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USACE / NAVFAC / AFCEC **UFGS-32 01 11.51 (November 2023)**

Preparing Activity: USACE **Superseding**
UFGS 32 01 11.51 (May 2016)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2025
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SECTION 32 01 11.51

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SECTION 32 01 11.51

[RUBBER] [AND] [PAINT] REMOVAL FROM AIRFIELD PAVEMENTS
11/23

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NOTE: This guide specification covers the requirements for removal of rubber deposits and paint from asphalt concrete or portland cement concrete airfield pavements.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information. This section contains a Tailoring Option for rubber or paint removal. Make this selection before editing the section.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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NOTE: Do not specify rubber removal without a friction test evaluation of the existing pavement condition, unless the need for rubber removal is prompted by other factors which limit the functionality of the airfield. Such factors may include airfield markings being obscured by excess rubber buildup, or a clean surface being required prior to new markings. Per the requirements of TSPWG 3-270-01.04-10, "Determining the Need for Runway Rubber Removal," when the average Mu value on the wet runway pavement surface in a rubber deposit area at both 65 and 95 km/h 40 and 60 mph is less

than the planning level in Table 2-2 for a distance of 305 meters 1000 feet or more, initiate a project to have rubber removed from the affected areas of the runway before the next friction test is scheduled. Contact the AFCEC, the Navy EFDs, or the USACE TSMCX for guidance.

Shotblasting is prohibited from use on airfield pavements. Sandblasting is prohibited from use on Navy airfield pavements.

NOTE: On the project drawings, show:

1. Locations and dimensions of areas applicable to removal work.

2. Type and general condition of pavement and any joints or markings for each removal area. Identify the thickness of the existing markings to be removed. Use ASTM D1005 to determine the dry film thickness of the painted markings.

3. Indication of whether rubber, paint, or both are to be removed in each work area.

4. Locations of Government hydrants to be provided for Contractor use.

PART 1 GENERAL

1.1 UNIT PRICES

1.1.1 Measurement

Removal of rubber [and] paint is measured by the number of square meters feet of rubber [and] paint to be removed, based on type and percentage of removal.

1.1.2 Payment

NOTE: Delete unit price sentence when the work is covered by a lump sum contract price.

Removal of rubber [and] paint is paid for at the contract unit price per square meter feet of rubber [and] paint to be removed, based on the type and percentage of removal.[Removal of rubber [and] paint is paid for as a lump sum based on the areas shown on the drawings.]

1.2 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in

the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D1005	(1995; R 2020) Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards

1.3 DEFINITIONS

1.3.1 Pavement Damage

Scarring is defined as the erosion of the pavement fine aggregate and binder that leaves some of the aggregate exposed. Pavement damage occurs when more than 25 percent of the depth (vertical dimension) of the nominal-sized aggregate diameter is uniformly exposed and aggregate could loosen.

1.3.2 Rubber Buildup

Deposits of rubber buildup are defined as any surface deposit that can be removed by scratching the deposit with a flat sharp object (such as a pocket knife) without damaging the pavement surface. Stains are defined as materials in the pavement surface microtexture resulting from rinse water residue. Staining resulting from rinse water residue that is not immediately removed is not acceptable and requires additional removal action.

1.3.3 Paint Buildup

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NOTE: There is no ASTM standard method for determining the in-place dry film thickness (DFT) of marking paint on pavement. If the DFT is desired, include the bracketed sentence to test a chip removed from the pavement marking.

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When paint thickness builds up over 40 mils (approximately five coats of paint), remove the coating thickness in accordance with paragraph TOLERANCES, ensuring the remaining material is well bonded and not subject to delamination when new coatings are applied. [Determine the paint dry film thickness (DFT) using ASTM D1005, Procedure C or D.]

1.3.4 Paint Removal

If markings are obsolete or non-compliant, irrespective of thickness of existing coatings, remove the paint in accordance with paragraph TOLERANCES so that any residual marking will not result in confusion.

1.3.5 Ghosting of Paint Markings

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NOTE: See FAA AC 150-5340-1M, Standards for Airport Markings, Figures 1-1 through 1-4 for examples.

****

Ghosting is the continued visual appearance of removed markings. Do not paint over old markings to be removed. Remove a predetermined larger size and shape of area that encompasses the old marking(s) and group adjacent markings together into a larger rectangular removal area.

1.4 ADMINISTRATIVE REQUIREMENTS

Submit a schedule of work to the Contracting Officer. Describe the work to be accomplished; noting the location of work, distances from the ends of runways, touchdown areas, taxiways, buildings, and other structures; and indicating dates and hours during which the work is to be accomplished. Schedule the work to conform to aircraft operating schedules. The Government will try to schedule aircraft operations so as to permit the maximum amount of time for the Contractor's work. However, in the event of any emergency, intense operational demands, adverse wind conditions, and other unforseen difficulties, discontinue all work at locations in the aircraft operational area. Keep the approved schedule of work current and notify the Contracting Officer of any changes prior to beginning each day's work.

1.5 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G". Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a “G” to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up

to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, and Air Force.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Schedule of work; G, [_____]

Waste Collection, Identification and Disposal Plan; G, [_____]

Pre-Existing Conditions Inspection Report; G, [_____]

SD-03 Product Data

Waterblasting Removal Equipment; G, [_____]

Sandblasting Equipment; G, [_____]

[Rubber] [and] [Paint] Removal Detergents or Chemicals ; G, [_____]

Detergent And Chemical Removal Equipment; G, [_____]

Mechanical Removal Equipment; G, [_____]

SD-06 Test Reports

Test Section Results; G, [_____]

SD-09 Manufacturer's Field Reports

Damage Repair Plan

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver detergents and chemicals required for rubber [and] paint removal in original manufacturer's containers labeled with appropriate EPA, OSHA, or other agency warnings, if applicable, and Safety Data Sheets. Protect materials from degrading until their use is required during execution of

the work.

1.7 PROJECT/SITE CONDITIONS

1.7.1 Environmental Requirements

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NOTE: For Navy, delete sandblasting. The use of sandblasting is prohibited for use on Navy airfield pavements.
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Ensure pavement surface is free of snow, ice or slush. Ensure surface temperature is at least 5 degrees C 40 degrees F and rising at the beginning of operations[except those involving sandblasting for which a lower surface temperature may be approved]. Do not permit chemical rubber removal operations to begin if rain is predicted within 24 hours. Cease operation during thunder and lightning storms. Cease operation during rainfall except for waterblasting and removal of previously applied chemicals. Cease waterblasting where surface water accumulation alters the effectiveness of material removal.

1.7.2 Airfield Traffic Control

Coordinate performance of all work in the controlled zones of the airfield with the Contracting Officer and with the [Flight Operations Officer or Airfield Manager] [control tower]. Neither equipment nor personnel can use any portion of the airfield without permission of these officers unless the runway is closed. Runways will be closed during the following times:

Day or Date	Runway Closing Time	Runway Opening Time	Important Notes
[_____]	[_____]	[_____]	[_____]

1.7.3 Radio Communication

Do not allow personnel or equipment to enter the controlled zones of the airfield until radio contact has been made with the control tower and permission is granted by the control tower. A radio for this purpose [will be provided by the Government. The Contractor is responsible for the radio and must reinburse the Government for repair or replacement of the radio if it is lost, damaged, or destroyed] [is to be provided by the Contractor and approved by the Government]. Always maintain contact with the control tower at all times during work in vicinity of the airfield. Notify the control tower when work is completed and all personnel, equipment and materials have been removed from all aircraft operating surfaces.

1.7.4 Emergency Landing and Takeoff

Emergencies take precedence over all operations. Upon notification from the Control Tower of an emergency landing or imminent takeoff, stop all operations immediately and evacuate all personnel and equipment to an area not utilized for aircraft traffic which is at least 76 m 250 feet measured perpendicular to and away from the near edge of the runway unless otherwise authorized by the Contracting Officer or the Contracting

Officer's Representative. Clear the work area of equipment, chemicals or detergents, and excess water within 15 minutes.

1.7.5 Airfield Lighting

When night operations are necessary, provide all necessary lighting and equipment. Direct or shield lighting to prevent interference with aircraft, the air traffic control tower, and other base operations. Provide lighting and related equipment capable of being removed from the runway within 15 minutes of notification of an emergency. Night work must be coordinated with the Flight Operations Officer or Airfield Manager and approved in advance by the Contracting Officer or authorized representative.

1.7.6 Water

Water to be used for high-pressure water equipment will be made available from Government hydrant[s] [as shown on the drawings,] [within [_____] m feet of all points of the work area,] [at no cost] [at the prevailing rates]. Furnish equipment and labor for delivery of water from the hydrant to the job site. Notify the Government on location of fire hydrant[s] to be used and the respective times of use. Connections to a fire hydrant are subject to inspection and approval. Provide and use a backflow prevention device for filling water tanks. Test, treat, and filter the water to verify it will not interfere with the rubber removal or damage or clog the rubber removal equipment.

1.8 SAFETY

Comply with OSHA 29 CFR 1910.

1.9 ACCEPTANCE

1.9.1 Tolerances

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NOTE: The following provides recommended rubber and paint removal percentages based on visual estimation of pavement area required to be exposed by the removal process. The degree of removal possible without damaging the pavement surface depends on pavement condition. Portland cement concrete pavements can withstand more water pressure impact than asphaltic concrete pavements before aggregates are exposed. Do not specify 100 percent removal, as this can result in excessive exposure of pavement aggregates.

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Acceptance of the removal of rubber [and] paint is based on compliance with the tolerances presented in the following Table. Reclean any area representing a failing test.

RUBBER REMOVAL	
Pavement Surface	Tolerance

RUBBER REMOVAL	
Portland Cement Concrete Pavement	Minimum 90 percent
Asphalt Pavement	Minimum 85 percent

PAINT REMOVAL	
Pavement Surface	Tolerance
Paint Removal to Reduce Paint Build Up	
Portland Cement Concrete Pavement	Minimum 85 percent of build up
Asphalt Pavement	Minimum 85 percent of build up
Paint Removal For Obsolete or Non-Compliant Markings	
Portland Cement Concrete Pavement	Minimum 95 percent
Asphalt Pavement	Minimum 90 percent

1.9.2 Test Section

Prior to the start of work, remove not less than 15 m 50 feet in length of rubber [and] paint on designated runways and touchdown areas. Use procedures, equipment, and movement rate to achieve the required degree of removal in accordance with the Table above. Use methods in paragraph COMPLIANCE TESTING to determine if the rubber [and] paint was successfully removed from the test section. Submit the test section results for approval before conducting any further removal work. Provide photos of the seven random locations within the test area taken before and after the removal.[Provide photos of four random locations at joint seals within the test area taken before and after removal.] The Government will compare the surface texture of the cleaned demonstration area to that of the non-trafficked areas to determine satisfactory completion of the removal operation. After approval of the operations, the cleaned sample area will become the standard for rubber [and] paint removal and final surface texture for the remainder of work.

PART 2 PRODUCTS

2.1 [RUBBER] [AND] [PAINT] REMOVAL DETERGENTS OR CHEMICALS

The use of environmentally acceptable detergents or chemical agents must be considered on a case-by-case basis. Submit the Safety Data Sheet (SDS) for detergents or chemicals in the [rubber] [and] [paint] removal process. Use of any detergents or chemicals in the [rubber] [and] [paint] removal process must be approved in advance by the Contracting Officer. The Government specifically reserves the right to reject the use of any process which the Contracting Officer determines may pose unnecessary risks to human health, the environment, the pavement, aircraft or NAVAIDS due to corrosion or foreign object damage (FOD) potential as a result of its use, storage, or disposal.

2.2 EQUIPMENT, TOOLS, AND MACHINES

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NOTE: Shotblasting is prohibited from use on all airfield pavements. Sandblasting is prohibited from use on Navy airfield pavements.

Coal tar concrete or surface sealers have been used as a jet fuel resistant surface course in older pavements. Coal tar has been determined to be a hazardous material and removal requires extensive protection to workers and the environment. Do not specify removal of coal tar without the express consent of the AFCEC, the Navy EFDs, or the USACE TSMCX Subject Matter Experts.

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Control the equipment used on asphalt [or tar concrete]and portland cement concrete pavements to remove rubber [and] paint accumulations while minimizing disturbances to asphalt [or tar]mixtures and preventing removal of hardened paste from the concrete.

2.2.1 Waterblasting Equipment

Submit product data for waterblasting removal equipment including area of coverage per pass, range of water pressures, and water tank capacity. Provide mobile waterblasting equipment capable of producing a pressurized stream of water that effectively removes rubber [and] paint from the pavement surface in accordance with paragraph TOLERANCES without significantly damaging the pavement. Provide equipment, tools, and machinery which are safe and in good working order. Provide equipment interlocks to prohibit high pressure water discharge when the vehicle or cleaning head is stationary (not moving forward or side to side).

2.2.2 Detergent and Chemical Removal Equipment

Submit product data for detergent and chemical removal equipment. Use equipment capable of applying and removing detergents and chemicals from the pavement surface. Provide sandbags or barriers to prevent detergents, chemicals or flush water from running over other markings or onto shoulders.

2.2.3 Mechanical Removal Equipment

Submit product data for mechanical removal equipment including area of coverage per pass.

2.2.3.1 Sandblasting Equipment

Provide mobile sandblasting equipment capable of producing a pressurized stream of sand and air that effectively removes rubber [and] paint from the pavement surface without filling voids with debris in asphalt or tar pavements or removing joint sealants in portland cement concrete pavements. Include with the equipment an air compressor, hoses, and nozzles of adequate size and capacity for removing rubber [and] paint. Equip the compressor with traps and coalescing filters that maintain the compressed air free of oil and water.

2.2.3.2 Grinding or Scarifying Equipment

Provide equipment capable of removing surface contaminants, paint build-up, or extraneous markings from the pavement surface. Identify the width of cut and type of scarifier proposed for use. After removal operations, clean the surface with pressurized water to remove residual debris or contaminants.

PART 3 EXECUTION

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NOTE: The Contracting Officer's Representative, the airfield manager and the pavements engineer will jointly develop guidelines and requirements for rubber and paint removal operations; and will jointly evaluate the feasibility of the Contractor's methods and project compliance with applicable regulations.
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3.1 REMOVAL OF RUBBER [AND] PAINT

****
NOTE: The following provides recommended rubber and paint removal percentages based on visual estimation of pavement area required to be exposed by the removal process. The degree of removal possible without damaging the pavement surface will depend on pavement condition. Portland cement concrete pavements can withstand more water pressure impact than asphaltic concrete pavements before aggregates are exposed. Do not specify 100 percent removal, as this will result in excessive exposure of pavement aggregates.

1. Rubber removal from Portland cement concrete pavements: 90 percent.

2. Rubber removal from asphaltic concrete pavements: 85 percent.

3. Paint removal from Portland cement concrete pavements and asphaltic concrete pavements: 85 percent.

NOTE: The drawings should indicate areas surfaced with a porous friction course.
****

Prior to any work being completed, submit a [Rubber] [and] [Paint] Removal Process Plan for approval by the Contracting Officer.

a. Prior to commencing any work, inspect the pavement where rubber [and] paint removal will be conducted. Inspect pavements, joints, lights, etc. to identify any pre-existing conditions. Mark areas and take pictures where joint seal, crack seal, and pavements are already compromised. Submit a Pre-Existing Conditions Inspection Report for approval.

b. The pavement surface type is [portland cement concrete] [and] [asphalt mixture] [as indicated].

c. Remove rubber on portland cement concrete pavements and asphaltic concrete pavements to within the tolerances of paragraph ACCEPTANCE. Remove paint on portland cement and asphaltic concrete pavement to within the tolerances of paragraph ACCEPTANCE. Remove all paint that is loose, flaking, chalky, or not to be re-marked or does not comply with size or pattern standards.

d. Chemical methods used must be compatible with pavement materials, the environment and working personnel.

e. Exercise close control of water pressure and blasting time/duration to prevent damage to joint sealants, existing markings that are not intended for removal, or the wearing surface. [Neither hydroblasting or abrasive blasting may be used for rubber removal on porous friction courses.]

f. Demonstrate the ability to remove rubber at a touchdown area of the runway selected by the Contracting Officer; at least one site per runway will be chosen. Rubber removal must not damage the pavement surface. The surface texture of the cleaned demonstration area will be compared to that of non-rubber traffic areas to determine satisfactory completion of the removal operation.

g. Protect light fixtures and runway surface sensors from damage throughout the removal operations.

h. Compliance testing for the amount of rubber and paint to be removed must conform to the requirements in paragraph COMPLIANCE TESTING.

****
NOTE: For contracts including rubber removal, include UFGS 32 17 23.16, ROAD AND PARKING LOT PAVEMENT MARKINGS, to refresh the markings.
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i. Refresh paint markings in accordance with Section 32 17 23.16 ROAD AND PARKING LOT PAVEMENT MARKINGS.

3.2 RATE OF REMOVAL

Remove rubber at an expected rate of 929 square meter 10,000 square feet per hour. Remove paint at an expected rate of 93 square meter 1,000 square feet per hour. Do not permit high-pressure water application to remove the existing pavement surface, joint seals or crack seals.

3.3 WATER PRESSURE

****
NOTE: The optimum water pressure to be used for rubber and paint removal will be determined by the test specified in paragraph entitled "Rubber and Paint Removal."
****

Provide water pressure impact upon the indicated pavement areas sufficient

to remove the designated rubber [and] paint to the required degree of removal without damaging the existing pavement, joint sealant, or other airfield appurtenances. Determine the optimum water pressure for removal from the test section. The Contractor is responsible for repairing any damage caused by the removal work.

3.4 CLEANUP AND WASTE DISPOSAL

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NOTE: The Contractor is normally responsible for total contract performance. However, at geographically isolated airfields, it may be necessary to furnish Government equipment and personnel for cleanup operations.
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Keep the worksite clean of by-products, debris and waste from [rubber] [and] [paint] removal operations. Perform cleanup operations continuously. [Residue will be removed from the pavement by Government-furnished sweepers and personnel. Notify the Government for coordination.] [Remove all residue from the pavement. Obtain the approval of residue removal and disposal method from the Contracting Officer prior to beginning work.] Prior to the start of work, submit a Waste Collection, Identification and Disposal Plan for approval,describing proposed actions regarding waste collection, control, identification, and disposal. . Address disposal methods and requirements for hazardous and non-hazardous wastes.

3.5 COMPLIANCE TESTING

a. Compliance with the [rubber] [and] [paint] removal requirements must be determined by direct testing within the designated work area.

b. Divide each work area designated for rubber removal into at least four equal zones for the purpose of compliance testing, as approved. Evaluate a minimum of seven random locations within each of the four equal zones. Divide each painted line, numeral or chevron into 30 m 100 ft. lengths. Randomly select a test location within the sample length and determine the percentage of paint removal.

c. Use a 0.1 square meter one square foot section of transparent material inscribed with a grid of 100 equal squares as a tool for quantitative measurement of the percent removal. Place the grid pattern on the pavement surface and count the squares which contain rubber [and] paint deposits. Compare the percentage of rubber [and] paint removed at each of the test locations to the tolerances described in paragraph ACCEPTANCE. Do not permit the number of squares containing rubber [and] paint deposits in each of the randomly selected locations to exceed the allowed percentage in paragraph ACCEPTANCE. Reclean zones not meeting the required percentage.

3.6 DAMAGE REPAIR

****
NOTE: Include bracketed paragraph for runways or touchdown areas with grooved pavements.
****

Repair any damage to the pavement surface, joint, joint and crack seals,

or other Government property caused during the performance of the work at the Contractor's expense. Submit a damage repair plan to include methods and material to the Contracting Officer's Representative for approval prior to performance of the repairs. Complete the repairs within the performance period of the Contract.

[Repair damage to runway or touchdown area grooves exceeding that identified in the Pre-Existing Conditions Inspection Report using an approved grooving machine of standard manufacture. Provide grooves that are 6 mm 1/4 inch deep by 6 mm 1/4 inch wide on 37 mm 1-1/2 inch centers and carried into, and tapered to zero depth within the non-corrected surface, or match any existing grooves in the adjacent pavement.]

-- End of Section --