE-41414-22
May 2024

Table of Contents

Appendix 'A' - Drawings

- S1 – Removals Elevation
- S2 – Reconstruction Details

Appendix 'B' – Product Data Sheets

- King HLM 350
- King HLM 500

Introduction

The purpose of this document is to convey the scope of work and technical requirements to complete the masonry repairs and stabilization work at the Doon Mill Ruins, located north of Old Mill Road just west of Schneider Creek in Kitchener, Ontario. This document is intended to be reviewed and used by the selected contractor(s) to better understand the scope of work for construction and bid purposes. For the bid, it is expected that the contractor(s) review this document in conjunction with attendance at the bidder's briefing and a thorough site review of the subject area before providing their cost to perform the work, to the Owner.

Refer to Appendix 'A' for plan drawings and details of the work and refer to Appendix 'B' for technical data sheets as may be applicable to the work.

General Notes

1. Provide protective barrier(s) around the work area to minimize the risk of damage due to the work and to restrict unauthorized access to the work area. Maintain the barrier(s) for the full duration of work. Coordinate with the City of Kitchener for pathway access and for access to the neighbouring property as required.

2. Clean site of debris at the end of each workday and at the end of the project. Secure the site at the end of each workday, including material storage area as applicable.

3. As applicable, arrange for all required inspections to identify buried and embedded utilities in and around the work areas. Take appropriate measures to protect these items from damage.

4. Supply, erect, and maintain an engineer certified scaffolding stair system to provide access to the work area, as required.

5. The contractor shall inspect all surfaces prior to starting work. Any substandard or severely deteriorated / unsafe areas are to be identified, documented, and reported to the Project Engineer.

6. The work is to be completed within a naturalized park with nearby streams and creeks. The contractor is responsible to provide environmental protections and tree protection to the area surrounding the work as required by the City of Kitchener and/or the GRCA. Protect other surfaces adjacent to the area of work including sidewalks, trails, and neighbouring properties. Sediment control and other protections may be required as a condition of the GRCA permit.

7. Site staging for storage of equipment/material containers and waste bins, and contractor parking, are to be coordinated with and approved by the City. All contractor equipment is to be kept in the approved area and secured at the expense of the Contractor. Coordination of parking for Contractor vehicles is to be coordinated with City of Kitchener staff. Storage and staging areas will be coordinated with the City prior to mobilization.

8. General conditions are to include all site coordination and management responsibilities including maintaining liability insurance (Owner to be named as additionally insured) plus

the cost of all standard and miscellaneous site requirements. The cost of all general conditions is to be included in the lump sum prices provided.

9. Allowed work hours for the project are 7:00 am to 7:00 pm, Monday to Friday, excluding statutory holidays, unless otherwise allowed by the Project Manager. No work shall be completed outside of these hours without prior written approval by the City.

10. Smoking is not permitted on the property.

11. Permits:
    11.1. The City of Kitchener will obtain and pay for all permits (including building permit and GRCA), certificates and approvals including municipal inspections, electrical inspections, service connections, road crossings, relocations, plumbing, inspections and permits, health department certificates, culvert permits and other permits and fees that relate directly to the Work.
    11.2. The Contractor is to file a Notice of Project with the Ministry of Labour and provide copy of Notice to the Owner and Consultant.

12. Throughout construction, coordinate all required reviews with the Engineer and Municipal Building Department as required. Provide a minimum of 48 hours notice for required site reviews. Reviews to include, but are not limited to:
    - limits of stone removal PRIOR to removing any material;
    - mock-up of mortar removals and cut-out;
    - mock-up of stone repointing; and
    - mock-up of stone cap installation.

13. Follow manufacturer's instructions for product installation, including for factors such as material storage / handling, surface preparation, and environmental conditions.

14. Close-out
    14.1. Prior to allowing public access to the building and site, ensure that all construction materials/debris and equipment are removed and that there is a final 'construction clean' completed of work areas. All construction barriers are to be removed.
    14.2. Arrange for final review by the Engineer and Owner.
    14.3. Complete deficiencies noted during final review.

Required Submittals

Provide the following submittals to the Engineer for review and approval prior to undertaking the work:

1. site plan, including storage areas and scaffold locations (as required);
2. repointing/bedding mortar selection (including colours, textures, and aggregate size);
3. sealant selection, including colour and backer rod; and
4. solid stone capping units.

Summary of Work Items

1. Remove the upper portion of tall walls surrounding the existing window opening to reduce overall height of wall to approximately 10’-0” above average grade.
2. Provide new solid stone coping along tops of all walls. Reconstruct the tops of the rubblestone masonry to provide a level surface for the new stone caps.
3. Remove approximately 5’-0” of wall at southeast corner to introduce approximately 3’-0” tall step. The intent of this change in elevation is to reduce the risk of climbing of this section of wall. Refer to attached drawings and photographs for reference.
4. Fill hollow shaft within southwestern corner of the mill ruins. Recess the face of the infill at the base to retain the appearance of the shaft opening.
5. Carry out extensive masonry repairs (deep repointing and localized rebuilding as required) to all areas of the mill ruins constructed out of field stone.

Scope of Work

The section below provides a more detailed description of each of the work items. Refer to attached drawings for additional details.

Work Item 1 – Removal of upper portions of tall walls.

1. Remove upper sections of tall walls as noted on attached reference drawings and images.
   1.1. Remove stone as solid uncut masonry units to below the proposed elevation of the underside of the new coping stone.
   1.2. Reinstate the top of wall using small stone units, mortar, and cut stone.
   1.3. Ensure top of wall is level from section to section (each independent wall panel is to be reinstated to the same elevation).
   1.4. Consolidate stone wythes and rubble core in preparation for new stone coping.
   1.5. Protect exposed top of wall from weather if exposed for more than 7 days prior to installation of coping.

Work Item 2 – Provide new solid stone coping at tops of walls.

2. Install new stone coping at top of walls.
   2.1. Provide complete shop drawings indicating angles, cuts, and joints along entire length of coping. Do not undertake fabrication prior to having received reviewed shop drawings, stamped *Reviewed* or *Reviewed As Noted*.
   2.2. Coping stone to be fabricated with natural limestone, selected to match the existing masonry in colour and texture. Provide sample for review and approval.
   2.3. Following removal of upper sections of wall, consolidate the stone wythes and rubble core.
   2.4. Set level line at predetermined height above average finished grade.
   2.5. Set new stone coping centered on wall in fresh mortar bed. Provide stone shims and supports as required to ensure the coping remains level as mortar sets.
   2.6. Ensure end coping stones are finished with a slope to the edge and are not cut square (hip angle).
   2.7. Ensure coping stones at inside corner of walls are provided with an inside slope to connect walls and provide continuous drainage planes (valley angle).

2.8. Ensure coping stones extend not less than 3” past outside edge of supporting walls at all locations. All coping stones to be the same width (ie. coping width for entire project is determined by widest point in all walls, plus overhangs).
2.9. Provide sealant and backer rod at all skyward-facing joints (head joints) in coping.
2.9.1. Sealant to be Dymonic 100 or approved equal, colour to match coping stone and mortar. Provide colour sample for approval prior to installation.

Work Item 3 – Remove end of southeast corner to grade.

3. Remove end of southeast corner to reduce risk of climbing.
3.1. Remove stone as solid uncut masonry units to beyond the final proposed limit of the wall. The intent is to ensure that no section of wall is less than 3’-0” above average finished grade.
3.2. Reinstate the end of the wall using small stone units, mortar, and cut stone.
3.3. Provide a final parge coating on the end of the wall using the approved face-pointing mortar, to a thickness of not less than ¾” (19mm).

Work Item 4 – Fill hollow shaft in north end of ruin.

4. Infill hollow shaft at north end of retained wall.
4.1. Flush shaft with low-pressure water to remove all loose aggregate, mortar, or other material.
4.2. Block the bottom end of the shaft with appropriate formwork material.
4.3. Infill the shaft with a combination of salvaged stone, mortar, and lime-based grout.
4.3.1. Ensure that not more than 24” of fluid grout is placed in a single 24-hour period.
4.3.2. Grout to be King HL-5 or approved equivalent.
4.4. Remove formwork at base of shaft and apply a recessed parge coat using the approved face-pointing mortar.

Work Item 5 – Carry out masonry repairs and restoration.

5. Carry out masonry repairs to retained masonry walls.
5.1. Cut out mortar joints where mortar is loose or cracked to a depth of not less than 25mm or twice the joint thickness, whichever is greater.
5.1.1. All equipment used for the removal of existing mortar shall be designed and used to minimize damage to the masonry units.
5.1.2. Chisels shall be the primary tools used for the removal of existing mortar.
5.1.3. Hand chisels shall be appropriately sized and maintained in a sharp condition.
5.1.4. Pneumatic chisels shall be small hand held 'carving tools' with appropriately sized points.
5.1.5. Concrete 'chipping hammers' shall not be used.
5.1.6. Grinders (mini) are only permitted for cutting a single central slot within horizontal joints prior to removing mortar using chisels. **Grinders shall not be used on vertical joints.**
5.1.7. Mortar saws shall be Arbortech AS160 brick and mortar saws or approved alternates. In the event that the use of mortar saw is elected, grinders shall not be permitted to be used.
5.1.8. All cutting out and repointing work shall be completed by qualified masons having at least five (5) years documented experience and shall have completed at

least three (3) projects of comparable size and scope within the last 5 years. Additional prequalifications may apply.

5.1.9. Defective mortar joints are defined as: joints in which mortar is missing, loose, spalled, eroded, powdered, broken, hollow, unsound, soft, or weathered more than 5mm from original plane.

5.1.10. Sound joints containing fine hairline cracks are excluded unless noted on the project drawings.

5.1.11. Carefully remove existing mortar, sealants and other materials from joints between brick and dimension stone masonry units, as well as from within previously repaired cracks within masonry units.

5.1.12. Except as noted otherwise, cut out to at least 25mm deep back to sound mortar where applicable. Remove deteriorated mortar full depth if necessary.

5.1.13. Temporarily support masonry units for which deteriorated bedding joint mortar is removed.

5.1.14. Do not damage adjacent masonry and other units.

5.1.15. Any units damaged during cutting-out operations will be considered as defective and must be repaired or replaced at the contractor's sole expense in a manner acceptable to the consultant.

5.1.16. Damage includes nicks, scores, deep scratches, chipped edges or the like that are, in the opinion of the consultant, caused by neglect or lack of proper care by the workers in carrying out the requirements under this section.

5.1.17. Perform cutting-out using the appropriately sized tool for the width of joint.

5.1.18. Under no circumstances are joints to be widened.

5.2. Following approval of removals by Engineer, repoint and consolidate all areas of masonry noted on the drawings.

5.2.1. Restoration mortar to be King HLM-500 for bedding mortar and King HLM-350 for face-pointing.

5.2.2. Immediately before repointing, flush joints with clean water until absorption is controlled and the surface of the masonry remains damp but not wet.

5.2.3. Do not apply mortar to wet surfaces.

5.2.4. Fill areas where mortar has been removed to greatest depth first.

5.2.5. Build up mortar in several ½" (12mm) compacted layers until outer face of masonry is reached.

5.2.6. Do not add additional water to mortar.

5.2.7. Re-tempering of mortar required due to early stiffening of the mix shall only consist of hand tamping.

5.2.8. Discard all mortar mixes after 12 hours following mixing.

5.2.9. Allow each layer to set before application of subsequent layer.

5.2.10. Pack joints solidly filling all accessible voids and tamp mortar.

5.2.11. Apply final layer and strike flush.

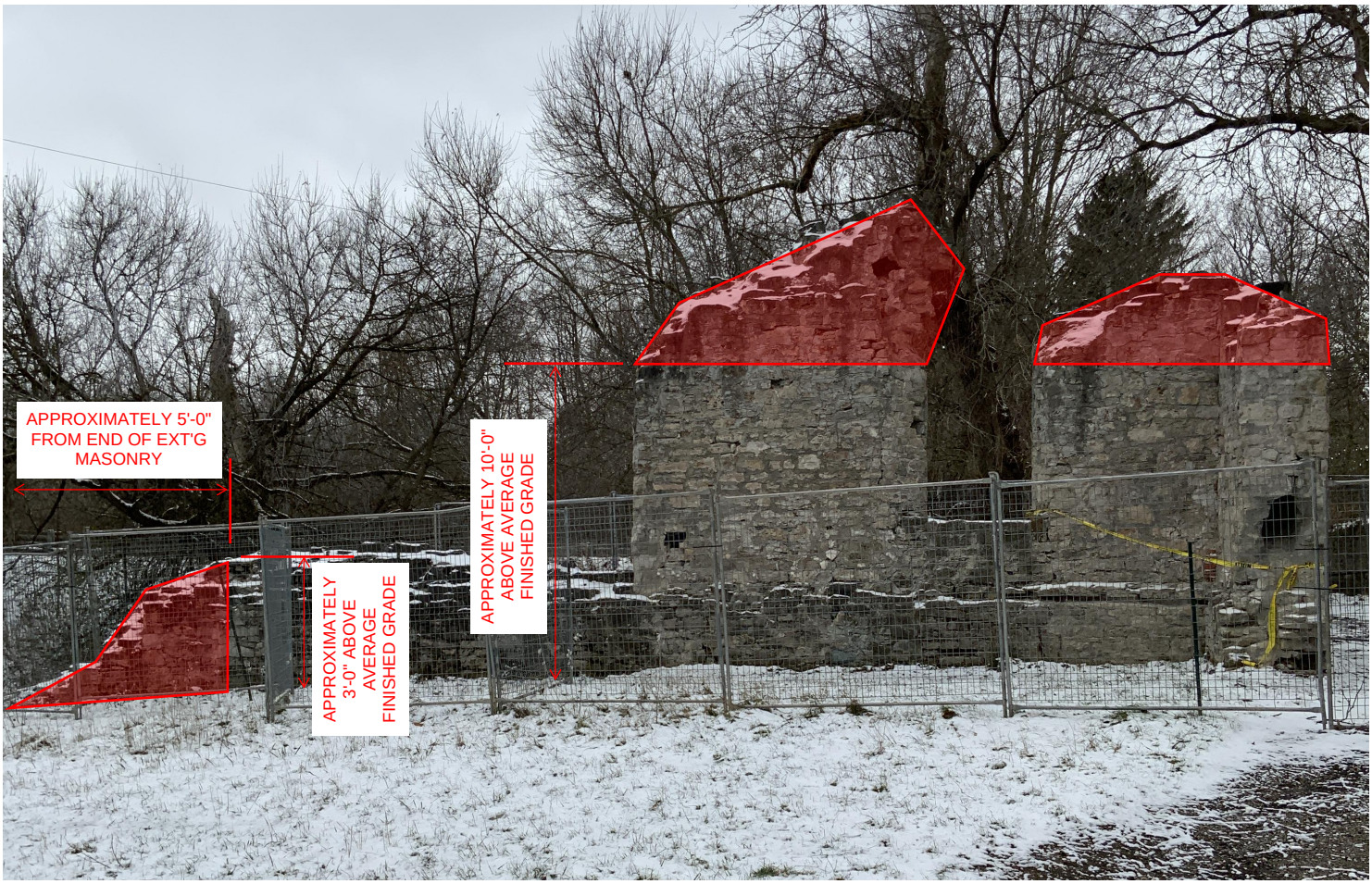
5.2.12. Allow mortar to set thumbprint hard before tooling to match the profile of the existing joints. Do not tool or slick mortar before thumbprint hard.

5.2.13. All masons shall use identical pointing tools.

5.2.14. Immediately after tooling lightly brush finished joint to remove surface binder using stiff bristled paint brush and produce as moderately weathered appearance.

5.2.15. Continuously clean the face of the masonry units during repointing operations.
5.2.16. Use a soft carpet pad or other similar device to remove mortar splatter and stains.
5.2.17. Remove residual stains with sponge and water before hardening.
5.2.18. Control drying of installed pointing.
5.2.19. Protect newly pointed masonry from rain, direct sunlight and wind by covering with damp burlap and tarpaulins. **Do not place new mortar before April 30th or after September 30th without the express written permission of the Engineer, following the review and approval of cold weather protection which may or may not require additional heat.**
5.2.20. Maintain burlap damp for three (3) days by intermittent misting with clean water.
5.2.21. Avoid light streaks, hairline cracks, tool burning, open joints, and other defects caused by tooling when mortar is excessively wet or dry.

Appendix A – Drawings



TACOMA ENGINEERS
176 Speedvale Avenue West
Guelph, Ontario N1H 1C3
Tel: 519.763.2000 Fax: 519.824.2000
www.tacomaengineers.com

Client
CITY OF KITCHENER
200 KING STREET WEST, KITCHENER, ONTARIO

Project
DOON MILL RUINS RESTORATION
1790 (APPROX.) OLD MILL ROAD, KITCHENER

Drawing
REMOVALS ELEVATION

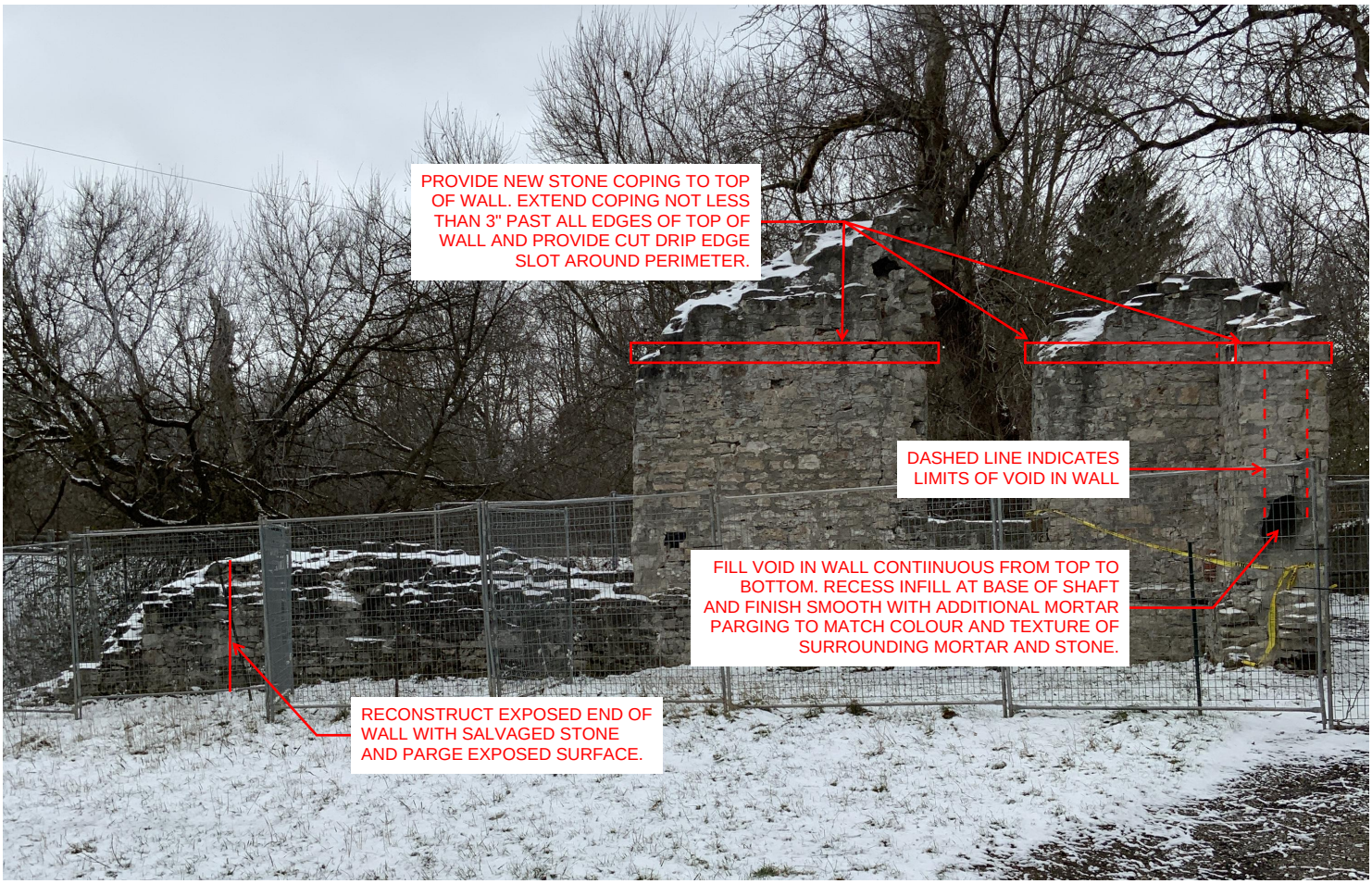
Scale
NTS

Date
JAN.2024

Drawn By
GZ

Project No.
TE-41414-22

S1



TACOMA ENGINEERS
176 Speedvale Avenue West
Guelph, Ontario N1H 1C3
Tel: 519.763.2000 Fax: 519.824.2000
www.tacomaengineers.com

Client
CITY OF KITCHENER
200 KING STREET WEST, KITCHENER, ONTARIO

Project
DOON MILL RUINS RESTORATION
1790 (APPROX.) OLD MILL ROAD, KITCHENER

Drawing
RECONSTRUCTION DETAILS

Scale
NTS

Date
JAN.2024

Drawn By
GZ

Project No.
TE-41414-22

S2

Appendix B – Product Data Sheets

THE MASONRY PEOPLE

KING
A SIKA COMPANY

DIVISION 04
GROUT
NATURAL HYDRAULIC LIME BASED

KING HL-5

FEATURES & BENEFITS
- Contains no sand
- Compatible with all historic or modern structures
- Can be pumped or injected by gravity
- Excellent water vapour transmission properties
- Pre-mixed, which reduces mixing time on site, ensures good proportions and guarantees a homogeneous grout throughout the project

USES
- Specially developed to fill voids in masonry structures
- Can be used indoors or outdoors

KING HL-5 is a pre-mixed and pre-bagged hydraulic lime injection grout specially designed to be used as a grout in order to fill the voids that have been created over time in historic structures. This grout contains no sand and is composed of natural hydraulic lime and other carefully selected components.

EXECUTION
- The application of the grout must comply with the requirements of sections 6 and 8 of CSA-A371-14

MIXING
Mechanical mixing using a high shear colloidal mixer is required when mixing King HL-5. Place 9.5 L (2.50 US gallon) of water into mixer and slowly introduce entire bag of King HL-5. Always mix the entire contents of the bag. Only if additional water is required to meet the target flow slowly add additional water while mixer is running, not exceeding the maximum recommended water content of 10.7 L (2.83 US gallon) per 20 KG (44 lb) bag. Continue mixing for 3 minutes and stop only when material has obtained a consistent homogeneous mix.

GROUT PLACEMENT
If the masonry element to be in contact with the grout has a high rate of absorption, it is preferable to moisten the cavities before the grout is injected.

Make sure there is no standing water in the cavities.

FOR INJECTION APPLICATION
Make sure there are no open mortar joints. Install injection tubes in joints every 300 mm (11.8") horizontally and 300 mm (11.8") vertically. Plug the tubes as the cavities are filled. Agitate the product regularly.

Never inject grout on frozen surfaces.

CLEANING
In order to avoid the use of chemicals, it is recommended to always clean splashes that appear on surfaces such as siding, neighbouring openings, metal flashing etc. in the hour following the installation by using only clean water and a nylon brush.

THE MASONRY PEOPLE

KING
A SIKA COMPANY

DIVISION 04
GROUT
NATURAL HYDRAULIC LIME BASED

KING HL-5

LIMITATIONS

- Never add admixtures on-site to modify set time, workability or any other properties of the plastic or hardened grout
- Never use KING HL-5 on frozen elements or mortar

OPTIMAL PERFORMANCE

- Surface and grout temperature should be between 5°C and 35°C (40°F and 95°F) and kept within this range for 3 days (72 hours) after the end of the work.

PACKAGING

This product is packaged in 20 KG (44 lb) triple-lined bags or bulk bags, wrapped on wooden pallets.

STORAGE AND SHELF LIFE

Always store in a dry area, protected from the weather. On-site, an additional tarp must be used to cover the product to prevent water infiltration. Unopened, properly stored bags have a shelf life of 12 months.

SAFETY PROCEDURES

This product is made of Portland Cement. Wearing safety equipment used for the handling of cement based products is therefore recommended: rubber gloves, dust mask, and safety glasses. Safety Data Sheets can be provided upon request.

TECHNICAL DATA*	
FLOW	
ASTM C 939	10 – 30 seconds
COMPRESSIVE STRENGTH	
ASTM C 109	
7 Days	3 MPa (435 psi)
28 Days	5 MPa (725 psi)
90 Days	8 MPa (1160 psi)
BLEEDING AND SEGREGATION	
ASTM C 940	2% Maximum
WATER RETENTION	
ASTM C 1506	70% Minimum
YIELD PER 20 KG (44 LB) BAG	0.02 m^3 (0.66 ft^3) of fresh grout

*All the values expressed are average values and are obtained under laboratory conditions.

V0521

SIKA CANADA INC.

Head Office
601 avenue Delmar
Pointe-Claire, QC H9R 4A9

Other Locations
Boisbriand (Quebec)
Brantford; Cambridge; Sudbury; Toronto (Ontario)
Edmonton (Alberta)
Surrey (British Columbia)

THE MASONRY PEOPLE

KING
A SIKA COMPANY

DIVISION 04
REPOINTING MORTAR
NATURAL HYDRAULIC LIME BASED

HLM-350

FEATURES & BENEFITS
- Contains no cement
- Formula similar to historic mortar
- Excellent water vapour transmission properties
- Better resistance to freeze-thaw cycles than air lime
- Better resistance to de-icing salts than air lime
- Pre-mixed, which reduces mixing time on site, ensures good proportions and guarantees a homogeneous mortar throughout the project

USES
- For repointing buildings or monuments (ancient or modern)
- Can be used indoors or outdoors

CAUTION
Colour variations on the hardened mortar can be observed even if the mortar in-place has been previously coloured in the factory and complies with the project specifications.

These colour variations are mainly attributed to various implementation conditions such as delay between mixing and tooling of joints, lack of protection against the weather during implementation, or variability in the rate of absorption/humidity. In order to avoid an undesirable result, we recommend that you pay particular attention to these points.

KING HLM-350 is a pre-mixed and pre-bagged mortar specially designed to be used when repointing masonry elements. This mixture is composed of natural hydraulic lime, masonry sand and an air-entraining agent. It is off-white in colour, and may be coloured in the factory or on the job-site using the Colour Plus System exclusive to KING.

EXECUTION
- The application of the mortar must comply with the requirements of sections 6 and 7 of CSA A-371-14 Standard.

MIXING
Small Quantity
Important: In order to avoid segregation issues, always mix the total content of one bag. If less than 30 KG (66 lb) is required (i.e. dry-mix, without water), place the total contents of the bag in a clean container, remove the required amount, and then add water to the amount withdrawn from the mixture.

Large Quantity
Always mix the entire contents of the bag. Mix the HLM-350 with a maximum of 4.2 L (1.1 US gallon) of potable water per 30 KG (66 lb) bag, in a clean mortar mixer. Mix for 5 minutes, or 5 to 10 minutes when using a coloured mortar or when a colourant is added on-site. Using the remaining water, adjust the mortar to obtain the desired consistency. Once well mixed, the consistency of the mortar should be firm enough to allow you to shape a ball with your hands.

MORTAR PLACEMENT
Surface preparation should include, removing any loose particles, dust and debris, as well as removing the old mortar to a depth of twice the thickness of the joint. Moisten the area to be repaired without leaving standing water in the cavities to be filled. Place the mortar in successive layers of 6 mm (¼ inch) thickness maximum. The layers of mortar are applied wet on wet. If work is interrupted, moisten the joint again before resuming work. Tool the joints and start the curing. Avoid working in direct sunlight or exposed to winds. The sun as well as the wind are elements to take into consideration in order to avoid cracking problems. Never spread mortar on frozen surfaces.

TOOLING OF THE JOINTS
The tooling of joints exposed to rain is an important step that contributes to the waterproofing of the masonry system and must be done using a jointer. The amount of water present in the mortar joint at the time of tooling will determine the final colour of the cured mortar. To avoid colour variation, ensure that the mortar joint always contains the same amount of water when it is tooled. As a general rule, the joint is considered ready to be tooled when the mortar has hardened sufficiently such that a fingerprint mark remains. Always tool the joint in order to respect the historical aspect of the original mortar.

CURING
Curing is essential for optimizing the physical properties of the mortar. The curing is carried out using a moist cure which must begin as soon as the initial set of the mortar is complete and continue for a period of 3 to 7 days. To learn more about the moist cure, refer to the guide: How to perform a moist cure for masonry, published by KING and available on the company's website.

THE MASONRY PEOPLE

KING
A SIKA COMPANY

DIVISION 04
REPOINTING MORTAR
NATURAL HYDRAULIC LIME BASED

HLM-350

LIMITATIONS

- Never add admixtures on-site to modify set time, workability or any other properties of the plastic or hardened mortar
- Never use HLM-350 on frozen elements or mortar
- Do not use HLM-350 for to lay masonry units. In this case, it is advisable to use HLM-500.
- Never add water to recover the loss of workability. Only mix again.

OPTIMAL PERFORMANCE

- Surface and mortar temperature should be between 5°C and 35°C (40°F and 95°F) and kept within this range for 2 days (48 hours) after the end of the moist cure.

PACKAGING

This product is packaged in 30 KG (66 lb) triple-lined bags or bulk bags, wrapped on wooden pallets.

STORAGE AND SHELF LIFE

Always store in a dry area, protected from the weather. On-site, an additional tarp must be used to cover the product to prevent water infiltration. Unopened, properly stored bags have a shelf life of 12 months.

SAFETY PROCEDURES

This product is made of Natural Hydraulic Lime. Wearing the same safety equipment that is usually used for the handling of cement-based products is recommended: rubber gloves, dust mask and safety glasses. Safety Data Sheets can be provided upon request.

CLEANING

In order to avoid the use of chemicals it is recommended to always remove as much splash or mortar stains as possible before the mortar hardens. If the use of cleaning products is necessary, be sure to contact the manufacturer of the product to validate the compatibility and the procedure to follow. It's important to mention that it is a mortar based on natural hydraulic lime.

If the colour ONYX is used, be sure to mention to the cleaning product manufacturer that the mortar contains Carbon Oxide pigments. Generally used cleaning agents are not compatible with Carbon Oxides. Apart from colour Onyx, all KING coloured mortars contain iron or titanium oxides.

Regardless of the technique or product selected, it is essential to preserve the integrity of the mortar.

Be sure to clean a test area before proceeding with the work.

TECHNICAL DATA*	
VICAT CONE	
ASTM C 780	15 mm (0.6") ± 5 mm (0.2")
COMPRESSIVE STRENGTH**	
CSA A3004-C2	
7 Days	0.7 MPa (101 psi)
28 Days	1.8 MPa (145 psi)
90 Days	2.7 MPa (290 psi)
AIR CONTENT	
EN-1015-7 Method A	14% Maximum
SHRINKAGE	
ASTM C 596	0.05% at 91 days
YIELD PER 30 KG (66 LB) BAG	0.018 m^3 (0.65 ft^3) of fresh mortar

* All the values expressed are average values and are obtained under laboratory conditions.
** The compressive strengths of natural hydraulic lime mortars gradually increase as a function of time unlike mortars containing cement which reach their optimal value around 28 days.

V0523

SIKA CANADA INC.

Head Office
601 avenue Delmar
Pointe-Claire, QC H9R 4A9

Other Locations
Boisbriand (Quebec)
Brantford; Cambridge; Sudbury; Toronto (Ontario)
Edmonton (Alberta)
Surrey (British Columbia)

THE MASONRY PEOPLE

KING
A SIKA COMPANY

DIVISION 04
MORTAR
NATURAL HYDRAULIC LIME BASED

HLM-500

FEATURES & BENEFITS
- Contains no cement
- Formula similar to historic mortar
- Excellent water vapour transmission properties
- Better resistance to freeze-thaw cycles than air lime
- Better resistance to de-icing salts than air lime
- Pre-mixed, which reduces time mixing on site, ensures good proportions and guarantees a homogeneous mortar throughout the project

USES
- For laying bricks, blocks or stones
- Can be used as a repointing mortar
- Can be used indoors or outdoors

CAUTION
Colour variations on the hardened mortar can be observed even if the mortar in-place has been previously coloured in the factory and complies with the project specifications.

These colour variations are mainly attributed to various implementation conditions such as delay between mixing and tooling of joints, lack of protection against the weather during implementation, or variability in the rate of absorption/humidity. In order to avoid an undesirable result, we recommend that you pay particular attention to these points.

KING HLM-500 is a pre-mixed and pre-bagged mortar specially designed to be used when laying masonry units in an historic preservation or for a new construction project. This product is composed of natural hydraulic lime, natural Type S air lime, masonry sand and an air-entraining agent. It is off-white in colour, and may be coloured in the factory or on the job-site using the Colour Plus System exclusive to KING.

EXECUTION
- The application of the mortar must comply with the requirements of sections 6 and 7 of CSA-A371-14

MIXING
Small Quantity
Important: In order to avoid segregation issues, always mix the total content of one bag. If less than 30 KG (66 lb) is required (i.e. dry-mix, without water), place the total contents of the bag in a clean container, remove the required amount, and then add water to the amount withdrawn from the mixture.

Large Quantity for Laying Masonry Units
Always mix the entire contents of the bag. Mix HLM-500 with a maximum of 5.5 L (1.45 US gallon) of potable water per 30 KG (66 lb) bag, in a clean mortar mixer. Pour 5 L (1.3 US gallon) of water into the mixer and add 30 KG (66 lb) of HLM-500. Mix for 5 minutes or 5 to 10 minutes when using a coloured mortar, or when a colourant is added on-site. Using the remaining water, adjust the mortar to obtain the desired consistency.

Large Quantity for Repointing Application
Mix KING HLM-500 with a maximum of 4.5 L (1.18 US gallon) of potable water per 30 KG (66 lb) bag, in a clean mortar mixer. Mix the product until obtaining of a sufficiently firm consistency to allow you to shape a ball with your hands.

MORTAR PLACEMENT
Laying Masonry Units
Avoid working in direct sunlight or exposed to winds. The sun and the wind are elements to take into account in order to avoid cracking problems. Never spread mortar on frozen surfaces.

MORTAR PLACEMENT
Repointing
Surface preparation should include, removing any loose particles, dust and debris, as well as removing the old mortar to a depth of twice the thickness of the joint. Moisten the area to be repaired without leaving standing water in the cavities to be filled. Place the mortar in successive layers of 6 mm (¼ inch) thickness maximum. The layers of mortar are applied wet on wet. If work is interrupted, moisten the joint again before resuming work. Tool the joints and start the curing. Avoid working in direct sunlight or exposed to winds. The sun as well as the wind are elements to take into consideration in order to avoid cracking problems. Never spread mortar on frozen surfaces. Always tool the joint in order to respect the historical aspect of the original mortar.

THE MASONRY PEOPLE

KING
A SIKA COMPANY

DIVISION 04
MORTAR
NATURAL HYDRAULIC LIME BASED

HLM-500

LIMITATIONS

- Never add admixtures on-site to modify set time, workability or any other properties of the plastic or hardened mortar
- Never use KING HLM-500 on frozen elements or mortar
- Never add water to recover the loss of workability. Only mix again.

OPTIMAL PERFORMANCE

- Surface and mortar temperature should be between 5°C and 35°C (40°F and 95°F) and kept within this range for 2 days (48 hours) after the end of the moist cure.

PACKAGING

This product is packaged in 30 KG (66 lb) triple-lined bags or bulk bags, wrapped on wooden pallets.

STORAGE AND SHELF LIFE

Always store in a dry area, protected from the weather. On-site, an additional tarp must be used to cover the product to prevent water infiltration. Unopened, properly stored bags have a shelf life of 12 months.

SAFETY PROCEDURES

This product is made of Natural Hydraulic Lime. Wearing the same safety equipment that is usually used for the handling of cement-based products is recommended: rubber gloves, dust mask and safety glasses. Safety Data Sheets can be provided upon request.

TOOLING OF THE JOINTS

The tooling of joints exposed to rain is an important step that contributes to the waterproofing of the masonry system and must be done using a jointer. The amount of water present in the mortar joint at the time of tooling will determine the final colour of the cured mortar. To avoid colour variation, ensure that the mortar joint always contains the same amount of water when it is tooled. As a general rule, the joint is considered ready to be tooled when the mortar has hardened sufficiently such that a fingerprint mark remains. Always tool the joint in order to respect the historical aspect of the original mortar.

CURING

Curing is essential for optimizing the physical properties of the mortar. The curing is carried out using a moist cure which must begin as soon as the initial set of the mortar is complete and continue for a period of 3 to 7 days. To learn more about the moist cure, refer to the guide: How to perform a moist cure for masonry, published by KING and available on the company's website.

CLEANING

In order to avoid the use of chemicals it is recommended to always remove as much splash or mortar stains as possible before the mortar hardens. If the use of cleaning products is necessary, be sure to contact the manufacturer of the product to validate the compatibility and the procedure to follow. It's important to mention that it is a mortar based on natural hydraulic lime.

If the colour ONYX is used, be sure to mention to the cleaning product manufacturer that the mortar contains Carbon Oxide pigments. Some commonly used cleaning agents are not compatible with Cabon Oxides. Apart from the colour, Onyx, all KING coloured mortars contain iron or titanium oxides.

Regardless of the technique or product selected, it is essential to preserve the integrity of the mortar.

Be sure to clean a test area before proceeding with the work.

THE MASONRY PEOPLE

KING
A SIKA COMPANY

DIVISION 04
MORTAR
NATURAL HYDRAULIC LIME BASED

HLM-500

TECHNICAL DATA*	
BEDDING MORTAR	
FLOW	
CSA A3004-C1	105 to 115%
COMPRESSIVE STRENGTH - BEDDING MORTAR**	
CSA A3004-C2	
7 Days	0.7 MPa (101 psi)
28 Days	1.8 MPa (145 psi)
90 Days	2.7 MPa (290 psi)
REPOINTING MORTAR	
COMPTESSIVE STRENGTH - REPOINTING MORTAR	
VICAT CONE	
ASTM C780	15 mm (0.6") +/- 5 mm (0.2")
CSA A3004-C2	
28 Days	More than 3 MPa (435 psi)
AIR CONTENT	
EN-1015-7 Method A	14% Maximum
SHRINKAGE	
ASTM C 596	0.05% at 91 days
YIELD PER 30 KG (66 LB) BAG	0.018 m^3 (0.65 ft^3) of fresh mortar

* All the values expressed are average values and are obtained under laboratory conditions.
** The compressive strengths of natural hydraulic lime mortars gradually increase as a function time unlike mortars containing cement which reach their optimal value around 28 days.

V0922

SIKA CANADA INC.

Head Office
601 avenue Delmar
Pointe-Claire, QC H9R 4A9

Other Locations
Boisbriand (Quebec)
Brantford; Cambridge; Sudbury; Toronto (Ontario)

Edmonton (Alberta)
Surrey (British Columbia)

TREMCO

TECHNICAL DATA SHEET

DYMONIC® 100

High-Performance, High-Movement, Single-Component, Polyurethane Sealant

PRODUCT DESCRIPTION

Dymonic® 100 is a single-component, medium-modulus, non-sag polyurethane sealant. Dymonic 100 offers a high-performance, high-movement, durable, flexible seal that performs excellently in moving joints and exhibits tenacious adhesion to substrates once fully cured.

BASIC USES

Typical applications for Dymonic 100 include expansion and control joints, precast concrete panel joints, perimeter caulking (windows, doors, and panels), aluminum, masonry, and vinyl siding. Dymonic 100 is also an excellent choice as a fluid applied flashing material in rough opening perimeters for fenestration/window, door and curtain wall applications. Dymonic 100 is suitable for water immersion applications and will not out gas.

FEATURES & BENEFITS

Dymonic 100 has been formulated with an innovative polymer technology, similar to TREMproof® 250GC and Vulkem® 45SSL, that allows it to be highly versatile and grants its unique capability to adhere to damp or green concrete without outgassing. The skin time of Dymonic 100 is 2 hours and the tack-free time is 6 to 8 hours. This significantly reduces dirt attraction and improves the overall asthetic look.

Dymonic 100 has a movememnt capability of +100/-50% in typical field conditions with excellent performance in moving joints. The formula is low-VOC and UV-stable, meaning Dymonic 100 will not crack, craze, or yellow under extreme UV exposure. Additionally, Dymonic 100 is jet fuel-resistant and compatible with many common construction substrates.

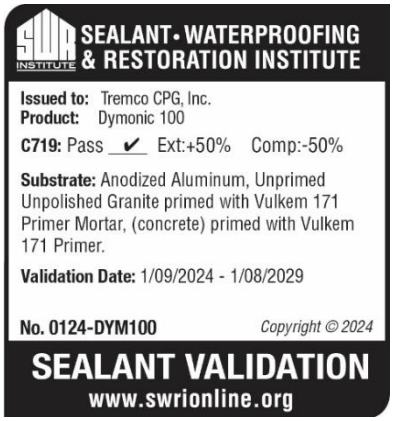
- Compatible with and can be coated over with Tremco's Vulkem Deck Coatings, ExoAir® Air Barrier products and the cold, fluid-applied TREMproof® line of below-grade waterproofing products
- Accepted for use over Nudura Insulated Concrete Forms (ICF)

There are 21 standard color options available for Dymonic 100, with the option of painting over the sealant.

Dymonic 100 meets or exceeds the requirements of the following specifications:

- ASTM C920 Type S, Grade NS, Class 50, Use NT, T, M, A, O, I
- U.S. Federal Specification TT-S-00230C, Class A, Type II
- CAN/CGSB-19,13-M87
- International Code Council (ICC) Section R703.8 Flashing
- AAMA 714-15 Specification for Liquid-Applied Flashing
- NFPA 285 Listed Component

Accepted fire rated systems: FF-D-1186, FW-D-1117, HW-D-1122, WW-D-1200, and BW-S-0006



AVAILABILITY

Immediately available from your local Tremco Sales Representative, Tremco Distributor, or Tremco Warehouse in 10.1 oz (300 mL) cartridges and 20 oz (600 mL) sausages.

COLORS

Available in Almond, Aluminum Stone, Anodized Aluminum, Beige, Black, Bronze, Buff, Dark Bronze, Gray, Gray Stone, Hartford Green, Ivory, Light Bronze, Limestone, Natural Clay, Off White, Precast White, Redwood Tan, Sandalwood, Stone, and White.

LIMITATIONS

Use with adequate ventilation. Always utilize the accompanying SDS for information on Personal Protective Equipment (PPE) and Health Hazards. Not recommended for use in chlorinated, potable, heavy or waste water. Although Dymonic 100 is paintable, this does not imply adhesion to and compatibility with all paints. Consult Tremco Technical Bulletin No. S-09-05 or Tremco Technical Services for more information.

WARRANTY

A repair or replacement warranty is available on all Tremco products. Visit https://www.tremcosealants.com/warranties/ for details.

TYPICAL PHYSICAL PROPERTIES

PROPERTY	TEST METHOD	TYPICAL RESULTS
Rheological Properties	ASTM C639	Non-sag (NS), 0" of sag in channel
Hardness Properties	ASTM C661	40 ± 5
Weight Loss	ASTM C1246	Pass
Skin Time	ASTM C679	2 to 3 hr
Tack Free Time	73.4°F (23°C) 50% RH	6 to 8 hr
Stain and Color Change	ASTM C510	Pass
Adhesion to Concrete	ASTM C794	35 pli
Adhesion to Concrete After Immersion	ASTM C794	30 pli
Adhesion to Green Concrete	ASTM C794	>25 pli
Adhesion to Damp Concrete	ASTM C794	>20 pli
Effects of Accelerated Aging	ASTM C793	Pass
Movement Capability	ASTM C719	± 50%
Movement Capability	ASTM C719 *(Modified)*	+100/-50%
Tensile Strength	ASTM D412	350 to 450 psi
% Elongation	ASTM D412	800 to 900%
Modulus at 100%	ASTM D412	75 to 85 psi
Tear Strength	ASTM D412	65 to 75 psi
Fungal Resistance	ASTM G21-15	Fungal Resistance = 0, No Growth
Service Temperature		-40 to 180 °F (-40 to 82 °C)
Application Temperature		40 to 100 °F (4 to 37 °C) *
Smoke Development, Fire Spread	ASTM E84	5, 5
Smoke Development, Fire Spread	CAN S102	10, 10
Fire Resistance of Assembly	NFPA 285	Pass
Crack Bridging	ASTM C1305	Pass
Nail Seal Ability	ASTM D1970 Section 7.9	Pass

**For temperatures below 40 °F, please refer to the Technical Bulletin, Cold Temperature Sealant Application Recommendations.*

Please refer to our website at www.tremcosealants.com for the most up-to-date Product Data Sheets.

NOTE: All Tremco Safety Data Sheets (SDS) are in alignment with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) requirements.

D100-DS/0224