



CONCRETE REPAIR POLICY MANUAL

December 2011

**City of Aurora, Colorado
Streets Services Division
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CONCRETE REPAIR POLICY STATEMENT

1. It is the policy of the City of Aurora Public Works Operations (Operations) to immediately make safe any hazardous condition, which is observed within the street right of way. A temporary repair, such as an asphalt patch, is required for any severely distressed concrete that presents a hazard to the public.
2. For damaged concrete in the public right of way, property owners may choose to have concrete repairs performed by either the city or to privately contract the work at their personal expense. Work performed by a private contractor in the right of way must conform to the current city specifications and a city permit is required. Please call 303-739-7350 for further information and questions regarding the permit process.
3. Concrete replacement work performed by the city shall be prioritized based on repair size, repair type and geographical location within the City of Aurora.
4. An Operations Project Coordinator will evaluate all concrete repair requests within one business day of receiving the request. The project coordinator shall utilize the City of Aurora's "Recommended Repair Manual Chart" and "Distress Identification Manual" in the evaluation process. The project coordinator shall notify the requestor of the repair method selected.
5. The project coordinator shall select the most economical approved repair method. The minimum size repair section required to alleviate the distress problem shall be the only work scheduled by the project coordinator. The standard minimum replacement section shall be five feet for all concrete structures.
6. Repairs shall be scheduled as soon as possible, and within the budgetary limits of the program. Operations will complete as much work on an annual basis as the budget will allow. Work that is not completed in the year it was originally scheduled will be reprioritized and rescheduled.
7. Sections that have had temporary repairs to correct a hazardous condition may be given priority over other repairs.
8. When there are numerous concrete repairs needed within limited geographic regions of the city, and/or it is to the city's economic advantage, Operations may choose to perform the scheduled repair work by contract instead of utilizing city crews.
9. It is the policy of the City of Aurora to fully comply with all provisions of the Americans with Disabilities Act (A.D.A.).
10. The city's concrete repair schedule plan is prepared on an annual basis, and is available for public review at Operations offices after April 15. Please call 303-326-8200 for more information on the plan.

CONCRETE REPAIR

City of Aurora Street Division Policy Manual June 2011

Introduction:

This document establishes the criteria for concrete repair and replacement by City of Aurora Public Works Operations (Operations). It is intended to be a guide to setting priorities for the scheduling of repairs and/or replacement of the concrete infrastructure maintained by Operations.

Fifteen separate types of concrete structures are owned by the City including: sidewalks; curb and gutters; combination curb, gutter, and sidewalk; crosspans; curb-cuts; handicap ramps; chase drains; inlets; and median noses.

Annual Concrete Repair Plan:

The city's concrete repair schedule and plan is prepared on an annual basis, and is available for public review at Operations offices after April 15. Please call 303-326-8200 for more information on the plan.

Repairs shall be scheduled as soon as possible after an evaluation by Operations, however all repairs must be within the budgetary limits of the program. Operations will complete as much work on an annual basis as the budget will allow. Work not completed in the year it was originally scheduled will be reprioritized and rescheduled. Damage that creates a safety hazard will be temporarily repaired or barricaded.

Concrete replacement work performed by the City shall be prioritized based on the repair size, repair type, severity and geographic location within the City of Aurora. Sections that have had temporary repairs to correct a hazardous condition may be given priority over other repairs.

Emergency Repairs:

If the condition of the concrete presents a hazardous situation, an emergency repair shall be made. Typically, an emergency repair shall be temporary in nature and may involve removal of a severely displaced section of concrete, then filling the void with dirt, gravel, or an asphalt patch to eliminate the hazard until permanent repairs can be scheduled.

Emergency repairs have priority over all other concrete work performed by the City. If hazards cannot be immediately repaired, they shall be barricaded to warn the public of the hazard until an emergency repair can be performed.

Citizen Requests:

Citizen Requests are evaluated by a project coordinator, and the rating of the distresses and the scheduling of the repair work shall conform to the policies of this manual. The appropriate repair

strategy will be selected by the project coordinator, and the citizen will be notified of the repair method.

Scheduling of concrete repairs is determined by repair size, severity, and geographic location. This scheduling technique maximizes crew productivity to stretch the limited budget of the program. The concrete repair program is scheduled on an annual basis, and as many repairs as possible are completed within the annual budget.

Contracts may be awarded to private contractors to repair the concrete in certain areas prior to or in association with scheduled street repair contracts. In addition, private contractors may be used for concrete repairs when it is to the City's economic advantage, or is necessary for the timely completion of the repairs. The extent of contracting is determined by the budgetary limits of the program and the extent of the needed repairs on an annual basis.

All contracted concrete repairs shall conform to the policies of this manual, and all work shall comply with City specifications. Permits are required for all work within City right-of-way whether performed by contractors or private property owners. Work performed without a permit is subject to removal and restoration at the contractor's or property owner's expense.

Curb cuts will not be constructed unless the full width of the drive is in need of repair. Damage to concrete within a City maintained driveway apron will be repaired only to the limit of the damage. Property owners may choose to pay for the balance of the concrete footage to complete the area of the curb cut. Property owners will need to negotiate and make payment directly to the contractor for this extra work.

Driveways, Detached Driveways, and Driveway Aprons:

Driveways, detached driveways and driveway aprons are not maintained by Operations. Maintenance of these concrete areas is the responsibility of property owners.

The sidewalk, curb and gutter are maintained by the City. Repairs to these concrete areas will be done in accordance with this Manual. The following photos highlight the areas that are not maintained by Operations.



Chase Drains:

Chase drains are used to channel away excess water from a storm event or basement sump pump under City maintained sidewalk to the city street. Typically, property owners are responsible for the cost of chase drain installation.

Site evaluations will be conducted by the City of Aurora Engineering Services at (303) 739-7300. Existing chase drains will be repaired in conformance with this manual.

Americans with Disabilities Act (ADA):

It is the policy of the City of Aurora Public Works Operations (Operations) to fully comply with all provisions of the Americans with Disabilities Act

Operations administers an annual contract to install new pedestrian ramps throughout the City. The annual budget for this program is set by the City Council, and each year the number of new ramps installed is based upon the budgetary limits of the program.

Whenever concrete repairs are scheduled at an intersection, where radii do not have a pedestrian ramp, Operations will install a standard pedestrian ramp as part of the normal work at that location. Certain locations within the City involving non-standard intersections, or non-standard concrete radii, may prevent the installation of the City Standard ramp.

Operations cooperates with other city departments and advisory groups to determine critical locations for new ramps. Citizens may request a pedestrian ramp installation at a specific location by calling 303-326-8200.

Common Types of Concrete Distresses:

This policy covers the five most common types of concrete distresses, which are present in the City of Aurora. These distresses include displacement, “bird-baths” or sunken concrete, broken and cracked concrete, spalled or scaled concrete, and gouged or chipped concrete.

The “Concrete Distress Identification Manual” contains a complete description and a photographic example of each type of distress at each of the three severity levels.

Distress Severity Levels:

Each type of concrete distress shall also be rated according to the severity of the distress by the city project coordinator. The Concrete Distress Identification Manual defines three possible levels: low, moderate, and severe. Depending on the severity, each distress requires a specific type of repair in order to bring them up to an acceptable level of service. The “Recommended Repair Method Chart” will be used by the project coordinator to determine the most cost-effective repair method for the actual condition of the concrete.

**City of Aurora, Colorado
RECOMMENDED
REPAIR METHOD CHART**

DISTRESS TYPE	SEVERITY RATING		
	LOW	MODERATE	SEVERE
DISPLACEMENT	≤ 3/8"	3/8 – 3/4"	>3/4"
REPAIR	Grind as requested	Patch to make safe.	Patch to make safe. Remove and Replace as funds allow.
SUNKEN or "BIRD-BATH"	< 2" Ponding	2-3" Ponding or exceeds limits of the concrete.	>3" Ponding
REPAIR	None	Patch to make safe.	Patch to make safe. Remove and Replace as funds allow.
CRACKED or BROKEN	1/8 – 3/8" wide single crack.	3/8 – 3/4" wide crack. Multiple cracks w/ no displacement.	>3/4" wide crack. Multiple cracks w/ displacement.
REPAIR	None	Patch to make safe.	Patch to make safe. Remove and Replace as funds allow.
CHIPPED or GOUGED	< 1/2"	>1/2" deep and/or 1' diameter	>2" and/or >2' diameter.
REPAIR	None	Patch to make safe.	Patch to make safe. Remove and Replace as funds allow.
SPALLING or SCALING	<1/8" deterioration <50% of slab affected.	1/8 -1/2" deterioration <50% of slab affected.	>1/2" deterioration >75% of slab affected.
REPAIR	None	Patch to make safe.	Patch to make safe. Remove and Replace as funds allow.

Project coordinators will rate each type of concrete distress as low, moderate, or severe. All hazards will be made safe, only severely damaged concrete will be removed and replaced as funds allow. The most cost-effective repair method, as determined by the project coordinator, will be utilized.

The following pages provide a written descriptions and photographic examples of each type of distress at each severity level.

CONCRETE DISTRESS IDENTIFICATION

DISPLACEMENT

Description: Displaced concrete creates a tripping hazard for pedestrians and cyclists. The associated crack also allows surface run-off to infiltrate into the subgrade soils. Water entering the sub-grade soils generally leads to more widespread concrete damage and street failures.

Displacement is normally a result of one or more of the following conditions: poor sub-grade preparation, trench failure, frost heave or tree root growth. The severity rating is determined by the amount of displacement between sections. The range will be defined in inches.

Severity Rating:

Low: 0 to 3/8 of an inch

Moderate: 3/8 to 3/4 of an inch

This rating shall include an opinion regarding the rate of deterioration of the concrete section in question.

1. A slow rate of deterioration warrants a future evaluation. In areas of high pedestrian traffic, the displaced section may be scheduled for grinding to reduce the possibility of tripping.
2. A fast rate of deterioration may warrant removal and replacement of the concrete.

Severe: 3/4 of an inch and greater.



LOW DISPLACEMENT



MODERATE DISPLACEMENT



SEVERE DISPLACEMENT

SUNKEN OR “BIRD-BATH”

Description: Sunken areas create ponds of water in the concrete. These ponds allow water to penetrate into the subgrade soils at the interface between the concrete and the asphalt. Water ponds also create hazardous roadway conditions due to splashing and cold weather icing problems.

Sunken concrete is normally the result of one or more of the following items: poor sub-grade preparation, trench failure, street related sub-grade failures or excessive loading. The severity levels will be determined by the ability to maintain adequate flow, as compared to the original design criteria.

Severity Rating:

Low: Deviations from the original line and grade which cause minor ponding of runoff water, yet still allow the majority of the flow to escape. Ponding of less than two inches in depth would be considered low severity.

Moderate: Deviations in line and grade which inhibit the flow of runoff water and do not permit the concrete structure to function according to design. There are two criteria for this rating:

1. Ponding depths between two and three inches.
2. Runoff water ponding beyond the limits of the concrete structure, allowing water to infiltrate into the adjacent subgrade soils.

Sunken sections identified as “moderate” generally need to be monitored to determine the rate of deterioration of the section, and will not be scheduled for removal and replacement. If joint sealing or crack sealing will reduce the rate of deterioration of a section, it should be scheduled as soon as possible. Sunken sections which contribute to a localized traffic or pedestrian problem should be scheduled for replacement.

Severe: Deviations in line and grade exceeding three inches, and/or excessive ponding of water exceeding the limits of the slab.



LOW SUNKEN "BIRD-BATH"



MODERATE SUNKEN "BIRD-BATH"



SEVERE SUNKEN "BIRD-BATH"

BROKEN OR CRACKED CONCRETE

Description: Cracking allows surface runoff to infiltrate into soils, and creates a hazard for pedestrians and cyclists. Cracks often widen with time, and the inflow of moisture into the subgrade often leads to displacement of the cracked concrete and potential street failure.

The typical causes of broken or cracked concrete are improper subgrade preparation, trench failure, improper loading, poor curing practices, or inadequate slab thickness. Severity levels should be determined by both the size and number of cracks within a given section, such as a ten-foot section of vertical curb and gutter.

Severity Rating:

Low: 1/8 to 3/8 of an inch in width.

No apparent hazard or surface infiltration.
A single crack in a section.

Moderate: 3/8 to 3/4 of an inch in width.

Multiple cracks with no displacement.
Cracked flow line with no displacement.

If it is possible to use repair methods, which can slow the rate of deterioration of a section, the repair should be scheduled as soon as possible. Examples of these methods are:

1. Grinding
2. Crack Sealing
3. Rout and Seal

Cracks classified as “moderate” should generally not require the removal and replacement of the section.

Severe: 3/4 of an inch or greater in width.

Multiple cracks with displacement.
Flow line crack with displacement.
Potential tripping hazard.



LOW CRACK



MODERATE CRACK



SEVERE CRACK

SPALLED OR SCALED CONCRETE

Description: The loss of mortar and/or aggregate from the surface of the concrete. Spalling reduces to load carrying capabilities of the concrete due to a thinning of the section. This type of distress is a pedestrian and cyclist hazard, as well as an unsightly visual condition.

The causes of spalled concrete are most often attributed to either defects in workmanship of concrete placement or improper curing of the product. Over-working the surface or the addition of water after placement can also lead to spalling, as can improper cold weather protection during curing.

Severity Rating:

Low: Deterioration of the slab surface to a depth of less than 1/8 of an inch.
Less than 50 % of the slab is affected.

Moderate: Deterioration of the slab surface to a depth of 1/8 to 1/2 of an inch.
More than 50 % of the slab is affected.

Spalled sections of concrete should be monitored to determine the rate of deterioration of the section. Slowly deteriorating sections should be reevaluated within 18 months of the original report. There are no approved intermediate repair strategies for spalling, so rapidly deteriorating sections should be scheduled for replacement.

Severe: Deterioration of 1/2 of an inch in depth and greater.
More than 75% of the slab area affected.



LOW SPALLED



MODERATE SPALLED



SEVERE SPALLED

GOUGED OR CHIPPED CONCRETE

Description: Chipped concrete can be a pedestrian and cyclist hazard, as well as an unsightly visual condition. Chips, which hold water, can make the concrete section more susceptible to damage from freeze/thaw cycles.

Gouged or chipped concrete is most often the result of either external damage by snow removal and construction equipment or excessive sub-grade pressures. Chipping adjacent to contraction joints is normally a result of poor workmanship or inadequate tooling practices.

Severity Rating:

Low: Gouges or chips to a depth of less than 1/2 of an inch.

Moderate: Concrete that is gouged to a depth of greater than 1/2 of an inch and /or up to 1 foot in diameter.

Generally, moderate chips and gouges do not warrant the removal and replacement of an entire section of concrete. Moderate gouging and chipping may be scheduled for patching in areas of high pedestrian traffic, and sections with multiple chips may be scheduled for patching.

Severe: Concrete gouges in excess of 2 inches in depth and over 1 foot in diameter.

Generally, patching should be scheduled wherever it is possible to complete the repair in an economical manner, and at less expense than removal and replacement. If a section must be replaced as a result of a gouge, a minimum section of five feet will be replaced.



LOW GOUGED



MODERATE GOUGED



SEVERE GOUGED