MAINTENANCE GUIDEBOOK III - PAVEMENT MAINTENANCE
CHAPTER FOUR - CONCRETE PAVEMENTS

SECTION A CONCRETE PAVEMENT CONSTRUCTION TYPES

1. CONSTRUCTION TYPES

Concrete pavements are used for roads, driveways, walks, parking, recreation areas, and swales. Figure 4-1 is a section through a concrete roadway, curb, and sidewalk, showing their construction.

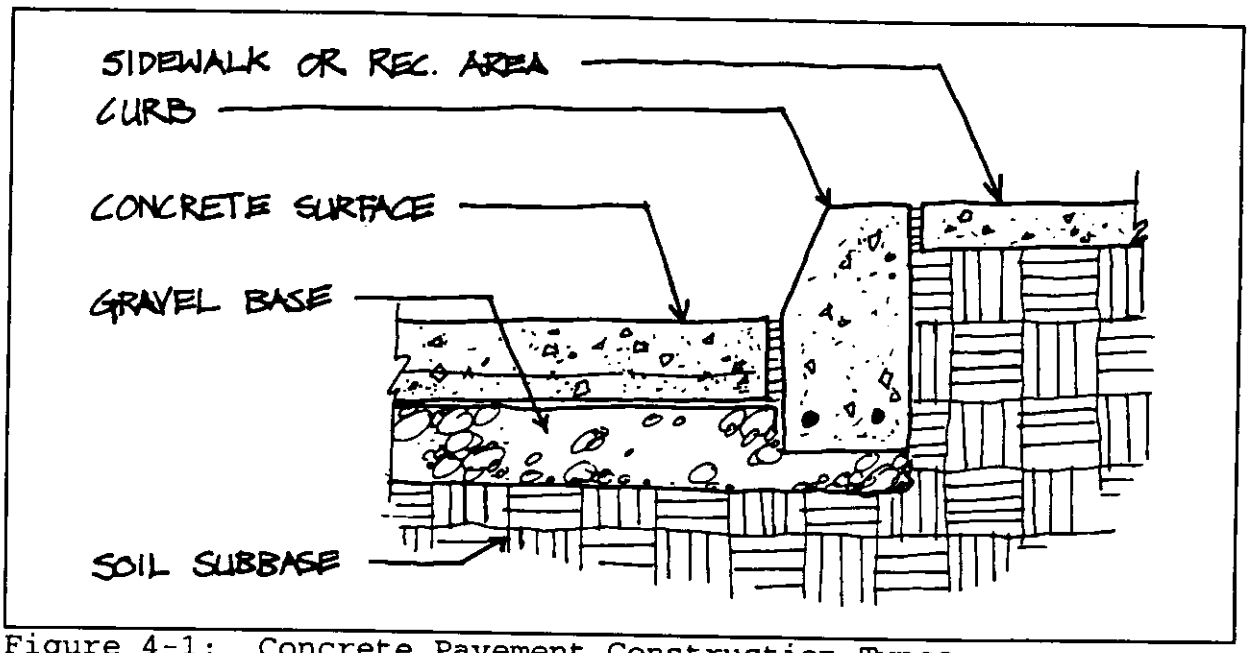

Figure 4-1: Concrete Pavement Construction Types

2. TYPES AND CAUSES OF FAILURES/DEFECTS

Well-constructed concrete pavement requires little maintenance; however, maintenance should not be neglected. Repairing defective areas as soon as practicable ensures the pavement's structural integrity and extends its life. Typical failures in concrete pavement include:

- Longitudinal and Transverse Expansion-Joint Failure: Failure in or directly adjacent to pavement joints.
- Spalling: The breaking, chipping, or fragmentation of the surface of a concrete slab, usually found near joints. The spalling is caused by defective joint construction or by damage due to undesirable and incompressible materials getting into an inadequately sealed joint.
- Scaling: A deficiency which occurs when the surface of a hardened concrete slab breaks away, usually early in the life of the slab. It can be caused by cycles of freezing and thawing,

applications of salts, or overworking the concrete during finishing.

- Crazing and Map Cracking: The occurrence of numerous fine hairline cracks in the surface of a newly hardened slab due to shrinkage, resulting from surface drying, premature floating, and troweling and/or overuse of tamper, vibrating screed, darby, or bull float.
- Failed/Disintegrated Areas: Pavement areas which are severely deteriorated and present a hazard.

Lack of adequate drainage causes most of these failures and problems similar to those discussed in the Chapter Three - Bituminous Pavement. Where drainage problems appear, the cause should be determined and corrective action taken as soon as possible. Simple drainage problems may be corrected as described in Chapter Three, Section C, Part 8.

SECTION B PAVEMENT MATERIALS

1. CONCRETE MIX TYPES

Concrete is a mixture of any type of Portland cement, sand, gravel or stone, and water. For general purposes, a 1-2-4 mix is used; that is, one part Portland cement, two parts sand, four parts gravel or stone. Four to six gallons of water per sack of cement should be added, depending on the amount of moisture in the sand, gravel, and stone. These proportions may vary, depending upon the size of the aggregate used and the desired strength of concrete (less water results in higher concrete strength). For concrete less than two inches thick, the size of gravel or stone should not exceed 3/8-inch. For concrete over two inches thick, the maximum size of gravel or stone should be 3/4-inch. The concrete should be made fairly stiff, but workable. It should never be sloppy.

a. Plant Mix

When a transit-mix plant is nearby, the concrete may be purchased and delivered to the job, ready-mixed and ready to be placed. The strength of concrete depends on local code requirements for sidewalk or pavement repairs; generally, 2500- to 3000-psi.

b. Prepackaged Concrete Dry Mix

Dry-mix concrete may be purchased in prepackaged form, in which cement and gravel are proportioned and premixed at the factory. The mix should be emptied on a board or in a wheel-barrow, and thoroughly mixed with water. The amount of water to be added is about one gallon per 90-pound bag of concrete mix. Too much water will decrease the strength of concrete.

c. Portland Cement

Portland cement is a general-purpose cement suitable for most uses except when specialized types of concrete are required. It develops its design strength in 28 days, when properly cured at a temperature of 70°F.

For the repairs described in this guidebook, concrete or mortar finishes may be opened to foot traffic after 48 hours, and after 7 days to vehicular traffic, provided that the temperature does not fall below 70°F, and the surface is properly cured and protected.

d. High Early-Strength Portland Cement

High-early strength Portland cement is a true Portland cement with additional accelerating agents. It is used where high strengths are required at a very early stage—one to three days after placing it. It develops its design strength in 24 hours. It is used where quick results are required, since it may be opened to both foot and vehicular traffic after 24 hours, provided that the temperature averages 70°F.

e. Air-Entrained Portland Cement

Air-entrained Portland cement, in which air-entraining materials are mixed, was developed to produce a concrete which is resistant to severe frost and to the adverse effects of salt used to melt snow and ice from the pavement. Concrete or cement-sand mixes made with this type of cement require less mixing water than nonair-entrained cements, but have the same slump, and permit finishing procedures sooner than a nonair-entrained Portland cement. Air-entrained Portland cement, either standard or high early-strength, can be purchased from local material suppliers, some lumber yards, and hardware stores, in 94-pound bags.

f. Cement-Sand Mix Finish or Topping

Cement-sand mix finish or topping is a combination of any of the above Portland cements and graded sand. The proportions, for general use, are one part Portland cement to two parts well-graded sand.

g. Prepackaged Dry Cement-Sand Mix

Prepackaged dry cement-sand mixes are available in 80-pound bags. The mix contains one part Portland cement to two parts sand. One sack of the prepackaged mix requires approximately one

gallon of water and covers approximately eight square feet, one-inch thick. Other prepackaged mixes are also available. The supplier should be consulted to determine the mix most suited to the HA's needs.

h. Epoxy-Resin Bonding Agents or Adhesives

Epoxy-resin bonding agents or adhesives are used for bonding new concrete to existing concrete. There are many "epoxy-resin" compounds available, formulated for particular uses. It is necessary, therefore, to select an epoxy specially formulated for the purpose of bonding of cement or concrete applications.

Before applying, read carefully the instructions on the containers. *Follow all directions.* Epoxy bonding agents have a short pot-life and usually set in one to two hours, depending on the temperature. Therefore, no more should be mixed than can be used in the time specified by the manufacturer.

i. Acid Etching and Cement Wash

This is probably the oldest method of bonding fresh cement-sand mortar or concrete to existing concrete. The existing concrete to be resurfaced should be cleaned and all loose and undesirable materials removed. A dilute solution containing one part commercial muriatic acid to nine parts of clean water should be made (the acid should always be poured into the water; never the water into the acid). This solution should be thoroughly brushed or broomed on the area to be resurfaced. After about 15 minutes, the surface should be flushed with water until all of the acid solution has been removed. Then, a thin layer of dry cement-sand-mix (approximately 1/8-inch thick) should be sprinkled over the wet concrete surface and uniformly broomed into the surface, displacing all air.

j. Latex Concrete Patch Materials

Latex concrete is a general-purpose product, formulated primarily for use in areas requiring thin overlays or patches such as concrete walks, floors, or other slabs. It may be applied from 1/2-inch thick to featheredge. This material has a drying time of approximately one hour. Mix only as much as will be used within the hour.

Latex concrete patch materials consist of latex (liquid binder) and powder (dry, premixed cement and fine aggregates). These two components may be secured in one package containing the powdered ingredients and a specially formulated latex. If desired, the latex may be purchased

separately and mixed with Portland cement and sand, in a proportion of 1:2-1/2.

The surface should be protected from traffic until the mixture is dry. Drying time, under normal conditions (70° to 80°F temperature), will be approximately 1 to 2 hours for thicknesses up to 1/4-inch. Longer setting time is required for greater thicknesses. Liquid latex should not be applied when the temperature is below, or is anticipated to go below, 50°F and the repaired surfaces should be protected against freezing.

k. Acrylic, Epoxy, and Polyurethane Coatings

These coatings have been developed in the past few years to provide protective coatings for assorted concrete surfaces. They are bright, wear well, and are easy to repair. They are applied like paint with brush, roller, or sprayer. Since these materials are coatings, the surface to receive them must be sound, smooth, clean, and free of all loose materials, dirt, and oil. Read the directions on the label before opening the container.

It is recommended that the material be applied in two coats. The first coat is usually thinned as designated on the container label. The thinned material may be spread evenly over the surface with a long-handled push broom roller or a 5-inch wide brush. The coverage will vary from 100 to 150 square feet per gallon, depending upon the porosity and roughness of the surface. After the first coat has dried, the second coat should be applied directly from the container in the same manner. The coverage will be approximately 150 square feet per gallon. The coating should be thoroughly dry before the area is opened to traffic.

These coatings should not be applied on a wet surface, nor when the temperature is below 50°F. All equipment should be cleaned immediately after use.

SECTION C WEATHER CONSIDERATIONS

1. COLD-WEATHER CONCRETING

In winter, the following precautions should be taken to protect new concrete:

- Do not place concrete on a frozen subbase. There is a chance that the frozen subbase will undergo considerable settling when it thaws.
- Do not place concrete in or against icy forms. Remove ice from the inside of forms and from the reinforcing steel.
- Do not try to place concrete without enough qualified personnel. It is very important to place and finish concrete as rapidly as possible.

- To prevent surface damage, delay final finishing of flat surfaces until concrete is between 50° and 70°F, and all surface water has disappeared.
- Protect the surface of the concrete slab from direct exposure to rain and sleet because any water-saturated concrete less than a month old is susceptible to damage from freezing. This may be done by placing burlap or plastic on the surface as soon as possible after finishing.
- Concrete mixes with air-entrainment are recommended for patching concrete paving and surfaces wherever severe frost action occurs, or where it is anticipated that repeated application of deicers such as calcium chloride, sodium chloride, or other similar salts will be used. Air-entrained concrete or air-entrained cement for concrete may be obtained from any transit-mix concrete company or a material supplier.
- The use of calcium chloride is not recommended. It is a salt which can damage the concrete.

2. HOT WEATHER CONCRETING

Difficulties may also arise when placing concrete in hot weather. Rapid drying of a flat concrete surface will result in cracks and a loss of concrete strength. Because of rapid setting of the cement and excessive absorption and evaporation of mixing water, the concrete may stiffen before it can be consolidated, causing difficulties when finishing. Before proceeding with concrete work in hot weather, compliance with the following precautions will minimize future problems:

- Be prepared with necessary equipment and personnel well in advance of starting work.
- Have ample water supply for sprinkling subbase and forms, and curing the new concrete surface.
- Have burlap mats, polyethylene sheets, and lumber ready to protect the fresh concrete from the effect of direct sun or have a curing compound with application equipment available. All materials should be on the site before the placing of concrete begins.
- Schedule work so that concrete can be placed and finished with the least delay. Starting at 5:00 or 6:00 am, or earlier if possible, is recommended if the repair is large or will require a long time.
- Do not delay in placing concrete.
- Start finishing operations as soon as the surface is free of bled water.
- If possible, use a fine spray to protect the finished surface from drying out too rapidly. Take care, however, not to start the spraying too soon, which could damage the finished surface.

Concrete surfaces should be protected by laying on wet burlap, wet cotton mats, or using a curing compound so that little or no moisture is lost during the early stages of hardening. The burlap and mats should not be allowed to dry out for 7 days (3 days if using high early-strength concrete).

The surface may also be protected by applying a curing compound as soon as the surface is hard enough to resist marring. Although it is more convenient, the use of a curing compound is not as effective as the burlap or mats in very hot weather.

SECTION D FORMING, PLACING, AND FINISHING

1. FORMING

Where required, forms and screeds (leveling boards) should be put in place accurately. The subbase should be properly prepared, shaped, and compacted and sprinkled lightly with water before placing concrete. When concrete is placed on an old concrete surface, the substrate should be clean and properly treated with epoxy bonding adhesive or acid-etched cement wash.

The concrete should be dumped, spread, and thoroughly spaded along the forms, screeds, or surrounding existing concrete edges to eliminate voids or honeycombing. It should be struck off to proper grade, and immediately darbied before any free water has bled to the surface.

Precautions should be taken not to overwork the concrete while it is still plastic, because water and fine material in it can be brought to the surface, which may lead to scaling, crazing, or dusting at a later date.

2. PLACING

The solid materials used in making concrete are heavier than water. Thus, shortly after placement, these materials have a tendency to settle to the bottom, forcing the water to the surface. This reaction is called bleeding. Bleeding usually occurs with nonair-entrained concrete, but not when air-entrained cement is used. It is important that concrete placing and screeding be performed before any bleeding takes place. Any operation performed on the surface while bled water is present will result in scaling, dusting, or crazing. This point cannot be overemphasized, since it is a basic rule for successful finishing of concrete surfaces. The concrete surface is screeded in the same manner as previously described for mortar topping.

When all bled water and sheen has left the surface and the concrete has started to stiffen, except for applying the topping materials, it is time for the other finishing operations, such as edging, grooving, floating, troweling, and brooming.

3. FINISHING

After it has been struck off and screeded, air-entrained concrete is finished in the same fashion as nonair-entrained concrete. All tools should be cleaned after completing concrete work.

SECTION E FINISHES

1. CEMENT-SAND MORTAR TOPPING

Old or existing concrete surfaces which have deteriorated or where a smooth surface is desired can be repaired by mortar topping. The mortar is placed only after the old concrete has been properly prepared to receive it. When topping is to be placed on old concrete, forms should be set where necessary. The existing concrete surface should be cleaned and treated with an epoxy bonding agent or given an acid-etching and cement wash as previously described.

Cement-sand mortar topping is made by adding enough water to a cement-sand mix to make a stiff workable mortar. The mortar should be just wet enough so that all grains of sand are coated with cement paste, without excess water. It should spread easily.

Mortar topping can be placed on fresh concrete for a finished surface; however, this is not necessary if a proper concrete mix is used. Mortar topping should be placed on wet or fresh concrete as soon as possible after the concrete substrate has been struck off and leveled. The topping should be poured on the prepared subsurface and struck off by moving a straightedge back and forth, with a saw-like motion, across the top of the forms or the surrounding surfaces of the slab. A small amount of mortar topping should always be kept ahead of the straightedge to fill in low spots and maintain an even surface. When Portland cement or high early-strength cement is used in the cement-sand mix, there will be a water sheen on the surface after the mortar finish has been spread by the straightedge. This water sheen does not appear when air-entrained cement is used.

As soon as the water sheen has left the surface and the mortar begins to stiffen, an edging tool should be run back and forth along the edge of the concrete, next to the forms. Care should be taken that the shoulder of the edger does not leave a deep impression in the slab. Immediately following edging, the slab should be grooved, where necessary, to match grooves in existing slab, or directly over the existing previously grooved joint. The slab should then be floated with a wood float to an even surface, removing undesirable marks left by the edger and groover.

If a smooth hard finish is desired, the surface should be steel-troweled immediately following the floating. The surface should then be allowed to set until it will support the weight of knee boards without marking or marring the surface. The surface is then given the second or final troweling to improve the texture and produce a smooth, dense, and hard surface.

Smooth surfaces may become slippery and hazardous when wet. A non-skid surface can be obtained after the steel-troweling by lightly brooming the surface by drawing a fine-bristled push broom over the

surface to produce a roughened texture for better traffic under foot. Immediately after completion of finishing operations, the surface should be protected and precautions taken.

When an air-entrained cement mix is used, there is no waiting for surface water to evaporate; therefore, finishing operations should start before the surface becomes dry or tacky. Edging and grooving are done as described above. The use of an aluminum or magnesium float is essential. A wood float drags and increases the work necessary to accomplish the same result.

2. DRY-DUST OR MONOLITHIC FINISH

A dry-dust or monolithic finish can only be used on fresh wet concrete and is especially useful when a colored surface is desired. The application and finishing process is the same whether the uncolored or colored dry mix is used.

After the concrete substrate has been poured and struck off or screeded, and the free water and excess moisture have evaporated from the surface, the surface should be floated to remove any ridges or depressions. If floated by hand, a magnesium or aluminum float should be used. Preliminary floating, which brings up moisture, should be finished before dry material is spread. If color is used, ridges or depressions may cause variations in color intensity. Immediately following the floating operation, some of the dry-dust materials should be shaken evenly, by hand, over the surface. In a few minutes, this dry material will absorb moisture from the plastic concrete, and should then be thoroughly floated into the surface. Immediately following this floating, the balance of the dry-dust material should be distributed over the surface, which should also be thoroughly floated and made part of the surface, obtaining a uniform color. All tooled edges and joints should be run before and after the applications.

Following final floating, the surface should be troweled. After the first troweling, enough time should elapse—depending on temperature, humidity, and other factors—to allow the concrete to increase its set. When the surface will not be marked by the knee boards, the final troweling is done to produce a smooth, dense, hard-wearing surface. The surface texture may be roughened as previously described. All precautions for protecting the surface should be followed.

SECTION F RECOMMENDED MAINTENANCE TO CORRECT DEFICIENCIES

When working with concrete, seasonal precautions must be taken to obtain the best results. In the winter, precautions against cold-weather damage should be taken, as well as those for hot-weather conditions.

Patching existing Portland-cement concrete pavement with cementitious mixes is preferable to bituminous

patching because it presents a uniform appearance of the pavement surface. However, bituminous patches may be necessary as a temporary measure, to be replaced later with a permanent cement-concrete patch.

Traffic should not be permitted on a fresh concrete or mortar surface until a sufficient strength has been reached to support the load. The concrete mix used and the temperature during the curing period will determine when the pavement may be opened to traffic.

The following concrete pavement failures (see Figure 4-2) are suitable for repair by maintenance personnel.

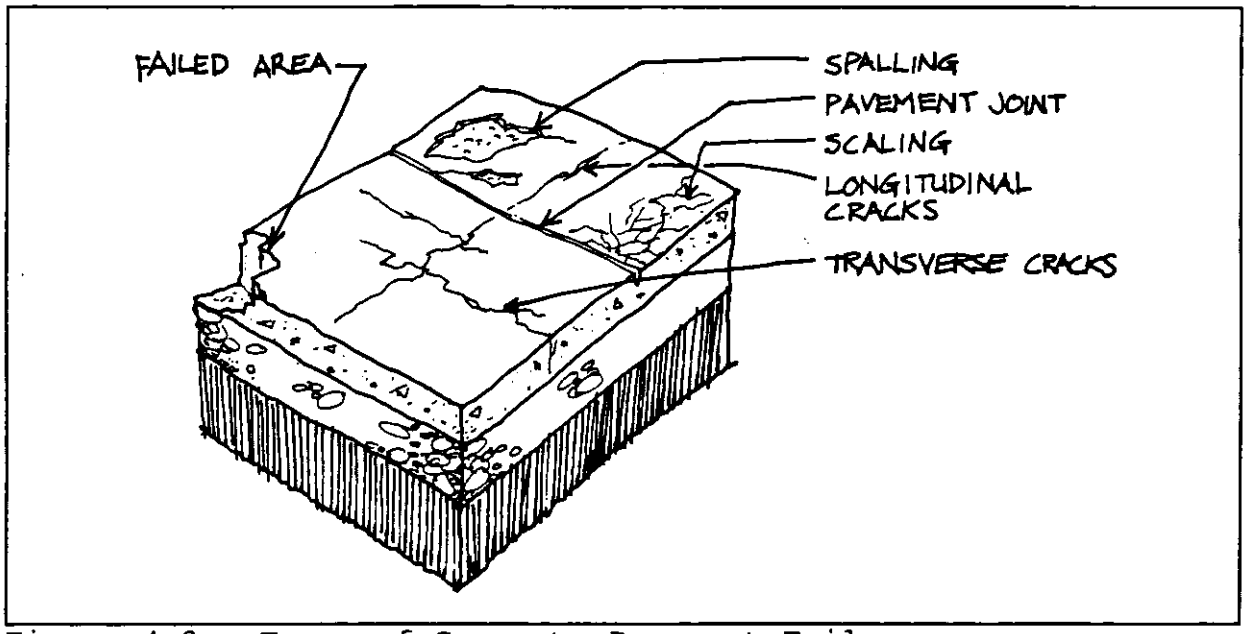

Figure 4-2: Types of Concrete Pavement Failures

1. LONGITUDINAL AND TRANSVERSE EXPANSION-JOINT FAILURE

a. Description of Deficiency

All concrete pavements expand or lengthen as temperatures increase, and contract or shrink when temperatures decrease. Concrete also expands when it absorbs moisture and shrinks with the loss of moisture. Longitudinal and transverse joints are constructed to permit such movement without damage to the slab. From a preventive-maintenance point of view, both require similar treatment to prevent water from entering the joints and causing deterioration.

When joints are not placed, or are improperly placed, random cracking occurs. These cracks should be filled with the proper type of joint filler or crack sealer to prevent water from entering the subbase. The best results are obtained by filling the defective joints or cracks when the pavement contraction is at or near its maximum size, consistent with working temperatures for the

sealer. Pouring of joint material should be done when necessary throughout the year; however, the pavement and joint should be dry, and the temperature above freezing. Joint filler that is poured when pavement is wet and the temperature is near or below freezing will not give satisfactory results. The pavement should be carefully checked late in the fall and again in the spring after snow removal and ice-treatment operations in order to ensure that all joints and cracks are properly sealed.

b. Materials, Equipment, and Personnel Required

See Chapter Three - Bituminous Pavement.

c. Recommended Repair Procedure

The following is the recommended repair procedure:

- Set up traffic signs; assign flaggers.
- Clean out old sealer, stones, and anything else which would prevent the slab from closing. Minimum depth for cleanout is 1-1/2 inches.
- Blow out joint; make sure joint is clean and dry.
- Repeat process where necessary.
- Fill joint to slightly under the pavement surface.
- Use joint dams made from cardboard if the sealer is running out of the edge of the slab. Several may be needed if the slab is on a sloped surface (see Figure 3-3).

2. SPALLING

a. Description of Deficiency

Spalling is the breaking, chipping, or fragmentation of a concrete slab, usually near joints, which is caused by defective joint construction or the infiltration of foreign and incompressible materials into the joint. Improper construction procedures include tipped or angled joints, bridging of concrete over expansion joints, incorrect installation of premolded strips or plates, the placement of inferior concrete, or excess finishing of concrete.

b. Materials, Equipment, and Personnel Required

- Materials Required:
  - Curing materials for all depths:

  Depth = less than 1"
  - Bonding agent;
  - Mortar topping, sand mix;
  - Concrete or mortar sand as required;

  Depth = 1" to 1-1/2"
  - Bonding agent;
  - Topping mix with 3/8" aggregate;
  - Concrete sand, small aggregate.

  Depth = 1-1/2" to 3"
  - Concrete mix.
- Equipment Required:
  - Truck;
  - Air compressor and jackhammer for removing defective concrete;
  - Portable electric saw with abrasive blade and portable generator where required;
  - Concrete mixer or mixing box as needed;
  - Screed (1"x 6" straight board, length at least two feet wider than largest patch for small patches);
  - Floats, trowels, edger;
  - Hand shovels, street brooms;
  - Forms where required;
  - Traffic signs and cones.
- Personnel required, depending on the extent of the work:
  - Supervisor, if necessary;
  - Concrete finisher;
  - Laborers.

c. Recommended Repair Procedure

- For all depths, set up traffic signs, assign flaggers.
- For depths of less than 1" to 3", note that the temperature of the underlying slab should be as near to that of the new concrete as possible. Warm concrete placed on a very cold slab will not bond well, and when the overlay has cooled, it may shrink enough to break away from the slab.
- Broom the area to be repaired.

- Check soundness of area to be repaired and the surrounding area (tap with hammer or drag a chain across).
- Remove any unsound pavement.
- Set forms to grade if required.
- Thoroughly sweep the area to be patched to remove any loose fine aggregate.
- Apply bonding agent or etch with acid and apply cement wash.
- Mix and apply topping mix.
- Finish patch to match surrounding pavement.
- Apply curing compound or wet burlap.
- Cure according to the topping mix used.

Concrete pavement with failures greater than three inches in depth should be replaced.

3. SCALING

a. Description of Deficiency

Scaling occurs when the surface of a hardened concrete slab breaks away or disintegrates from the paving surface, usually early in the life of slab. It can be caused by any of the following:

- Cycles of freezing and thawing, especially when nonair-entrained concrete was used.
- Applications of deicing salts when nonair-entrained concrete was used.
- Overworking the concrete during the finishing operations while bled water is on the surface. Mixing this excess water into the top of the slab will cause a segregation of the surface fines (sand and cement) brought to the surface, and another layer of clean washed sand which is not bonded to the concrete under it.

b. Materials and Equipment Required

The same materials and equipment are required as for spalls of less than 1".

c. Recommended Repair Procedure

The same materials and equipment are required as for spalls of less than 1".

4. CRAZING AND MAP CRACKING

a. Description of Deficiency

Crazing or map cracking is the occurrence of numerous fine hairline cracks in the surface of a newly hardened slab due to surface shrinkage. These cracks are caused by any of the following:

- Rapid surface drying caused by high air temperatures, hot sun, drying winds, or a combination of these.
- Premature floating and troweling (floating and troweling when there is an excess amount of moisture on the surface or while the concrete is too plastic). Premature floating and troweling brings an excess amount of fines and moisture to the surface, resulting in crazing.
- Overuse of tamper, vibrating screed, darby, or bull float.

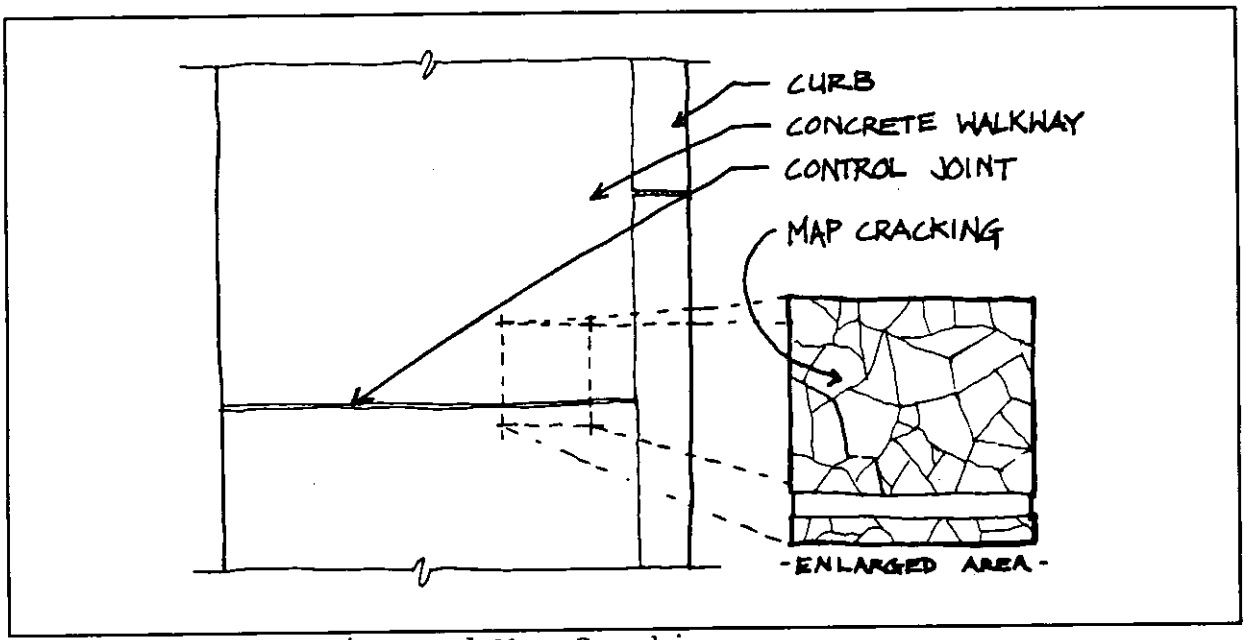

Figure 4-3: Crazing and Map Cracking

b. Recommended Repair Procedure

This is a minor defect and not worth the time and effort to repair. The cracks are extremely small and can't be sealed. The recommendation is to inspect these areas possibly twice a year, and if the cracks develop into spalls they should be repaired as necessary.

5. FAILED OR DISINTEGRATED AREAS

a. Description of Deficiency

This section deals with defects resulting from pavement or subgrade failures. Similar to bituminous pavement defects, the failures include potholes, edge failures, and other disintegrated areas requiring full or partial-depth patching. Failed pavement which has been badly cracked, broken, or disintegrated should be entirely restored to its original condition with new concrete.

b. Materials, Equipment, and Personnel Required

- Materials Required:
  - Ready-mixed concrete, preferably high early-strength. If ready-mix is not available, cement (preferably high early-strength, sand, stone or well-graded gravel aggregate, 3/4" maximum size) large patches.
  - Prepackaged concrete mix for smaller patches.
  - Water for mixing and cleaning up tools.
  - Curing compound or burlap.
  - Sand or base material, if needed.
- Equipment Required:
  - Dump trucks for hauling away removed concrete, sand, and aggregate if needed;
  - Truck to haul tools, forms, and prepackaged mix to job site;
  - Air compressor, jackhammer, air hose, tamper;
  - Rubber-tired loader to load broken concrete (for a large patch);
  - Concrete mixer; mortar box if hand mixing is necessary;
  - Forms, screed, finishing tools (floats, trowels, edgers, soft broom for texturing, large bucket to wash tools);
  - Shovels, picks, street brooms;
  - Signs, cones, lights, barricades for traffic management.
- Personnel Required:
  - Supervisor, if necessary;
  - Truck drivers, as needed;
  - Concrete finisher;
  - Laborers, as needed.

c. Recommended Repair Procedure

Depending on the size of the work, it is a good practice to have straight-line cuts either perpendicular or parallel to the center line. The thickness of a patch, in full-depth patching, should not be less than the existing slab. However, if the stability of the subgrade is questionable, but insufficient to warrant replacement, a greater thickness of concrete may be advisable.

Matching reinforcing steel should be replaced at the same spacing as that found in the existing concrete pavement. Expansion, contraction, or construction joints disintegrated through use or damaged during removal of broken concrete should be replaced, as nearly as possible in the same location and to the proper level. The defective area should be inspected and marked off, and all unstable materials removed and replaced.

- Set up signs; assign flagmen.
- Remove area to be patched.
- Trim excavated area as required.
- Refill with base material, stone screenings, or sand as needed, and compact.
- Set reinforcing steel as required;
- Wet down bottom of the excavated hole, but do not allow the water to puddle.
- If possible, coat sides of existing concrete with bonding agent and allow to become tacky.
- Pour concrete and finish.
- Apply curing compound or wet burlap.
- Clean up area and finishing tools.
- Do not open to traffic until the required curing time is over.
- Check often to make sure the burlap is kept wet if it was used. No action is necessary if curing compound was used.
- At the end of the curing period, remove burlap, remove forms if used, backfill where needed.
- Remove barricades and signs.
- Open to traffic.

END OF CHAPTER FOUR