

COATINGS MANUAL

HRSD

3.0 HOW TO USE THIS COATINGS PROGRAM

3.1 General

Use of this Coatings Manual has been designed to be as easy as possible. The Manual is structured such that the specification and purchasing of coatings projects is straight forward and systematic. Below are simple instructions on how to effectively use this manual.

- A. Section 1.0 outlines the objectives of this Coatings Manual.
- B. Section 2.0 defines HRSD's commitment to success of the Coatings Program covered by this Manual.
- C. Terms and Abbreviations Used in This Manual.

The following terms and abbreviations are used throughout this coatings manual:

1. Active Crack Movement – refers to actively moving existing cracks in concrete substrates. Such crack movement due to thermal changes in the substrate due to climate and/or process exposures causes cracking to occur through rigid cured coatings like epoxies.
2. CMU – refers to concrete masonry units used for constructing walls in buildings and other structures.
3. CSM – refers to Coating System Manufacturer.
4. Coating System I.D. – refers to the identification code for various standard HRSD Coating Systems as described in this manual.
5. CTR – refers to Coating Manufacturer's Technical Representative.
6. DFT – refers to dry film thickness of a coating. See definitions in Paragraph 1.04 of Section 7 of this manual.
7. Film quality – refers to the integrity of a coating film after it is applied and cured. Good film quality means no pinholes in the film or missed areas over the substrate with uniform thickness and good coverage and hiding of the substrate.
8. NACE – refers to the National Association of Corrosion Engineers.
9. Recoating work – refers to complete removal of existing coatings on a given substrate followed by application of new coatings over that same substrate.
10. SSPC – refers to the Society for Protective Coatings.

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11. Ferrous Metals – refers to carbon steel, ductile iron, cast steel, and cast iron metal substrates.
12. Touch-up Coating Work – refers to localized removal of existing coatings and surface preparation to local bare areas of the substrate followed by the application of primers and intermediate coats of coatings to those areas. Touch-up coating work can also involve abrading the overall existing coated surfaces followed by retopcoating of all surfaces, but does not necessarily include overall abrading, cleaning, and topcoating.
13. VOC Content – Volatile Organic Compound – refers to the portion of the coating that is a compound of carbon and is photochemically reactive, and evaporates during drying or curing. VOC is expressed as grams per liter or as pounds per gallon.
14. WFT – refers to wet film thickness of an applied coating. See definition in Paragraph 1.04 of Section 7 of this manual.

3.2 Developing a Coatings Project

- A. Describe the Existing Coating Problem/Substrate.

The first step in developing coating projects is to identify the need for coating work. Is the substrate or structure of concern being degraded by corrosion or chemical attack? If yes, coating work is most likely required. Is the existing coating on a given substrate delaminating, peeling, cracking, or otherwise failing? If so, the substrate probably will be attacked or is being attacked or no longer has the aesthetic look desired. As such, recoating work or touch-up coating work is probably necessary. If the substrate has been badly attacked and degraded, i.e. structural steel members are perforated or have failed or concrete deterioration is very deep and requires rebuilding, such problems should be handled through HRSD's Engineering Department or the Physical Plant Division of HRSD. Record this information in the Coatings Project Development Form included at the end of this subsection of the manual.

- B. Establish Physical Limits of Structures or Areas to be Coated.

Once the decision to do coating work has been made, the next essential decision is to determine the physical extent of the work. This requires defining the limits of the coating work such as all structural steel between column lines A₁ and A₆ (North to South) and between column lines D₄ and D₁₁ (East to West). Or the limits of work may include all exterior surfaces of the No. 4 Fuel Oil Tank or all coated carbon steel surfaces comprising the rake mechanism, bridge, and center well for the No. 3 Secondary Clarifier, etc. Record this information in the Coating Project Development Form included herein.

- C. Identify the Apparent Cause of Existing coating Failure.

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Look at the existing coating and try to assess why it failed. For example, you might state that the existing coating is 23 years old and has outlived its service life. Or you might state that it is only 5 years old, but is delaminating and the removed pieces or chips of the coating have cement paste attached to them. This probably indicates a lack of proper surface preparation. As such, this apparent cause information should be recorded on the Coatings Project Development Form included herein.

D. Identify The Substrate Conditions For The New Coating System Work Carefully And In Detail.

This involves describing the existing substrate conditions such as “the structural steel to be recoated is heavily rusted and the existing coatings are delaminating or peeling.” Or the description might state that, “the existing concrete has depth losses up to ½” and requires resurfacing and/or rebuilding prior to being recoated.” Provide sufficient information such that the right coating system can be selected for the coatings project being developed. Record this information in the Coatings Project Development Form. If the substrate is concrete and you believe it will be necessary to apply a complete skim coat of a filler/surfacer material over it to ensure proper hiding of the substrate profile (after surface preparation) by the standard coating system or if there are prevalent air voids and many other substrate undulations present, a complete skim coat of the filler/surfacer material should be specified. Record this information in the Coatings Project Development Form. Also, add this language to the Scope of Work in Section 7 in paragraph 1.01 B.

E. Define Exposure Conditions for the New Coating System.

1. Describe the physical exposure, i.e. abrasion due to grit in waste water or heavy fork truck traffic or no wear or abrasion. Record on the Coatings Project Development Form.
2. Describe the chemical exposure – list chemicals and concentrations used, handled, or present in the area, i.e. 50% Sodium Hydroxide or H₂S gas concentrations over 150 ppm. Also, include the temperature at which the chemicals are handled. Measure and record on the Coatings Project Development Form the surface pH of the substrates to be coated.
3. Describe the Thermal Exposure - For example, wastewater temperature is between 50° and 95°F annually or air temperature in the headspace can reach 150°F in summer months. Or, compressed air temperatures in the aeration piping just downstream of the Compressor or Blower Building can reach 175°F. Record this information on the Coatings Project Development Form.
4. Describe the Weather Exposure - For example, the substrate is exposed to direct sunlight and weathering and therefore to U.V. light or substrate is completely enclosed in the building. Record on the Coatings Project Development Form.

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F. Describe Existing Coating Conditions.

1. Estimate percentage of existing coating failure. For instance, approximately 5% of coated area has delaminated mostly near and adjacent to welds. Record this information on the Coatings Project Development Form.
2. Evaluate the Coating Adhesion to Substrate.

If the coating can be easily lifted off the substrate with a dull putty knife or scraper, complete removal of existing coatings and recoating is usually recommended.

Before deciding whether to recoat or touch-up coat, test the adhesion of the existing coating to the substrate and apply test patch areas of the new coating system selected over each representative type of existing coated condition to check adhesion of the new coating system over the existing coatings. Perform adhesion tests in accordance with ASTM D3359 for coatings with thicknesses of 20 mils (ASTM D3359, Standard Test Methods for Measuring Adhesion by Tape Test). Test results showing an adhesion rating of 5A on immersed surfaces or 4A or better on all other surfaces shall be considered acceptable. All other test results will be considered unacceptable and shall be marked for removal and recoating. Perform tests at representative number of areas. If unacceptable results are detected, more frequent testing should be performed to define the limits of the poorly adhered existing coating systems. Record adhesion test results on Coatings Project Development Form. For coatings thicker than 20 mils, use the dull putty knife evaluation method. This method involves getting the knife under the coating and seeing how easily the existing coatings can be removed. If such removal is very difficult and the existing coatings are well-adhered and difficult to detach from the substrate, removal is probably not required and touch-up coating work will be fine. Record findings on Coatings Project Development Form.

3. Generally Assess Existing Coating Film Quality.

Identify whether the existing coating remains glossy or is chalked or cracked, etc. If a coating is heavily chalked and has fine interconnected cracking all over it, it is probably better to remove it and perform recoating work. If it has localized rust through and undercutting at welds and connections only, touch-up coating work will be a good approach. It is important to identify such conditions in your coating project development work. Chalking can be identified by wiping the coating with your hand or with clean white rags. (Use dark rags if the coating is white.)

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If there are lots of fine cracks in the existing coating system combined with lifting and delamination, the coating is likely age hardened and embrittled. This requires removal and recoating work.

If there are widespread pinholes or rust-through or delamination or peeling or blistering, note this information. This requires removal and recoating work. Record your observations in the Coatings Project Development Form.

4. Determine Existing Coating Thickness.

Coating thickness is an important variable. Excessive film thickness results in too much film stress in the existing coating system causing intercoat delamination of subsequently applied coatings, (meaning between coats). If a structure has been coated multiple times over its life, another topcoat could end up creating excessive thickness. Be sure the existing coating system is intact, uncracked, well-adhered, and is not too thick.

Consult with the selected CSM to determine if existing coatings are too thick to coat over or not. As a general rule of thumb, don't coat over existing alkyd coatings on metal substrates over 15 mils in thickness except where touch-up is performed. Similarly, don't coat over existing unfilled epoxy coatings that are 30 mils DFT on steel substrates. Otherwise, check with the CSM. Record all information on the Coatings Project Development Form.

For higher film stress type coatings (i.e. solvented epoxies or less than 100% solids coatings), the total coating thickness must carefully follow the manufacturer's recommendations for the maximum coating thickness.

Measure the existing coating film thickness using the appropriate instrument from your "inspection tool box" described later in this Coating's Manual. Record the findings of DFT measurements for existing coatings in the Coatings Project Development Form.

5. Determine Whether Touch-Up Coating or Recoating Work is Required.

Once the limits of work have been established, you will have to decide whether maintenance touch-up coating work or touch-up plus topcoating or complete removal (of existing coatings) and complete new coating application or recoating is required. This is an important decision as it affects cost, schedule, and future coating performance. As general guidelines, the following guidance is recommended when making such coating work decisions:

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For Concrete Surfaces

- If the existing coating failure has occurred at **isolated** areas and does not exceed 15 to 20% of the total area, maintenance touch-up coating work is acceptable.
- If the existing coating failure is **uniformly** widespread over the total surface area and failure is between 3 and 15 percent, complete removal and recoating or touch-up priming and retopcoating of all surfaces are options. If the surfaces have only been coated once before in that case, touch-up and retopcoating are feasible. If this is the second or third recoat cycle, complete removal and recoating is recommended.
- If the coating system is in an aggressive chemical or corrosion environment and failure involves coating film degradation or cracking, complete removal and recoating are recommended. This generally means that immersion grade linings or aggressive headspace linings need to be replaced.
- If the exposure conditions are relatively benign and the extent of coating failure is as high as 10%, touch-up priming and retopcoating may be permitted. In such cases, be sure to check to see that the existing coating is not embrittled, or is not continuing to lift and delaminate between coats or from the substrate, or is not easily removed with a dull putty knife or 5-in-1 tool. If any of these conditions are identified, complete removal and recoating is recommended.

For Masonry Surfaces

- Generally follow the same recommendations as presented for concrete surfaces.
- CMU surfaces are generally coated for aesthetic purposes or for protection in mildly corrosive environments. As such, most of the time recoating will involve touch-up priming and retopcoating efforts. Aggressive removal of existing coatings from CMU or even brick surfaces is typically not recommended as it creates too much substrate damage. In such instances, careful and thorough removal of peeling or delaminated coatings are recommended.

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For Steel Surfaces

As a general guideline, it is recommended that SSPC-VIS-2 be used to evaluate the extent of rusting to aid you in making the decision to recoat a steel structure or perform touch-up coating work. SSPC-VIS-2 or ASTM D610 is entitled, "Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces." This standard provides a Rust Grade Scale and both graphics and photographs for a pictorial comparison to the subject structure.

A Rust Grade 10 indicates no rusting or less than 0.01% of surface rusted whereas a Rust Grade 5 indicates rusting to the extent of 3% of surface rusted. A Rust Grade 1 indicates approximately one-half of the surface is rusted. If you determine that a structure has an overall Rust Grade of 7, 8, or 9, touch-up coating work or touch-up and retopcoating will generally be prudent approaches. Use your judgment on retopcoating based on the extent of failure and how widespread the failure is on the overall surfaces. If on the other hand, you determine that a structure has an overall Rust Grade of 1, 2, 3, 4, 5, or 6, it is generally recommended that complete coating removal and recoating be performed. These guidelines assume that the Rust Grade is generally representative of the entire surface areas of the structure. If however a structure has localized coating failure confined to discrete portions of the structure, a touch-up coating approach (localized preparation, priming and topcoating) is recommended. The outcome of this decision should be checked off in the Coatings Project Development Form.

G. Describe the Working Conditions for the Coating Project.

This information is important to project development as it pertains to work access and to on-going facility operations issues. For example, if the work is located within confined spaces, confined space entry permits and procedures will be required. Also, the work may require scaffolding and operating equipment protection during the work. You should also note if vehicles will need to be parked elsewhere during coatings work to prevent overspray damage, etc. If conditions for the work will be very humid, hot, wet, or cool, the Contractor may be required to provide humidity and/or temperature control measures during the work. Record this information in the Coatings Project Development Form.

H. Identify Need for Soluble Salt Decontamination. (Steel Substrates ONLY)

The presence of soluble salts such as chlorides or sulfates on metallic substrates to be coated can result in premature coating failure when present in sufficient concentrations. These salts are typically not removed by blast cleaning and, in fact, can be driven into the blast profile of the metal by abrasive blast cleaning. When coatings are applied over soluble salt contaminated steel, subsequent molecular moisture migration (normal to coatings in humid or immersion environments) in and out of the coating film results in

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the moisture solubilizing the salts and condensing on the steel surface under the coating film. Over time, this creates small osmotic cells pulling more moisture to the concentrated solution under the coating causing osmotic pressure to develop. This pressure pushes the coating off the surface creating blistering of the coating with subsequent delamination. If the specifier suspects that existing metals to be coated (in existing facilities) or new metals to be coated have been exposed to chlorides or sulfates from sea coastal exposure or chemical exposure, etc., specific testing and surface preparation language should be included in Section 7 as noted herein.

There are several conditions under which soluble salt contamination occurs. These include sea coastal environments where salt air or spray reaches metal surfaces routinely or where metals have been exposed to wastewater high in chloride ions due to coastal collection system infiltration (can be splash/spillage or immersion conditions). Also, whenever blistering of coatings over metal surfaces has caused prior coating failure and exposure to salt water or air are routine, it is reasonable to suspect that soluble salts were a contributor to the previous coating failure. In all such cases, testing for soluble salts should be performed by HRSD prior to executing the coatings project.

1. The Soluble Salt Sampling Procedure to be used is as described in the Soluble Salt Test Kit provided in your inspection "Tool Box". Follow the instructions in that Test Kit for Soluble Salt Sampling and Testing. Record results in the Coating Project Development Form.

2. Significance of Detected Levels
(These values are based upon experience and reported research.)

Chlorides

50 ppm or greater chloride will be considered detrimental.

Sulfates as Comparison to Soluble Ferrous Ions:

50 ppm or greater will be considered detrimental.

If soluble salt testing indicates detrimental levels, the metal surfaces to be coated shall be recleaned using steam cleaning as required in the Section 7. Soluble salt contamination testing shall then be repeated until below detrimental (soluble salt) values are obtained. Next, the metal surfaces shall be recleaned via abrasive blast cleaning or other approved methods as required by Section 7.

3. This testing shall be performed on representative areas of the steel surfaces to be coated. There is optional language included in the specifications for soluble salt decontamination of steel surfaces. Record findings on Coatings Project Development Form.

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- I. Identify if active crack movement is expected to reflect through the new coating systems for project. **Applies to Concrete Substrates ONLY.**

This can be ascertained by visually looking at the existing coating system. If it was a non-flexible coating like an epoxy and substrate cracks propagated or reflected through it, it is probable the same thing will happen with the new coating system. Another way to be sure of this (when no prior coating was present) is to glue a crack monitor across the crack and monitor it for 6 months. If movement is indicated, it will be an issue.

However as a general rule, most cracks that go all the way through a slab or wall will be thermally active throughout normal annual temperature swings. And as such the cracks will reflect through or transmit through new rigid cured coatings like epoxies or acrylics, etc. The general guidance here is as follows:

- If the environment is not corrosive or does not involve immersion service, reflective cracking is not an issue to be concerned with.
- If the environment is corrosive or can be intermittently or involves immersion service (could be corrosive headspace or corrosive immersion or non-corrosive immersion or secondary containment area subject to intermittent corrosive conditions), you need to be concerned about active crack movement in concrete substrates reflecting through new coatings.

The way to deal with active crack movement is to select a flexible coating like standard coating systems FP-1, FP-2, or PU-1 (found in Section 5.0 of this Manual) provided they meet the chemical resistance requirements and are identified as appropriate for the service conditions in this manual. Or, the cracks can be treated by routing and sealing with the appropriate caulking material after the new coatings are applied or specially treated with fiberglass cloth reinforcement or other special treatments as recommended by the CSM. Such details will need to be attached to Section 7 for your Coatings Project where applicable. See paragraph 1.08 B. 6. in Section 7 of this Manual. Record information on the Coatings Project Development Form. Refer to Appendix E of this Manual. It provides graphics and photographs of various causes of cracking in concrete.

- J. Select the standard coating systems to be used for the work in this Project.

To select the right standard coating systems for your project, review Section 4.0 of this Manual. It provides the Coating System Selection Schedule under Subsection 4.1. This Schedule lists coating systems by substrate and environment and gives you service conditions and typical structures. Subsection 4.2 provides a schedule for Coating System Selection by Typical Wastewater Treatment Plant Structures (for treatment plant work only). Using these schedules, select the Standard Coating Systems from Section 5.0 of this Manual (Standard HRSD Coatings Systems) needed for your project and record them in the Coating Project Development Form. You are now ready to tailor the Standard Coating Specifications, Section 7 to your coatings project. See Subsection 3.3 of this Coatings Manual for those specific instructions.

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- K. Inspection of HRSD Coatings Projects is either handled through In-House Inspection or through contracting with Third Party Inspection Companies. In-House Inspection essentially involves a quality assurance type of effort (spot checking and auditing the Contractor's quality control inspection efforts as required in Section 7, Part 4 of the Coatings Manual). This inspection effort is performed by HRSD personnel who have been trained and provided with an inspection "pocket manual" and inspection instruments "tool box". Third Party Inspection is performed by prequalified firms with NACE and SSPC trained inspectors having the appropriate requisite wastewater coatings experience identified in this Coatings Manual. Third Party Inspection should only be used on large and/or critical coatings projects as outlined in Section 9.0 of this Coatings Manual. Otherwise, In-House Inspection should be used on HRSD Coatings projects as delineated in Section 10.0 of this Coatings Manual. Follow the guidelines in Section 9.0 and 10.0 when deciding whether to use In-House or Third Party Inspection on HRSD coatings projects. Designate the use of either In-House or Third Party Inspection in the Coatings Project Development Form under item K.

- L. Determine and identify all appurtenances and/or attached items to the substrate that will interfere with the coating work which requires removal or removal and installation. Record this information under item L. on the Coatings Project Development Form. Examples include v-notch weir plates at clarifier launder troughs or light fixtures on walls, etc.

- M. **Coatings Project Development Form – See Attached.**

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COATINGS PROJECT DEVELOPMENT FORM
(To be filled in electronically)

HRSD Facility: _____

HRSD Location: _____

Date: _____

HRSD Originator: _____

- A. Description of Existing Coating Problem/Substrate:

- B. Establish Physical Limits of Structures or Areas to be Coated.

- C. Identify the Apparent Cause of Existing Coating.

- D. Identify the Substrate Conditions for the New Coating System.

Include need for complete skimmer coat of filler/surfacer here:

- E. Define Exposure Conditions for the New Coating System.
 - 1. Describe Physical Exposure:

 - 2. Describe Chemical Exposure:
 - a. List chemicals and concentrations used, handled, or present in area.

 - b. Measure surface pH and record: (pH test strips and instructions for use will be provided in your inspection “Tool Box”.)

 - 3. Describe Thermal Exposure:

 - 4. Describe Weather Exposure:

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F. Describe Existing Coating Conditions.

1. Estimate Percentage of Existing Coating Failure:

2. Evaluation of Coating Adhesion to Substrate:

3. Generally Assess Existing Coating Film Quality.

4. Existing Coating Thickness Measurements: (List Measured DFTs)

Is Existing Coating Too Thick to Coat Over?

5. Determination to Touch-up or Recoat (check one box only):
 Touch-up Coating Work. Recoating Work.

G. Describe the working conditions for the coating work:

H. Identify need for soluble salt decontamination – yes or no. If yes, is it chlorides or sulfates? (Indicate answers here.)

If yes, be sure to include soluble salt decontamination language in Section 7 specifications.

I. Identify if active crack movement is expected to reflect through new coatings. (Applies only to concrete substrates.) If yes, be certain to select a coating system that can bridge crack movement or specify special crack treatment per the CSM’s instructions.

J. Select and identify the Standard Coating System(s) for the work to be performed.

| Substrates and Work Location Description | Coating System ID |
|--|-------------------|
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K. Designate whether In-House or Third Party Inspection will be used for this project:
(check one only)

In-House Inspection

Third Party Inspection

L. Identify and list all appurtenances or attached items to substrates that require removal or removal and installation to properly perform coating work:

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COATINGS PROJECT DEVELOPMENT FORM
(To be filled in by hand)

HRSD Facility: _____

HRSD Location: _____

Date: _____ **HRSD Originator:** _____

A. Description of Existing Coating Problem/Substrate:

B. Establish Physical Limits of Structures or Areas to be Coated.

C. Identify the Apparent Cause of Existing Coating.

D. Identify the Substrate Conditions for the New Coating System.

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Include need for complete skim coat of filler/surfacer here:

E. Define Exposure Conditions for the New Coating System.

1. Describe Physical Exposure:

2. Describe Chemical Exposure:

a. List chemicals and concentrations used, handled, or present in area.

b. Measure surface pH and record: (pH test strips and instructions for use will be provided in your inspection "Tool Box".)

3. Describe Thermal Exposure:

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4. Describe Weather Exposure:

F. Describe Existing Coating Conditions.

1. Estimate Percentage of Existing Coating Failure:

2. Evaluation of Coating Adhesion to Substrate:

3. Generally Assess Existing Coating Film Quality.

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4. Existing Coating Thickness Measurements: (List Measured DFTs)

Is Existing Coating Too Thick to Coat Over? _____

5. Determination to Touch-up or Recoat (check one box only):

- Touch-up Coating Work.
- Recoating Work.

G. Describe the working conditions for the coating work:

H. Identify need for soluble salt decontamination – yes or no. If yes, is it chlorides or sulfates? (Indicate answers here.)

If yes, be sure to include soluble salt decontamination language in Section 7 specifications.

I. Identify if active crack movement is expected to reflect through new coatings. (Applies only to concrete substrates.) If yes, be certain to select a coating system that can bridge crack movement or specify special crack treatment per the CSM's instructions.

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3.3 Tailoring the Standard Coatings Specifications to Your Project.

Do not delete any numbered or lettered sections of the specification since it may alter appropriate references to other paragraphs.

If you are preparing to specify coatings work, first refer to the Standard Coatings Specifications in Section 7 of this manual. This Section of the Manual includes blank coatings specifications and an example coating specification to follow as you fill in the blanks with the information that tailors the blank specifications to your specific coatings project. Using your blank Section 7, follow the instructions below:

1. See Page 1 of Section 7. Fill in the location and contacts information for the project in, paragraph 1.01 of Section 7. For Section 7-EX, go to Page 1.
2. See Page 1 of Section 7. Fill in a written description of the Scope of Work in paragraph 1.02 B. of Section 7. Use your Example Specifications (Section 7 EX) as a guide for writing this paragraph. If concrete substrate conditions are involved and a complete skim coat of a filler/surfacer material is required, describe the need for this including the material to be used in the Scope of Work section. Also, identify and list all appurtenances or attached items that require removal or removal and installation. See Page 1 of Section 7-EX.
3. See Page 2 of Section 7. Fill in the location of the work for this project in paragraph 1.03 A. of Section 7. For Section 7-EX, see Page 1.
4. See Page 2 of Section 7. Fill in the number of working days from start date in paragraph 1.03 E. of Section 7. See Page 2 of Section 7-EX.
5. See Page 2 of Section 7. Decide if you will include paragraph 1.03 F. requiring the Contractor to sign the 3-year Coatings Performance Guarantee or not. If not, type in Not Applicable or Not Used. If not required, delete the language in Paragraph 1.03G and type in 1.03 G. – not used. The Guarantee should be required for any critical work, but should not be required for coating offices or non-critical structures. If the Guarantee is required, insert the Standard 3-Year Performance Guarantee from Contractor onto the very back of Section 7. This can be found in Subsection 3.5 of the Coatings Manual. If included, fill in Insert A of the Guarantee describing the location of the pertinent coating work and fill out attachment “A” giving the normal operating/exposure conditions. For Section 7-EX, see Page 2.
6. See Page 2 of Section 7. Fill in the normal working hours for the project, i.e. 7:00 a.m. to 3:30 p.m. Monday through Friday, in paragraph 1.03 H. For Section 7-EX, see Page 2.

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7. See Page 2 of Section 7. Under paragraph 1.03 J., list or fill in any unusual working conditions for this project. An example might be that special security arrangements need to be made for access to the work. Refer to Part G of the Coatings Project Development Form for this information. For Section 7-EX, see Page 2.
8. See Page 2 of Section 7. Under paragraph 1.03 K., fill in any additional requirements related to boundaries of work area or access to facilities. An example might be, work shall not block the doors to electrical motor control centers. For Section 7-EX, see Page 2.
9. See Page 2 of Section 7. Designate the Contractor's Storage Area on site in paragraph 1.03 L. For Section 7-EX, see Page 3.
10. See Page 3 of Section 7. In paragraph 1.03 M., designate which bathroom facilities the Contractor's personnel may use during the performance of the work (if any) or indicate that the Contractors must provide their own portolets. For Section 7-EX, see Page 3.
11. See Page 3 of Section 7. Designate if the work covered by this Contract is covered by Confined Space Entry Requirements and Permitting Procedures in paragraph 1.03 N. For Section 7-EX, see Page 3.
12. See Page 7 of Section 7. See Paragraph 1.06 H. Indicate that the work covered by this Contract requires the performance of a mock-up panel or mock-up area representative of the overall acceptable coating work for the job. In other words at the discretion of the HRSD representative, a mock-up can be required (say 100 SF of the overall work area) to be used as a standard of work for the project. If not used, indicate not used. If required, describe the mock-up requirements in detail. Mock-ups should only be required when the work involves highly critical corrosion protection or the work is very important aesthetically or the job is rework of a premature coating failure, etc. For Section 7-EX, see Page 7.
13. See Page 8 of Section 7. Proceed to Paragraph 1.07 B. 6. Here you must determine if standard detail drawings for coating system terminations or transitions are required. (For Concrete Substrates Only.) If yes, the contractor must obtain those drawings that are pertinent to the project from CSM and submit as required in Section 7 paragraph 1.07 B.6. For Section 7-EX, see Page 8.
14. See Page 11 of Section 7. Proceed to Part 2, Paragraph 2.01 A. of Section 7. Here, insert the Coating Manufacturers and Products you have selected for the project. This information can be inserted directly from Section 5.0 Standard HRSD Coating System descriptions. See the example table below. Refer to the Sample Specifications (Section 7 – EX) for a sample table. For Section 7-EX, see Page 12.

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COATING SYSTEM ID:

SUBSTRATE(S):

SYSTEM GENERIC DESCRIPTION:

| Manufacturer | Filler/Surfacer | Primer Coat | Intermediate Coat | Finish Coat |
|---------------------|------------------------|--------------------|--------------------------|--------------------|
| | | | | |
| | | | | |
| | | | | |
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15. See Page 12 of Section 7. Paragraph 2.02, Coating System Schedule. Fill in this schedule by listing the Coating System I.D. (from Section 5.0 of this Manual), the location/description of areas/surfaces to be coated, the substrate type, i.e. steel, concrete, etc., the exposure condition, i.e. immersion corrosive or weathering exposure only or above water line for tank, etc., and the desired finish color (use Equipment and Piping Color Identification Code from Section 6.0 of this Manual where applicable to piping or equipment). Otherwise indicate N/A for not applicable. This schedule delineates which Coating System Guidelines will be attached to the specification for this project. For Section 7-EX, see Page 14.
16. See Page 16 of Section 7. Proceed to Paragraph 3.04 C. 4.

This language provides the requirements for the cleaning to remove soluble salts from metallic substrates especially ferrous metals prior to coating application. It may or may not be required depending upon the exposure conditions. For Section 7-EX, see Page 18.

If the testing performed by HRSD (as defined in 3.2 H. of this Manual) indicates detrimental levels of soluble salts, the following standard language under paragraph 3.04 C.4. should be imported into the specifications:

Cleaning for Decontamination of Soluble Salts.

- a. Cleaning for decontamination shall utilize a steam generator (“Jenny”) capable of producing steam/hot water temperature of 150°F minimum to 200°F maximum. Hot water pressure washing at 150°F can also be utilized using clean, fresh, potable water only. The steam/hot water shall be applied using a lance with a nozzle providing a fan shaped spray pattern. The recommended discharge temperature is 150°F for safety reasons.
- b. Steam/hot water shall be applied in a minimum of two passes over all surfaces cleaned. Horizontal members on substrates shall be cleaned from end to end continuously and from top to bottom as this horizontal progression continues. Vertical pipes or substrates shall be cleaned around the circumference from top to bottom (crown to invert) to ensure complete solubility and rinsing of contaminants from top to bottom. As this cleaning proceeds, the surfaces of the steel shall be scrubbed using stiff bristle brushes.
- c. Once completed, this cleaning shall be followed by repeated thorough rinsing. Rinsing can be accomplished using pressure water washing using unheated potable water. Once

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decontamination cleaning has been performed over a representative (small) area, the cleaned substrate shall be tested for soluble salt concentrations to ensure that the pattern and extent of cleaning will be adequate. Testing will be performed by HRSD to ensure the cleaning efforts have removed the soluble salts.

17. See Page 20 of Section 7. Proceed to Paragraph 3.07 of Section 7. Insert here complete copies of the Coating System Guidelines for each Standard Coating System pertinent to the project. The standard coating systems will be listed in the Coating System Schedule in Paragraph 2.02 of the specifications Section 7. The Coating System Guidelines are found in Section 8.0 of this Manual. For Section 7-EX, see page 22.

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**THREE YEAR PERFORMANCE GUARANTEE FROM CONTRACTOR
(To be filled in electronically)**

The quality of both materials and workmanship for the installed coating materials as defined in the Specifications Section 7 will be the sole responsibility of the Contractor. It is hereby guaranteed that should the coating material delaminate, chip, peel, blister, crack or otherwise fail due to improper surface preparation, improper mixing and application or curing of coating materials or protection of the coating work during cure by the Contractor or due to lack of material quality on the part of the material manufacturer (also referred to as the CSM), the Contractor shall repair or replace the damaged or failing coating to HRSD's satisfaction at no cost to HRSD and at HRSD's convenience. Should the existing substrate below the coating fail causing such coating failure, except if related to inadequate surface preparation or coating quality causing substrate corrosion, the Contractor shall not be held liable.

It is further understood by the Contractor that any incompatibility with or error in formulation of the coating materials used on this project, which results in a coating failure, will be a financial matter strictly between the Coating System Manufacturer (CSM) and the Contractor. The business responsibility and financial accountability for such a material related failure to HRSD would remain solely with the Contractor.

The Contractor shall hold total accountability for this quality performance guarantee to HRSD. The Owner is the Hampton Roads Sanitation District. The location of the coating work covered by this Performance Guarantee is .

The coating work covered by this Performance Guarantee is described in detail in the Scope of Work (Paragraph 1.02 B.) portion of the Section 7 Specification for this Contract.

The Contractor agrees to replace or repair any coating damage for which he is accountable in an expeditious manner and at HRSD's convenience. Should a gross coating failure occur, where the Contractor is at fault, HRSD can request repayment up to the total amount of the original contract price of the coating system from the Contractor. Should welding repairs or mechanical damage caused by HRSD or others cause coating damage or failure, the Contractor is not responsible for such coating failures or damage.

Any failure of the coating system that is caused by excessive point loading, i.e., falling or dropped items, equipment parts or other physical damage caused by HRSD or others which is not considered normal to the facility operating conditions is not the Contractor's responsibility for repair or replacement. Any change in chemical or thermal exposure due to changed facility operating conditions which causes coatings to fail will relieve the Contractor from the responsibility for this Guarantee. The normal operating conditions are described in Attachment "A" to this Guarantee.

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The Contractor agrees to provide the Guarantee obligations described above for a period of three (3) years from the date of project completion and work acceptance by HRSD.

This Guarantee is an integral requirement of this project and all pertinent contract documents.

The Contractor fully understands and agrees to the terms of this Guarantee.

Contractor

Officer's Name and Title

Date

Corporate Seal

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ATTACHMENT A

To

Three Year Performance Guarantee From Contractor

Physical Operating Conditions:

Chemical Exposure Conditions:

List Chemicals, Concentrations, and Temperatures:

Normal Headspace Surface pH or Immersion pH:

Temperature of Exposure:

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**THREE YEAR PERFORMANCE GUARANTEE FROM CONTRACTOR
(To be filled in by hand)**

The quality of both materials and workmanship for the installed coating materials as defined in the Specifications Section 7 will be the sole responsibility of the Contractor. It is hereby guaranteed that should the coating material delaminate, chip, peel, blister, crack or otherwise fail due to improper surface preparation, improper mixing and application or curing of coating materials or protection of the coating work during cure by the Contractor or due to lack of material quality on the part of the material manufacturer (also referred to as the CSM), the Contractor shall repair or replace the damaged or failing coating to HRSD's satisfaction at no cost to HRSD and at HRSD's convenience. Should the existing substrate below the coating fail causing such coating failure, except if related to inadequate surface preparation or coating quality causing substrate corrosion, the Contractor shall not be held liable.

It is further understood by the Contractor that any incompatibility with or error in formulation of the coating materials used on this project, which results in a coating failure, will be a financial matter strictly between the Coating System Manufacturer (CSM) and the Contractor. The business responsibility and financial accountability for such a material related failure to HRSD would remain solely with the Contractor.

The Contractor shall hold total accountability for this quality performance guarantee to HRSD. The Owner is the Hampton Roads Sanitation District. The location of the coating work covered by this Performance Guarantee is _____

_____.

The coating work covered by this Performance Guarantee is described in detail in the Scope of Work (Paragraph 1.02 B.) portion of the Section 7 Specification for this Contract.

The Contractor agrees to replace or repair any coating damage for which he is accountable in an expeditious manner and at HRSD's convenience. Should a gross coating failure occur, where the Contractor is at fault, HRSD can request repayment up to the total amount of the original contract price of the coating system from the Contractor. Should welding repairs or mechanical damage caused by HRSD or others cause coating damage or failure, the Contractor is not responsible for such coating failures or damage.

Any failure of the coating system that is caused by excessive point loading, i.e., falling or dropped items, equipment parts or other physical damage caused by HRSD or others which is not considered normal to the facility operating conditions is not the Contractor's responsibility for repair or replacement. Any change in chemical or thermal exposure due to changed facility operating conditions which causes coatings to fail will relieve the Contractor from the responsibility for this Guarantee. The normal operating conditions are described in Attachment "A" to this Guarantee.

**COATINGS MANUAL
HRSD**

The Contractor agrees to provide the Guarantee obligations described above for a period of three (3) years from the date of project completion and work acceptance by HRSD.

This Guarantee is an integral requirement of this project and all pertinent contract documents.

The Contractor fully understands and agrees to the terms of this Guarantee.

Contractor

Officer's Name and Title

Date

Corporate Seal

**COATINGS MANUAL
HRSD**

ATTACHMENT A

To

Three Year Performance Guarantee From Contractor

Physical Operating Conditions:

Chemical Exposure Conditions:

List Chemicals, Concentrations, and Temperatures:

Normal Headspace Surface pH or Immersion pH:

Temperature of Exposure:

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3.5 Holding Pre-Bid Meetings for Coatings Projects.

Once the Section 7 specifications have been completed for the project and you have advertised the project, a pre-bid meeting may be held. At the pre-bid meeting it is essential to show the Contractors (bidders) the work areas and to point out all special project requirements. The Pre-Bid Meeting Checklist that follows should be used to ensure that all HRSD expectations are well defined to the bidders for the project.

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Pre-Bid Meeting Checklist

A. Be Sure To Review The Findings Of The Coatings Project Development Form With The Bidders Including:

- Existing Coatings/Substrate Problem.
- Physical Limits of Coating Work.
- Cause of Existing Coating Failure.
- Substrate Conditions.
- Exposure Conditions.
- Existing Coating Conditions.
- Decision to Touch-up Coat or Recoat.
- Working & Access Conditions Under Which Work Will be Performed.
- Soluble Salt Test Findings – If Pertinent.
- Active Crack Movement Issues – If Concrete Substrate.
- Standard Coating Systems Selected.

B. Review The Essential Items From Section 7 Specifications Including:

- Work Location.
- HRSD Contacts.
- Scope of Work (in detail).
- Schedule & Working Hour Requirements.
- Requirement for 3-Year Performance Guarantee if required (including requirement for annual follow-up inspections)
- Unusual Work Conditions.
- Boundaries for Work Areas.
- HRSD Safety Briefing.
- Designated Storage Areas.
- Designated Bathroom Requirements.
- Confined Space Entry Permit Requirements.
- Quality Assurance and Submittal Requirements.
- Mock-up Requirements – If Pertinent to Project.

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- CTR – Coating Technical Representative Requirements – From Selected Supplier.
 - Any Submittal Requirements For Coating Termination Detail Drawings Or Sketches As Well As Crack Or Joint Treatment Procedures Or Details.
 - Selected Coating Products & Suppliers.
 - Cover Coatings System Schedule/Discuss Different Levels Of Surface Preparation For Different Exposure Conditions.
 - Explain That General Requirements Are In the specification Section 7.0 For Surface Preparation & Application, But That Detailed Requirements Are In The Coating System Guidelines.
 - Containment & Protection Requirements For Other Surfaces And Equipment Not To Be Coated. (Moving vehicles if required due to overspray risks, etc.)
 - Initial Pressure Washing Requirements For Decontamination If Required.
 - Cleaning for Decontamination of Soluble Salts If Required.
 - Atmospheric And Surface Temperature Requirements For Coating Work. (Let Contractor know if dehumidification or heating must be provided to maintain minimum ambient conditions for the coating work.)
 - Discuss Quality Control Testing And Inspection Requirements Of The Contractor. (Explain that contractor must provide inspection reports as required in specifications.)
 - Insure Contractor Reviews Requirements In Section 4 Of Specifications.
 - Hold Point Inspection Check List (Distribute Checklist to Bidders).
- C. Perform A Project Walkthrough To Show The Bidders The Work Areas And Access Conditions. If The Work Involves Tank Interior, Have One Out Of Service That They Can See. If Not Possible, Provide Photographs or Video of Conditions.
- D. Get All Questions From Bidders In Writing, Not Verbally, Respond With Answers To Questions To All Of The Bidders In Writing.

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3.6 Reviewing “Or Equal” Coating Product Submittals from Bidders.

Once the bids come in, you will likely receive alternate product submittals. Follow the procedure provided in Subsection 4.3 of this Manual for that review and approval or rejection process.

3.7 Inspection during the Coatings Project.

HRSD personnel should follow the In-House Inspection or Third Party Inspection Guidelines for Coatings Projects as delineated in Sections 9.0 and 10.0 of this Manual.

3.8 Closing out the Coatings Project.

Using the Coatings Project Close Out Form provided herein, you should evaluate how well the project was executed by the Contractor and close the project out. This should include the results of the final inspection and follow-up inspections. Review all of the Contractor’s daily inspection reports, and the inspection report provided by the CTR, CSM. This review plus your evaluation of the completed work plus review of any of your inspection notes or any Third Party Inspection reports should give you all the data you need to fill out the Coatings Project Close Out Form, (which follows this paragraph in this Coatings Manual.)

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COATINGS PROJECT CLOSE OUT FORM

(To be filled in by electronically)

HRSD Facility: _____

Date: _____

HRSD Originator: _____

Project No.: _____

Project Description: _____

Contractor: _____

Close Out Information

A. Schedule Evaluation

Scheduled Start Date: _____

Scheduled Completion Date: _____

Actual Start Date: _____

If different from scheduled, why? _____

Actual Completion Date: _____

If different from scheduled, why? _____

B. Cost Evaluation

Bid Cost = \$_____

Actual Cost = \$_____

Difference + or - = \$_____

If different, why? _____

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C. Quality Evaluation (grade as Excellent, Good, Fair, or Poor): _____

| Job Aspect | Grade | Comments |
|-----------------------------------|--------------|-----------------|
| Project Set-up: | | |
| Surface Preparation: | | |
| Environmental Control: | | |
| Coating Application: | | |
| Coating Cure: | | |
| Project Clean-up: | | |
| Total Project Performance Grade = | | |

D. Safety Performance Evaluation

Describe any problems observed or reported: _____

E. Overall Evaluation of Project

Excellent, Good, Fair, or Poor. Explain reasons for overall evaluation grade:

F. Recommendations for Reinspection of Completed Work.

What tests or evaluations to make? _____

G. Summary of Reinspection Findings & Warranty Enforcement.

1. After 12 months: _____

2. After 24 months: _____

3. After 36 months: _____

4. Was Warranty Enforced? _____

5. Was Work Quality Corrected per Warranty? _____

When to Perform? _____

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Project Closed Out by:

HRSD Representative: _____

Date: _____

Agreement to Reinspection on the following dates:

(date)

(date)

(date)

By:

HRSD Representative

Contractor Representative

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COATINGS PROJECT CLOSE OUT FORM

(To be filled in by hand)

HRSD Facility: _____

Date: _____ HRSD Originator: _____

Project No.: _____ Project Description: _____

Contractor: _____

Close Out Information

A. Schedule Evaluation

Scheduled Start Date: _____

Scheduled Completion Date: _____

Actual Start Date: _____

If different from scheduled, why? _____

Actual Completion Date:

If different from scheduled, why? _____

B. Cost Evaluation

Bid Cost = \$ _____

Actual Cost = \$ _____

Difference + or - = \$ _____

If different, why? _____

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C. Quality Evaluation (grade as Excellent, Good, Fair, or Poor)

| Job Aspect | Grade | Comments |
|--------------------------------------|--------------|-----------------|
| Project Set-up: | | |
| Surface Preparation: | | |
| Environmental Control: | | |
| Coating Application: | | |
| Coating Cure: | | |
| Project Clean-up: | | |
| Total Project Performance Grade = | | |

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D. Safety Performance Evaluation

Describe any problems observed or reported:

E. Overall Evaluation of Project.

Excellent, Good, Fair, or Poor. Explain reasons for overall evaluation grade:

F. Recommendations for Reinspection of Completed Work.

What tests or evaluations to make?

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G. Summary of Reinspection Findings & Warranty Enforcement.

1. After 12 months:

2. After 24 months:

3. After 36 months:

4. Was Warranty Enforced?

5. Was Work Quality Corrected per Warranty?

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When to Perform?

Project Closed Out by:

HRSD Rep.: _____

Date: _____

Agreement to Reinspection on the following dates:

_____ (date)

_____ (date)

_____ (date)

By:

HRSD Rep.

Contractor Rep.

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3.9 List of Appendices to This Coatings Manual

There are five appendices to this Coatings Manual which provide supplemental technical reference information for HRSD coatings program users and referenced technical standards used in this manual. The appendices are as follows:

Appendix A – Basics on Corrosion In Wastewater Collection and Treatment Systems.

Appendix B – Understanding VOC Regulations.

Appendix C – Basics on Coatings Chemistry: What the Generic Types Mean Practically.

Appendix D – Background on Substrates for Coatings.

Appendix E – Referenced Technical Standards.