

SECTION 01350

SPECIAL ENVIRONMENTAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. SECTION INCLUDES: Work includes special environmental "Green" building practices related to energy efficiency, indoor air quality, and resource efficiency, including the following special requirements.
1. Maximizing recycled content in materials, products, and systems.
 2. Requiring wood from certified sustainably harvested sources.
 3. Requiring practices to ensure healthy indoor air quality in final Project.
 4. Maximizing use of reusable and recyclable packaging.
 5. Maximizing use of durable products.
 6. Maximizing use of products with low embodied energy (production, manufacturing, and transportation).
 7. Maximizing use of products that are easy to maintain, repair, and that can be cleaned using non-toxic substances.
- B. RELATED REQUIREMENTS: Section 01575 - Site Waste Management Program.
- C. RELATED DOCUMENTS: Construction Drawings, provisions of the Design/Build Agreement, and applicable provisions of other Division 1 Sections apply to this Section.

1.02 DEFINITIONS:

- A. CHEMICALS OF CONCERN: Those chemicals listed in the three (3) lists below as carcinogens, reproductive toxicants, and chemicals with established Chronic Reference Exposure Levels (REL):
1. Carcinogens: Chemicals listed as probable or known human carcinogens in the latest published edition of the following two lists:
 - a. California Environmental Protection Agency, Air Resources Board (ARB), list of Toxic Air Contaminants (California Air Toxics).
<http://www.arb.ca.gov/toxics/summary/summary.htm>
 - b. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA), Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).
http://www.oehha.ca.gov/prop65/prop65_list/Newlist.html
 2. Reproductive Toxicants: Chemicals known to cause reproductive toxicity including birth defects or other reproductive harm in the latest published edition of the following list: California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA), Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). *http://www.oehha.ca.gov/prop65/prop65_list/Newlist.htm*
 3. Chemicals With Established Chronic Reference Exposure Levels (REL):
 - a. Chronic RELs have been developed for 41 hazardous airborne substances as of May 2000. A chronic REL is an airborne concentration level that would pose no significant health risk to individuals indefinitely exposed to that level. RELs are based solely on health considerations, and are developed from the best available data in the scientific literature. The California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA) establishes and publishes RELs. The latest version of the complete list is shown at *www.oehha.org/air/chronic_rels/allChrels.html*.

- b. Table 1 under "INDOOR AIR EMISSIONS TESTS, Special Requirements for Adhesives," as listed below, was adopted from this list. It contains 21 VOCs that may have material/product sources and that have been detected in indoor air.

- B. ADDITIONAL DEFINITIONS: Additional definitions used in this Section are those contained in Section 01427 of these Specifications.

1.03 ENVIRONMENTAL GOALS

A. GENERAL:

1. The State has established general environmental goals for design and for construction of the Project; Design team and construction team are encouraged to participate to maximum degree possible to realize the State's environmental goals. Environmental goals should be achieved in a manner that will ultimately provide a safe and healthy environment for the building occupants.
2. Construction Documents are not intended to limit alternative means of achieving environmental goals.
3. Suggestions from Design/Builder, subcontractors, suppliers, and manufacturers for implementing goals are encouraged.
4. Team approach is encouraged.

B. ENVIRONMENTAL GOALS:

1. Refer to specific Specifications sections for more detailed construction requirements related to specific materials and systems.
2. Energy Efficiency (Operations Through Project Life): Materials and systems are intended to maximize energy efficiency for operation of Project throughout service life (Final Completion to ultimate disposition – reuse, recycling, or demolition).
3. Indoor Air Quality: Materials are selected and processes specified, such as preconditioning and temporary ventilation, to maximize healthy indoor air quality.
4. Resource Efficiency (Project Construction): Materials and systems are to maximize environmentally-benign construction techniques, including construction waste recycling, reusable delivery packaging, and reusability of selected materials.

C. EFFICIENT USE OF RESOURCES:

1. Re-use existing building materials to extent feasible within concept expressed in Construction Documents.
2. Select materials that use resources such as energy, water, and constituent materials efficiently.
3. Use construction practices that achieve most efficient use of resources and materials such as material reduction and dimensional planning.
4. Provide materials that utilize recycled content to maximum degree possible without being detrimental to product performance or indoor air quality.
5. Provide for non-destructive removal and re-use of materials at the end of their service life in the building.

D. SCARCE, IRREPLACEABLE, AND ENDANGERED RESOURCES:

1. Avoid scarce, irreplaceable, and endangered resources.
2. Select materials from abundant resources.
3. Select replaceable materials, renewable materials, and materials which can be replenished.
4. Select materials that minimize damage to natural habitats and the natural environment.
5. Select materials that can be easily refinished, repaired or refurbished to extend their useful life.

- E. DURABLE MATERIALS:
 - 1. Use durable materials.
 - 2. Select materials with longest useful service life.
 - 3. Select materials that can be re-used or may be recycled.

- F. RESOURCE EFFICIENT MATERIALS:
 - 1. Use resource efficient materials; consider energy use over life cycle of material including harvesting, mining, manufacturing, transport, installation, use, operations, recycling and disposal.
 - 2. Select materials that use less energy to manufacture.
 - 3. Select materials that conserve energy during building operations.
 - 4. Select locally made materials.
 - 5. Consider the thermal mass potential of heavy materials in order to minimize cooling and heating requirements.

- G. POLLUTION-GENERATING MATERIALS:
 - 1. Select materials that generate least amount of pollution during mining, manufacturing, transport, installation, use, and disposal.
 - 2. Avoid materials that emit greenhouse gases
 - 3. Avoid materials that require energy intensive extraction, manufacturing, processing, transport, installation, maintenance, or removal.
 - 4. Avoid materials that contain ozone-depleting chemicals (e.g. CFCs or HCFCs) and that emit potentially harmful volatile organic compounds (VOCs).
 - 5. Employ construction practices that minimize dust production and combustion by-products.
 - 6. Avoid materials that can leach harmful chemicals into ground water; do not allow potentially harmful chemicals to enter sewers or storm drains.
 - 7. Protect soil against erosion and topsoil depletion.
 - 8. Minimize noise generation during construction; screen mechanical equipment to block noise.
 - 9. Select materials that can be reused or recycled and materials with significant percentage of recycled content; conform with or exceed specific project recycled content percentages for individual materials; avoid materials difficult to recycle.
 - 10. Protect natural habitats; restore natural habitats where feasible within scope of Project.

- H. WOOD PRODUCTS: Use woods from Forest Stewardship Council (FSC) certified sustainably harvested sources.

1.04 SUBMITTALS

- A. RESOURCE EFFICIENT PRODUCT DATA:
 - 1. Environmental Issues Data: Submit following information, including manufacturer's certifications, verifying information, and test data, where Specifications sections require data relating to environmental issues including but not limited to:
 - a. Project Recyclability: Submit information to assist Owner and Design/Builder in recycling materials involved in shipping, handling, and delivery, and for temporary materials necessary for installation of products.
 - b. Recycled Content: Submit information regarding product post industrial recycled and post consumer recycled content as required by the State of California Public Contract Code Sections 10233, 10308.5 and 10354. Use the form, Recycled Content Certification for CAEEC, Block 225, a sample of which is attached as Appendix A to Section 01350.
 - c. Product Recyclability: Submit information regarding product and product's component's recyclability including potential sources accepting recyclable materials.

d. Provide Forest Stewardship Council (FSC) certification for all wood products.

B. INDOOR AIR QUALITY (IAQ) DATA:

1. Environmental Issues Data: Furnish material safety data sheets (MSDS) for materials as required in each specific specification section. All MSDSs submitted must contain specific chemical content data identifying the percent of the total product mass represented by each listed chemical. All chemicals listed as proprietary on the MSDS shall be separately listed and submitted to the Architect for review under a non-disclosure agreement.
2. Environmental Issues: Submit emission test data produced by one of the acceptable testing laboratory listed in under "ACCEPTABLE INDOOR AIR EMISSIONS TESTING LABORATORIES" below. for materials as required in each specific specification section. The laboratory reports shall contain emissions test data on VOCs including total VOCs (TVOC), specific individual VOCs, formaldehyde and other aldehydes as described below.
3. Identify all VOCs (that are chemicals of concern) on the lists referenced under "CHEMICALS OF CONCERN" above that are emitted by each material.
4. Specific test conditions and requirements are set forth in Article 1.05, Section D. The following general requirements shall apply:
 - a. For all required tests, submit documentation of the sample acquisition, handling, and test specimen preparation, as well as test conditions, methods, and procedures
 - b. VOC samples shall be identified and quantified for the ten most prevalent compounds and any other compounds (that are chemicals of concern) on the lists as referenced in Article 1.2 above.
 - c. For wet-applied products, submit results of TVOC samples collected at 6, 24, and 48 hours and results of samples for individual VOCs and formaldehyde collected at 48 hours.
 - d. For dry products, submit results of TVOC samples collected at 6, 24, and 96 hours and results of samples for individual VOCs and formaldehyde collected at 96 hours.
5. Cleaning and maintenance products: Provide data on the manufacturers' recommended maintenance, cleaning, refinishing and disposal procedures for material products. Where chemical products are recommended for these procedures, provide the MSDS for each chemical product used for each of these procedures. For cleaning, maintenance, and refinishing, provide a description of the equipment and processes used. It is preferable to use low- or zero-VOC products that have minimal health, toxicity, or irritancy effects.
6. For the purposes of reporting, identification of product contents shall not be limited to those regulated under the Clean Air Act (CAA) but shall also include the compounds exempted from the CAA. The California EPA and local air district definitions of VOCs based on the CAA are not sufficient as they exempt compounds considered non-reactive.

C. CERTIFICATES: Submit the following environmental issues certifications:

1. Submit documentation certifying accuracy of post-industrial and post-consumer recycled content, and recyclability.
2. Prior to Final Completion, submit certificate signed by corporate office holder (i.e. President or Vice President, or similar position of authority) of Design/Builder, subcontractor, supplier, or manufacturer indicating:
 - a. Post-industrial and post-consumer recycled content of materials installed are same as those required by the project requirements.
 - b. Product recyclability of materials installed are same as those required by the project requirements.
 - c. Indoor air quality requirements. Certification shall state products and materials provided are essentially the same as, and contain essentially the same components as the products and materials that were tested.

3. Comply with requirements specified in Section 01770 – Closeout Procedures.

- D. CLOSEOUT SUBMITTALS: Submit environmental product certifications, in two forms:
1. Two CD-ROMs organized by CSI 16 Division Format.
 2. Four three-ring binders organized by CSI 16 Division Format with Table of Contents and with dividers for each division.

1.05 QUALITY ASSURANCE

- A. ENVIRONMENTAL PROJECT MANAGEMENT AND COORDINATION: Design/Builder to identify one person on Design/Builder's staff to be responsible for environmental issues compliance and coordination.
1. Experience: Environmental project manager to have experience relating to "Green" building construction.
 2. Responsibilities: Carefully review Construction Documents for environmental issues, coordinate work of trades, subcontractors, and suppliers; instruct workers relating to environmental issues; and oversee Project environmental goals.
 3. Meetings: Discuss environmental goals at following meetings.
 - a. Pre-construction meeting.
 - b. Pre-installation meetings.
 - c. Regularly scheduled job-site meetings.
 - d. Special client meetings (e.g. Green Team, Green Building Focus Group)
- B. ENVIRONMENTAL ISSUES CRITERIA: Comply with requirements listed in various Specification sections.
- C. ACCEPTABLE INDOOR AIR EMISSIONS TESTING LABORATORIES:
1. Berkeley Analytical; 904 Wright Avenue, Suite 12, Richmond, California 94804; telephone 510-236-2325; fax 510-236-2335; e-mail: berkeleyanalytical@worldnet.att.net.
 2. Air Quality Sciences, Inc.; 1337 Capital Circle, Atlanta, Georgia 30067; telephone 770-933-0638; fax 770.933.0641; e-mail: aqs@mindspring.com.
- D. INDOOR AIR EMISSIONS TESTS:
1. Review specimen collection, documentation, preparation, and shipping procedures with the testing laboratory prior to preparation and shipping to the laboratory.
 2. Provide environmental chamber test data from tests based on ASTM Standard D5116-97, Guide for Small Scale Environmental Chamber Determination of Organic Emissions from Indoor Materials/Products.
 3. Tests shall be conducted according to the procedures described in ASTM Standard D5116-97 on product test specimens pre-conditioned in clean air prior to testing and as specified elsewhere in Section 01350 or other sections of these specifications.
 - a. For wet-applied products, a realistic test specimen shall be prepared using the substrate material on which it will be applied in the building; the test specimen shall be conditioned for five days in clean air ventilated at 1 air change per hour.
 - b. For dry products, samples shall be packaged in the normal manner at the factory and shipped directly to the laboratory. Conditioning shall be done for 10 days in clean air at 1 air change per hour.
 4. The maximum concentration permitted for any chemical emitted in emissions tests shall not result in a modeled indoor air concentration greater than 1/2 the guideline concentration or OEHHA REL as listed in Table 1 below (with the exception of formaldehyde, which is discussed separately below). The model shall take into account realistic loading factors for the product or material and shall use a weekly average air exchange rate of 0.75 per hour. This air exchange rate is based on a typical weekly State office building operating schedule and an assumed off-hours air exchange rate of 0.3 per hour (assumed ach during normal operating hours is in excess of 1.0 per hour).

Calculations must be submitted with all other documentation. This requires the calculation of emission factors and then application of the emission factors, product loading and building parameters in a steady state mass-balance model assuming zero outdoor concentrations, perfect mixing and no sink effects. Alternatively, follow the procedures in ASTM D5116-97.

5. No single product shall contribute more than ½ the OEHHA Staff recommended indoor air limit for formaldehyde in office environments of 28 µg/m³ (23 ppb). The same modeling procedure as described above shall be used for formaldehyde.
6. Special Requirement for Adhesives: All construction adhesives used in the Work shall comply with the following requirement: no component present in the adhesive at more than 1% of the total mass of the adhesive shall be a carcinogen or reproductive toxicant as defined in the lists in "CHEMICALS OF CONCERN" above.

Table 1 - Maximum Concentrations:

Chronic RELs for selected organic chemicals with possible indoor sources
Adopted from Calif. OEHHA list as of May 2000

| Chemical name | Alternate Chemical name | CAS # | REL ppb | REL µg/m ³ |
|----------------------------------|-------------------------|-----------|---------|-----------------------|
| Acetaldehyde | | 75-07-0 | 5 | 9 |
| Benzene | | 71-43-2 | 20 | 60 |
| Chloroform | | 67-66-3 | 50 | 300 |
| Ethylbenzene | | 100-41-4 | 400 | 2,000 |
| Ethylene glycol | | 75-00-3 | 200 | 400 |
| Ethylene glycol monoethyl ether | 2-Ethoxyethanol | 110-80-5 | 20 | 70 |
| Ethylene glycol monoethyl ether | 2-Ethoxyethyl acetate | 111-15-9 | 60 | 300 |
| Ethylene glycol monomethyl ether | 2-Methoxyethanol | 109-86-4 | 20 | 60 |
| Formaldehyde | | 50-00-0 | 2 | 3 |
| n-Hexane | | 110-54-3 | 2,000 | 7,000 |
| Isopropanol | 2-Propanol | 67-63-0 | 3,000 | 7,000 |
| Methyl chloroform | 1,1,1-Trichloroethane | 71-556 | 200 | 1,000 |
| Methyl t-butyl ether | t-Butyl methyl ether | 1634-04-4 | 2,000 | 8,000 |
| Methylene chloride | Dichloromethane | 75-09-2 | 100 | 400 |
| Naphthalene | | 91-20-3 | 2 | 9 |
| Phenol | | 108-95-2 | 50 | 200 |
| Styrene | | 100-42-5 | 200 | 900 |
| Tetrachloroethylene | Tetrachloroethene | 127-18-4 | 5 | 35 |
| Toluene | | 108-88-3 | 70 | 300 |
| Trichloroethylene | Trichloroethene | 79-01-6 | 100 | 600 |
| Xylenes (m-,o-,p-) | | | 200 | 700 |

E. EMISSIONS TESTING LOADING RATIOS, MODELING ASSUMPTIONS:

1. The results of the emission rate calculations shall be used to calculate a concentration based on the area of the material, and the volume and ventilation rate of the space associated with its use. The requirements pertaining to the values of material area and associated volume are provided here for products and materials that are required to be tested by specific sections of this specification
2. Environmental Chamber Loading Ratios:
 - a. Indoor air emissions testing laboratories may use a range of acceptable loading ratios in order to make use of various size chambers, since these are not standardized across laboratories. Loading ratios ranging from 0.25 m²/m³ to 0.45

- m²/m³ will be acceptable. For dry products, loading ratios within reasonable limits are not critical for determining emission factors.
- b. The higher the loading ratio, the lower the expected emission factor; however, this relationship is not linear, especially at higher concentrations. Therefore, where strong formaldehyde (or other chemical) sources are known or expected to be present, loading ratios should be selected to represent a median value for the plausible range of actual building loading ratios.
 - c. All loading ratios used shall be included in the test report.
 - d. Manufacturers may request that the Design/Builder or the subcontractor provide information on the actual quantity of material to be used in the project and forward this information to the indoor air emissions testing laboratory so that loading ratios can be adjusted toward the actual loading ratio of the project. However, for low-emitting materials such as those being tested in this project, the actual loading ratio will not significantly affect emission rates except for strong formaldehyde sources, primarily products using urea formaldehyde resins.
3. Sample Preparation Requirements:
- a. Substrates for Environmental Chamber Emissions Tests of Individual Products or Materials:
 - 1) Flat and Eggshell Paints: 5/8" gypsum board
 - 2) Semi-Gloss Paints: Steel
 - 3) Resilient Flooring: Stainless steel tray, fitted tightly so that only the upper surface is exposed.
 - 4) Carpet Tile and Broadloom Carpet: Stainless steel tray, fitted tightly so that only the upper surface is exposed.
 - 5) Acoustical Ceiling Panels: No substrate, sample to be suspended or supported in chamber with no edge masking.
 - 6) Medium Density Fiberboard: No substrate, sample to be suspended or supported in chamber with no edge masking.
 - 7) Gypsum Board: No substrate
 - b. Substrates for Environmental Chamber Emissions Tests of Assemblies of Products or Materials:
 - 1) Resilient Flooring and Adhesives: 1/2" cement backer board
 - 2) Carpet Tile/Broadloom Carpet and Adhesives: 1/2" cement backer board
 - 3) Wall Coverings and Adhesives: 5/8" gypsum board
 - 4) Joint Sealers: Steel channel 0.64 cm by 0.64 cm by 25.4 cm Channel shall be filled with sealant.
 - 5) Medium Density Fiberboard: Laminates or wood veneers as specified
 - c. Special Requirements for Preparation and Handling of Paint Test Specimen:
 - 1) Flat and Eggshell Paints:
 - a) Primer-sealer, flat and eggshell paints should be applied to 6" x 6" x 5/8" thick gypsum board samples of material to be used on project, samples to be supplied by Hensel Phelps Construction Company.
 - b) The prepared gypsum board squares should be held at test conditions for 24 hours prior to painting.
 - c) A piece should be accurately weighed just prior to painting, then the borders should be masked off leaving a 5.5" x 5.5" area in the center for painting. The paint should be applied using a standardized roller procedure that simulates the application of paint in buildings. The roller should be 4" wide with a nap of 3/8", intended for smooth surfaces.
 - d) The paint should be stirred in its container and 100 mL of paint transferred to a heavy-duty aluminum foil disposable tray.
 - e) The roller cover should be saturated with paint by running it back and forth in the tray.

- f) The paint should be applied to the substrate using four strokes, two in the vertical direction and two in the horizontal direction, so that the entire area is uniformly covered.
 - g) The tape is then removed from the substrate and the substrate is immediately reweighed.
 - h) The difference in weight will determine the amount of applied paint and the coverage in grams of wet paint per square meter of substrate surface.
 - i) The substrate should then be placed on a 6" x 6" piece of stainless steel to cover the back surface. The substrate should be attached to the stainless steel with strips of low VOC aluminized tape so that only the painted surface is exposed. A blank piece of gypsum should be similarly prepared. Alternate procedures to cover the unpainted surfaces of the gypsum board may be used.
 - j) Place the sample in the conditioning environment immediately and hold there for the required five days.
- 2) Semi-gloss paint should be applied to a 6" x 6" clean steel sheet following the same procedure as above for "flat and eggshell paints." The painted surface should be 5.5" x 5.5". No tape should be used.
4. Chemical Analysis:
- a. VOC Analysis: For VOC analysis, multi-point calibrations shall be done using pure compounds whenever such compounds are available from commercial suppliers (such as Aldrich Chemical Company, Sigma Aldrich, where at least 60,000 compounds are now available). Quantitative analyses performed using surrogate compounds shall be indicated in the reported test results.
 - b. Formaldehyde and Acetaldehyde Analysis: Formaldehyde analysis shall be performed following ASTM Standard D 5197-97 "Standard Test Method Formaldehyde and other Carbonyl Compounds in Air (Active Sampler Methodology)"
5. Modeling Concentrations Based on Emissions Test Results:
- a. The areas and volumes for calculating (modeling) concentrations have been based on the amount of material used and 90% of the floor area multiplied by the clear height of the floor (top of structural concrete deck to bottom of deck above). The 90% factor compensates for solid materials that are not part of the clear air volume of the space.
 - b. There are multiple air handlers serving separate portions of the building and mixing of return air for the upper five floors. Thus, the 90% volume of these floors is combined for a total volume of 83,757 m³. The calculation of concentrations based on emissions shall use the entire floor area of these floors, 23,388 m² and a volume of 83,757 m³. (Note: this would be a loading ratio for floor area to space volume of 0.28 m²/m³).
 - c. Material Areas for Calculations:
 - 1) Carpet Tile and Broadloom Carpet: Area = 23,070 m², space volume = 83,757 m³
 - 2) Resilient Flooring: Area = 1,942 m², space volume = 15,561 m³
 - 3) Acoustical Ceiling Panels: Area = 20,754 m², space volume = 83,757 m³
 - 4) Flat Latex Paint: Area = 41,917 m², space volume = 83,757 m³
 - 5) Semi-Gloss Paint Area (total area of painted doors and door frames on floors 2-6): Area = 1905 m²; Volume = 83,757 m³
 - 6) Gypsum Board: Area = 41,917 m², volume = 83,757 m³
 - 7) Joint Sealers: Prior to testing, subcontractor or supplier shall provide quantity estimate in total linear feet of equivalent 1/4" x 1/4" sealant exposed to the interior on floors 2-6 for source term in modeling space volume = 83,757 m³.

- 8) Medium Density Fiberboard: Subcontractor or supplier shall provide total quantity used in casework on floors 2-6 in square feet for source term. Space volume = 83,757 m³. If the casework MDF is encapsulated with laminate or other material, testing should be done on sample of laminate-encapsulated MDF as proposed for use on project. Design/Builder, Subcontractor or supplier to provide samples for testing.
- 9) Wall Covering: Area of wall covering used on floors 2-6 = 114 m², space volume = 83,757 m³
- d. Reporting Requirements: In addition to reporting requirement stated elsewhere in the specifications, reports shall include the ten most abundant compounds emitted from the sample, all compounds on the list in Table 1 of Section 01350, and all compounds on the Proposition 65 and Toxic Air Contaminant lists of the State of California. For these compounds, report the following:
 - 1) The measured chamber concentrations at each required time point
 - 2) The calculated emission factors
 - 3) Calculated building concentrations and the assumptions used to make that calculation
- e. Additional Reporting Requirements: For paints, include those specified elsewhere in these specification, those listed in ASTM D5116-97 as well as the mass of paint applied and paint coverage in grams per square meter.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. ENVIRONMENTAL ISSUES: Take special care to prevent accumulation of moisture on materials and within packaging during delivery, storage, and handling to prevent development of mold and mildew on packaging and on products.
- B. PACKAGING: Use packaging that is reusable or recyclable.

1.07 PROJECT CONDITIONS

- A. ENVIRONMENTAL PRODUCT CERTIFICATION:
 1. Include manufacturer certification indicating product contains maximum recycled content possible without being detrimental to product performance
 2. Include certification indicating cleaning materials are environmentally benign
- B. CONSTRUCTION VENTILATION AND PRECONDITIONING:
 1. Temporary Construction Ventilation:
 - a. Maintain sufficient temporary ventilation of areas where materials are being used that emit VOCs. Maintain ventilation continuously during installation, and until emissions dissipate after installation. If continuous ventilation is not possible via the building's HVAC system(s) then ventilation shall be supplied via open windows and temporary fans.
 - b. Period after installation shall be sufficient to dissipate odors and elevated concentrations of VOCs. Where no specific period is stated in these specifications, a time period of 72 hours shall be used.
 - c. Ventilate areas directly to outside; ventilation to other enclosed areas is not acceptable.
 2. During dust producing activities (e.g. drywall installation and finishing) the ventilation system shall be turned off, and openings in the supply and return HVAC system shall be protected from dust infiltration.
 3. Preconditioning:
 - a. Allow products which have odors and which have significant VOC emissions to off-gas in a dry, well-ventilated space for sufficient period to dissipate odors and emissions prior to delivery to Project.

- b. Condition products without containers and packaging to maximize off-gassing of VOCs
- c. Condition products in ventilated warehouse or other building. Comply with substitution requirements for consideration of other locations.

C. PROTECTION AND PACKAGING:

- 1. Protection:
 - a. Take special care to prevent accumulation of moisture on materials and within packaging during delivery, storage, and handling to prevent development of molds and mildew on packaging and on products.
 - b. Immediately remove from site and properly dispose of materials showing signs of mold and signs of mildew, including materials with moisture stains.
 - c. Replace all moldy materials with new, undamaged materials.
- 2. Packaging:
 - a. Deliver materials in recyclable or in reusable packaging such as cardboard, wood, paper, or reusable blankets, which will be reclaimed by supplier or manufacturer for recycling.
 - b. Minimize packaging materials to maximum extent possible while still ensuring protection of materials during delivery, storage, and handling.
 - c. Reusable Blankets: Deliver and store materials in reusable blankets and mats that are reclaimed by manufacturers or suppliers for reuse where program exists or where program can be developed for such reuse.
 - d. Pallets: Where pallets are used, suppliers shall be responsible to ensure pallets are removed from site for reuse or for recycling.
 - e. Corrugated Cardboard and Paper: Where paper products are used, either recycle or reuse as part of construction waste management recycling stream, or recycle for use by manufacturer or supplier where program is available for such recycling.
 - f. Sealants, Paint, Primers, Adhesives, and Coating Containers: Return to supplier or manufacturer for reuse where such program is available.

1.08 SEQUENCING

A. ENVIRONMENTAL ISSUES:

- 1. On-Site Application: Where odorous and/or high VOC emitting products are applied on-site, apply prior to installation of porous and fibrous materials. Where this is not possible, protect these porous materials with polyethylene vapor barriers.
- 2. Complete interior finish material installation no less than thirty (30) days prior to Final Completion. Building shall be flushed-out continuously for at least thirty (30) days prior to Final Completion as specified in Article 3.1 below. When Design/Builder is required to perform touch-up work, provide temporary construction ventilation during installation and extend building flush-out by a minimum of four (4) days after touch-up installation with 100% tempered outside air for 24 hr per day.

PART 2 - PRODUCTS

2.01 MATERIALS

A. GENERAL ENVIRONMENTAL ISSUES:

- 1. Mold and Mildew: Materials that have evidence of growth of molds or of mildew are not acceptable, including both stored and installed materials; immediately remove from site and dispose of properly.
- 2. Moisture Stains: Materials that have evidence of moisture damage, including stains, are not acceptable, including both stored and installed materials; immediately remove from site dispose of properly.

- B. DUCTS: Seal ducts during construction to prevent accumulation of construction dust and construction debris inside ducts.

2.02 SUBSTITUTIONS

- A. SUBSTITUTIONS ENVIRONMENTAL ISSUES: Requests for substitutions shall comply with requirements specified in Section 01600 – Product Requirements, with following additional information required where environmental issues are specified:
 - 1. Indicate that each proposed substitution complies with requirements for VOCs — both TVOC and individual VOCs.
 - 2. The State, in consultation with the Green Team, and Architect reserve right to reject proposed substitutions where data for TVOC and individual VOCs is not provided or where emissions of TVOC and/or individual VOCs are higher than for specified materials.
 - 3. Comply with specified recycled content and other environmental requirements.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

- A. BUILDING FLUSH OUT:
 - 1. Just prior to Final Completion, flush out building continuously (i.e. 24 hours per day, seven (7) days a week) using 100% tempered outside air (or maximum amount of outside air while achieving reasonable indoor temperature) for at least thirty (30) calendar days. If interruptions of more than a few hours are required for testing and balancing purposes, extend the flush out period accordingly.
 - 2. If construction schedule permits, extend the flush-out period beyond 30 days.

3.02 CLEANING

- A. FINAL CLEANING ENVIRONMENTAL ISSUES:
 - 1. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains, and foreign substances; polish transparent and glossy surfaces using solvent-free materials, low or zero VOC containing materials, low odor materials, and environmentally benign materials.
 - 2. Clean equipment and fixtures to sanitary condition using solvent free materials, low- or zero-VOC containing materials, and low odor materials.
 - 3. Vacuum carpeted and soft surfaces with high efficiency particulate arrestor (HEPA) vacuum.
 - 4. Clean ducts using HEPA vacuum immediately prior to Final Completion and prior to using ducts to circulate air, if ducts were not sealed during construction, and contain dust and dirt. Oil film on sheet metal shall be removed before shipment to site. However, ducts shall be inspected to confirm that no oil film is present. If oil is still present, it shall be removed.
 - 5. Replace all air filters (i.e., pre and final filters) just prior to Final Completion.
 - 6. Remove and properly dispose of recyclable materials using construction waste management program described in Section 01565 – Site Waste Management Program.

3.03 PROTECTION

- A. ENVIRONMENTAL ISSUES:
 - 1. Protect interior materials from water intrusion or penetration; where interior products not intended for wet applications are exposed to moisture, immediately remove from site and dispose of properly.

2. Protect installed products using methods that do not support growth of molds and mildews.
3. Immediately remove from site materials with mold and materials with mildew.

END OF SECTION

APPENDIX A

Capitol Area East End Complex, Block 225 -- CIWMB #74 IFB# _____

RECYCLED CONTENT CERTIFICATION FOR CAPITOL AREA EAST END COMPLEX – BLOCK 225

This form is to be completed by a corporate officer of the product manufacturer for the Contractor (Design/Builder). The Contractor (Design/Builder) must return the certification, completed for each product with recycled content as identified in the Project Specifications. Attach additional sheets if necessary.

| CONTRACTOR (DESIGN/BUILDER) | | | | | PRODUCT MANUFACTURER | | | | | |
|--|--|---|--------------|-----------------|--|------------------|-------------------------------|------------------------------|--------------------------------|----------------------|
| Name/Address: Telephone, fax, e-mail: | | | | | Name/Address: Telephone, fax, e-mail: | | | | | |
| Item # | Product Category ^{1&2} (Include if applicable) | Product Description CSI Section Number ³ (Needed for all products) | Quantity Bid | Unit of Measure | Cost of Material (Excluding installation labor) | Weight in Pounds | % Virgin Content ⁵ | % Post-Consumer ⁶ | % Post-Industrial ⁷ | Total % ⁸ |
| | | | | | | | As a percent of total weight | | | |
| | | CSI Section: | | | | | | | | 100 |
| | | CSI Section | | | | | | | | 100 |
| | | CSI Section: | | | | | | | | 100 |
| | | CSI Section: | | | | | | | | 100 |
| | | CSI Section: | | | | | | | | 100 |
| | | CSI Section: | | | | | | | | 100 |

Public Contract Code Sections 10233, 10308.5, and 10354 require all vendors and contractors to certify in writing, under penalty of perjury, to the state agency awarding a contract, the minimum, if not the exact percentage, of post-consumer and post-industrial material in the materials, goods, or supplies offered or used.

Public Contract Code Section 12205(a) requires all state agencies to require all contractors to certify in writing, under penalty of perjury, the minimum, if not the exact percentage, of post-consumer and post-industrial material in the materials, goods, or services provided or used.

Printed Name (a corporate officer)

Title

Date

Signature

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NOTES

(1) Product Category: (Fill in above, if applicable. This information is used to determine compliance with the State Agency Buy Recycled Campaign.)

- | | | |
|-----------------------|--------------------------------|---------------------------|
| 1. Compost/Co-compost | 5. Plastic Products | 9. Steel Products |
| 2. Glass Products | 6. Paper Products | 10. Tires |
| 3. Lubricating Oils | 7. Printing and Writing Papers | 11. Tire-Derived Products |
| 4. Paint | 8. Solvents | |

(2) Product category is used for State agency reporting. Products that are made from multiple material types should be reported in the product category of the material type representing most of the product. The amount of material used in the product can be measured by weight or volume. If, for instance, a chair is made from steel, aluminum, and plastic and most of the material, either by weight or volume, is plastic, report it as a plastic product. If, however, most of the product, either by weight or volume, is steel, report the purchase as a steel product.

(3) Identify the Construction Specifications Institute (CSI) Specification Section number for the product, as indicated in the Project Specifications.

(4) Below are products preliminarily identified in the Project Specifications as having minimum recycled content requirements. Refer to the Project Specifications for individual sections in the specifications for recycled content level that must be achieved. Recycled content guidelines shall include, but not be limited to, the products below.

- | | | |
|---|--|--|
| 1. Parking Bumpers (Section 02848) | 8. Bentonite Waterproofing (Section 07170) | 15. Resilient Flooring (Section 09650) |
| 2. Concrete reinforcement (Section 03200) | 9. Building Insulation (Section 07210) | 16. Carpeting (Sections 09682, 09686) |
| 3. Structural Steel (Section 05120) | 10. Steel Doors and Frames (Section 08110) | 17. Paints and Coatings (Section 09900) |
| 4. Metal Decking (Section 05300) | 11. Glazing (Section 08800) | 18. Metal Toilet Compartments (Section 10160) |
| 5. Cold-Formed Metal Framing (Section 05400) | 12. Gypsum Board (Sections 09255, 09260, 09265) | 19. Identifying Devices (Section 10400) |
| 6. Architectural Woodwork (Section 06400) | 13. Ceramic Tile (Section 09300) | |
| 7. Fluid-Applied Waterproofing (Section 07140) | 14. Acoustical Ceilings (Section 09510) | |

(5) Virgin material content is that portion of the product made from non-recycled material, that is, the material is neither post-industrial nor post-consumer material.

(6) Post-consumer material is defined as "a finished material which would have been disposed of as a solid waste, having completed its life cycle as a consumer item, and does not include manufacturing wastes." This is material such as a newspaper that is read, recycled and then made into recycled content newsprint or some other recycled product. Post-consumer material is generally any product that is bought by the consumer, used, and then recycled into another product.

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- (7) Post-industrial (also referred to as pre-consumer or secondary material) is defined as "fragments of finished products or finished products of a manufacturing process, which has converted a resource into a commodity of real economic value, but does not include excess virgin resources of the manufacturing process." This is material such as newsprint that is trimmed from a roll in the paper plant that is returned to the beginning of the process to make recycled content newsprint. The material (product) did not get to the consumer before being recycled. Post-industrial material DOES NOT include post-consumer material. FOR EXAMPLE: If a Printing and Writing Paper contained 20% post-consumer material, you would indicate 20 in the post-consumer column and 80 in the virgin column. If the product had 40% secondary material and 20% post-consumer material, you would indicate 40 in the post-industrial column, 20 in the post-consumer column, and 40 in the virgin column.
- (8) The sum of the percentages for virgin, post-consumer, and post-industrial content must equal 100 percent.

END OF APPENDIX