

# PROJECT SPECIFICATION MANUAL

## PERMIT SET

May 24th, 2011

### **METRO Household Hazardous Waste Facility Green Roof Project**

Portland, Oregon

architecture

**ORANGEWALLstudios**

planning

**PROJECT**

Metro Central Transfer Station  
Household Hazardous Waste Facility  
Green Roof Project  
6161 NW 61<sup>st</sup> Avenue  
Portland, OR 97210

**OWNER**

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**Date:** May 24th, 2011  
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This Project Manual has been organized under the format of the Construction Specifications Institute (CSI). Section numbers are listed merely for identification, and they may not be consecutive. The Contractor shall check the contents of this Manual against the Table of Contents to assure that this volume is complete.

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STRUCTURAL CALCS

SAMPLE O+M MANUAL

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02909 Green Roof System

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### **DIVISION 6 - WOOD & PLASTICS**

06100 Rough Carpentry

06310 Wood Preservative Treatment

### **DIVISION 7 - THERMAL & MOISTURE PROTECTION**

07200 Thermal Insulation

07530 Single Ply Roofing

07620 Sheet Metal and Flashings

07840 Fire stopping

07920 Joint Sealants

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### **DIVISION 12 - FURNISHINGS - not included**

### **DIVISION 13 - SPECIAL CONSTRUCTION - not included**

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**END OF TABLE**

# Project Name GREEN ROOF PROJECT OPERATIONS & MAINTENANCE MANUAL

DATE

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# 1. GENERAL OPERATIONS & MAINTENANCE

## 1a. Introduction

This manual will serve as a guideline for operations and maintenance of \_\_\_\_\_. The goal of this document is to identify the need for regular specified maintenance and inspection to:

- Identify any potential issues and develop a well-documented site history
- Add to the collective knowledge of ecoroof techniques and technology
- Improve scheduling efficiency for maintenance and irrigation
- Develop preventative maintenance techniques to avoid future problems

The following sections provide specific Operational & Maintenance requirements for areas related to the Green Roof. Section II summarizes best management practices for O&M. Section III summarizes all of the project components, necessary maintenance or inspection, routine schedules, and conditions/activities that would trigger unscheduled visits. Appendices include Construction Documents and Product Documentation to ensure a complete understanding of all system components.

## 1b. General Operations & Maintenance

An O&M log should be created and maintained to document all operations and maintenance activities and inspections. Inspection records will be used to: 1) Determine where special maintenance conditions exist, 2) Determine optimal frequencies for future inspection and maintenance, 3) generate scheduled and unscheduled (i.e. repair) orders, and 4) assure facility operation and aesthetics. Documentation of operations and maintenance should be conducted according to appropriate standards and best management practices for green roofs, including the following elements:

1. Full inspection should occur on a quarterly basis for a period of the first 2 years, and a minimum of semi-annually thereafter. More frequent spot inspections are recommended, depending on site-specific conditions as shown in the matrix in Section III
2. Inspection records should include:
  - General condition of vegetation areas, predominant plant species, distribution and success rate
  - Soil condition and erosion areas
  - Areas of standing water or potential drainage problem areas
  - Condition of roof drains
  - Operation of irrigation timing, moisture sensors, Et module
  - Observed unscheduled maintenance needs
  - Components which do not meet the performance criteria and require immediate maintenance

## 1c. O&M Contacts

CONTACT	PHONE	EXT./PAGER	EMAIL
Name/Title	Phone no.	15031	<a href="#">email</a>

## 2. OPERATIONS & MAINTENANCE REQUIREMENTS

### 2a. Irrigation

- Irrigation will be accomplished through the use of spray rotors. System layout and as-builts are found in Appendix A and data sheets are included in Appendix B.
- Download of ET data and water usage should be checked once per month and recorded in the operations log. This will provide critical baseline information for future years operations.
- Irrigation will be used to supplement natural rainfall, primarily in low-water months from June to September. The irrigation timing will be based on the site conditions and augmented by the ET Controller for optimal water usage.
- Main lines should be drained in fall from internal point of connection.

### 2b. Vegetation Management

- During the establishment period, areas where soil coverage leaves bare patches greater than 4" shall be supplemented with additional cuttings to match.
- Fallen leaves and debris shall be removed from planted areas and located in designated compost area. Any non-compost or surplus materials should be removed from roof surface and disposed of in an acceptable manner.
- Nuisance and prohibited vegetation from the Portland Plant List shall be removed when discovered. A copy of the nuisance & prohibited plants is located online at <http://www.portlandonline.com/bps/index.cfm?c=45131>
- Dead vegetation shall be removed and replaced. Dead-heading of flower stalks from sedums should be done once per year in the late fall.
- Weeds will be removed manually. *Pre-emergent or other herbicides shall not be used.* Weeds shall be removed regularly and not allowed to accumulate or spread.
- The following groupings of vegetation should be the goal of maintenance: Sedums should be allowed to colonize freely in the areas established on the planting plan in three distinct diverse mix (not monocultural). While banding is part of the design intent, it is understood that vegetation will change over time and does not need to be highly maintained to keep this intact.

### 2c. Soil Substrate/Growing Medium

- Inspection should be conducted for evidence of erosion from wind or water.
  - Any erosion should be stabilized with additional substrate and/or growing medium similar in nature to the original material (not to exceed 2.5" soil depth)
  - Areas should be planted immediately with appropriate material to hold soils in place; use erosion control netting and/or sterile straw mulch if necessary to provide immediate coverage of areas.
  - Sources of erosion damage (shedding from other roofs, channeling of surface runoff, obstructions) should be identified & corrected immediately.

### 2d. Aesthetics

- The desired aesthetic of the green roof is to maintain a healthy mix of succulent vegetation, that is free of weeds and that each band is not dominated by a single species.
- Irrigation is for maintenance of plant health, and should allow for seasonal variation of plants, not to maintain a lush surface year round.
- Weeding and litter control should be done to maintain a neat appearance of vegetation and common areas and to avoid colonization by non-sedum species.

## 2e. Insect Control

- Every attempt shall be made not to harbor detrimental insects on the green roof and to encourage the colonization by beneficial insects.
- Standing water that creates an environment for development of insect larvae shall be eliminated by manual means. *Chemical sprays shall not be used.*

## 2f. Structural Components

- Maintain clear drainage of rooftop drains to prevent accumulation of water in ponds
- Protect and preserve the integrity of roofing system and Green Roof by adhering to all requirements from manufacturer when performing activities on roof, specifically relating to excavation or modification to edge areas.
- Do not penetrate the roof membrane during any rooftop activity

## 2g. Debris and Litter

- Remove litter periodically to prevent clogging of inlet drains and interference with plant growth – this includes some trimming of flower stalks from sedums. Remove all litter from roof at the time of removal.

## 2h. Spill Prevention

- Any maintenance of rooftop equipment and building that requires handling of substances that can contaminate groundwater or damage plantings or green roof system should:
  - exercise safe spill prevention measures according to manufacturers specifications
  - identify and correct any damage or releases of pollutants as soon as possible

## 2i. Training and Written Guidance

- Information in this Operation & Maintenance report shall be provided to all maintenance personnel, and multiple copies should be available from \_\_\_\_\_.
- A specific safety program, compliant with all OSHA regulations, should be developed for maintenance staff while working on open roof systems in zones that have lower than 42" parapet heights and/or do not have adequate tie-offs for elevated worker safety.

## 2j. Access and Safety

- Access should be safe and efficient. Due to low parapet height, maintenance staff should take adequate safety precautions while working on rooftop.
- Any rooftop work should follow Oregon Occupational Safety & Health Division standards for preventing falls from Elevation.
- Egress and ingress routes shall be maintained to design standards clear of debris that would cause tripping
- Walkways shall be clear of obstructions and maintained to design standards

### 3. O&M SCHEDULE + DOCUMENTATION

#### 3a. Activity Matrix

The following table summarizes operations and maintenance activities. Each section is divided by the component or area that is addressed. Specific activities are listed, each including a routine schedule for regular maintenance, as well as possible triggers that will necessitate unscheduled checks. All activities should be recorded in an O&M manual for a complete record of adjustments, upkeep, repairs, and water usage.

Area	Activity	Unscheduled Trigger	Schedule First 2 years	Schedule Long Term
Irrigation	Inspect system for correct operation, water coverage and/or broken lines;	Noticeable dry or brown patches/ die-back of vegetation	Every month during irrigation season; Once weekly during hot, dry periods	Twice yearly (once at system startup in spring); spot check during hot, dry periods
	Evaluate irrigation timing with plant water needs. Record schedule	Noticeable dry or brown patches/ die-back of vegetation	Every month during irrigation season	3 times yearly during irrigation season
	Check for breaks	Reduction of line pressure	One monthly during irrigation season	Once monthly during irrigation season
	Check valves for operation	System degradation on controller	Twice yearly during irrigation season	Twice yearly during irrigation season
	Replace damaged connections, pipe accessories	as needed	as needed	as needed
	Flush irrigation system and winterize system; insulate live supply lines	n/a	End of irrigation season (Nov 1)	End of irrigation season (Nov 1)
Vegetation Management	Check for dead plants and replace; Survey for nuisance and/or prohibited vegetation	complaints	Once per month	Once per year (Spring)
	Remove fallen leaves/debris	debris interferes with roof drains	Once per month	Every three months
	Mow sedums – cuttings from existing plants to encourage colonization	n/a	Once per year	As needed
	Cutting back & removal of flower heads	n/a	Once per year (Fall)	Once per year (Fall)
	Manually remove weeds in planted areas	Complaints	Once per month	Twice per year
	Apply additional sedum cuttings to cover exposed soil areas	complaints; notice erosion	as needed	Every spring as needed
	Contain plantings that are colonizing areas not specified such as ballasted areas and flashings along parapet	n/a	Twice per growing season	Once per growing season
Soil Substrate/ Growing Medium	Identify potential erosion (by wind or water) areas and take measures to stabilize	Rainfall event greater than 1" in 24 hour period	Once per month	Twice per year
	Measure for potential settling & stability issues of material; maintain 4" profile	n/a	Once per month	Once per year

Area	Activity	Unscheduled Trigger	Schedule First 2 years	Schedule Long Term
Insect Control	Survey for presence of detrimental insects	noted presence of insects	Twice per season	Twice per season
	Eliminate standing water that could harbor insect larvae	noted presence of standing water	as needed	as needed
Aesthetics	Examine and note general aesthetic conditions of rooftop, including plant health, litter, and necessary maintenance	n/a	Every visit	Once per month
Structural Components	Examine rooftop drains for proper functioning	ponding is noted	Once per month	Twice per year
	Examine Green Roof System for damage, necessary repairs, or other structural issues	n/a	Once per month	Twice per year
Debris/ Litter	Pick up litter on roof area and check drains for clogging	Complaints or noticeable accumulation	Once per month	Once per month
Spill Prevention	Exercise safe spill prevention measures if using chemicals that could damage roof, vegetation or contaminate groundwater	work scheduled on rooftop equipment	as needed when activity is triggered	as needed when activity is triggered
Training	Provide input on safety program and O&M manual	if problem is noted	as needed (review yearly for compliance)	as needed (review every three years for compliance)
Access/ Safety	Maintain clear walkways to design standards	n/a	Once per month	Every 3 months
	Take adequate safety precautions while working in low parapet zone	always	always	always

### 3b. Maintenance Calendar

The following is recommended schedule for O&M for the first two years (augment annually based on site observations and project maturity) and long term, to focus on the primary maintenance issues that will arise at different times of the year. While this outlines scheduled required activities, there should be regular visits and observation (monthly walk through) to observe unscheduled triggers and identify potential problems before they escalate. Every visit should include review for access/safety, litter removal, and updating O&M logs accordingly.

MONTH	ESTABLISHMENT (2 YEARS)	LONG TERM
January February March	Check for Erosion/Exposed Soil/Standing Water Check drains for obstructions Litter Removal	Spot Check for Erosion Issues, Standing Water, Drain Function & Litter Removal
April	Spring Cleaning/Heavy Weeding Survey for Nuisance Vegetation & Remove Provide Additional Sedum Cuttings in Exposed Areas Mow Sedum areas to promote colonization Fill any soil areas that settled more than 1"	Spring Cleaning/Light Weeding Survey for Nuisance Vegetation & Remove Add sedum cuttings (if needed)
May	Startup Irrigation System, Set Timer & Test Moderate Weeding	Startup Irrigation System, Set Timer & Test Light Weeding as needed
June	Monitor and Adjust Irrigation Timing Flush Irrigation Filters Moderate Weeding	Light Weeding as needed Flush Irrigation Filters
July	Monitor and Adjust Irrigation Timing Flush Irrigation Filters Light Weeding	Monitor Irrigation (critical dry months) Flush Irrigation Filters
August	Monitor and Adjust Irrigation Timing Flush Irrigation Filters Light Weeding	Monitor Irrigation (critical dry months) Flush Irrigation Filters
September	Monitor and Adjust Irrigation Timing Flush Irrigation Filters Moderate Weeding	Light Weeding as needed Flush Irrigation Filters
October	Remove Flower Stalks/Additional Leaf Litter Moderate Weeding Survey for Nuisance Vegetation & Remove Drain Irrigation System, Flush & Winterize	Remove Flower Stalks/Excess Leaf Litter Light Weeding as needed Survey for Nuisance Vegetation & Remove Drain Irrigation System, Flush & Winterize
November December	Check for Erosion/Exposed Soil Check Drains for obstructions Litter Removal	Spot Check for Erosion Issues, Standing Water, Drain Function & Litter Removal

### 3c. O&M Form

Maintenance: Record date, description, and contractor (if applicable) for all structural repairs, landscape maintenance, and facility cleanout activities.

Log #:	Date:	Work Performed By:	Initials:
Description of Work Performed:			
Scheduled? (Y/N)	Required Follow-up Activities and Date:		

Log #:	Date:	Work Performed By:	Initials:
Description of Work Performed:			
Scheduled? (Y/N)	Required Follow-up Activities and Date:		

Log #:	Date:	Work Performed By:	Initials:
Description of Work Performed:			
Scheduled? (Y/N)	Required Follow-up Activities and Date:		

Log #:	Date:	Work Performed By:	Initials:
Description of Work Performed:			
Scheduled? (Y/N)	Required Follow-up Activities and Date:		

*Make additional copies as needed and keep in a binder for reference*

## **APPENDIX A.** Construction Documents

*Include Table of Contents*

## **APPENDIX B.** Product Documentation

*Include Table of Contents*



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- PART 1 - GENERAL
  - SUMMARY
  - This section includes specifications for a vegetated roof system, including all elements installed over the existing roof membrane and insulation. This section includes all system elements, drainage mat, filter fabric, gravel ballast, growing medium, plants, and irrigation for the green roof only. Contractor should only reference related sections listed in section: Related Documents.
  - RELATED DOCUMENTS
  - Drawings and general provisions of the Contract, including the General and Supplementary Conditions and Division 1 Specification sections, apply to the work of this section.
  - SYSTEM DESCRIPTION
  - Furnish and install components of the green roof system as described in this section. Scope of system includes all component installation after rooftop penetrations, parapets & flashing, and waterproofing system is fully installed and tested for performance. Protection layering is considered 'roofing' in this context.
  - Based on structural capacity of the roof, the maximum weight of the green roof system, fully saturated and including all components is **not to exceed 15 lbs per square foot** unless rated for living loading or otherwise specified.
  - The system will be installed over the new roof membrane system. Refer to architectural drawings and roofing specifications for all components related to this system.
  - System includes all components necessary to provide complete, working system that integrates with other new construction and work specified in other sections, including electrical, plumbing, and roofing.
  - SUBMITTALS
  - Provide manufacture's product data for all items specified. Provide data indicating all primary components and all accessory components, including
    - Provide data on soil mix, indicating compliance with specified parameters and
      - Third party laboratory certification of saturated weight limits;
      - provide FLL certified testing of growing media.
    - Provide necessary information to provide complete supplemental irrigation coverage as noted on drawings
    - Provide complete plant list sources and available quantities to meet drawing requirements.
    - Any green roof installer approvals or necessary state certifications
    - Provide product data and samples of all additional components of the green roof assembly as specified, including pavers, insulation, drain mat, filter fabric, gravel, edging,
  - Provide project-specific Operations & Maintenance manual using the template attached at the end of this section.

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- PART 1 - GENERAL (CON'T)
  - QUALITY ASSURANCE
  - Refer to Section: Submittals
  - Perform work in strict accordance with construction documents and specifications. Maintain one copy of these instructions on site during roofing work.
  - Plans and Specifications:
  - Notify Owner of any omissions, contradictions or conflicts at least seven days prior to bid date. Owner will provide necessary corrections or additions to plans and specifications by addendum. If Contractor does not so notify Owner of any such condition, it will be assumed that the Contractor has included the necessary items in the bid to complete this specification.
  - Installer must have been and continue to be in operation under current business name and structure for the last two (2) contiguous years. Green roof components shall be installed by a licensed landscape contractor in good standing with the Oregon Landscape Contractors Board (LCB). General CCB is not sufficient for green roof scope that falls under the purview and requirement of 'landscape' as governed by the LCB.
  - PRE-INSTALLATION CONFERENCE
  - Convene two weeks prior to commencing work on this section.
  - Review preparation and installation procedures and coordination of schedules required with related work.
  - Attendees must include representatives from the following:
    - General Contractor
    - Green Roof Systems Subcontractor – Certified Landscape Contractor
    - Roofing membrane manufacturer technical representative (if required for warranty)
    - Architect
    - Landscape Architect
    - Owner's Project Manager
    - Other trades subcontractors as requested by Owner, Architect, Landscape Architect.
  - DELIVERY, STORAGE AND HANDLING
  - Delivery materials in sufficient quantity to allow continuity of work
  - Deliver materials in original unopened containers of packaging clearly labeled with manufacturer's name, brand name, instruction for use, all identifying numbers, and U.L. labels.
  - Materials shall be stored in a neat, safe manner, not to exceed the allowable structural capacity of the storage area. Do not overload building with stored materials.

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- PART 1 - GENERAL (CON'T)
  - Store materials in a clean, dry area protected from water and direct sunlight.
  - Store all adhesives at temperatures between 60°F (15.5°C) and 80°F (26.6°C). If exposed to lower temperatures, restore materials to 60°F (15.5°C) minimum temperature before using.
  - Testing of saturated weight of delivered Growing Media to be conducted prior to transportation and installation on roofing surface (see submittals)
  - Plant materials must delivered weed-free and ready to install. Provide plant tags & sourcing information for all plants.
  - **PROJECT CONDITIONS**
  - Field Measurements: Applicator shall have sole responsibility for all measurements, estimates of material quantities and sizes, and site conditions that will affect work. inspect and measure completed roof prior to installation of any green roof system components.
  - Coordinate green roof system with other building trades and work.
  - Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, animal fat, etc.) to come in contact with the roof membrane. Any exposure to foreign materials or chemical discharges must be presented to membrane manufacturer for evaluation to determine any impact on the roof membrane assembly performance.
  - Prior to any Green Roof System installation, new roofing membrane, parapet flashings, roof penetrations, and other roofing elements shall be installed and testing for waterproofing quality. It is strongly recommended that the roof area or portions thereof be leak tested by means of electronic testing or by ponding water at a minimum depth of 2" for a period of 48 hours to check the integrity of the membrane installation.
  - General contractor shall assure that adequate protection is provided after installation so other trades do not damage membrane.
  - **WARRANTY & MAINTANENCE**
  - Provide 1 year warranty for all materials installed within scope of Green Roof System. Warranty period will begin upon written acceptance of 'substantial completion' and require all activities outlined therein.
  - Provide documentation in Operations & Maintenance manual for work completed during Warranty period, as shown in Sample O&M attached to this section (appendix A). Activities for the entire year should be documented in O&M forms and handoff to owner after 1 year.
  - Provide 1 year maintenance for all materials, and equipment for all materials installed with the scope of Green Roof System. Maintenance period will begin upon written acceptance of 'substantial completion' and require all activities outlined therein.

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4 • PART 2 - PRODUCTS  
5  
6 • GENERAL  
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8 • All products shall be provided as specified in the following section: Materials, or as noted  
9 on drawings and details.  
10  
11 • Materials and manufacturer's products should be tested and proven to be compatible as a  
12 complete, unified system.  
13  
14 • MATERIALS  
15  
16 • Green Roof Assembly (per Submittals provide samples of all materials):  
17  
18 ○ Drainage Mat: 3/8" drainage composite with woven filter fabric layer on top and  
19 bottom – rated for horizontal green roof applications (min. compressive strength  
20 of 15,000 psf) - w/o water retention cups or with cups facing down.  
21  
22 ○ Filter Fabric: Polyester/Polypropylene filter fabric, made of non-woven needle  
23 punched fibres. 1 mm thickness.  
24  
25 ○ Edge Retention Flashing: 2.5" Perforated Aluminum Edging as shown on  
26 drawings.  
27  
28 ○ Access Pavers: 24x24" Concrete Pavers rated for rooftop ballast conditions, not  
29 to exceed 15 psf in weight (60 lbs/paver). Layout and install as shown on plans  
30 atop 1" rigid foam board.  
31  
32 ○ Stone Ballast (around penetrations and drains as shown on plans): clean, washed  
33 1" to 1.5" round river rock to a maximum 2" depth.  
34  
35 • Growing Media:  
36  
37 ○ Extensive Green Roof growing media mix consisting of max 20% by volume  
38 organic matter (no paper waste) with the remainder comprised of various grades  
39 of pumice. The organic matter should be dairy compost and fine aged fir bark.  
40 Field Moisture Capacity should not exceed 65 pounds per cubic foot saturated –  
41 13.54 psf @ 2.5" depth);  
42  
43 ■ Provide data sheets from independent testing lab to verify requirements  
44 and saturated weight limit of materials specified (see Submittals)  
45 ■ Provide FLL testing certification document for growing media. (see  
46 Submittals)  
47

- 1 • Plantings
- 2
- 3 ○ Plantings: Selected by the landscape architect in keeping with the overall plan
- 4 intended: Refer to plans for specific plant sizes, quantities, and notes on
- 5 installation; Provide on-site for acceptance by landscape architect prior to
- 6 transport to roof surface;
- 7
- 8
- 9 • PART 2 - PRODUCTS (CON'T)
- 10
- 11 • Irrigation System: Provide permanent irrigation as shown on drawings with all necessary
- 12 components for operation. Coordinate installation of valves, backflow, drain, and piping
- 13 routed through building with plumbing/architectural work following all building codes.
- 14 Coordinate electrical service to controller and routing of low-voltage wiring to locations
- 15 as shown on plans. Component specifications include:
- 16
- 17 ○ Piping: PVC PVC Class 200, Type 1, white, NSF approved, solvent weld pipe
- 18 meeting the requirements of ASTM D2241-00UVR-PVC Sch 40 solvent weld
- 19 pipe, meeting the requirements of ASTM 2855-96 Size as required to meet
- 20 manufacturer's velocity specifications. Fittings, welding compounds per
- 21 manufacturer's requirements.
- 22
- 23 ○ Control Valve: Automatic Control valve Glass-filled nylon body with pressure
- 24 compensation module, forward flow design and of a size and type to sufficiently
- 25 operate system. Water volumes and velocity through valve shall not exceed
- 26 manufacturer's recommended optimum performance criteria.
- 27
- 28 ○ Gate Valve: MSS SP-80, Class 125, Type 1, nonrising-stem, bronze body with
- 29 solid wedge, threaded ends, and malleable-iron handwheel.
- 30
- 31 ○ Drain Valve: 1-inch size bronze angle valve with rising stem and cross-type
- 32 handle.
- 33
- 34 ○ Check Valve: A one way valve that will keep water on rooftop from flowing
- 35 back into building. PVC body with a 1/2 pound spring. Able to handle up to
- 36 200psi static pressure.
- 37
- 38 ○ Irrigation Spray Heads: Spray rotors nozzles in heavy duty plastic bodies -
- 39 designed for efficiency (80% plus) using large water droplet in multi-trajectory
- 40 stream, adjustable from 0-360 degrees and able to operate at 30 psi min.
- 41
- 42 ○ Valve Boxes: Plastic valve box with locking lid, sized to provide a minimum of 3
- 43 inches (75 mm) clear on all sides of the valve to facilitate access, maintenance,
- 44 repair or removal.
- 45
- 46 ○ Evapotranspiration (Et) Sensor: On-site weather station with rain, wind,
- 47 temperature, and other site conditions and calculate on site Et for use with
- 48 controller. Compatible with controller and moisture sensor. Mounting per
- 49 drawings and details.
- 50

- 1           ○ Moisture Sensor: Provide an underground sensor for measuring soil moisture  
2           relative to threshold and allow for system to be shut down or turned on when  
3           levels are reached. Freeze-heat resistant, compatible with controller.  
4
- 5           ○ Low-Voltage Wiring: Solid copper or stranded copper wire, UL listed for direct  
6           burial in ground. Size of wire shall be in accordance with manufacturer's  
7           recommendations, but in no case less than number 14.  
8

9

10

11       • PART 2 - PRODUCTS (CON'T)

12

- 13           ○ Controller: Shall have ability for all zones to fully operate and meet both normal  
14           and specified low volume system requirements as shown on drawings, and as  
15           required by site conditions.
  - 16               ▪ Controller shall be 'solid state', commercial grade and have a single  
17               station for each control valve and shall be installed per manufacturer's  
18               recommended installation procedures.
  - 19               ▪ Controller shall be capable of a minimum of 2 start times per station per  
20               day and be equipped with a minimum 7-day watering cycle. Controller  
21               shall be equipped with master valve/pump start capability.
  - 22               ▪ Controller must be suitable for either indoor or outdoor mounting. The  
23               Contractor shall coordinate with the Owner to identify location for  
24               Controller mount and provide appropriate cabinet
  - 25               ▪ Controller should be compatible with Evapotranspiration Control module  
26               (programmable for Et data input) and in-soil moisture sensors  
27               (programmable for Moisture sensor on/off, thresholds).  
28

29

30       • PART 3 - EXECUTION

31

32       • INSPECTION

- 33
- 34       • The landscape contractor and roofing contractor, along with Architect and Landscape  
35       Architect shall examine all surfaces to receive the roofing assembly to verify it is  
36       acceptable and proper to receive work related to Green Roof System.

- 37
- 38       • The roofing contractor shall not proceed with the installation of the green roof  
39       components until waterproofing test has been conducted on membrane.  
40

41       • PROTECTION

- 42
- 43       • Protect work of other trades against damage caused by work of this Section.
- 44
- 45       • Prevent debris from entering and clogging roof drainage system during construction.
- 46
- 47       • Protect roofing membrane against damage caused by and rooftop work performed during  
48       installation; Protect building and equipment from damage. Notify Owner and repair any  
49       damage caused by construction activities related to this section.  
50

51

52       • SURFACE PREPARATION

- 1 • Prior to installation, remove any debris, obstructions, dirt or grime from roof deck,  
2 membrane, and parapet walls.  
3
- 4 • Sweep all surfaces to receive green roof system components  
5
- 6 • Install protection board as early as possible to protect roof membrane during rooftop  
7 installation activities  
8  
9
- 10
- 11 • PART 3 – EXECUTION (CON'T)  
12
- 13 • INSTALLATION - GENERAL  
14
- 15 • Conform to specifications and construction documents for installation  
16
- 17 • Install entire system in one continuous operation, with no more than overnight breaks in  
18 installation / construction activities if possible.  
19
- 20 • At start of each work day, plug drains within daily work area. Remove plugs at end of  
21 each work day or before arrival of inclement weather.  
22
- 23 • Maintain depth and grade of growing media. If any erosion problems appear or persist  
24 prior to establishment of plant material, use sterile straw mulch.  
25
- 26
- 27 • INSTALLATION – GREEN ROOF SYSTEM  
28
- 29 • Install all components shown on details and in specifications in the following order:  
30
- 31 • Roofing: Roofing membrane, protection layer and insulation should be installed and  
32 tested prior to any work related to Green Roof System installation. Refer to roofing  
33 sections specific information related to this work.  
34
- 35 • Drainage Layer Materials providing complete coverage along with overlap to entire roof  
36 area to receive green roof system components. Protect separation fabric from damage  
37 and ensure entire drainage layer is thoroughly covered prior to installation of soils.  
38
- 39 • Metal Edging/Soil Retention Flashing in perimeter areas, drains, roof vents, and other  
40 equipment where noted on plans. Install filter fabric where shown and at material  
41 interfaces to prevent erosion and assist in soil retention along perimeters.  
42
- 43 • Stone and/or paver ballast shall be installed at all roof perimeters, building walls,  
44 penetrations, and access hatches and as shown on plans.  
45
- 46 • Growing Media: Install growing media in specified areas and in exact depths. Consistently  
47 monitor to ensure that maximum soil depth is not being exceeded in any area. Media  
48 should be placed carefully to avoid damage or displacement of other materials. Do not  
49 compact.  
50
- 51 • Wet entire soil area, filling any low spots or uneven areas to achieve final grade depth.  
52

- 1 • Irrigation: Install prior to installation of any plant material and test for function, leakage,  
2 etc. prior to planting. Combine installation of irrigation system with growing media  
3 installation if work can be conducted in a proper manner with greater efficiency.  
4  
5 • Plantings/Vegetation: Install vegetation as noted on plans in adequate quantities, spacing,  
6 and sizes to meet acceptable standards as defined by landscape architect.  
7  
8  
9  
10 • PART 3 – EXECUTION (CON'T)  
11  
12 • CLEAN-UP/COMPLETION  
13  
14 • Clean, repair, or replace soiled, defaced or disfigured finishes caused by work in this  
15 section.  
16  
17 • Ensure irrigation system timing and function is adequate to protect plant materials.  
18  
19 • Completely remove all construction materials, plant tags, or other materials not included in  
20 the completed green roof system.  
21  
22 • Request review for ‘Substantial Completion’, walk site and review punch-list items.  
23  
24 • Request review for ‘Final Completion’ – completed punch-list items to satisfaction of  
25 owner, architect and landscape architect.  
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28 END OF SECTION

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- PART 1 - GENERAL
- CONTRACT CONDITIONS
- Work of this Section is bound by the Contract Conditions and Division 1, bound herewith, in addition to this Specification and accompanying Drawings.
- EXTENT OF WORK
  - Equipment Curbs
  - Any other Rough Carpentry Work shown on Drawings
- RELATED WORK SPECIFIED IN OTHER SECTIONS
  - Preservative Treatment of Wood: Section 06310
- COORDINATION
  - Coordinate with other Trades affecting or affected by Work of this Section.
- PART 1 - GENERAL
- EVIDENCE OF GRADE
  - Grademark of Association having jurisdiction must appear on each piece of Material as follows:
    - Lumber: (WWPA) Western Wood Products Assn. or other Agency certified by Board of Review of American Lumber Standards Committee.
    - Plywood: (APA) Engineered Wood Assn. (formally known as American Plywood Assn.); 7011 S. 19<sup>th</sup> St.; Tacoma, WA 98411.
- PRODUCT DELIVERY, STORAGE, & HANDLING
  - Protect against damage and discoloration.
  - Do not store Wood materials in wet or damp areas, or in contact with Ground.
  - Do not overload Building Structure with stored Materials.

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2 • PART 2 - PRODUCTS  
3  
4 • LUMBER  
5  
6 • Species, unless otherwise specified:  
7 • Where Pressure-preservative Treated: Hem-Fir  
8 • Elsewhere: Douglas Fir  
9 • Finish, unless otherwise specified herein: Surfaced 4 sides  
10 • Sizes & Shapes, unless otherwise specified herein: Standard nominal dimensions  
11 • Manufacturing Standard: Dept. of Commerce Product Standard 20.  
12 • Wood Products provided for this Project shall originate in "Certified Well-Managed  
13 Forests" as certified by Forest Stewardship Council.  
14 • For information and sources of Certified Forest Products contact Certified  
15 Forest Products Council at (503) 224-2205.  
16 • Uncertified Forest Products will be rejected and shall be replaced.  
17 • Grade & (WWPA Grading Rules Paragraph Number):  
18 • Furring, Blocking, Curbing, & Bracing: Standard (40.12)  
19 • Maximum Moisture content when installed in Project:  
20 • Douglas Fir: 19%  
21 • Hemlock, if any: 17%  
22  
23  
24 • PLYWOOD - GENERAL  
25  
26 • Manufacturing Standard: U.S. Product Standard 1  
27 • APA Grades, unless otherwise specified elsewhere:  
28 • Exposed Surfaces: A  
29 • Elsewhere: C  
30 • Types, unless otherwise specified elsewhere:  
31 • Where exposed to Moisture: Exposure 1  
32 • Elsewhere: Exposure 2  
33 • Display APA Grade Mark on each Piece  
34  
35  
36 • FASTENERS  
37  
38 • Manufacturing Standard:  
39 • Bolts: Fed. Spec. FF-B-575  
40 • Nuts: Fed. Spec. FF-N-836  
41 • Expansion Shields: Fed. Spec. FF-S-325  
42 • Lag Screw & Lag Bolts: Fed. Spec. FF-B-561  
43 • Toggle Bolts: Fed. Spec. FF-B-588  
44 • Wood Screws: Fed. Spec. FF-S-111  
45 • Nails & Staples: Fed. Spec. FF-N-105B  
46 • Washers: Provide Washers under Bolt heads, Lag heads, and Nuts.  
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3 • FASTENERS (Cont.)  
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5 • Material: Steel  
6 • Finish:  
7 • At Preservative-treated Wood: Stainless Steel  
8 • Elsewhere: Contractor's choice  
9 • Type:  
10 • Where type is specifically noted: Use type specified.  
11 • Elsewhere:  
12 • Where applied to Lumber: Nails or Wood Screws  
13 • Where applied to Plywood or Particle Board: Nails or Sheetmetal Screws  
14 • Where applied to Metal: Machine Screws or Bolts  
15 • Where applied to Masonry: Machine Screws with Expansion Shields  
16 • Extent of Work:  
17 • Provide all necessary for installation of Work specified herein.  
18 • Sizes and quantities noted hereunder and in Nailing Schedule  
19  
20  
21 • TELEPHONE & SIMILAR EQUIPMENT MOUNTING PANELS  
22  
23 • Material: Fire-retardant Plywood  
24 • Exposed Face Grade: A  
25 • Nominal Thickness: 3/4 inch  
26 • Edges: Square  
27 • Size & Shape: Satisfy conditions of use.  
28  
29  
30 • EQUIPMENT CURBING  
31  
32 • Material: Framing Lumber  
33 • Surface Finish: Smooth  
34 • Special Treatment: Pressure-preservative as specified in Section 06310  
35 • Size & Shape: See Drawings  
36  
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- 1 • PART 3 - EXECUTION  
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3 • EXISTING CONDITIONS  
4  
5 • Verify that Surfaces to receive Work specified herein are rigid, secure, accurately sized  
6 and located, and otherwise properly prepared.  
7 • Prior to starting Work, notify General Contractor about defects requiring correction.  
8 • Do not start Work until conditions are satisfactory.  
9  
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11 • PROTECTING WORK OF OTHER SECTIONS  
12  
13 • Protect against damage and discoloration caused by Work of this Section.  
14  
15  
16 • INSTALLATION GENERAL  
17  
18 • Install Proprietary Products in accordance with Manufacturer's instructions.  
19 • Use additional Fasteners to those specified herein where necessary to insure rigidity  
20 and permanence.  
21 • Provide Washers under Nuts and Heads when making Bolted or Lag Screwed connections.  
22 • Drive Nails perpendicular to grain in lieu of toe-nailing where feasible.  
23 • Accurately locate, cut, fit, and install Work secure, rigid, to true lines, plumb, and level,  
24 unless otherwise indicated.  
25  
26  
27 • PART 3 - EXECUTION  
28  
29  
30 • EQUIPMENT CURB INSTALLATION  
31  
32 • Securely attach to Roof Deck straight, plumb, and true.  
33  
34  
35 • PRODUCT CLEANING & REPAIRING  
36  
37 • Including Work of other Trades, clean, repair and touch-up, or replace when directed,  
38 Products which have been soiled, discolored, or damaged by Work of this Section.  
39 • Remove Debris from Project Site upon Work completion, or sooner if directed.  
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45 END OF SECTION  
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- PART 1 - GENERAL
- CONTRACT CONDITIONS
- Work of this Section is bound by the Contract Conditions and Division 1, bound herewith, in addition to this Specification and accompanying Drawings.
- RELATED WORK SPECIFIED IN OTHER SECTIONS
- Rough Carpentry to be treated: Section 06100
- REFERENCED SPECIFICATIONS
- Pressure Treatments specified hereunder refer to Specifications of American Wood Preservers Assn. (AWPA); Box 5690; Granbury, TX 76049; (817) 326-6300.
- Specifications can be obtained from Association.
- COORDINATION
- Coordinate with other Trades affecting or affected by Work of this Section.
- CERTIFICATION
- Affix Quality Seal of American Wood Preservers Bureau (AWPB) to each treated Member or, submit Affidavit stating that Preservative Treatment complies with these Specifications.
- Indicate year of treatment, Preservative used in treatment, applicable AWPB Quality Standard, trademark of AWPB Certified Agency, proper exposure conditions, Treating Company and Plant location, and Moisture condition of treated material.
- PART 1 - GENERAL
- REGULATORY AGENCY REQUIREMENTS
- Comply with Environmental Protection Agency requirements including the following:
  - Wear Dust Masks and Eye Goggles when sawing or machining Treated Wood.
  - Wash Hands after working with Treated Wood.
  - Do not burn Treated Wood; dispose in normal Trash Collector.

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3 • **PRODUCT DELIVERY, STORAGE, & HANDLING**  
4  
5 • Protect against damage.  
6  
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9 • **PART 2 - PRODUCTS**  
10  
11  
12 • **PRESSURE-APPLIED TREATMENT MATERIAL**  
13  
14 • Treatment: AWPA C-2  
15 • Preservative:  
16 • Manufacturer & Brand: CSI ACQ Preserve, Osmose Nature Wood, Wolmanize  
17 Natural Select, or approved.  
18 • Material: Alkaline Copper Quat or Copper Azole (ACQ)  
19 • Extent of Work: Apply to Wood, if any, in the following locations:  
20 • In contact with Concrete  
21 • In contact with Masonry  
22 • In contact with Roofing  
23 • In contact with exterior Sheetmetal  
24 • Elsewhere shown on Drawings or specifications  
25  
26  
27 • **BRUSH-APPLIED TREATMENT MATERIAL**  
28  
29 • Material: 2% minimum Copper Napthanate Solution, or approved.  
30 • Extent of Work: Treat any Field Cuts to Pressure-treated Material  
31  
32  
33  
34 • **PART 3 - EXECUTION**  
35  
36  
37 • **EXISTING CONDITIONS**  
38  
39 • Verify that Material to receive Treatment does not exceed Moisture Content specified  
40 for similar Untreated Wood.  
41 • Prior to starting Work, notify General Contractor about defects requiring correction.  
42 • Do not start Work until conditions are satisfactory.  
43  
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45 • **PROTECTING WORK OF OTHER SECTIONS**  
46  
47 • Protect against damage and discoloration caused by Work of this Section.

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- PRESSURE TREATMENT

- Follow Referenced Specifications.
- Incise Members prior to Treatment.
- Minimum Retention: 0.25 pcf

- FIELD CUTS

- Liberally apply 2 coats of Brush Treatment Material to field-cut Surfaces.

- WASTE DISPOSAL

- Do not burn Treated Wood Scraps.
- Do not mix Treated Wood Scraps with Untreated Wood. Separate Scraps and lawfully dispose.

END OF SECTION

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- PART 1 - GENERAL
- CONTRACT CONDITIONS
- Work of this Section is bound by the Contract Conditions and Division 1, bound herewith, in addition to this Specification and accompanying Drawings.
- DEFINITIONS
- Specified "R" values designate Thermal Resistance of Insulation only, not including Air Spaces or other factors assumed to result in higher "R" values.
- COORDINATION
- Coordinate with other Trades affecting or affected by Work of this Section.
- SUBMITTALS
- In accordance with requirements specified in Section 01340.
- REGULATORY AGENCY REQUIREMENTS
- If and where Insulation is not covered with Gypsum Board or other Fire-rated Material:
  - Maximum Insulation & Facing Flame Spread: 25
  - Maximum Insulation & Facing Smoke Density: 450
- PRODUCT DELIVERY, STORAGE, & HANDLING
- Deliver to Project Site in Manufacturer's original unopened packages.
- Label Package Wrappers with Brand Name, Insulation type, and Thermal Rating.
- Store Materials off ground.
- Protect against damage and discoloration.
- Weight Foam Insulation as required to prevent wind-induced damage.
- Protect Foam Insulation edges against crushing and breaking.
- Immediately remove damaged or wet Materials from Jobsite.
- ENVIRONMENTAL CONDITIONS
- Do not install Insulation when Surface to receive Insulation is wet.

- 1 • ADVANCE NOTICES  
2  
3 • Notify Architect at least 24 hours prior to completing Insulation Work for inspection.  
4  
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6 • PART 2 - PRODUCTS  
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9 • RIGID BOARD INSULATION  
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11 • On existing metal roof deck:  
12 • Manufacturer & Brand: Firestone Building Products, Carlisle, Johns Manville,  
13 or approved.  
14 • Insulating Material: ISO 95+ (Polyisocyanurate)  
15 • Type: HCFC-free with zero Ozone-depletion  
16 • Manufacturing Standard: ASTM C-1289  
17 • Nominal ASTM D-1622 Density: 2 pcf  
18 • Panel Size: Provide minimum Joints practicable.  
19 • Nominal Thickness: 3 inches (R-19 min)  
20  
21  
22  
23 • SAFING INSULATION  
24  
25 • Material: Foil faced Mineral Wool  
26 • Manufacturer & Brand: US Gypsum Thermafiber, or approved.  
27 • Thickness: As required to tightly fill Space.  
28  
29  
30 • ADHESIVE  
31  
32 • Type: Recommended by Manufacturer of Material to be secured.  
33 • Manufacturer & Brand: Firestone Building Products, or approved.  
34 • Product Name: I.S.O. FIX 2  
35 • Type: One component polyurethane adhesive  
36  
37  
38 • VAPOR PROOF TAPE  
39  
40 • Manufacturer & Brand: Alumiseal Zero Perm, or approved; 183 Madison, New York,  
41 NY 10016; (800) 235-2313.  
42 • Material: Adhesive-backed, Mylar-faced Aluminum Foil.  
43 • Width: 1-1/2 inches  
44 • Approximate Permeability Rating: 0.0 perms  
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- PART 3 - EXECUTION

- EXISTING CONDITIONS

- Verify that Work of preceding Trades is completed.
- Verify that Surfaces and Spaces to receive Insulation are accurately sized and located, dry, protected against inclement weather, clean, and otherwise properly prepared.
- Reuse existing perlite board, If perlite board is wet or damaged, replace for dry, clean condition. Notify Architect of prior to replacing and perlite board or if conditions vary and prior to purchasing new material.
- Prior to starting Work, notify General Contractor about defects requiring correction.
- Do not start Work until conditions are satisfactory.

- PROTECTING WORK OF OTHER SECTIONS

- Protect against damage and discoloration caused by Work of this Section.
- Maintain the following Minimum Clearances between Insulation and any recessed Lighting Fixtures, Metal Chimneys, Metal Gas Vents, or other similar Device, unless Device is U.L. rated for Zero Clearance:
  - Side Clearance: 3 inches
  - Top Clearance: 24 inches

- SURFACE PREPARATION

- Remove, or protect against, Projections which could damage Insulation or prevent proper Insulation installation.
- Remove bond-reducing Coatings, and roughen Surfaces, to receive Insulation by adhesion as necessary for bond.
- Prime Surfaces to receive Insulation by adhesion.

- INSULATION INSTALLATION, GENERAL

- Follow Manufacturer's instructions.
- Fit Insulation snugly between Framing without forcing.
- Where Doors, Windows, or other Openings occur in Framing, pack Insulation into Voids.
- Where adjacent pieces of Insulation abut, fit snugly together without overlapping.
- Permit no gaps for Air passage.
- Carefully cut and fit Insulation around Pipes, Conduits, and other Obstructions.
- Where Pipes, Conduit, and other Obstructions are located within Insulated Walls or within other Insulated Spaces, place Insulation between cold-in-winter Surface and Obstruction, compressing Insulation where necessary.

- 1 • Except where indicated above, do not compress Insulation more than 10%.  
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6 • RIGID BOARD INSULATION INSTALLATION  
7  
8 • Install horizontally, in regular courses, and true to line.  
9 • Stagger adjacent Joints.  
10 • Bring edges into moderate contact without deforming.  
11 • Maintain sufficient Perimeter Edge Space for Insulation expansion.  
12 • Cut to fit neatly at Corners and around Projections through Insulation.  
13 • Secure Insulation to Substrate.  
14 • Maintain Insulation integrity.  
15  
16  
17 • VAPOR RETARDER FACING PATCHING  
18  
19 • Patch and seal Facing punctures, penetrations, tears, and voids with Vapor Proof Tape.  
20 • Permit no Openings for Vapor transmission.  
21  
22  
23 • WASTE MANAGEMENT  
24  
25 • Reuse any Insulation Scraps where Insulation is concealed from view.  
26  
27  
28 • PRODUCT CLEANING & REPAIRING  
29  
30 • Including Work of other Trades, clean, repair, and touch-up; or replace when directed,  
31 Products which have been soiled, discolored, or damaged by Work of this Section.  
32 • Remove Debris from Project Site upon Work completion, or sooner if directed.  
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36 END OF SECTION  
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- PART 1 - GENERAL

- CONTRACT CONDITIONS

- Work of this Section is bound by the Contract Conditions and Division 1, bound herewith, in addition to this Specification and accompanying Drawings.

- EXTENT OF WORK

- Apply at all Roof Decks.

- RELATED WORK SPECIFIED IN OTHER SECTIONS

- Sheet metal Flashing & Trim: Section 07620

- COORDINATION

- Coordinate with other Trades affecting or affected by Work of this Section.

- LAYOUT DRAWINGS

- Submit in accordance with Section 1340.
- Include Roof outline, Splice locations, Penetrations, and Edge Details.
- Include Membrane Manufacturer's approval of Drawings.

- REGULATORY AGENCY REQUIREMENTS

- Label Products indicating compliance with UL fire-resistance requirements specified in Building Code.
- Comply with Wind Uplift Requirements specified in Building Cods.

- PRODUCT DELIVERY, STORAGE, & HANDLING

- Protect against damage and discoloration.
- Do not overload Building Structure with stored Materials.

- 1 • MANUFACTURER'S CERTIFICATIONS  
2  
3 • Submit evidence of the following:  
4 • That Roofer is Manufacturer-trained and Manufacturer-approved to perform  
5 Work of this Section as follows:  
6 • To General Contractor with Subbid Proposal  
7 • To Architect prior to ordering Products  
8 • That Manufacturer has reviewed and approves this Specification as follows:  
9 • To Architect prior to ordering Products  
10 • Immediately following Work completion, submit to Architect:  
11 • Certification that Manufacturer's Representative has inspected Work prior to,  
12 during, and after Work completion, and that Work complies with these  
13 Specifications and Manufacturer's instructions.  
14  
15  
16  
17 • PRE-INSTALLATION MEETING  
18  
19 • Prior to starting Work, Roofer shall arrange meeting to clarify any questions about  
20 Specifications, details, and other application requirements.  
21 • Representatives of the following shall attend:  
22 • General Contractor  
23 • Roof Deck Subcontractor  
24 • Roofing Subcontractor  
25 • Roofing Manufacturer  
26 • General Sheetmetal Subcontractor  
27 • Roof-mounted Equipment Subcontractors  
28 • Roof-penetrating Equipment Subcontractors  
29  
30  
31 • WEATHER REQUIRMENTS  
32  
33 • Comply with Manufacturer's recommendations.  
34  
35  
36 • ADVANCE NOTICES  
37  
38 • Notify Architect and Roofing Manufacture at least 48 hours prior to starting Work.  
39  
40  
41 • WORK WARRANTY  
42  
43 • Roofing and Flashings are subject to 2 year Warranty.  
44 • Roofer is responsible for proper placement of Metalwork, which has been provided by  
45 other Trades, and is in contact with Roofing.  
46  
47

1 • MAINTENANCE WARRANTY

2

- 3 • Prior to Final Project Acceptance submit the following Warranties for inclusion in  
4 Owner's Maintenance Manual:

5 • We, the undersigned, do hereby warrant fully-adhered Roofing and related  
6 Roofing System to include Flashing against failure under normal usage as may  
7 occur within the following time periods after Project Substantial Completion  
8 date, and defective Work will be repaired or replaced at no additional cost to  
9 Owner:

10

- 11 • 2 Years: Defective Work including any resulting damage to Building  
12 Materials and/or Building Contents.

13

14 ROOFER: \_\_\_\_\_

15 By: \_\_\_\_\_

16 GENERAL CONTRACTOR: \_\_\_\_\_

17 By: \_\_\_\_\_

18

- 19 • 20 Years: Defective Work, but not including any damaged Building  
20 Materials or Building Contents.

21

22 ROOFING MANUFACTURER: \_\_\_\_\_

23 By: \_\_\_\_\_

24

25

26

27

28 • PART 2 - PRODUCTS

29

30 • ROOFING MEMBRANE

31

- 32 • Manufacturer & Brand: Firestone 'UltraPly' TPO, or approved.

- 33 • Material: Thermoplastic Polyolefin (TPO)

- 34 • Minimum UL 790 Fire-resistiveness Class: A

- 35 • Color: White.

- 36 • Thickness: 60 Mil

- 37 • Sheet Size: Largest practicable

38

39 • ROOF DECK SHEATHING

40

- 41 • Manufacturer & Brand: Firestone 'DensDeck', or approved.

- 42 • Thickness: 3/8 inches

- 43 • Flame Spread Rating: 0

- 44 • Smoke Development Rating: 0

- 45 • Extent of Work: Provide over Metal Deck and Parapet Wall Surfaces to receive Roofing.

46

47 • JOINT REINFORCING TAPE

- 1  
2 • Brand: MM 6125 RE-EV  
3 • Thickness: 215 mils  
4 • Extent of Work: Cover Joints between adjacent Sheathing Panels.  
5  
6  
7 • VAPOR RETARDER  
8  
9 • Owens Corning Permastop, Fortifiber Vaporstop 298, Reef Griffolyn, or approved.  
10  
11  
12 • CRICKET FORMING BOARD  
13  
14 • Material: Polyisocyanurate Insulation Board, or approved.  
15 • Manufacturer: Contractor's choice  
16 • Minimum Density: 1-1/2 pcf  
17 • Shape: Tapered 1/2 per ft., minimum.  
18 • Extent of Work: Provide where necessary to form Roof Slope Crickets.  
19  
20  
21 • ADHESIVE, CEMENT, MASTIC, & SEALANT  
22  
23 • Furnished by Membrane Manufacturer.  
24  
25  
26 • NAILING STRIPS, CURBS, & BLOCKING  
27  
28 • Materials: Recommended by Membrane Manufacturer for conditions of use  
29 • Source: Furnished by Membrane Manufacturer  
30  
31  
32 • FLASHING MEMBRANE  
33  
34 • Manufacturer: Approved by Roofing Membrane Manufacturer  
35 • Material: Match Membrane  
36 • Color: Match Roofing Membrane  
37 • Thickness: 60 mil.  
38  
39  
40  
41 • PROTECTION MAT  
42  
43 • Manufacturer & Brand: Firestone 'UltraPly' TPO Walkway Pad, or approved.  
44 • Extent of Work: Provide between Roofing Membrane and Paver Pedestals and as  
45 defined in the drawings.  
46  
47

1

2 • PART 3 - EXECUTION

3

4

5 • EXISTING CONDITIONS

6

7 • Verify that Surfaces to receive Roofing System are clean, smooth, sound, dry, and free  
8 of sharp edges, fins, grease, oil, water, ice, frost, foreign matter, and other conditions  
9 that could adversely affect Roofing execution and permanence, and are otherwise  
10 properly prepared.

11 • Prior to starting Work notify General Contractor about defects requiring correction.

12 • Do not start Work until conditions are satisfactory.

13 • Do not start until other Work which penetrates Membrane is completed.

14

15

16 • PROTECTION

17

18 • Protect other Work against damage and discoloration caused by Work of this Section.

19 • Prevent Adhesive Solvent Fumes from being drawn into Building Ventilation System.

20

21

22 • SURFACE PREPARATION

23

24 • Prior to roofing, remove from Roof Deck any oil, grease, debris, obstruction, snow, ice,  
25 moisture, or projections which could damage System.

26

27

28 • SHEATHING INSTALLATION

29

30 • Mechanically fasten to Substrate in accordance with Regulatory Agency requirements.

31

32

33 • CRICKET BOARD INSTALLATION

34

35 • Form into shapes shown on Drawings.

36 • Secure Board to Roof Sheathing with Adhesive.

37 • Maintain 1/2 inch per ft. minimum slope at Cricket Valleys.

38

39

40

41 • VAPOR RETARDER INSTALLATION

42

43 • Apply, in accordance with Membrane Manufacturer's instructions, over Decks to  
44 receive Thermal Insulation.

45 • Minimum Side Laps: 2 inches

46 • Minimum End Laps: 6 inches

47 • Seal Edge, Perimeter, and Penetration Laps with Adhesive.

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- INSULATION INSTALLATION

- General:

- Apply in dry condition in accordance with Manufacturer's instructions and Regulatory Agency requirements.
- Apply in 2 or more layers to specified overall thickness.
- Stagger Joints between adjacent Insulation layers at least 8 inches.
- Maximum Open Space between adjacent Insulation Sheets: 1/8 inch
- Position long sides of Insulation Sheets with Continuous Joints. Stagger adjacent Transverse Joints.
- Neatly cut and fit Insulation at Roof Edges and at any Vertical Projections through Insulation. Fill Open Spaces with Edge Expansion Strips.
- Miter Insulation at any Ridges.
- Do not damage Insulation edges or faces during installation.
- At Sloping Insulation maintain the following:
  - 1/4 inch per ft. minimum slope.
  - Minimum specified thickness at Roof Drains.
  - Provide tapered Fiber Edge Strip at any exposed Insulation edges.
- At Roof Drains:
  - Taper top layer of Insulation for 24 inches around and downward toward Drain.

- MEMBRANE INSTALLATION

- Follow Manufacturer's instructions using Fully Adhered method.
- Place Sheet in final position without stretching.
- Allow Sheets to relax 30 minutes minimum before making splices or anchoring to Substrate.
- Overlap adjacent Sheets at least 3 inches for splicing.
- Remove any Wrinkles or Air Pockets.
- Secure Membrane as instructed by Membrane Manufacturer.
- Make Seams and Penetrations watertight.
- Check Seam sealing for continuity and integrity.
- Prior to end of each Working Day, seal exposed Seam edges with Sealant.
- Flash Membrane perimeter and penetrations as instructed by Membrane Manufacturer.

- FLOOD TESTING

- Prior to covering Membrane, flood Roofing with nominally 1/4 inch of water and a maximum of 3 inches, for at least 4 hours.
- Repair any Leaks or, if so directed, replace Roofing, and repeat Test.

- 1 • PROTECTING COMPLETED WORK
- 2
- 3 • Prevent Water-flow beneath or behind any completed Work.
- 4 • Notify General Contractor to protect completed Work against damage and discoloration
- 5 caused by workmen of other Trades.
- 6
- 7
- 8 • WASTE MANAGEMENT
- 9
- 10 • Collect Scrap Materials, and deposit where directed for recycling.
- 11
- 12
- 13 • CLEANING & REPAIRING
- 14
- 15 • Including Work of other Sections, clean, repair and touch-up, or replace when directed,
- 16 Products which have been soiled, discolored, or damaged by Work of this Section.
- 17 • Remove debris from Project Site upon Work completion, or sooner if directed.
- 18
- 19
- 20
- 21
- 22 END OF SECTION
- 23
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- 1  
2 • PART 1 - GENERAL  
3  
4  
5 • CONTRACT CONDITIONS  
6  
7 • Work of this Section is bound by the Contract Conditions and Division 1, bound  
8 herewith, in addition to this Specification and accompanying Drawings.  
9  
10  
11 • RELATED WORK SPECIFIED IN OTHER SECTIONS  
12  
13 • Single Ply Roofing: Section 07530  
14 • Field Painting: Section 09900  
15  
16  
17 • COORDINATION  
18  
19 • Coordinate with other Trades affecting or affected by Work of this Section.  
20  
21  
22 • SAMPLES  
23  
24 • Prior to starting Work submit two 12x12 inch samples of Factory-painted  
25 Sheetmetal.  
26 • Show color and thickness.  
27  
28  
29 • PRODUCT DELIVERY, STORAGE, & HANDLING  
30  
31 • Package Factory-painted Materials with Non-sticking Paper or Strippable Film  
32 Coating between adjacent Sheets.  
33 • Protect against damage and discoloration.  
34  
35  
36 • PRODUCT DELIVERY, STORAGE, & HANDLING (Cont.)  
37  
38 • Do not bend, warp, or twist Sheets.  
39 • Ventilate stored Sheets as required to prevent Condensation build-up between  
40 Sheets.  
41 • Do not overload Roof Structure with Stored Materials.  
42  
43  
44 • FIELD MEASUREMENTS  
45  
46 • Verify prior to fabrication.

- 1       • If field measurements differ slightly from Drawing dimensions modify Work as required  
2       for accurate fit. If measurements differ substantially, notify Architect prior to fabrication.  
3  
4  
5       • MAINTENANCE WARRANTY  
6  
7       • Warrant Sheetmetal Flashing and Trim to be weatherproof for 2 years following  
8       Project Substantial Completion date, and repair or replace without additional cost to  
9       Owner any water leaks and resulting damage to Building Materials and/or Building  
10       Contents as may occur under normal usage within Warranty Period.  
11       • Warrant for 20 years following Project Substantial Completion that Factory-applied  
12       Enamel Coatings on Sheetmetal will not fade, chalk, craze, chip, crack, peel,  
13       delaminate, or otherwise deteriorate.  
14  
15  
16  
17       • PART 2 - PRODUCTS  
18  
19       • GALVANIZED STEEL SHEETS  
20  
21       • Where Exposed to View:  
22       • Metal Manufacturing Standards: ASTM A-653  
23       • Minimum Coating Designation: G-90  
24       • Pattern: Smooth without texture  
25       • Minimum Metal Thickness: Specified below  
26       • Finish:  
27       • Fluoropolymer Enamel with 70% minimum PVDF content  
28       • Minimum Dry Film Thickness: 1 mil  
29       • Color: Match existing.  
30  
31       • Where Concealed from View:  
32       • Manufacturing Standard: ASTM A-653  
33       • Quality: Lock-forming.  
34       • Minimum Metal Thickness: Specified below  
35       • Minimum Coating Designation: G-90  
36       • Pattern: Smooth without texture  
37  
38  
39       • STAINLESS STEEL SHEETS  
40  
41       • Manufacturing Standard: ASTM A-167  
42       • Type: 304  
43       • Temper: Soft, fully annealed.  
44       • Thickness: Specified below  
45       • Finish: 2D, dull.  
46       • Pattern: Flat without texture  
47

- 1       • REGLETS  
2  
3       • Manufacturer: Contractor's choice  
4       • Type: Shown on Drawings, unless otherwise required by conditions of use.  
5       • Material: 24 ga. Galvanized Steel  
6       • Finish: Factory-paint or field-paint to match adjacent Sheetmetal Flashing color.  
7       • Accessories: Provide all necessary including Factory-formed Corners and Joint  
8       Connectors.  
9       • Extent of Work: Provide where necessary for Flashing installation.  
10  
11  
12       • NAILS  
13  
14       • Manufacturing Standard: Fed. Spec. FF-N-105B  
15       • Type: Barbed, slating.  
16       • Head: Flat  
17       • Material: Hot-dip Galvanized Steel Wire  
18       • Minimum Length: 1 inch  
19  
20  
21       • SCREWS  
22  
23       • Manufacturing Standard: Fed. Spec. FF-S-107  
24       • Type: Self-tapping  
25       • Head: Pan  
26       • Material: Cadmium-plated Steel  
27       • Minimum Size: No. 7  
28       • Minimum Length: 1 inch  
29  
30  
31       • RIVETS  
32  
33       • Type: As required by conditions of use  
34       • Material: Stainless Steel  
35       • Minimum Diameter: 1/8 inch  
36       • Length: Recommended by Rivet Manufacturer for conditions of use  
37  
38  
39       • SEALANT  
40  
41       • Manufacturer & Brand: Dow 999-A, GE Silicone II, Mameco Vulkem 116, Ruscoe  
42       Permanent Sealer, Sonneborn NP-1, Tremco Gutter Seal, or approved.  
43  
44  
45       • ASPHALT PLASTIC CEMENT  
46  
47       • Manufacturing Standard: Fed. Spec. SS-C-153

- 1       • Type: I  
2  
3  
4       • PRIME COATING & UNDERCOATING  
5  
6       • For Galvanized Steel: Galvanized Primer specified in Section 09900  
7       • For Stainless Steel: Zinc Chromate Primer specified in Section 09900  
8  
9  
10       • ASPHALT COATING COMPOUND  
11  
12       • Manufacturing Standard: Fed. Spec. TT-C-494  
13       • Type: II  
14  
15  
16       • FABRICATION  
17  
18       • General:  
19           • Form to shapes and dimensions shown with planes and lines in true alignment.  
20           • Unless otherwise shown on Drawings or specified, fabricate with longest  
21           practicable lengths.  
22           • Form Openings Head and Sill Flashing with End Dams.  
23           • Hem exposed edges.  
24           • Angle bottom edges of vertical surfaces to form drip.  
25       • Seams:  
26           • Common Lock Seams: 3/4 inch finish width; 4-ply loose-locked.  
27           • Flat Lock Seams: 5/8 inch finish width; 4-ply flat locked, malleted tight; sweat  
28           full with Solder.  
29           • Single Corner Seams: 3/4 inch finish width; 3-ply loose locked.  
30           • Double Corner Seams: 5/8 inch finish width; 4-ply loose locked.  
31           • Lap Seams: 3 inch finish width.  
32           • Solder-Lap Seams: 1 inch finish width; sweat full with Solder.  
33           • Cover Plate Seams:  
34               • Space abutting Sheets 1/2 inch; cover Joint with 4 inch wide Cover and  
35               Back-up Plates set in Sealant.  
36               • Match Plates to Flashing profile.  
37               • Secure Plates to Substrate with Screw installed through Open Space  
38               between adjacent Flashing Sheets.  
39           • S-Lock Seams: Form 1-1/4 inch wide "S" shaped Seam on one edge of  
40           Flashing Sheet for concealed fastening.  
41       • Cleats: Same Material and thickness as adjacent Sheetmetal Sheets.  
42  
43  
44       • EXISTING CONDITIONS  
45  
46       • Verify that Surfaces to receive Sheetmetal are smooth, clean, and otherwise properly  
47       prepared.

- 1  
2  
3     • Verify that Reglets and Nailers to receive Sheetmetal are properly placed.  
4     • Prior to starting Work notify General Contractor of defects that require correction.  
5     • Do not start Work until conditions are satisfactory.  
6  
7  
8     • PROTECTING WORK OF OTHER SECTIONS  
9  
10    • Protect against damage and discoloration caused by Work of this Section.  
11  
12  
13    • INSTALLATION, GENERAL  
14  
15    • Install Work watertight, without waves, warps, buckles, tool marks, fastening  
16    stresses, distortion, or defects which impair strength or mar appearance.  
17    • Install planes and lines in true alignment.  
18    • Allow for Sheetmetal expansion and contraction.  
19  
20  
21    • CLEAT INSTALLATION  
22  
23    • Space 2 ft on center, unless continuous Cleats or other spacings are specified hereunder.  
24    • Secure spaced Cleats to Substrate with 2 Fasteners to prevent Cleat rotation.  
25    • Secure Continuous Cleats to Substrate with Fasteners spaced at 12 inch maximum centers.  
26    • Cover Fastener Heads with Cleat Tabs folded back over Fastener Head.  
27  
28  
29    • REGLET INSTALLATION  
30  
31    • Install in accurate locations, straight, in-line, and with leak-proof Joints.  
32    • Caulk any surface-mounted Reglets with Sealant.  
33  
34  
35    • SOLDERING  
36  
37    • At Factory-painted Sheetmetal: Substitute Sealant in lieu of soldering.  
38    • Elsewhere:  
39      • Clean and flux Metals prior to soldering.  
40      • Sweat Solder completely through Seam widths.  
41  
42  
43    • SEALANT INSTALLATION  
44  
45    • Apply 1/4 inch diameter Bead, centered in full length of Joint.  
46  
47

- 1       • ASPHALT PLASTIC CEMENT INSTALLATION  
2  
3       • Trowel apply 1/8 inch thick.  
4  
5  
6       • PAINTING  
7  
8       • Where Sheetmetal is scheduled to receive Field Painting, shop-apply Primer Coat as  
9       specified in Section 09900. Minimum Primer Coat dry film thickness: 1-1/2 mils.  
10       • Protect Galvanized Steel against corrosion with Asphaltic Coating Compound:  
11       Minimum Dry Film Thickness applied to each Contacting Face: 7-1/2 mils  
12  
13  
14       • COUNTER FLASHING  
15  
16       • Form of 24 ga. Galvanized Steel.  
17       • Overlap Base Flashing 4 inches minimum.  
18       • Install Bottom Edge spring-tight against Base Flashing, or at Contractor's option  
19       secure Bottom Edge with 1 inch wide Clips spaced no greater than 24 inch o.c.  
20       Attach Clips to Substrate with concealed Fasteners. Reinforce Clips by double-  
21       bending Clip 3/4 inch back over bottom edge of Counter Flashing.  
22       • Lap-seam Vertical Joints, and apply Sealant.  
23       • Miter, Lap-seam, and close Corner Joints with Solder.  
24       • Provide where Roof intersects Vertical Surfaces, and elsewhere shown on Drawings.  
25  
26  
27       • COPINGS  
28  
29       • Form of 24 ga. Galvanized Steel.  
30       • Fabricate with Cover Plate Seams spaced approximately 10 ft. apart.  
31       • Miter and join Corners with Cover Plate Seams.  
32       • Lock Exterior Edges over Continuous Cleats secured to Substrate.  
33       • Lock Interior Edges over Spaced Cleats secured to Substrate.  
34       • Slope Coping top toward Roof.  
35  
36  
37  
38       • PARAPET WALL COVERING  
39  
40       • Form of 24 ga. Galvanized Steel.  
41       • Fabricate with continuous Horizontal Seams.  
42       • Anchor Seams to Substrate with Cleats spaced 12 inches apart, maximum.  
43       • Hook top edge of Covering into hemmed edge of Coping.  
44       • Attach bottom edge of Covering to top of Counter Flashing with Common Lock  
45       Seams.  
46       • Bend Covering around Corners 12 inches, minimum.  
47       • Cover inside face of Parapet Walls, unless otherwise shown on Drawings.

- 1  
2  
3     • ROOF PENETRATION FLASHING  
4  
5     • General:  
6         • Form of 24 ga. Galvanized Steel.  
7     • Base Flashing:  
8         • Extend Flange onto Roof 6 inches minimum in all directions away from  
9             Penetration, and upward around Penetration to position at least 2 inches above  
10             Roof surface.  
11         • Solder-lap Joints.  
12         • Furnish to Roofer for installation.  
13     • Counter Flashing:  
14         • Overlap Base Flashing at least 1 inch with Storm Collar sloped away from  
15             Penetration.  
16         • Secure to Penetration with Solder.  
17  
18  
19     • EQUIPMENT SUPPORT FLASHING  
20  
21         • Form of 18 ga. Galvanized Steel.  
22         • Fully cap Support.  
23         • Overlap Base Flashing 4 inches.  
24         • Solder-lap Joints.  
25         • Provide Sealant around Penetrations, if any.  
26         • Provide at Roof-mounted Equipment.  
27  
28     • MISCELLANEOUS FLASHING  
29  
30         • Provide 26 ga. Stainless Steel Flashing with End Dams around Doors, Windows, and  
31             other Openings in exterior Walls, where shown on Drawings, and elsewhere  
32             necessary to maintain Building watertight.  
33  
34  
35     • PART 3 - EXECUTION  
36  
37  
38     • CLEANING & REPAIRING  
39  
40         • As Work progresses, neutralize excess flux with 5% to 10% Washing Soda Solution,  
41             and thoroughly rinse.  
42         • Immediately after installation remove Protective Covering from Factory Painted Sheetmetal.  
43         • Including Work of other Sections, clean, repair and touch-up, or replace when  
44             directed, Products which have been soiled, discolored, or damaged by Work of this  
45             Section.  
46         • Leave non-factory-painted surfaces ready for Field Painting specified in Section  
47             09900.

- 1 • Remove Debris from Project Site upon Work completion, or sooner if directed.

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END OF SECTION

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- PART 1 - GENERAL
- CONTRACT CONDITIONS
- Work of this Section is bound by the Contract Conditions and Division 1, bound herewith, in addition to this Specification and accompanying Drawings.
- WORK INCLUDED
- In accordance with governing laws, regulations, codes, and requirements; seal Openings through Fire-rated Assemblies as required to prevent the passage or spread of Flame, Smoke, and Hot Gases, including the following:
  - Mechanical Piping, Ductwork, and Electrical Conduit passing through Fire-rated Walls, CMU Walls, Floors, and Ceilings.
  - Open Joints located between adjacent Fire-rated Walls, Floors, & Ceilings.
  - Open Cells between Steel Decking and adjacent Fire-rated Construction.
- RELATED WORK SPECIFIED IN OTHER SECTIONS
- Joint Sealants: Section 07920
- WORKER'S QUALIFICATIONS
- Employed by or acceptable to Fire Stopping Manufacturer.
- REGULATORY AGENCY REQUIREMENTS
- Fire Stopping shall comply with governing Building Code requirements, including successfully passing Hose Stream Tests specified in IBC Sections 712 & 713.
- COORDINATION
- Coordinate with other Trades affecting or affected by Work of this Section.
- PART 1 - GENERAL
- CERTIFICATE OF COMPLIANCE

- 1 • Upon Work completion, submit Manufacturer's written certification that Fire Stopping  
2 has been installed in accordance with these Specifications and in compliance with  
3 Regulatory Agency Requirements.  
4  
5  
6
- 7 • **FIELD MOCK UP**  
8
- 9 • Provide typical examples of each type of Fire Stopping for Architect's review.  
10 • Reprepare, if necessary, until Mock Ups are accepted.  
11 • Accepted Mock Ups represent minimum standard of acceptability, and Work of lesser  
12 quality is subject to rejection.  
13 • Approved Mock Ups may be used on Project Work.  
14  
15
- 16 • **PRODUCT DELIVERY, STORAGE, & HANDLING**  
17
- 18 • Deliver Products to Jobsite in original unopened Containers. Save Containers for  
19 Architect's inspection.  
20 • Protect Products against damage.  
21 • Do not exceed Product "shelf life".  
22 • Immediately remove from Project Site any damaged or out-of-date Products.  
23  
24
- 25 • **ENVIRONMENTAL REQUIREMENTS**  
26
- 27 • Perform no Work when Work Conditions exceed Fire Stopping Manufacturers'  
28 specified limits.  
29  
30
- 31 • **ADVANCE NOTICES**  
32
- 33 • Notify Architect at least 48 hours prior to covering-over Work of this Section, so that  
34 Inspections can be made.  
35  
36  
37  
38
- 39 • **PART 2 - PRODUCTS**  
40  
41
- 42 • **FIRE STOPPING**  
43
- 44 • Manufacturer: Firestop Systems, GE, Hilti, 3M, RectorSeal, STI, USG, or approved.  
45 • Material: Shall contain no Asbestos, Halogens, Lead, or Volatile Solvents.  
46 • Type: Caulk, Wrap, Strip, Sheet, Mortar, Collars, Foams, Pillows, Pads, Board, or  
47 Putty as required by conditions of use.

- 1 • Fire-resistiveness: Rated for use as Through-Penetration Fire stopping in accordance  
2 with ASTM E-814 or UL 1479  
3 • Performance Requirements:  
4 • Fire Stopping shall be flexible, moisture resistant, and it shall not shrink or pull  
5 away from contact surfaces.  
6 • Fire Stopping must comply with South Coast Air Quality Management Rule 1168  
7 and Bay Area Air Quality Management District Regulation #8 rule 51  
8 • Paintability: Fire Stopping, if and where exposed to view, shall be paintable or capable  
9 of receiving Finish Materials where so specified in other Sections.

10

11

12

13 • PART 3 - EXECUTION

14

15

16 • EXISTING CONDITIONS

17

- 18 • Verify that Surfaces to receive Fire Stopping are clean, dry, and free from Dust, Oil,  
19 Grease, Rust, Lacquer, loose Mortar, Ice, Frost, or other Bond-reducing Matter.  
20 • Allow Concrete Surfaces to cure at least 4 weeks before applying Sealant.  
21 • Prior to starting Work, notify General Contractor about defects requiring correction.  
22 • Do not start Work until conditions are satisfactory.

23

24

25 • PROTECTING WORK OF OTHER SECTIONS

26

- 27 • Protect against damage and discoloration caused by Work of this Section.  
28 • Do not contaminate adjacent Materials.  
29 • Mask Surfaces adjacent to Fire Stopping as required for protection.

30

31

32 • SURFACE PREPARATION

33

- 34 • Remove Dust, Dirt, Wax, Moisture, Ice, Frost, and any other Foreign Matter from  
35 Surfaces to receive Fire Stopping.  
36 • If and where necessary, provide Backing Support to receive Fire Stopping.

37

38

39 • PRIMING

40

- 41 • If and where so recommended by Fire Stopping Manufacturer, prime Surfaces to  
42 receive Fire Stopping.  
43 • Follow Primer Manufacturer's instructions.

44

45

46

47

- 1 • FIRE STOPPING INSTALLATION
- 2
- 3 • Follow Manufacturer's instructions and Building Code requirements.
- 4 • Fill Openings as required to ensure effective Fire and Smoke Barrier.
- 5 • Install flush with adjacent Surface.
- 6 • Remove excess Fire stopping and any Masking Materials.
- 7 • Leave exposed Surfaces neat and smooth.
- 8
- 9
- 10 • PRODUCT CLEANING & REPAIRING
- 11
- 12 • Including Work of other Trades, clean, repair and touch-up, or replace when directed,
- 13 Products which have been soiled, discolored, or damaged by Work of this Section.
- 14 • When removing spilled or excess Fire Stopping, do not damage adjacent Surfaces.
- 15 • Remove Debris from Project Site upon Work completion, or sooner if directed.
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23

END OF SECTION

- 1
- 2 • PART 1 - GENERAL
- 3
- 4
- 5 • CONTRACT CONDITIONS
- 6
- 7 • Work of this Section is bound by the Contract Conditions and Division 1, bound
- 8 herewith, in addition to this Specification and accompanying Drawings.
- 9
- 10
- 11 • EXTENT OF WORK
- 12
- 13 • Caulk Exterior Joints as follows:
- 14 • Joints between adjacent Dissimilar Materials: Polyurethane Sealant
- 15 • Elsewhere caulking is shown on Drawings or required to weatherproof
- 16 Building: Polyurethane Sealant
- 17
- 18
- 19 • RELATED WORK SPECIFIED IN OTHER SECTIONS
- 20
- 21 • Sealing Sheetmetal Joints: Section 07620
- 22 • Sealant-type Firestopping: Section 07840
- 23
- 24
- 25 • COORDINATION
- 26
- 27 • Coordinate with other Trades affecting or affected by Work of this Section.
- 28
- 29
- 30 • INSTALLER'S QUALIFICATIONS
- 31
- 32 • Installer must have successfully completed at least 2 similar Projects, and be in full-
- 33 time business performing Work of this type.
- 34
- 35
- 36 • PRODUCTS LIST
- 37
- 38 • In accordance with Section 01340, submit for each Sealant used MSD or Product Data
- 39 Sheets which identify VOC emission rate.
- 40
- 41
- 42
- 43 • FIELD MOCK UP
- 44
- 45 • Provide examples of each type of Joint Sealant for Architect's review.
- 46 • Reprepare, if necessary, until Mock Up is accepted.

1 • Accepted Mock Ups represent minimum standard, and Work of lesser quality is subject  
2 to rejection.

3 • Approved Mock Ups may be used on Project Work.  
4

5

6

7 • PRODUCT DELIVERY, STORAGE, & HANDLING

8

9 • Protect against damage and discoloration.

10 • Store in original, tightly sealed Containers, and with original legible Labels thereon.

11 Do not open Containers or remove Labels until Architect reviews.

12 • Do not exceed Sealant shelf life.  
13

14

15

16 • WEATHER REQUIREMENTS

17

18 • Perform no Work when weather exceeds Manufacturer's specified limits.  
19

20

21

22 • WARRANTY

23

24 • Warrant Joint Sealant Work for 5 years following Project Substantial Completion date

25 that Sealants will not loose their adhesion or cohesion, that Work of this Section will

26 remain weatherproof, and that Contractor will repair and/or replace without additional

27 cost to Owner any water leaks and resulting damage to Building Materials and/or

28 Building Contents as may occur under normal usage within Warranty Period.  
29

30

31

32

33 • PART 2 - PRODUCTS

34

35

36 • SEALANTS - GENERAL

37

38

39

40 • POLYURETHANE SEALANT

41

42 • Manufacturer & Brand: Contractor's choice

43 • Components: 1

44 • Type: Non-sag

45 • Manufacturing Standard: ASTM C-920, Type S, Class 25, Grade NS

46 • ASTM C-661 Shore A Hardness Range: 15-25

47 • Joint Movement Range: Plus or Minus 50%

48

49

50

51

- 1 • ACRYLIC LATEX SEALANT
- 2
- 3 • Manufacturer & Brand: Contractor's choice
- 4 • Components: 1
- 5 • Manufacturing Standard: ASTM C-834
- 6 • Minimum ASTM C-736 Recovery: 75%
- 7 • Joint Movement Range: Plus or Minus 7½ %
- 8
- 9
- 10 • FOAM AIR-INFILTRATION SEALANT
- 11
- 12 • Manufacturer & Brand: Grace Polycel One, or approved.
- 13
- 14
- 15 • SEALANT COLORS
- 16
- 17 • Foam Sealant: Contractor's choice
- 18 • All Other: Approximate color of Adjacent Surfaces, unless otherwise indicated, and
- 19 subject to Architect's approval.
- 20
- 21
- 22 • PRIMER & SURFACE CONDITIONER
- 23
- 24 • Manufacturer & Type: Recommended by Sealant Manufacturer
- 25
- 26
- 27 • BACKER ROD
- 28
- 29 • Manufacturer & Brand: Contractor's choice
- 30 • Material: Closed-cell, soft-rod, formed without Freon Gas, and recommended by
- 31 Sealant Manufacturer for conditions of use.
- 32 • Diameter: 25% greater than Joint width
- 33 • Extent of Work: Provide for all Sealants, except Foamed types.
- 34
- 35
- 36 • BOND BREAKER TAPE
- 37
- 38 • Manufacturer & Brand: Contractor's choice
- 39 • Material: Polyethylene Tape, or approved.
- 40 • Extent of Work: Where Backer Rod can not be used, provide Tape where necessary to
- 41 prevent 3-sided adhesion of Sealant to Substrate
- 42
- 43
- 44 • FOAM SEALANT DAMS
- 45
- 46 • Material: Contractor's choice
- 47 • Minimum UL Fire Resistance Rating:

- 1           • At Dams Remaining in Place: Match adjacent Wall or Floor Rating.  
2           • At Dams to Be Removed: None required  
3  
4  
5  
6   • PART 3 - EXECUTION  
7  
8  
9   • EXISTING CONDITIONS  
10  
11   • Verify that Joints to be sealed are clean, dry, and free from Dust, Oil, Grease, Rust,  
12    Lacquer, loose Mortar, Ice, Frost, or other Bond-reducing Matter. If necessary, remove  
13    Bond-reducing Matter by grinding.  
14   • Verify that Sealants are compatible with Substrate.  
15   • Allow Concrete Surfaces to cure at least 4 weeks before applying Sealant.  
16   • Prior to starting Work, notify General Contractor about defects requiring correction.  
17   • Do not start Work until conditions are satisfactory.  
18  
19  
20   • PROTECTING WORK OF OTHER SECTIONS  
21  
22   • Protect against damage and discoloration caused by work of this Section.  
23   • Mask Surfaces adjacent to Joints as required for complete protection.  
24  
25  
26   • SURFACE PREPARATION  
27  
28   • Remove Dust, Dirt, and any other Foreign Matter from Joints to be sealed.  
29  
30  
31   • PRIMING  
32  
33   • Where so recommended by Sealant Manufacturer, prime Surfaces to receive Sealant.  
34   • Apply with Bristle Brush.  
35   • Do not flood surfaces.  
36  
37  
38   • BACKER ROD INSTALLATION  
39  
40   • Using Wheeled Tool, install Backer Rod behind Sealant in accordance with Sealant  
41    Manufacturer's instructions.  
42   • Provide in continuous, one-piece lengths where practicable. Where discontinuous  
43    pieces are necessary, butt Rod Joints neatly and snugly.  
44   • Force Rods into Joints to uniform depth, approximately 1/2 Joint width (1/4 inch  
45    minimum and 5/8 inch maximum).  
46   • Do not stretch, twist, puncture, or tear Rods. Replace any damaged Rods.  
47

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- DAM INSTALLATION
- Provide around Wall and Floor Penetrations to receive Foam Penetration Sealant.
- FOAM SEALANT INSTALLATION
- Follow Sealant Manufacturer's instructions.
- Inject Sealant continuously until Opening is filled.
- If Opening is not filled within Sealant Snap Time or maximum of 3 minutes, stop application for at least 15 minutes before resuming work.
- Trim cured Foam flush with Adjacent Surface.
- Remove any combustible Dams.
- POLYURETHANE & ACRYLIC LATEX SEALANT INSTALLATION
- Apply in accordance with Manufacturer's instructions using Hand or Pressure Gun type Dispenser.
- Size Gun Nozzle to fit Joint.
- Force Sealant into Joints firmly against Joint Sides to fill Joints and Voids solid; superficial pointing with Skin Bead not acceptable.
- Prevent 3-sided adhesion of Sealant to Substrate.
- Install Sealant flush with Adjacent Surface.
- Within 10 minutes after installation, and using Dry Tool finish Sealant to smooth, uniform, and slightly concave shape.
- Remove excess Sealant and Masking Materials, if any, immediately after Sealant installation.
- Leave Sealant Surfaces neat and smooth.
- WASTE MANAGEMENT
- Place used Sealant Tube and Containers in containers for Hazardous Materials.
- PRODUCT CLEANING & REPAIRING
- Including Work of other Trades, clean, repair and touch-up, or replace when directed, Products which have been soiled, discolored, or damaged by Work of this Section.
- Remove Debris from Project Site upon Work completion, or sooner if directed.

END OF SECTION

- 1  
2 • PART 1 - GENERAL  
3  
4  
5 • CONTRACT CONDITIONS  
6  
7 • Work of this Section is bound by the Contract Conditions and Division 1, bound  
8 herewith, in addition to this Specification and accompanying Drawings.  
9  
10  
11 • RELATED WORK SPECIFIED IN OTHER SECTIONS  
12  
13 • Joint Sealants: Section 07920  
14  
15  
16 • COORDINATION  
17  
18 • Coordinate with other Trades affecting or affected by Work of this Section.  
19  
20  
21 • PRODUCTS LIST  
22  
23 • Before ordering, submit complete List of Materials proposed for use.  
24 • Obtain Architect's acceptance before ordering.  
25  
26  
27 • COLOR SAMPLES  
28  
29 • In accordance with Section 01340, submit 2 Samples of each specified Finish, Color,  
30 and Sheen.  
31 • Minimum Sample Size: 8-1/2 x 11 inches  
32 • Sample Substrates:  
33 • For Paint: Stiff Paper, or approved.  
34 • Obtain Architect's acceptance before proceeding with Contract Work.  
35  
36  
37  
38 • FIELD MOCK UP  
39  
40 • Before proceeding with Contract Work, apply where directed each specified Coating on  
41 actual Work Surfaces.  
42 • Include at least the following:  
43 • Walls: 100 sq. ft.  
44 • Simulate Contract Lighting during Architect's review.  
45 • Accepted Mock Up represents Minimum Acceptance Standard for Subsequent Work.  
46 • Accepted Mock Up, in like-new condition, may be used in Contract Work.

- 1 • Prior to starting Project Work, adjust Mock-up Colors as directed by Architect at no  
2 additional cost to Owner.  
3  
4
- 5 • CERTIFICATE OF COMPLIANCE  
6
- 7 • Submit Affidavit from Paint Manufacturer's Architectural Service Representative that  
8 Products and Work of this Section comply with these Specifications.  
9  
10
- 11 • PRODUCT DELIVERY, STORAGE, & HANDLING  
12
- 13 • Deliver in Manufacturer's original, unopened Containers with legible Labels intact.  
14 • Do not open Containers or remove Labels until Architect inspects.  
15 • Store in suitable location where directed by General Contractor.  
16 • Protect against damage and contamination.  
17 • Remove unacceptable Materials from Project Site.  
18  
19
- 20 • PRODUCT LABELS  
21
- 22 • Each Product Container Label shall include:  
23 • Manufacturer's Name  
24 • Type of Material  
25 • Manufacturer's Product Number  
26 • Manufacturer's Batch Number  
27 • Color  
28 • Instructions for reducing when applicable  
29  
30
- 31 • WORK SPACE ENVIRONMENTAL REQUIREMENTS  
32
- 33 • Comply with Manufacturer's recommendations.  
34 • Perform Work only under the following conditions, unless otherwise instructed by  
35 Manufacturer:  
36 • Maximum Relative Humidity: 85%  
37 • Minimum Dew Point Variance between Air & Surface Temperature: 5 °F.  
38 • Minimum Ambient Air & Surface Temperature during application and until  
39 Film is dry-hard thereafter:  
40 • At Epoxy Coatings: 70 °F.  
41 • Elsewhere: 45 °F.
- 42 • Do not work:  
43 • Where Dust, Air-borne Particles, or Insects are present.  
44 • Where Inclement Weather may damage Coating Surface.  
45 • With less than 30 ft. candles of Available Light measured 3 ft. above Floor.  
46  
47

1 • EXTRA STOCK

2

3 • Submit, in previously unopened Containers, 1 gallon of each color of each Top Coat.

4 • Label each Container with Product-identification and Use-location.

5 • Store on Project Premises where directed by Owner.

6

7

8

9 • PART 2 - PRODUCTS

10

11

12 • GENERAL

13

14 • Products for each general purpose shall be of same Manufacturer. Do not use Products  
15 of different Manufacturers over one another, except for Shop Prime Coats specified in  
16 other Sections.

17 • Products shall be free of Lead and Mercury.

18 • Products shall have good flowing and brushing properties and shall dry or cure free of  
19 Blemishes or Sags.

20 • Products shall not exceed Code-required Flame-spreads or Smoke-developments.

21

22

23 • GALVANIZED STEEL PRETREATMENT MATERIAL

24

25 • Manufacturer & Brand: Amchem Galvaprep, or approved.

26

27

28

29 • OTHER COATINGS

30

31 • Products listed below in Paint Schedule shall comply with latest edition of Approved  
32 Products List published by Master Painters Institute (MPI). Copies can be obtained  
33 from Institute at (888) 674-8937, or they can be viewed by Computer at

34 [www.paintinfo.com](http://www.paintinfo.com) and clicking-on either "Product Index Alphabetical" or "Product  
35 Index by MPI Number".

36 • Approved Manufacturers:

37 • Only those Manufacturers who maintain a full-time Local or Regional  
38 Architectural Representative are approved for use on this Project.

39 • Benjamin Moore, ICI, Kelly Moore, Parker, Rodda, & Sherwin Williams are  
40 approved. Others may be approved if they attest to maintaining a full-time  
41 Representative.

42

43

44 • Products shall meet or exceed VOC and Chemical Component limits of Leadership in  
45 Energy & Environmental Design (LEED 2.1) Green Seal requirements, including the  
46 following:

47 • Maximum VOC Content:

- 1                   • Flat & Eggshell Waterborne Latex (Acrylic) Emulsion Paint, if any: 50  
2                   grams/liter  
3                   • Semi-gloss & Gloss Waterborne Latex (Acrylic) Emulsion Paint, if any:  
4                   150 grams/liter  
5                   • Oil-based Paint, if any: 380 grams/liter  
6                   • Waterborne Epoxy, if any: 200 grams/liter  
7                   • Water-based Polyurethane Transparent Stain, if any: 170 grams/liter  
8                   • Maximum Aromatic Hydrocarbon Content:  
9                    • Oil-based Paint, if any: 10%  
10                  • Minimum Post-consumer Recycled Content:  
11                  • For Exterior Use, if any: 90%  
12                  • For Light Colors, if any: 50%  
13                  • Maximum Biocide Content, if any: 0.025%  
14  
15  
16                  • **COLORS**  
17  
18                  • Match existing colors.  
19                  • Manufacturers listed in Approved Products List are approved provided they can supply  
20                  Colors that match scheduled Colors to Architect's satisfaction.  
21  
22  
23                  • **MIXING & TINTING**  
24  
25                  • Follow Manufacturer's instructions.  
26                  • Unless otherwise instructed by Manufacturer, deliver Coatings factory-mixed to Jobsite.  
27                  • Job-mix and Job-tint only when required by Manufacturer.  
28                  • Mix only in clean, rust-resistant Containers.  
29                  • Use Tinting Colors recommended by Coating Manufacturer.  
30                  • Where Thinner is used, do not exceed Coating Manufacturer's recommendations. Do  
31                  not use Kerosene or Organic Solvents to thin Water-based Coatings.  
32  
33                  • **PART 3 - EXECUTION**  
34  
35  
36                  • **EXISTING CONDITIONS**  
37  
38                  • Examine Surfaces to receive Coatings for existing conditions that could adversely  
39                  effect Work execution, permanence, or quality. Give particular attention to Primer  
40                  Coatings applied by other Trades.  
41                  • Verify that General Contractor has removed Door Hardware, as specified in Section 08710.  
42                  • Do not apply Coating over Substrates which exceed the following Maximum Moisture  
43                  Content:  
44                    • Masonry or Concrete: 12%  
45                    • Wood: 15%  
46                    • Plaster or Gypsum Board: 12%  
47                  • Prior to starting Work, notify General Contractor about defects requiring correction.

- 1 • Do not start Work until conditions are satisfactory. Applying Coatings to defective  
2 Substrates indicates acceptance of Defective Substrate by Painter, and Painter shall bear  
3 all costs to produce acceptable Work, including re-painting entire Surface (No touch-up  
4 painting).  
5  
6
- 7 • PROTECTING WORK OF OTHER SECTIONS  
8
- 9 • Protect against damage and discoloration caused by Work of this Section.  
10 • Prior to painting, remove or otherwise protect any Finish Hardware, Accessories, Cover  
11 Plates, Lighting Fixtures, and similar Items. After painting, reinstall Removed Items  
12 and remove Protective Coverings.  
13 • Do not dump Waste Materials, including Thinners, into Landscape Planting Beds,  
14 Plumbing Fixtures, or Storm Drains.  
15 • Cover or otherwise protect Paint Storage and Mixing Rooms.  
16  
17
- 18 • FIRE PROTECTION  
19
- 20 • Take extraordinary care to prevent Fire.  
21 • Open Coating Containers only when needed.  
22 • Keep Rubbing Cloths and Oily Rags submersed in Water.  
23  
24
- 25 • SURFACE PREPARATION  
26
- 27 • General:  
28 • Remove any Loose Material, Dirt, Dust, or Foreign Matter.  
29
- 30 • Concrete:  
31 • Remove excess Form Oil and Curing Compound.  
32 • Where necessary for Coating-adhesion, etch Concrete with Muriatic Acid  
33 Solution. Following treatment, rinse thoroughly and dry.  
34 • Allow Concrete to cure at least 60 days prior to painting.  
35
- 36 • Zinc Alloy & Galvanized Steel:  
37 • Thoroughly clean with Solvent or pressure-wash with Detergent in hot Water.  
38 • Etch Metal with Metal Conditioner or in accordance with Steel Structures  
39 Painting Council Specifications.  
40
- 41 • Stainless Steel:  
42 • Thoroughly clean with Solvent, or pressure-wash with Detergent in hot Water.  
43
- 44 • All other Non-galvanized Ferrous Metal:  
45 • Remove any Rust, Grease, Oil, or loose Scale.  
46 • Aluminum:  
47 • Etch with Phosphoric Acid, or approved.

- 1
- 2 • Other Wood:
- 3 • Clean Soiled Surfaces with Alcohol, or approved.
- 4 • Remove any Mildew by scrubbing with Trisodium Phosphate Solution, treat
- 5 with Bleach Solution, rinse with clean Water, and allow Surfaces to completely
- 6 dry before proceeding with remaining work.
- 7 • Hand-block-sand Surfaces to remove any Raised Grain.
- 8 • At Opaque Coatings seal any Knots, Pitch, and Resinous Sapwood before
- 9 Primer Coat application.
- 10 • Fill any Voids, including set Nail and other Fastener Holes. At any Natural-
- 11 finished Wood, color Filler to match Wood.
- 12 • Apply Clear Sealer-primer to any smooth-surfaced Fir before applying any
- 13 scheduled Penetrating Stain.
- 14 • Surfaces to receive Epoxy Enamel:
- 15 • Follow Coating Manufacturer's instructions.
- 16
- 17
- 18 • COATING APPLICATION
- 19
- 20 • General:
- 21 • Follow Coating Manufacturer's instructions.
- 22 • Do not apply initial Coating until Surface Moisture Content is within limitations
- 23 recommended by Coating Manufacturer. Where in doubt test with Moisture Meter.
- 24 • Except as otherwise specified hereunder, apply Coatings with suitable Brush,
- 25 Roller, or Spray Equipment recommended by Coating Manufacturer.
- 26 • Back-roll or brush-in spray-applied Primer Coats to assure Coating penetration.
- 27 • Maintain Brushes, Rollers, and Spray Equipment clean, free from contaminates,
- 28 and suitably prepared for conditions of use.
- 29 • Do not exceed Coating Manufacturer's specified Coating Application Rate.
- 30 • Follow Coating Manufacturer's recommended Drying Time between succeeding Coats.
- 31 • Apply Finish Coats smooth, free of Brush Marks, Streaks, Laps, Coating Pile-
- 32 up, and Skips.
- 33 • Leave any Moldings and Ornaments clean, true to detail, and without excessive
- 34 Coating build-up in Corners and Depressions.
- 35 • Where Coating abuts other Materials or Colors cut Coating Edge clean, sharp,
- 36 and with no overlap.
- 37 • In addition to Door Faces, finish Door Tops, Bottoms, and Edges as specified
- 38 below. If necessary, remove Doors from Frames.
- 39 • Tint each Coat progressively lighter to enable confirmation of Coat quantities.
- 40 • Sand and dust between each Coat to provide anchor for succeeding Coats, and
- 41 to remove any Defects visible from 36 inch minimum distance.
- 42 • Extend Paint Finish behind Mirrors and other similar Wall-mounted Items.
- 43 • Painted Work:
- 44 • Flat Metalwork, including Doors: Apply Paint with Roller or Airless Spray
- 45 Equipment only. Do not apply by Brush.

- 1           • Roller-applied High-build Coatings: Do not "move" Paint with roller, or stop  
2           rolling prior to roller going dry. Remove roller marks by back-rolling, using  
3           minimum possible pressure, and rolling in 1 direction only.  
4  
5  
6   • FIELD QUALITY CONTROL  
7  
8   • Before proceeding with remaining Work, request Architect to inspect each first-  
9   finished Room, Space, and Item for acceptability.  
10   • Immediately following application, Wet Film Thickness of Coatings may be tested in  
11   compliance with ASTM D-4414.  
12   • After 14 calendar days following application, Coatings may be tested as follows:  
13       • In compliance with ASTM D-4138, Dry Film Paint Thicknesses may be  
14       measured using a Mark II Tooke Coating Inspection Gage, or a similar  
15       Precision Instrument, designed for measuring Paint Coating Thicknesses.  
16       Touch-up Test Surface, which will measure approximately 1 sq. inch per Test.  
17       • In compliance with ASTM D-3359 Tape Test, Coating Adhesion may be  
18       determined.  
19   • Recoat any Work which fails Test.  
20  
21  
22   • WASTE MANGEMENT  
23  
24   • In accordance with Waste Management Plan specified in Section 01640:  
25       • Surplus Paint: Set aside for Owner's reuse or donate to Organization such as  
26       Habitat for Humanity.  
27       • Partly-used Paint Containers: Tightly-seal and store in protected, well-  
28       ventilated, fire-safe area maintained at moderate temperature, and designated  
29       for hazardous materials  
30       • Do not dispose of Paints or Solvents by pouring on Ground. Place in suitable  
31       Containers for proper disposal.  
32  
33  
34   • PRODUCT CLEANING & REPAIRING  
35  
36   • Remove any Spills, Splatters, and Stains including those in Paint Storage and Mixing Room.  
37   • Unless otherwise approved, refinish entire Surface where portion of Coating is unacceptable.  
38   • Including Work of other Trades, clean, repair and touch-up, or replace when directed,  
39   Products which have been soiled, discolored, or damaged by Work of this Section.  
40   • Remove Debris from Project Site upon Work completion, or sooner if directed.  
41  
42  
43   • PROTECTING COMPLETED WORK  
44  
45   • Post Signs and install Barricades where necessary to protect Completed Work of this  
46   Section against damage and discoloration.  
47

- 1  
2  
3 • PAINTING SCHEDULE  
4  
5 • General:  
6 • Prime Coats specified below may be omitted where Factory-applied Shop  
7 Coatings have been applied by other Trades.  
8 • Quantities of Coats specified below are the minimum. Finished Work shall be  
9 even, uniform, and free from cloudy and mottled appearance. Apply additional  
10 (4 minimum) Coats of any Deep or Bright Tone Colors where necessary to hide  
11 Substrate.  
12 • Minimum Dry Film Thicknesses specified below include Prime Coat and Finish  
13 Coats combined.  
14 • Surfaces not coated, unless otherwise indicated elsewhere:  
15 • Items having complete Factory-applied Finish  
16 • Irrigation System  
17 • Joint Sealants  
18 • Roofing  
19 • Instructional Labels including Fire-resistance Rating Labels  
20 • Exterior Stainless Steel:  
21 • Latex Enamel  
22 • 1 coat Galvanized Primer (MPI Product #134), followed by:  
23 • 2 coats Semi-gloss (MPI Level #5) Latex Enamel (MPI Product #11)  
24 • Minimum Dry Film Thickness: 4.0 mils  
25 • Exterior Galvanized Steel:  
26 • Latex Enamel  
27 • 1 coat Galvanized Primer, (MPI Product #134), followed by:  
28 • 2 coats Semi-gloss (MPI Level #5) Latex Enamel (MPI Product #11)  
29 • Minimum Dry Film Thickness: 4.0 mils  
30  
31  
32 • All Other Exterior Ferrous Metal:  
33 • Latex Enamel  
34 • 1 coat Bonding Primer (MPI Product #107), followed by:  
35 • 2 coats Semi-gloss (MPI Level #5) Latex Enamel (MPI Product #11)  
36 • Minimum Dry Film Thickness: 4.0 mils  
37  
38 • Exposed Mechanical & Electrical Work:  
39 • Exterior Metal, including Work on Roof:  
40 • Finish same as other Exterior Metal of same kind.  
41 • Piping, Equipment, & Supports:  
42 • 1 coat Anti-corrosive Metal Primer (MPI Product #79), followed by:  
43 • 2 coats Semi-gloss (MPI Level #5) Alkyd Enamel (MPI Product #94)  
44 • Minimum Dry Film Thickness: 4 mils  
45 • Pipe & Duct Covering:  
46 • 1 coat Flat gloss (MPI Level #1) Latex Dry-fall Paint (MPI Product #118)  
47 • Electrical Conduit:

- 1                   • 1 coat Galvanized Primer (MPI Product #134), followed by:
- 2                   • 2 coats Semi-gloss (MPI Level #5) Latex Enamel (MPI Product #94)
- 3                   • Minimum Dry Film Thickness: 4.0 mils
- 4           • Electrical Panel Board Doors:
  - 5                   • 1 coat Galvanized Primer (MPI Product #134), followed by:
  - 6                   • 2 coats Semi-gloss (MPI Level #5) Latex Enamel (MPI Product #94)
  - 7                   • Minimum Dry Film Thickness: 4.0 mils

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END OF SECTION