



SIDEWALK REPAIR MANUAL



May 2018

INTRODUCTION

The City of North Liberty is committed to providing safe sidewalks for all. Maintaining North Liberty's public structures is a matter of pride.

It is important to preserve the community for the future, and protect the community's investments in streets, sewers and sidewalks by keeping them clean, safe, looking good and working well.

Chapter 136 of the City Code identifies property owners as responsible for the construction, reconstruction and maintenance of the sidewalk system abutting their property.

Property owners have the option to make the repairs themselves; however, placing concrete is difficult work and requires an advanced skill set and knowledge of City codes and standards. Consider hiring a professional for the best results.

There are repair options available, depending on the amount of damage and the type of hazards. This repair manual will take you through each method, step-by-step. Each posted defective area in your sidewalk should be evaluated separately, to decide which repair method would be most effective. Sidewalk Inspectors are available to meet with property owners to discuss repair options.

A permit is required to work in the City right-of-way. Permits can be obtained at the Building Department Office, located at 1 Quail Creek Circle, online at the City's website (www.northlibertyiowa.org) under permits, or from the Planning Department at 3 Quail Creek Circle, North Liberty, IA, 52317. There is a permit fee associated with the permit.

If you hire a contractor, the contractor will be responsible for obtaining the permit.

The tools needed for making repairs will be listed in each step. In the back of this repair manual, there is a tool glossary with pictures to help you identify the tools you will need.

If you have any questions, please contact the Building Department at 319-626-5713 or Planning Department at 319-626-5728

Thank you.

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SIDEWALK POSTING TYPES AND CRITERIA

(See Appendix I)

All hazards in the City right-of-way, latitudinal and longitudinal, shall be posted for repair.

Stub Toes (Grade/Step Separation)

A guideline of 3/4 -inch vertical separation for all sidewalk and driveway areas will be used to determine if a stub toe is hazardous.

Openings (Holes, Wide Cracks, Concrete Separations)

All openings, in the City right-of-way, that are considered hazardous shall be posted for repair. A guideline of 3/4 - inch depth and/or 3/4- inch width will be used to determine if an opening is hazardous.

Spalled sidewalks and driveways, where the concrete is chipped to the point of creating a trip hazard, shall be posted for repair. A guideline of 3/4- inch width and/or 3/4- inch depth will be used in determining if a spalled area is hazardous.

Raised Areas

Raised sidewalks and driveways shall be posted when the raised area is hazardous. As a guideline, when the uppermost point of the raised area is greater than 4 inches from the original grade, the area may be considered hazardous.

Sunken Areas

Sunken sidewalks and driveways may be posted when it causes a trip hazard or has sunken 4 inches below the original grade.

Unused Driveway Approaches

All driveway approaches are constructed under a revocable permit and may be posted for closure if permanently unused or hazardous. Permanently unused driveway approaches, not serving legal maneuvering space on a property, as set forth in planning codes, may be closed. Examples are driveways blocked by fences, walls, landscaping, or driveways to illegal parking areas in yards.

Root Damage at Adjoining Properties

Where a tree root has lifted the sidewalk or driveway on either side of the property line, both properties may be posted to correct and maintain the grade of the sidewalk, or driveway, for both properties. Each posted property will have a notation about the adjoining property. To maintain quality of work, the properties should be repaired together. They could be repaired separately, by installing a temporary transition area, that would later be replaced during repairs made by the second property owner. In cases where it is necessary to install a transition area on the abutting property, repairs can be made without creating a hazard at the property line. Verify with a Sidewalk Inspector the area needed to make a proper transition.

7 i f V F U a d g

Will be maintained by the City of North liberty .

SIDEWALK REPAIR METHODS

Obtain Permit

A permit is required before work is started in the City right-of-way. Permits can be obtained, in person or online or from the Building Inspection Department or Planning Department Offices.

Method 1: Grinding

Concrete grinding is one method used to remove “stub toes” that are 1 inch high or less and perpendicular to the flow of pedestrian traffic. Verify with the posting Sidewalk Inspector to determine if grinding would be an acceptable repair method.



“Stub toes” are areas in the sidewalk, where part (or all) of one square is higher than the one next to it, causing a tripping hazard for pedestrians. It may be possible to eliminate the “stub toe” hazard by grinding down the high edge.

Grinding repairs shall not exceed 1 inch vertically. The repaired section surface finish shall conform to the non-slip coefficient of friction, per standard specification. This can be achieved by roughing the surface with a saw blade or other approved method. Verify with the City to determine if grinding would be acceptable.

If you grind down a stub toe caused by tree roots, the repair may only be temporary. Grind off the hazard so that the walk has a gradual slope or transition. For a ½-inch of rise, grind back 6 inches. For a (maximum) 1 inch rise, grind back 12 inches.

Tools Needed for Grinding Repair

Hand Tools	Power Tools
Gloves, Goggles, Hearing Protection, Eye Protection, Dust mask or respirator	Masonry Grinder

You will need a masonry grinder, which can be rented. See Appendix IV for rental information. Grinding concrete is noisy and dusty. Remember to wear hearing and eye protection.



If the sidewalk is raised 1 inch or less, and the concrete edges are solid, the concrete may be ground to remove the stub toe hazard. Sidewalks raised greater than 1 inch cannot be ground, as this would compromise the structural integrity of the sidewalk.

If, during grinding, aggregate becomes dis-lodged, or edges becomes spalled, or deteriorated, full depth repair will become necessary.

Areas raised in the sidewalk greater than 1 inch are to be removed and replaced at full depth.

Request a final inspection, if all posted hazards are approved for grinding. If posted hazards are to be corrected by a combination of grinding and removing and replacing concrete, a final inspection will be required after **all** repairs have been completed.

Method 2: Remove and Replace

Removal and replacement is typically used to repair the following types of hazards:



Barricades

A permit to work, in the City right-of-way, requires permit holders to erect freestanding barricades on work sites in the sidewalk, driveway, curb, and street, to warn pedestrian and/or vehicular traffic. Excavated portions of sidewalk, at entry areas, within the work site shall have barricades during construction, to prevent possible injury to pedestrian and/or vehicular traffic. The liability for an accident or injury, during construction, is the responsibility of the permit holder.

Barricades can be built out of scrap lumber, but must be a minimum of 36 inches tall. Barricades can also be rented from rental equipment businesses. Siewalk closed signs shall be posted on each barricade.



When Transition Areas are Needed

In some cases, it may be necessary to install a transition area onto the neighboring property. This process allows repairs to be made without creating a hazard at the property line. Verify with a Sidewalk Inspector to determine the area needed to make a proper transition. If adjacent properties are repaired at the same time, a transition would not be necessary.

Saw Cut and Break Up Existing Concrete

Saw cut all sections to be removed, using a concrete or masonry blade. Break up and excavate sections to the proper depth, per City Standard Drawings and Specifications.

Remove All Debris and Prepare the Base

All debris must be removed from the City right-of-way and barricades placed prior to requesting a form inspection. Some people use broken concrete for garden pathways or retaining walls. If you don't use it, debris can be taken to a landfill or be recycled.

To prevent future settling, pouring concrete on bare soil is only allowed, if firm and undisturbed. For larger excavations, it may be a requirement, that 2" crushed aggregate be placed as a base first. Also, remove any soft or muddy areas, then rock and compact. All aggregate must be compacted to 95%. If rock is needed, it shall be 1"- 0 crushed rock, which will need to be compacted (using a plate compactor) to the required depth.

Tools Needed to Remove Concrete

Hand Tools		Power Tools		
Gloves, Goggles, Shovel		Concrete Saw		
Sledge Hammer, Axe		Circular Saw w/ masonry blade		
Pry Bar, Rake		Jackhammer		
Pick, Broom		Truck or Trailer		
Time Estimate (in hours) for two persons:				
Number of Squares	1	2	3	4
Hours to Prepare the Site	1 ½	2 ½	3 ½	4 ½

Placing Forms

You will need to place forms to hold the newly mixed concrete. A form is simply a 1" or 2" x thickest sidewalk, piece of lumber slightly longer than the excavated area, to hold the concrete in place until it hardens or cures. Drive wooden stakes into the ground on the outside of the form, every 2 to 3 feet apart, and nail the form to grade. The stakes will keep the forms straight and secure. Stakes should be placed slightly lower than the form to not cause interference when the concrete is screeded.



When repairing sidewalks and curbs damaged by tree roots, a form consultation will be necessary to discuss the following options:

Radius Block outs

To reduce the width of the sidewalk, where roots have encroached into the sidewalk, use a radius block out. This will also leave room for root expansion, when the Urban Forestry Inspector will not allow roots to be cut and removed.



Reduce Sidewalk

Sidewalks that are 6-foot-wide may be reduced 1 foot, if necessary, in cases where roots are encroaching into the sidewalk, and the Urban Forestry Inspector will not allow root removal. Sidewalks can be reduced to 4-foot-wide in extreme cases, only with approval of a Sidewalk Inspector.



Tools Needed to Form Concrete

Hand Tools	Materials
Tape Measure, Hand Saw	Lumber, Survey Stakes
Hammer, String Line, Level	Nails, Black Felt Expansion
Time Estimate (in hours) for two persons:	
Number of Squares	1 2 3 4
Hours to Prepare the Site	1/4 1/2 1/2 3/4

Request Form Inspection

After all posted areas have been excavated to proper depth, forms have been set, barricades are in place, and all debris has been removed from the City right-of-way you may request an inspection prior to pouring the concrete by calling 319-626-5713.

Provide the posted address and the permit number.

Inspections will be made Monday through Friday, excluding holidays. Requests must be received by 6:30 am to obtain an inspection that day. Requests made after 6:30 am, will be inspected the next business day.

If an inspection card reading "Do Not Pour Concrete" is given, the deficiencies need to be corrected and another form inspection requested. Once an approved form inspection card is issued, "Permission Granted to Pour Concrete," concrete may be poured.

Concrete replacement will be tooled to match existing patterns and have a broomed finish per City Specifications.

Contraction/Expansion Joints

Place joints at the direction of the Sidewalk Inspector.

Expansion material is a pre-molded strip, made of tar-impregnated black felt like material, that can be purchased in most building supply stores. Gray recycled paper expansion material is not acceptable. Wood strips, including cedar and pressure treated lumber, are not acceptable and will decay over time. Expansion material will be used as directed by the Sidewalk Inspector.

Typical locations for expansion joints, or contraction joints, are as follows:

1. Between different thicknesses of concrete: to separate a 4-inch sidewalk from a 6-inch driveway.
2. Continuation of existing expansion joints or contraction joints.
3. Grade breaks: where the concrete grade will change, or be different i.e. ramping over tree roots.
4. Expansion material or bond breaker will need to be used around objects such as buildings, retaining walls, or utility poles.
5. Deep joints are typically spaced at a dimension twice the width of sidewalk.

Use a straight 1" x 4", or 2" x 4", backboard slightly shorter than the length of the expansion material to place behind the expansion material and stake into place. Place fresh concrete on both sides of the expansion joint and then remove the backboard and the stakes. The concrete will hold the expansion straight and to grade.



After Permission Granted to Pour Concrete:

Tools Needed for Placing and Finishing Concrete

Hand Tools		Materials		
Rubber Boots and Gloves	Screed Board	Ready Mixed Concrete		
Mortar box or Wheelbarrow	Bull Float	Dry Concrete Mix (Premix or Sakcrete)		
Shovel, Water Hose	Hand Float, Broom	Dry Cement for Sakcrete		
Steel Trowel, Jointer Tool	3/8" Radius Edger Tool (3" typical-match existing)			
Time Estimate (in hours) for two persons:				
Number of Squares	1	2	3	4
Placing, Leveling Concrete	2	2	2.5	2.5

Determine How Much Concrete is Needed

Measure the width and length of the area(s) you must fill with concrete. This will give you the area in square feet. Refer to the chart below and figure out about how many cubic yards of concrete you will need. An average city sidewalk square is 9 square feet (3 foot by 3 foot). Sidewalks are 4 inches deep; so, for one repair area you would need 1/9 of a cubic yard of concrete.

Depth of Concrete	Area (width x length) In Square Feet						
	9	18	27	36	80	160	240
4" Sidewalk (In Cubic Yds.)	1/9	1/4	1/3	1/2	1	2	3
6" Driveway (In Cubic Yds.)	1/6	1/3	1/2	2/3	1 ½	3	4 ½

Placing and Finishing Concrete

Once you know how much, and what kind of concrete to use, and are ready to place the concrete, the next steps come fast. Make sure you understand beforehand what you will be doing. Have the necessary tools ready and the steps clearly in mind.

Concrete Options

City Standard Construction Specification Section requires Portland Cement Concrete used in the construction and repair of sidewalks, driveways, and curbs, shall have a minimum specified compressive strength of 3300 psi, with a of 4-inch maximum slump. Slump is a measurement of the consistency of concrete. The addition of too much water (higher slump) will weaken.

If you need 3 to 7 cubic yards or more, concrete can be purchased from a local source and be delivered. Some companies will not deliver on the weekend, so schedule accordingly.

If you need 1 to 3 cubic yards or less, you may want to mix it yourself, purchase ready-mixed concrete that you haul yourself in a supplied trailer, or utilize a meter mix truck that mixes the concrete on-site.

To mix it yourself you will need dry concrete mix such as “Premix” or “Sakcrete”, which can be purchased from a building supply store. Check the specifications on the bag to determine if the concrete mix meets the 3300-psi minimum strength. You can use a mortar box or a wheelbarrow to mix in, and a square point shovel or garden hoe for mixing. When ready, add water a little at a time until workable. Concrete should be placed immediately after mixing.

Note: Do not place concrete when freezing weather is expected, as it will not cure correctly and will need to be replaced.

It is not recommended to pour concrete if very hot weather is expected, as it will cure too quickly and may have to be replaced.

When pouring concrete during rainy weather, be prepared to tent areas with plastic while finishing concrete, to prevent water damage.

Skin

There is lime in concrete which can harm human and animal skin. Wash it off as soon as possible, with soap and water, or wear rubber gloves and boots to prevent direct contact with the concrete.

Clothing

Let the concrete dry if it gets on your clothing, and then brush it off. Be sure it is all brushed off before putting your clothes into the washing machine or it could damage the machine.

Wet Down/Soak the Base

Keep the base moist until the concrete is poured. Dry ground will draw moisture from the concrete and the concrete will cure too quickly. The base needs to be soaked but not so much that it holds water or becomes extremely muddy. If this occurs, or there have been several days of rain, the excess water and/or mud should be removed, rocked, and then compacted again before pouring concrete.

Placing and Leveling the Concrete

After you pour the concrete into the form, spread it out as evenly as you can with a shovel, leaving it slightly higher than the existing sidewalk.



Next use the edge of a 2" x 4" board or "screed", that reaches across the entire width of the formwork and move it across the surface in a sawing motion. Concrete should be the same grade as the existing formwork, which should be at existing grade of abutting sidewalk.

Floating

Next, level off any high areas of concrete and fill in any low areas, before the concrete begins to harden. Use a bull float. Push it back and forth across the width of the area you are replacing. Then push it back and forth across the length of the area being replaced. If you must add any concrete to fill low areas, push the float across again. After floating, surface should not have holes or high spots.



Use the magnesium hand float for small areas, perimeters, and around obstructions.



Caution

Concrete can easily be overworked. Do not pass the float over the slab more than a few times because this can produce a weak surface with low wear resistance.

Breaking the Edges

You'll need an edger tool. Draw it along all outside edges that were formed, including both sides of any expansion joints. This pushes larger rock pieces down, and prepares the edges for final finishing.



Note: The following steps must be done AFTER the water on top of the concrete has evaporated and the sheen has vanished.

Troweling

Take a steel finishing trowel and slide it straight across the top. This step brings water to the surface and seals the concrete. To finish, take the steel trowel and work it in arcs, with each new arc removing the heel mark from the arc before.



Brooming

Take a concrete broom or paint brush and draw it across the new concrete transverse to (opposite of) the direction of travel to give the concrete a light broom finish. The broom finish creates traction, making the sidewalk less slippery for pedestrians. Timing for this step is critical. If the surface is broomed too soon, it will deteriorate prematurely. If the surface is broomed too late, it won't have enough traction.



Shine the Edges

Draw the finish edger along all outside edges that were formed, including both sides of any expansion joints.



Shallow/Decorative Joints

Shallow joints are the grid, or score lines, across the width and length of a sidewalk. Match the existing joint pattern in your sidewalk. Using a back and forth rocking motion, place the shallow joints with a jointing tool.



GRAFFITI, VANDALISM AND FOOTPRINTS

To remove unwanted graffiti, vandalism, and footprints in wet concrete, proceed as follows:

1. Use the edge of your hand float and plane off any high spots.
2. Pat the concrete with your float to draw moisture.
3. If necessary, mix up a tiny batch of concrete to fill in any holes.
4. Use a steel finishing trowel to seal the concrete surface.
5. Take a soft broom or paint brush and draw it across the concrete transverse to (opposite of) the direction of travel to give the concrete a light broom finish.

To address graffiti, vandalism, or footprints in freshly cured concrete, it may be necessary to use a grinder to remove the high spots. Then mix a small batch of 2 parts sand, to 1 part Portland Cement to fill any holes, and then follow steps 4 & 5 above.

CLEAN UP

Leave the barricades up for about 2 days. The time it takes the concrete to cure varies depending on the weather, and the size of the job. A minimum of 2 days must elapse between the day the concrete was poured, and the day of the final inspection. When repairs are made in driveway areas, it is recommended that the new concrete not be driven on for at least 7 consecutive days, to ensure proper curing. This will help to prevent cracking.

Request a Final Inspection when the project is finished. Concrete work must be completed, all forms removed, all voids are backfilled with dirt and compacted, and job site has been cleaned up.



REQUEST FINAL INSPECTION

When concrete work is completed, all forms are removed, all voids are backfilled with dirt, and compacted to the top edge of the new concrete, and job site has been cleaned up, a final inspection must be requested. Call 319-626-5713 to request a final inspection.

Provide the permit number and the affidavit number. Inspections will be made Monday through Friday, excluding holidays. Requests must be received by 7 am to obtain an inspection that day. Requests made after 7 am, will be inspected the next business day. If the work is found satisfactory, a "Repairs are Complete" inspection report recorded online.

If work is found unsatisfactory, a "Repairs Not Acceptable" inspection report will be emailed to the permit holder. The report will specify any corrections that need to be made. Another final inspection, and possibly another form inspection, must be requested.

APPENDIX IV - MATERIALS, SERVICES, and TOOLS

What to Use and Where to Find Them

Many of the tools and materials used in sidewalk repair are not normal household items. Due to legal restrictions, we the City are not allowed to recommend specific contractors or specific stores which might have the best deals or the most knowledgeable sales people.

Product and Service Classifications in the telephone book is where you will find everything you need. Time spent on the telephone or internet doing some comparison-shopping could save you time and money.

Product and Service Classifications

Barricades

Building Materials Retail

Concrete Contractors

Concrete-Ready Mixed

Garbage & Rubbish Collection/Drop Boxes

Landfills and Transfer Sites (Dump)

Recycling Services

Rental Service Stores

(Equipment and Tools)

Sand and Gravel





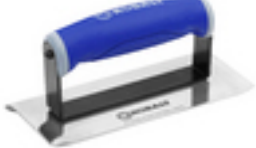







Stump Removal









Tree Service

Tools, Used

Trailer and Truck Rental

Following is a tool glossary with pictures to identify the types of tools needed to make sidewalk, driveway and curb repairs.

 <p>Axe</p>	 <p>Boots</p>	 <p>Bull Float</p>	 <p>Concrete Boom</p>
 <p>Concrete Edger</p>	 <p>Concrete Grover</p>	 <p>Concrete Hand Float</p>	 <p>Gloves</p>
 <p>Finishing Trowel</p>	 <p>Hammer</p>	 <p>Hand Saw</p>	 <p>Level</p>

 <p>Mortar Box</p>	 <p>Pick Mattock</p>	 <p>Pry Bar</p>	 <p>Rake</p>
 <p>Round Point Shovel</p>	 <p>Safety Glasses</p>	 <p>Screed Board</p>	 <p>Sledge Hammer</p>
 <p>Square Point Shovel</p>	 <p>Tape Measure</p>	 <p>Water Hose</p>	 <p>Wheelbarrow</p>