



What's happening to the Seattle Mural?

The Office of Arts & Cultural Affairs is working with Seattle Center to restore the *Seattle Mural*, by artist Paul Horiuchi. The Mural was created for the 1962 World's Fair and is a City of Seattle Landmark. From July 18 through July 29, art conservators will replace missing glass pieces and remove silica deposits from the surface of the artwork.

Through its conservation program, the Office of Arts & Cultural Affairs regularly inspects and maintains approximately 400 artworks in the City's public art collection.

This project has been made possible, in part, with funding from:



National Trust for Historic Preservation

Questions? Jason Huff, public art project manager
jason.huff@seattle.gov or (206) 684-7278

APPENDIX B

Sustainability Information

Sustainable Buildings and Sites Policy

When to use the Capital GREEN Toolkit

How to Use the Capital GREEN

Capital Green Toolkit Form

Capital Green Toolkit Calculator

Sustainable Buildings and Sites Policy

1. Goal

The goal of a Citywide policy on sustainable buildings and sites is to maximize the environmental quality, economic vitality, and social health of our city through the design, construction, operation, maintenance, renovation, and decommissioning of our buildings and sites. This policy also demonstrates the City's commitment to addressing climate change and creating a sustainable future by protecting, conserving, and enhancing the region's environmental resources; to providing leadership in setting community standards for sustainable development; to providing responsible stewardship of the City's fiscal resources and public assets over time by leveraging our investments to create financial, public and environmental value; and to creating quality environments that are healthy and provide community benefit.

Sustainable buildings and sites support overall City objectives by making efficient use of limited energy, water, and material resources; reducing climate change; minimizing pollution and hazardous materials; creating healthy indoor environments; reinforcing natural systems; providing habitat; creating vibrant spaces for people; and contributing to their neighborhoods.

2. Organizations Affected

All City departments and offices, and their contractors, responsible for planning, financing, designing, developing, constructing, occupying, or managing buildings and sites shall meet the requirements of this policy.

All non-City entities receiving more than 50% of their total funding for building construction, additions, renovations, and tenant improvements from the City of Seattle shall meet the requirements of this policy or an alternative standard approved by the Sustainable Buildings and Sites Steering Committee. Entities receiving funding for affordable housing development through the Seattle Office of Housing shall meet the requirements of the Evergreen Sustainable Development Standard rather than the standards outlined in this policy.

3. Guidelines for Planning, Designing, and Financing Projects

The development of sustainable buildings and sites requires an integrated and holistic approach to assessing performance and value in order to meet multiple goals and maximize the efficiency of multiple systems. In order to meet this challenge, projects are strongly encouraged to utilize the following key concepts and frameworks in planning, financing, designing and constructing sustainable buildings and sites.

Triple Bottom Line: the value or success of a project, program, or action considering costs and benefits in terms of environmental, economic, and social impacts.

Life Cycle Cost: the total cost of ownership over the life of an asset. Life cycle cost can be used to evaluate a complete building or site as well as an individual product, process, or service. Life cycle cost takes into account all costs of acquiring, owning, and disposing of an asset in order to maximize return on investments and achieve the highest, most cost-effective performance possible. Life cycle cost assessment often utilizes the concept of net present value where the incremental costs and the associated savings are calculated over the life of the asset and identified as the current financial cost or savings.

Integrated Design Process: a collaborative method for designing buildings which emphasizes the development of a holistic design. Integrated design processes require multidisciplinary collaboration, including key stakeholders and design professionals, from conception to completion and involve a “whole building design” approach in which a building is viewed as an interdependent system, as opposed to an accumulation of its separate components (site, structure, systems and use). The goal of looking at all the systems together to is make sure they work in harmony rather than in conflict with each other. Projects utilizing an integrated design process approach undertake systems analysis during early design phases and integrated design workshop(s) at multiple stages of the project’s development.

4. Building Project Standards

It shall be the policy of the City of Seattle to plan, finance, design, construct, manage, renovate, operate, maintain, and decommission its buildings in a sustainable manner. To work toward this goal, all buildings, or portions of buildings, owned by, leased by, or leased to the City of Seattle as well as buildings, or portions of buildings, receiving 50% of their funding from the City of Seattle shall meet the following minimum requirements, to the maximum extent practicable.

Projects that have begun schematic design by the effective date of the policy are exempted from meeting the standards of sections 4.1 and 4.2 but are strongly encouraged to meet the goals of this policy to the greatest extent feasible.

4.1. New Construction, Additions, and Major Renovations

LEED

All projects constituting new construction, an addition or a major renovation of a City-occupied, City-owned building and impacting 5,000 or greater gross square feet shall meet a minimum LEED Gold rating through the appropriate rating system, as well as the following standards:

- Achieve a modeled energy use intensity performance that is a minimum of 15% more efficient than a baseline building meeting the 2009 Seattle Energy Code;
- Achieve projected water use performance that is a minimum of 30% more efficient (not including irrigation) than a baseline building meeting the 2009 Uniform Plumbing Code;
- Achieve a 90% waste diversion rate for construction involving demolition and a 75% waste diversion rate for construction not involving demolition; and
- Provide bicycle parking and changing/showering facilities appropriate to accommodate expected future demand.

Projects are strongly encouraged to utilize WaterSense plumbing fixtures. Projects requiring flushometer toilets and for which WaterSense fixtures are not available are encouraged to install toilets meeting code flush rates and to utilize rainwater harvesting or greywater to assist in meeting the 30% efficiency standard. If a City department, in consultation with the Steering Committee, determines that the cost of achieving a 30% water reduction has a payback beyond fifteen years the project may be exempted from the water performance standard.

The Department of Planning and Development's City Green Building may identify LEED credits or equivalent standards that meet these goals in order to accommodate alternative compliance pathways. Projects may achieve Living Building Challenge certification as a substitute for meeting a LEED Gold rating and additional standards.

Design and project management teams are encouraged to meet higher sustainability standards such as LEED Platinum, the Living Building Challenge, or net-zero energy.

Major renovations are projects that include both significant modifications to the building envelope and an overhaul of the HVAC system.

Capital Green

All projects constituting new construction, an addition or a major renovation of a City-occupied, City-owned building, but impacting less than 5,000 gross square feet, as well as those projects not eligible for a LEED rating, shall include the completion of a Capital Green checklist in order to assess opportunities for incorporating sustainable building features in the project.

4.2. Minor Renovations and Tenant Improvements

LEED

All projects constituting a minor renovation or tenant improvement of a City-occupied, City-owned building, that both impacts 5,000 or greater gross square feet and involves substantial modification to all three of the major systems – mechanical, electrical, and plumbing – shall achieve a LEED Gold rating through the appropriate rating system, as well as the following standards:

- Achieve projected water use performance that is a minimum of 30% more efficient (not including irrigation) than a baseline project meeting the 2009 Uniform Plumbing Code;
- Achieve a 75% waste diversion rate for construction involving demolition and a 60% waste diversion rate for construction not involving demolition;

Projects are strongly encouraged to utilize WaterSense plumbing fixtures. Projects requiring flushometer toilets and for which WaterSense fixtures are not available are encouraged to install toilets meeting code flush rates. If the City department, in consultation with the Steering Committee, determines that a 30% water reduction is not achievable using code minimum flushometer toilets the project may be exempted from the water performance standard.

The Department of Planning and Development's City Green Building may identify LEED credits or equivalent standards that meet these goals in order to

accommodate alternative compliance pathways. Projects may achieve Living Building Challenge certification as a substitute for meeting a LEED Gold rating and additional standards.

Design and project management teams are encouraged to improve the energy efficiency of their individual project by either substantially exceeding code or by meeting or exceeding the Citywide portfolio goals for existing buildings identified in Section 5. Participation in an energy target-setting and benchmarking program such as Energy Star or the 2030 Challenge is strongly encouraged to identify appropriate design goals.

Design and project management teams are encouraged to meet higher sustainability standards such as LEED Platinum, the Living Building Challenge, or net-zero energy.

Substantial modification to the mechanical system means the addition or replacement of heating or cooling equipment serving 50% or more of the heating or cooling load for the tenant space.

Substantial modification to the electrical system means the addition or replacement of 20% or more of the fixtures, or 20% or more of the lamps plus ballasts within the tenant space.

Substantial modification to the plumbing system means addition or replacement of 50% or more of all plumbing fixtures within the tenant space, or the addition of an on-site water collection system that reduces potable water use.

Capital Green

All projects constituting a minor renovation or tenant improvement by a City department of a City-occupied, city-owned building that either impacts less than 5,000 gross square feet or does not involve substantial modifications to mechanical, electrical, and plumbing systems shall include the completion of a Capital Green checklist in order to assess opportunities for incorporating sustainable building features in the project.

4.3. Non-City entity occupying City owned buildings

Non-City entities which occupy City-owned buildings should be encouraged to meet the standards of sections 4.1 and 4.2. At a minimum, City departments shall work with these entities to assess opportunities for incorporating sustainable building features in tenant improvement projects in keeping with the goals of this policy.

4.4. City occupying non-City owned buildings

When a City department occupies a building owned by a non-City entity, the City department shall meet the standards of sections 4.1 and 4.2 unless the City department, in consultation with the Steering Committee, determines it is infeasible based on specific circumstances.

5. Buildings Management

City departments shall, independently and in cooperation with each other, seek opportunities to maximize the energy and water efficiency of existing City-owned buildings, consistent with the City's climate protection goals.

6. Sites

City Departments shall follow landscape best management practices that promote the environmental, economic, and social health of our city. Each City department should use best management practices that are appropriate for their specific properties while coordinating with other departments to promote consistent practices and ensure high performance City-wide. Best management practices shall, at a minimum, consider opportunities for:

- Reducing the energy use of fleets and equipment by using energy efficient products and minimizing transportation of soil and other materials
- Reducing water use from irrigation
- Reducing runoff pollution by minimizing the use of pesticides and fertilizers
- Using green infrastructure to, minimize stormwater run-off, reduce urban heat island effects, and provide habitat
- Selecting landscape materials and site furnishings that are sustainable
- Controlling invasive species and promoting native species
- Addressing issues of crime and safety
- Creating opportunities for environmental education

All projects constituting the development or major renovation of park property owned by Seattle Parks and Recreation shall include completion of an Ideal Green Parks checklist.

7. Pilot Projects

City departments are requested to seek opportunities to initiate pilot projects that can demonstrate higher levels of environmental performance and evaluate the effectiveness of alternative rating systems. Departments should commence design on the following specific pilot projects by 2015:

- Six Sustainable Sites Initiative pilot or certified projects including two projects on Parks property, two projects in the right-of-way, and two projects outside of parks and the right-of-way;
- One Living Building Challenge certified project.

8. Additional City Priorities

While building and site standards and rating systems tend to focus on environmental and human health, there are many other City-wide goals that should be considered in order to maximize the total environmental, social, and economic benefits of buildings and sites. In addition to the standards above, departments are requested to seek to implement the following goals where appropriate:

- ***Design Quality***: strive for design excellence developing designs that respond to the site and neighborhood, integrate the numerous design disciplines, meet the needs of its constituencies, including children and people with disabilities or from other cultures, are timeless and enduring, incorporate sustainability principles, encourage walkability, and reflect the prudent use of public resources
- ***Transportation Impacts***: discourage single-occupant-vehicle commuting by locating facilities in areas of high transit service, limiting available on-site parking, and setting parking fees to reflect the true cost of parking
- ***Climate Adaptation***: consider how changing climate conditions, including temperature, precipitation and sea level, could impact the project and its function over its lifetime and consider design options to enhance the resiliency of the project to these changes.
- ***Art***: assess opportunities to incorporate art by including an artist on the design team, integrating commissioned art into the building and site design, and/or including art programming in interior and public spaces
- ***Urban Forestry***: support the City of Seattle's canopy cover goals, contained in the Urban Forest Management Plan, by seeking to maximize the canopy cover potential of sites where compatible with proposed uses

- **Public Safety:** maximize public safety by considering access restrictions, incorporating appropriate interior & exterior lighting, minimizing empty or unused spaces, supporting eyes on the street, and following Crime Prevention Through Environmental Design (CPTED) guidelines
- **Co-location:** consider opportunities to co-locate multiple uses on City property, including housing, offices, libraries, community centers, police stations, fire stations, gardens, public meeting space, etc., in order to maximize the value of City property
- **Deconstruction:** utilize deconstruction and materials salvage when removing any structure; design buildings in order to allow deconstruction at the end of their lifetime in order to allow more complete reuse or recycling

9. Procedures and Responsibilities

9.1. Sustainable Buildings and Sites Steering Committee

The City shall put in place a Sustainable Buildings and Sites Steering Committee whose responsibilities include the ongoing implementation and evaluation of this policy. The Steering Committee will be staffed by The Department of Planning and Development's City Green Building and will consist of representatives from each of the City's capital departments and the Office of Sustainability and Environment.

The Directors of City departments whose responsibilities include planning, financing, designing, constructing, operating, maintaining, renovating or decommissioning City-owned facilities shall designate one or more members to the Steering Committee. Committee members are expected to regularly attend meetings, to assist with the responsibilities of the committee, and to communicate the work of the Steering Committee with their individual departments.

A Sites Sub-committee of the Steering Committee shall be established to assist with the development of the sustainable site management guidelines identified in 4.5. The Sites Sub-committee shall be staffed by City Green Building and consist of representatives from each of the City's capital departments responsible for the planning, finance, design, construction and ongoing maintenance of sites. The Sites Sub-committee shall be responsible for reviewing the existing site management policies used by departments; developing City-wide best management practices that are relevant to all departments; coordinating trainings to ensure

appropriate implementation of the policy; and the ongoing evaluation of and updates to City-wide guidelines.

9.2. Departmental Responsibilities

Each City department is responsible for complying with this policy in each of the facilities they own and/or occupy. City capital project managers shall plan and implement capital projects consistent with this policy.

All capital construction which falls under this policy shall be budgeted to meet the required standards. Budget planning to achieve higher sustainability standards is encouraged.

City capital departments shall promote compliance with this policy by existing and prospective tenants. Departments shall adapt leasing processes, including site selection criteria, requests for proposals, maintenance and operations agreements and leasing contracts, to reflect the goals of this policy.

City capital departments shall report annually on their work to meet the Sustainable Buildings and Sites Policy. No later than March 31 of each year, each department responsible for capital improvements shall submit a report to The Department of Planning and Development's City Green Building detailing the sustainable buildings and sites work for the previous year. The report should include identification of completed, ongoing and planned projects subject to this policy. For completed projects subject to LEED, the report should include information such as: project characteristics including use, size, and scope of work; green approaches incorporated into the project; total development and construction costs; the incremental cost for LEED documentation and certification; incremental costs and savings for green strategies, if known, including utility incentives and projected yearly utility savings; and energy and water usage and utility costs for three years after occupancy. Information provided on completed projects subject to Capital Green would include information such as: the scope of work; the Capital Green checklist for the completed project; project costs; any known incremental costs for green strategies; and energy and water usage and utility costs, if relevant.

City departments implementing a LEED project shall assign LEED on-line access to City Green Building staff to allow City Green Building to compile data on LEED credits and achievements for the full portfolio of the City's LEED projects.

9.3 City Green Building, Department of Planning and Development, Responsibilities

City Green Building shall assist departments in the implementation of this policy by establishing and participating in the Steering Committee and Sites Subcommittee, developing implementation guidelines, helping to coordinate training and providing general assistance.

City Green Building shall develop a standard reporting tool for annual reports from departments and shall compile an annual progress report based on the information provided by the individual departments. City Green Building shall conduct periodic evaluations of the appropriateness and effectiveness of the policy.

City Green Building, in coordination with City departments engaged in leasing, shall develop model leasing language and/or tools that can be adapted to the City's leasing processes. Leasing language and tools should include environmental performance goals in such areas as site selection, tenant improvements, requests for proposals, building rules, and operations and maintenance.

City Green Building, in coordination with Finance and Administrative Services, shall evaluate and recommend improvements to Capital Green towards improving the utility of this resource in helping departments meet the goals of this policy.

10. Sustainability Rating Systems

2030 Challenge: a series of phased energy consumption performance targets issued by Architecture 2030 for new and existing buildings created with the goal of keeping global average temperature below 2°C above pre-industrial levels. Targets are measured against regional or country averages for that building type. The targets for new buildings are a 60% reduction beginning in 2010, with incremental targets every 5 years until reaching carbon neutrality in 2030. For existing buildings the target reduction is 10% by 2015 with incremental targets reaching a 50% reduction by 2030.

Capital Green: an evaluation tool developed by the City of Seattle to assist project managers and consultants identify and implement sustainable approaches in small scale projects, including: new construction, additions and renovations, tenant improvements and equipment replacement. Capital Green is designed to encourage the use of high

performance methods and conservation efforts in the areas of site, water, energy, climate, materials and indoor environmental quality.

Evergreen Sustainable Development Standard (ESDS): a sustainable building standard for Washington State affordable housing projects. ESDS was developed by the Washington State Department of Commerce, in partnership with the Seattle Office of Housing, to promote public health, energy conservation, operational savings and sustainable building practices. The ESDS requires a minimum level of sustainable performance for all projects funded through the Housing Trust Fund. All projects funded through the Seattle Office of Housing are also required to meet the Evergreen Standard.

Ideal Green Parks: a scoring system developed by Seattle Parks and Recreation and the University of Washington. It is designed to reduce the negative impacts of parks on the environment while maximizing positive impacts. Credits focus on efficient use of resources and increasing the longevity of Parks investments.

LEED (Leadership in Energy and Environmental Design) Rating System: a green building rating and certification system, developed by the U.S. Green Building Council (USGBC). LEED evaluates environmental performance from a whole building perspective, including sites, water efficiency, energy & atmosphere, materials & resources, indoor environmental quality, locations & linkages, awareness & education, innovation in design, and regional priority. Projects are rated according to their level of environmental performance: Certified, Silver, Gold or Platinum. As of 2011, the LEED rating system consists of nine separate but coordinated rating systems: New Construction; Core & Shell; Commercial Interiors; Schools; Healthcare; Retail; Existing Building Operations & Maintenance; Homes; and Neighborhood Development.

Living Building Challenge: a sustainable building certification program developed by the International Living Building Institute, that focuses on a performance-based, prerequisite-only approach to certification with the aim of producing buildings that are not merely less harmful than conventional building but actually contribute positively to their surroundings.

Sustainable Sites Initiative (SITES): a rating and certification system for the design, construction, operations and maintenance of sustainable landscapes. Developed by the American Society of Landscape Architects, the Ladybird Johnson Wildflower Center, and the United States Botanic Garden, SITES measures environmental performance related to water, soil, vegetation, materials selection, and human health and well being. As of 2011, SITES is in pilot phase, with final public release planned for 2013.

CAPITAL GREEN TOOLKIT

When Does it Apply?

The Capital Green Toolkit is applicable to new construction, additions, major renovations, minor renovations, and tenant improvements. It is to be used for projects that are:

- a. not required to meet LEED under the Sustainable Buildings & Sites Policy, *or*
- b. not eligible to receive a LEED rating, as identified by the US Green Building Council

Capital Green is not required for routine maintenance projects, such as equipment replacement, painting or new flooring. Nor is Capital Green required for projects with such a highly limited scope of work that no more than three Capital Green strategies apply. Project managers should utilize the Capital Green Toolkit to determine which strategies are relevant to the scope of work for each project. If no more than three strategies apply, then the project does not need to use the Toolkit.

Following are the types of projects for which Capital Green applies, along with examples.

- **New construction or major renovation project smaller than 5,000 square feet**
 - 4,500 sf vehicle maintenance shop
 - 1,500 sf branch library addition
 - Gut rehab of a 3,500 sf community center
 - New freestanding 400 sf public restroom
- **Minor renovation or tenant improvement project smaller than 5,000 square feet**
 - Remodel 2,500 sf storefront for neighborhood service center
 - Remodel 4,000 sf warehouse space to accommodate new offices
 - 3,500 sf tenant build-out including flooring, painting, furniture and lighting
 - New plumbing fixtures, partitions, flooring and painting in a 400 sf restroom
- **Non-LEED eligible project**
 - New 30,000 sf parking garage
 - 5,500 sf unoccupied storage facility addition
- **Minor renovation or tenant improvement project that is \geq 5,000 sf, but does not include all three of the following: mechanical, electrical, and plumbing**
 - Seismic upgrade to 7,500 sf fire station (no mechanical, electrical or plumbing)
 - 10,000 tenant improvement for new office area (includes mechanical and electrical but no plumbing)
 - Roof replacement at 9,000 sf community center

HOW TO USE THE CAPITAL GREEN TOOLKIT



The Capital GREEN Toolkit



We've dubbed it a “toolkit” because Capital GREEN is more than just a list of sustainable strategies. It contains:

- Checklists
- Calculators
- Resources
- Reporting



The Capital GREEN Toolkit



- The Capital GREEN Toolkit consists of two Excel files – capital green form.xls and toolkit.xls.
- The Form file contains your checklist of strategies
- The Toolkit file provides calculators and tracking of metrics
- These two files must stay together.
- The Toolkit.xls file must be open for macros to run in the Form.xls file.





Getting Started

- Open both the capital green form.xls and the toolkit.xls files.
- Begin in the Form file

Capital GREEN
Project Summary

Date Entered: 12/24/2012

Project Name: Seattle Project Project No.: x2012
Department: FAS Project Manager: TR

Brief Description:

Address:

Step One: Capture the scope of your project below
Step Two: On the Simple Checklist remove strategies that don't apply by selecting NA
Step Three: Use the Expanded Checklist as your ongoing project checklist throughout design and construction
Step Four: Use separate toolkit file calculators for relevant strategies
Step Five: Tally results on the Final Checklist and make PDF with the Final Summary for reporting

Design Team:

Architect: Other Consultant:
Mechanical Engineer: Other Consultant:
General Contractor: Other Consultant:

SCOPE OF WORK: (select as many of the elements below as apply to your scope of work)

Demolition Furnishings [More information](#)
 Sitework HVAC

toolkit - Microsoft Excel

Address:

Building Area (for building project only): XX sf OR Building Area Undergoing Work:

Site Area: XX sf OR Site Area Undergoing Work:

Budget (Const. Cost): \$ - (exclude labor, equipment, mechanical, electrical and plumbing):
Project Material Cost: \$ -

Design Team:

Architect: Other Consultant:
Mechanical Engineer: Other Consultant:
General Contractor: Other Consultant:

Strategies Available:
Strategies Achieved:
at Baseline:
at Target:
% Achieved: #DIV/0!

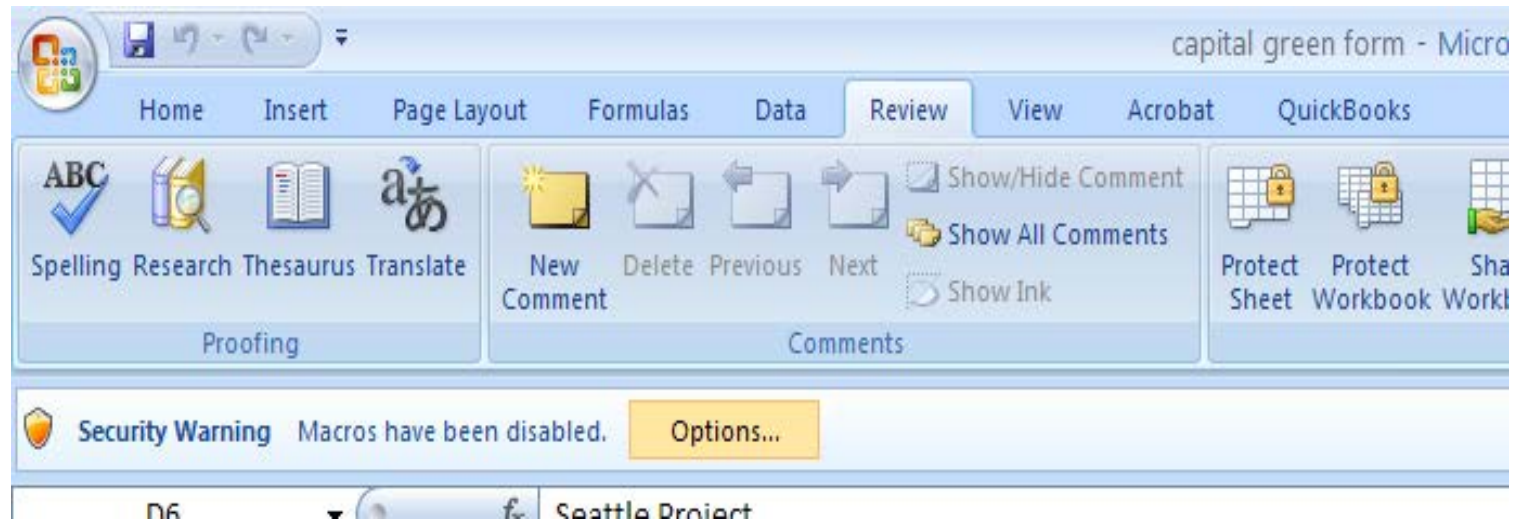
SUMMARY OF METRICS:

#DIV/0!	% Materials manufactured w/in 500 miles of project site
#DIV/0!	% Materials harvested w/in 500 miles of project site
#DIV/0!	% Wood from sustainable sources
#DIV/0!	% Rapidly renew able materials
#DIV/0!	% Construction Waste Diverted
#DIV/0!	% Recycled Content Materials



Enabling Macros

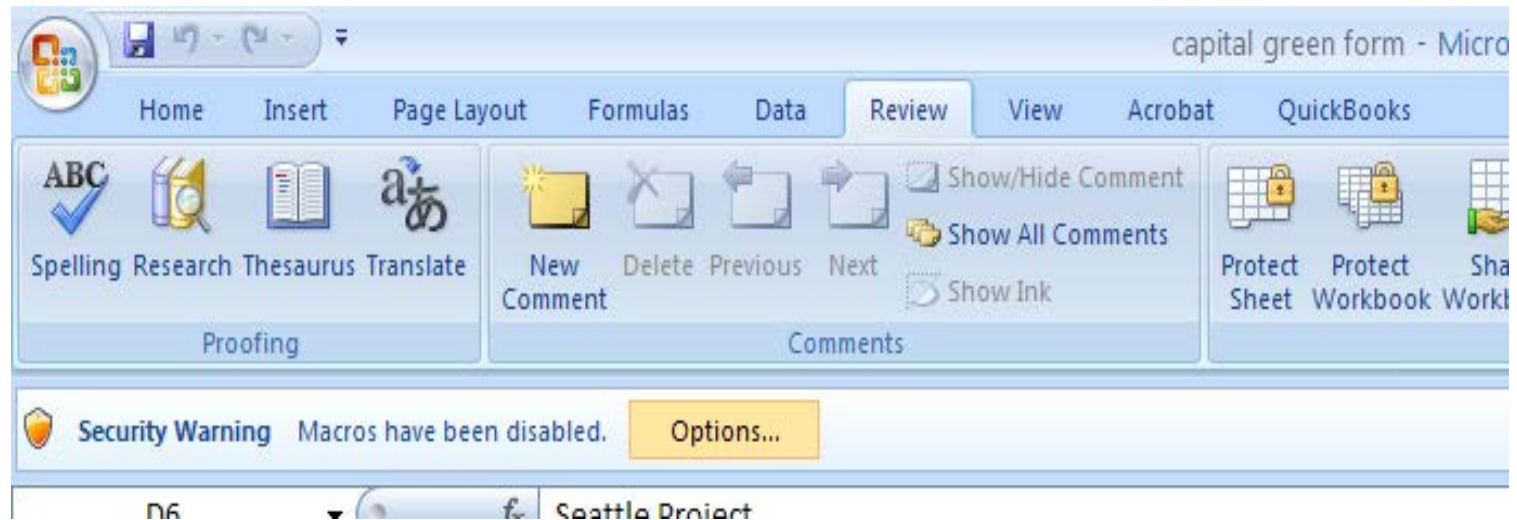
- Your computer security will automatically prevent Macros from running when you open a new file





Enabling Macros

- Click Options





Enabling Macros

- Enable this content and click OK



Project Summary Form



- ❑ Fill out Project Summary Form
- ❑ Project No. must be alphanumeric – no punctuation marks
- ❑ Make sure Toolkit file is open
- ❑ Grey cells are for user entry. White cells autofill.

The screenshot shows a spreadsheet application window titled "Project Summary". The interface includes a grid with columns A through H and rows 1 through 26. The form content is as follows:

- Row 2: "Capital GREEN" logo and "Project Summary" title.
- Row 3: "Date Entered:" field with value "12/24/2012".
- Row 6: "Project Name:" field with value "Seattle Project".
- Row 7: "Department:" field with value "FAS".
- Row 7: "Project No.:" field with value "x2012".
- Row 7: "Project Manager:" field with value "TR".
- Row 7: "Brief Description:" field (grey).
- Row 9: "Address:" field (grey).
- Row 11: "Step One: Capture the scope of your project below".
- Row 12: "Step Two: On the Simple Checklist remove strategies that don't apply by selecting NA".
- Row 13: "Step Three: Use the Expanded Checklist as your ongoing project checklist throughout design and construction".
- Row 14: "Step Four: Use separate toolkit file calculators for relevant strategies".
- Row 15: "Step Five: Tally results on the Final Checklist and make PDF with the Final Summary for reporting".
- Row 16: "Design Team:" label.
- Row 17: "Architect:" field (grey).
- Row 17: "Other Consultant:" field (grey).
- Row 18: "Mechanical Engineer:" field (grey).
- Row 18: "Other Consultant:" field (grey).
- Row 19: "General Contractor:" field (grey).
- Row 19: "Other Consultant:" field (grey).
- Row 22: "SCOPE OF WORK: (select as many of the elements below as apply to your scope of work)".
- Row 23: "Demolition" checkbox (unchecked).
- Row 23: "Furnishings" checkbox (unchecked).
- Row 24: "[More information](#)" link.
- Row 25: "Sitework" checkbox (unchecked).
- Row 25: "HVAC" checkbox (unchecked).

The spreadsheet status bar at the bottom shows "Ready" and the active tab is "Project Summary".



Project Scope Categories



- Check all boxes that match your scope of work
- Click to Generate Checklist

The screenshot displays a software interface with a table on the left and a checklist on the right. The table has a header row (row 35) titled "Understanding Scope Categories" and several rows of text (rows 36-44) describing various project scope categories. The checklist on the right is titled "SCOPE OF WORK: (select as many of the elements below as apply to your scope of work)" and contains a grid of checkboxes for different categories. A red arrow points from a "Click to Generate Checklist" button to the "More information" link. The interface also includes a navigation bar at the bottom with tabs for "Project Summary" and "Information", and a "Ready" status indicator.

Row	Category	Selected
21		
22		
23		
24		
25	Understanding Scope Categories	
26		
27	The Scope of Work categories filter the more than 100 possible with specific project scopes. Filters are major building element construction, additions, alterations or tenant improvement pro	
28	possible work scopes are accommodated. Choose all categories	
29		
30	Demolition: Removal of existing buildings; portions of build	<input type="checkbox"/>
31	remediate building or site contamination.	
32	Sitework: Exterior site improvements which may or may not	<input type="checkbox"/>
33	landscape, irrigation, paving, parking areas, roads, drives and	
34	Building Structure: New building structural elements or moc	<input type="checkbox"/>
35	foundations, bearing walls, below grade walls, columns, floc	
36	Building Envelope: Elements which create the building's we	<input checked="" type="checkbox"/>
37	Includes roofing, roof sheathing, exterior walls and cladding	
38	crawlspaces or unheated space.	
39	Interior Construction: Permanently installed interior partitio	<input checked="" type="checkbox"/>
40		
41	Interior Finishes: Permanently installed casework, flooring,	<input checked="" type="checkbox"/>
42		
43	Specialties & Equipment: Appliances, commercial kitchen e	<input type="checkbox"/>
44		
	Furnishings: Systems furniture, ancillary furnishings. Includ	<input type="checkbox"/>
	conference tables, task chairs, conference chairs, side tables	
	HVAC: Heating, ventilating and air conditioning systems or f	<input checked="" type="checkbox"/>
	space heating and cooling equipment, water heating equipment, ductwork, contr	

SCOPE OF WORK: (select as many of the elements below as apply to your scope of work)

<input type="checkbox"/> Demolition	<input type="checkbox"/> Furnishings	More information
<input type="checkbox"/> Sitework	<input checked="" type="checkbox"/> HVAC	
<input type="checkbox"/> Building Structure	<input checked="" type="checkbox"/> Plumbing	
<input checked="" type="checkbox"/> Building Envelope	<input checked="" type="checkbox"/> Electrical	
<input checked="" type="checkbox"/> Interior Construction	<input type="checkbox"/> Fire Suppression	Click to Generate Checklist
<input checked="" type="checkbox"/> Interior Finishes	<input type="checkbox"/> Parks Project	
<input type="checkbox"/> Specialties & Equipment		

Ready

Generating Simple Checklist



- If you see this message

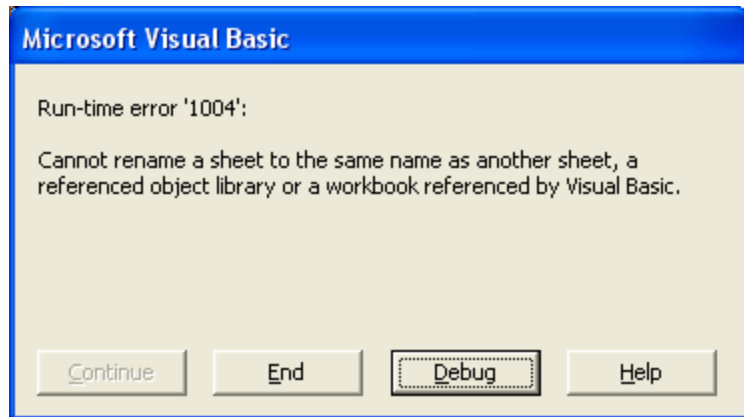


- Go up to the Security Alert on your navigation bar and click Options to Enable Macros
- Then click Generate Checklist again





- ❑ Macros will only run one time. If you click to **Generate Checklist** twice, you will see this message:

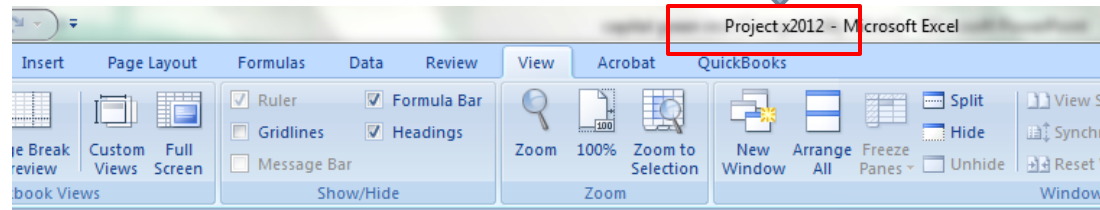



- ❑ Click **End** and then delete the empty tab you are now on.
- ❑ Go to **Simple Checklist** tab.

The Simple Checklist



- You are now on the Simple Checklist tab of a Project No.xls file



1
2 Capital GREEN 
3 Simple
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6 Project Name: Date Entered:
7 Department: Project No.:
8 Project Manager:
9
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Number	Strategies	Scope	Select
S.2.1.A	<i>Design to avoid bird collisions by using fritted glass, an auto shutoff of night time lighting, or by avoiding highly reflective glass</i>	Env	?
S.2.2.A	<i>Limit trespass of exterior lighting over site boundary and upward into night sky by using shielded fixtures</i>	Elec	?
W.1.1.A	<i>Provide a green roof</i>	Struct, Env	?
W.2.1.A	<i>Use rainwater for cooling tower make-up water</i>	HVAC	?
W.2.2.A	<i>Install low flow plumbing fixtures</i>	Plumb	?
W.2.3.A	<i>Install low volume flush fixtures</i>	Plumb	?

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48
49
50

You can add scope by deleting this worksheet and re-running the previous macro BEFORE generating the next sheet
The toolkit file MUST be open
Generate Expanded Checklist



The Simple Checklist



- The Simple Checklist represents a shortlist of sustainable strategies potentially applicable to your project – see the ? in the far right Select column.

1
2 Capital GREEN
3 Simple
4
5
6 Project Name: Seattle Project
7 Department: FAS
8
9
10
11
12
13
14
15

Date Entered: 12/24/2012

Project No.: x2012
Project Manager: TR

You can add scope by deleting this worksheet and re-running the previous macro BEFORE generating the next sheet
The toolkit file MUST be open
Generate Expanded Checklist

Number	Strategies	Scope	Select
S.2.1.A	Design to avoid bird collisions by using fritted glass, an auto shutoff of night time lighting, or by avoiding highly reflective glass	Env	?
S.2.2.A	Limit trespass of exterior lighting over site boundary and upward into night sky by using shielded fixtures	Elec	?
W.1.1.A	Provide a green roof	Struct, Env	?
W.2.1.A	Use rainwater for cooling tower make-up water	HVAC	?
W.2.2.A	Install low flow plumbing fixtures	Plumb	?
W.2.2.B	Install low volume flush fixtures	Plumb	?

Project Summary | Simple Checklist | Information

Ready 100%



The Simple Checklist



- Select NA for all strategies not applicable to project
- Click Generate Expanded Checklist

5

6 **Project Name:**

7 Department:

8

9

Project No.:

Project Manager:

generating the ne:
The toolkit file N

**Generate Expar
Checklist**

Number	Strategies	Scope	Select
11	<i>S.2.1.A Design to avoid bird collisions by using fritted glass, an auto shutoff of night time lighting, or by avoiding highly reflective glass</i>	Env	N/A ←
12	<i>S.2.2.A Limit trespass of exterior lighting over site boundary and upward into night sky by using shielded fixtures</i>	Elec	?
13	<i>W.1.1.A Provide a green roof</i>	Struct, Env	?
14	<i>W.2.1.A Use rainwater for cooling tower make-up water</i>	HVAC	?
15	<i>W.2.2.A Install low flow plumbing fixtures</i>	Plumb	?

Simple Checklist Information

Ready

100%



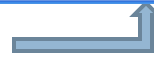
The Expanded Checklist



- You are now on the Expanded Checklist tab
- But a new Summary tab has also generated

5				
6	Project Name: Seattle Project		Project No.: x2012	The 'toolkit Ge
7	Department: FAS		Project Manager: TR	
8				
9				
10	Number	Links	Goal	Strategies
11	M.1.1.A			<i>Use materials manufactured within 500 miles of site.</i> yes
12		calculator		A. Source materials manufactured within 500 miles of the project site.
13			Baseline:	20% cost of materials
14			Target:	40% cost of materials
15			Comments:	<Please provide explanation if strategy was not achieved or other comments as desired>
16	M.1.1.B			<i>Use materials harvested or extracted within 500 miles of site.</i> yes
17		calculator		B. Source materials harvested or extracted within 500 miles of the project site.
18			Baseline:	5% cost of materials
19			Target:	10% cost of materials
20			Comments:	<Please provide explanation if strategy was not achieved or other comments as desired>
21	M.1.2.A			<i>Use wood from Forest Stewardship Council (FSC) sources</i> yes
22		calculator		A. Use wood from Forestry Stewardship Council (FSC) sources
23		ATF	Baseline:	20% cost of wood products
24		SFI	Target:	50% cost of wood products

Ready | Summary | Simple Checklist | **Expanded Checklist** | Information | All Strategies



The Summary Tab



- Go to the Summary tab to explain your NAs
- Then return to the Expanded Checklist tab

5									
6	Project Name:	Seattle Project			Project No.:	x2012			
7	Department:	FAS			Project Manager:	TR			
8									
9									
10	Number	Comments						Selection	
11	<i>C.3.1.B</i>							N/A	
12	<i>M.3.1.A</i>							N/A	
13	<i>M.3.1.B</i>							N/A	
14									
15									
37									
38									
Summary Simple Checklist Expanded Checklist Information All Strategies									
Ready									



The Expanded Checklist



- All applicable strategies are reset to Yes.
- Evaluate each with compliance info, calculators and resource links now available.

10	Number	Links	Goal	Strategies	Selection
11	M.1.1.A			<i>Use materials manufactured within 500 miles of site.</i>	yes
12		calculator		A. Source materials manufactured within 500 miles of the project site.	
13			Baseline:	20% cost of materials	
14			Target:	40% cost of materials	
15			Comments:	<Please provide explanation if strategy was not achieved or other comments as desired>	
16	M.1.1.B			<i>Use materials harvested or extracted within 500 miles of site.</i>	yes
17		calculator		B. Source materials harvested or extracted within 500 miles of the project site.	
18			Baseline:	5% cost of materials	
19			Target:	10% cost of materials	
20			Comments:	<Please provide explanation if strategy was not achieved or other comments as desired>	



The Expanded Checklist



- This is your checklist during design and construction
- As strategies are incorporated or rejected select Y/N/NA
- Explain N and NA selections in the comment field below the strategy

9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Selection
Number	Links	Goal	Strategies													
M.1.1.A			Use materials manufactured within 500 miles of site.													Y
	calculator		A. Source materials manufactured within 500 miles of the project site.													
		Baseline:	20% cost of materials													
		Target:	40% cost of materials													
		Comments:	<i><Please provide explanation if strategy was not achieved or other comments as desired></i>													
M.1.1.B			Use materials harvested or extracted within 500 miles of site.													N
	calculator		B. Source materials harvested or extracted within 500 miles of the project site.													
		Baseline:	5% cost of materials													
		Target:	10% cost of materials													
		Comments:	<i><Please provide explanation if strategy was not achieved or other comments as desired></i>													
M.2.1.A			Implement a construction waste management plan to divert recyclable waste from the landfill													n/a
	CWM		A. Implement Construction Waste Management Plan.													
		Baseline:	75% waste diverted													
		Target:	85% waste diverted													

Ready | Summary | Simple Checklist | **Expanded Checklist** | Information | All Strategies



- There are 10 strategies that require calculations to demonstrate achievement
- For each of these strategies, there is a calculator found in the toolkit.xls file
- Each calculator can be accessed from the link in the Expanded Checklist or directly by going to the appropriate tab in the Toolkit file


9	10	Number	Links	Goal	Strategies	Selection
11	M.1.1.A				<i>Use materials manufactured within 500 miles of site.</i>	Y
12			calculator		A. Source materials manufactured within 500 miles of the project site.	
13				Baseline:	20% cost of materials	
14				Target:	40% cost of materials	
15				Comments:	<i><Please provide explanation if strategy was not achieved or other comments as desired></i>	





- Calculators are provided for:
 - Regional materials
 - Wood and rapidly renewables
 - Recycled content
 - Building reuse
 - Heat island
 - Flushout
 - Sound absorption

toolkit - Microsoft Excel

		Regional Material Calculator	Date Completed: 12/27/2012		
Project Name: Seattle Project		Project No.: x2012			
Department: FAS		Project Manager: TR			
Project Material Cost (from Final Summary): \$ 100,000.00					
<p>M1.1.A and M1.1.B - Use materials manufactured and/or harvested within 500 miles of project site : Fill in highlighted cells for each product which contains locally manufactured and/or harvested content. White cells will calculate results. Material cost is considered the cost to the project and should include taxes and transportation expenses to the jobsite. Once the material is on the jobsite, all labor and equipment associated with the material should be excluded. Products with multiple components should be broken into components. The percentage of each component is based on weight (see example at bottom of sheet). Do not include Mechanical Electrical or Plumbing systems.</p>					
M1.1.A Compliant?			M1.1B Compliant?		
Baseline: 20%		NO	Baseline: 5%		
Target: 40%		NO	Target: 10%		
			YES		
			YES		
Product	Material Cost	% Manufactured w/in 500 miles	% Harvested w/in 500 miles	Manufactured Value	Harvested Value
Plywood	\$ 1,500.00	100.00%	100.00%	\$ 1,500.00	\$ 1,500.00
Concrete	\$ 10,000.00	100.00%	95.00%	\$ 10,000.00	\$ 9,500.00
Insulation	\$ 2,500.00	100.00%	0.00%	\$ 2,500.00	\$ -
	\$ -			\$ -	\$ -
	\$ -			\$ -	\$ -

Ready



- Information entered into a calculator will feed the Final Summary form tab in this file
- This tab will also reflect Project Summary info entered in the Form file along with additional project detail
- At completion, this Final Summary will become a key part of your project's reporting

1	Capital GREEN			Date Entered: 12/27/2012
2	Project Summary			
3	Project Name:	Seattle Project	Project No.:	x2012
4	Department:	FAS	Project Manager:	TR
5	Brief Description:			
6				
7	Address:			
8				
9				
10				
11	Building Area (for building project only):	XX sf	OR Building Area Undergoing Work:	
12	Site Area:	XX sf	OR Site Area Undergoing Work:	
13	Budget (Const. Cost):	\$ -	(exclude labor, equipment, mechanical, electrical and plumbing):	
14	Project Material Cost	\$ 100,000.00		
15	Design Team:			
16	Architect:		Other Consultant:	
17	Mechanical Engineer:		Other Consultant:	
18	General Contractor:		Other Consultant:	
19				
20				
21				
22				
23				
24	Strategies Available:			
25	Strategies Achieved:			
26	at Baseline:			
27	at Target:			
28	% Achieved:	#DIV/0!		
29				
30				
31				
32				
33	SUMMARY OF METRICS:			
34		14.00%	% Materials manufactured w/in 500 miles of project site	
35		11.00%	% Materials harvested w/in 500 miles of project site	
36		#DIV/0!	% Wood from sustainable sources	
37		0.00%	% Rapidly renewable materials	
38		0.00%	% Construction Waste Diverted	
39		0.00%	% Recycled Content Materials	
40				
41				
42				
43				

Final Summary | Regional Material Calc | Wood and Renewables Calc | Recycled

Ready



Project Scope Changes



- If your scope changes, you have a few choices depending on where in the process you are.
- If you have gone no further than the Simple Checklist, delete that Tab and start again. You will be prompted to overwrite your Project No.xls file. Say Yes.
- If you have already selected and explained your NA's and generated an Expanded Checklist, first print out the Summary tab to save your NAs. Then delete all Tabs except Project Summary and Information, and start again. You will be prompted to overwrite your Project No.xls file. Say Yes.



Project Scope Changes



- If you have already entered data into your toolkit calculators, you can save that information by renaming the Toolkit file before you begin the process again.
- And of course, you always have the option of closing both files, deleting the Project No.xls file, and starting over again.



The Final Checklist



- While the Expanded Checklist tracks the strategies your project **pursued** through design and construction
- The Final Checklist compiles your project's **achievements** for reporting and is the last step in the process
- On the Expanded Checklist, make sure each strategy shows Y/N/NA selected, any N or NA selections are explained in the comment field, and any calculators are complete
- Then Generate Final Checklist





□ You are now on the Final Checklist tab

1	Capital GREEN		Date Entered: <input type="text" value="12/27/2012"/>		Available	22
2	Final				Achieved	0
3					Baseline	0
4					Target	0
5	Project Name: <input type="text" value="Seattle Project"/>		Project No.: <input type="text" value="x2012"/>			
6	Department: <input type="text" value="FAS"/>		Project Manager: <input type="text" value="TR"/>			
7						
8						
9						
10	Number	Links	Goal	Select Level of Achievement		
11	M.1.1.B		Use materials harvested or extracted within 500 miles of site.	N		
12		calculator	B. Source materials harvested or extracted within 500 miles of the project site.			
13			Baseline: 5% cost of materials	Baseline Achieved ?:	N	
14			Target: 10% cost of materials	Target Achieved ?:	N	
15			Comments: <Please provide explanation if strategy was not achieved or other comments as desired>			
16	M.1.2.A		Use wood from Forest Stewardship Council (FSC) sources	N		
17		calculator	A. Use wood from Forestry Stewardship Council (FSC) sources			
18		ATF	Baseline: 20% cost of wood products	Baseline Achieved ?:	N	
19		SFI	Target: 50% cost of wood products	Target Achieved ?:	N	
20		FSC	Comments: <Please provide explanation if strategy was not achieved or other comments as desired>			
21	M.1.2.B		Use rapidly renewable materials, i.e., materials that are harvested within a 10 year or shorter timeframe	N		
22		calculator	B. Materials include cork, linoleum, wheatgrass, bamboo, cellulose insulation, etc.			
23			Baseline: 1% cost of materials	Baseline Achieved ?:	N	

Project Summary | Summary | Simple Checklist | Expanded Checklist | **Final Checklist** | Information | All Strat...

Ready





- Tally of available strategies appears
- All strategies reset to N pending level of achievement

Project x2012

Number	Links	Goal	Select Level of Achievement
11		M.1.1.B Use materials harvested or extracted within 500 miles of site.	N
12	calculator	B. Source materials harvested or extracted within 500 miles of the project site.	
13		Baseline: 5% cost of materials	Baseline Achieved?: N
14		Target: 10% cost of materials	Target Achieved?: N
15		Comments: <Please provide explanation if strategy was not achieved or other comments as desired>	
16		M.1.2.A Use wood from Forest Stewardship Council (FSC) sources	N
17	calculator	A. Use wood from Forestry Stewardship Council (FSC) sources	
18	ATF	Baseline: 20% cost of wood products	Baseline Achieved?: N
19	SFI	Target: 50% cost of wood products	Target Achieved?: N
20	FSC	Comments: <Please provide explanation if strategy was not achieved or other comments as desired>	

Project Name: Seattle Project
 Department: FAS
 Project No.: x2012
 Project Manager: TR

Date Entered: 12/27/2012

Available: 22
 Achieved: 0
 Baseline: 0
 Target: 0

Project Summary | Summary | Simple Checklist | Expanded Checklist | **Final Checklist** | Infor



- Each strategy has a baseline and target level of performance

9	10	11	12	13	14	15
	Number	Links	Goal	Select Level of Achievement		
	M.1.1.A		Use materials manufactured within 500 miles of site.			Y
		calculator	A. Source materials manufactured within 500 miles of the project site.			
			Baseline: 20% cost of materials	Baseline Achieved ?:		Y
			Target: 40% cost of materials	Target Achieved ?:		N
			Comments			
			:			<i><Please provide explanation if strategy was not achieved or other comments as desired></i>

- To achieve the strategy, you must at minimum meet the baseline
- Target performance exceeds minimum compliance





- Some thresholds require calculations to demonstrate compliance
- Some thresholds do not

26	M.2.1.A	Implement a construction waste management plan to divert recyclable waste from the landfill	N
27	CWM	A. Implement Construction Waste Management Plan.	
28		Baseline: 75% waste diverted	Baseline Achieved?: N
29		Target: 85% waste diverted	Target Achieved?: N
30		Comments: <Please provide explanation if strategy was not achieved or other comments as desired>	
31	M.2.2.A	Provide convenient and appropriately sized recycling collection and storage	N
32		A. Provide conveniently located and appropriately sized recycle collection & storage for paper, metal, cardboard, plastic and glass.	
33		Baseline: ✓	Baseline Achieved?: N
34		Target: Include composting storage	Target Achieved?: N
35		Comments: <Please provide explanation if strategy was not achieved or other comments as desired>	





- Though target achievement implies baseline achievement, only one level will tally to keep metrics clean

Project x2012

Number	Links	Goal	Select Level of Achievement
11		M.1.1.B Use materials harvested or extracted within 500 miles of site.	Y
12	calculator	B. Source materials harvested or extracted within 500 miles of the project site.	
13		Baseline: 5% cost of materials Baseline Achieved?: Y	
14		Target: 10% cost of materials Target Achieved?: Y	
15		Comments: <Please provide explanation if strategy was not achieved or other comments as desired>	
16		M.1.2.A Use wood from Forest Stewardship Council (FSC) sources	Y
17	calculator	A. Use wood from Forestry Stewardship Council (FSC) sources	
18	ATF	Baseline: 20% cost of wood products Baseline Achieved?: Y	
19	SFI	Target: 50% cost of wood products Target Achieved?: N	
20	FSC	Comments: <Please provide explanation if strategy was not achieved or other comments as desired>	

Available 22
Achieved 2
Baseline 1
Target 1

Project Name: Seattle Project Project No.: x2012
Department: FAS Project Manager: TR

Project Summary Summary Simple Checklist Expanded Checklist Final Checklist Infor



□ The Final Summary tab in the Toolkit file collects your metrics

Capital GREEN
Final Summary

Date Entered: 2/14/2013

Project Name: **Seattle Project** Project No.: 1097
 Department: **fas** Project Manager: **tr**
 Brief Description: 4,500 SF Tenant Improvement

Address: 700 5th Avenue, Suite xxx

Building Area (for building project only): OR Building Area Undergoing Work: 4,500 SF
 Site Area: OR Site Area Undergoing Work: None

Budget (Const. Cost): \$ 300,000.00
 Project Material Cost: \$ 140,000.00 (exclude labor, equipment, mechanical, electrical and plumbing):

Design Team:
 Architect: 123 Design Other Consultant:
 Mechanical Engineer: HVAC Design-Build Other Consultant:
 General Contractor: ABC Contractor Other Consultant:

Strategies Available: 36
 Strategies Achieved: 28
 at Baseline: 18
 at Target: 10
 % Achieved: 78%

SUMMARY OF METRICS:

34.29%	% Materials manufactured w/in 500 miles of project site
6.83%	% Materials harvested w/in 500 miles of project site
0.00%	% Wood from sustainable sources
1.89%	% Rapidly renewable materials
90.00%	% Construction Waste Diverted
16.30%	% Recycled Content Materials

Project Summary tab in Capital Green form file


Final Checklist tab in Capital Green form file

Calculators In Toolkit file





- The Final Checklist tab in the Form file captures your Strategies and comments

Number	Links	Goal	Select Level of Achievement
<p>Capital GREEN Final  Date Entered: 2/9/2013</p> <p>Project Name: Seattle Project Project No.: 1097 Department: fas Project Manager: tr</p>			
W.2.2.A		Install low flow plumbing fixtures	Y
<p>A. Install low flow plumbing fixtures including lavatory faucets, showerheads and kitchen sink faucets.</p> <p>Baseline: Exceed Seattle Plumbing Code with 2.0 gpm kitchen sink and showerhead Baseline Achieved?: N Exceed Seattle Plumbing Code with 1.75 gpm kitchen sink and showerhead plus 0.5 gpm lavatory w/auto sensor Target: Target Achieved?: Y</p> <p>Comments: Only kitchen sink is in scope. Installed 1.8 gpm.</p>			
E.1.1.A		Commission building energy systems.	Y
<p>A. Seattle Energy Code requires all mechanical work and lighting controls be commissioned. This strategy expands the requirement to include electrical systems.</p> <p>Seattle 2009 Energy Code</p> <p>Baseline: Commission all mechanical and electrical work, regardless of project size, to meet the Seattle Energy Code. Baseline Achieved?: Y design and construction documents, specifications and submittals. Cx to participate in operator training and provide post occupancy Target: Target Achieved?: N</p> <p>Comments: Baseline commissioning was performed.</p>			
Number	Comments		Selection
1	E.1.3.A+ Submetering is not required by code. Project cannot afford additional meter expense.		N
2	M.3.1.A+ Will save demising walls and some doors, but probably not enough.		N
3	M.3.2.B+ Not in project budget.		N
4	M.3.2.C+ Not in project budget.		N
5	E.1.1.F+ Project does not have control of locations for outdoor air intakes.		n/a
6	E.1.4.C+ Not in project budget.		N





- The Final Summary tab of the Toolkit file **plus** the Final Checklist tab of the Form file together serve as your reporting
- PDF these two tabs and send them to Sandra Mallory



How to use the Capital GREEN Toolkit

The Capital GREEN Toolkit consists of a folder with two Excel files – the capital green form.xls and toolkit.xls. These two files must stay together in the folder, and the toolkit must be open for macros to run. These two source files should never be changed or overwritten. You can save as and rename a toolkit file to keep calculators.

Step One – The Project Summary Form

1. Open both files
2. In the capital green form.xls file Enable Macros by clicking the Options button next to Security Warning on your navigation bar.
3. Enter basic project information.
4. Check boxes for as many categories as necessary to reflect the scope of work of the project. (See Information Tab for more on work category definitions.)
5. Click Generate Checklist button to create new tab called Simple Checklist.

Step Two – The Simple Checklist

1. You are now on a tab called Simple Checklist in a file called Project#.xls with a list of potential sustainable strategies for your project.
2. Select “NA” in the right column to remove any sustainable strategies that do not apply to your project scope.
3. Click Generate Expanded Checklist to open a new tab.
4. If you already have a Toolkit file from a previous run, you must rename it now and click Okay to continue.
5. Go to the Summary tab and explain each NA. Then return to the Expanded Checklist tab.

Step Three – The Expanded Checklist

1. Each strategy is now presented in more detail with links to relevant resources and calculators.
2. Mark strategies Y or N for pursuit as they are incorporated or rejected. This Expanded Checklist serves as your project checklist throughout the process and can be distributed to consultants and subcontractors. This Checklist is about pursuit, not achievement.

Step Four – The Toolkit File Calculators

1. Use Toolkit file calculators to track progress of materials, heat island, flushout and sound absorption strategies.
2. Add project detail on Final Summary tab.

Step Five – Final Checklist and Reporting

1. When the project is substantially complete and you are ready to make your final report, click Generate Final Checklist.
2. You are now on the Final Checklist tab, and a tally has appeared in the upper right corner showing how many sustainable strategies are available to your project scope.
3. For each strategy achieved, select the baseline or target level attained. The tally above will change to reflect your selections.
4. Make sure any calculators in Toolkit file are complete. Metrics will feed the Final Summary tab.
5. Output both the Expanded Checklist and the Final Summary from the Toolkit file as your Final Report.
6. Send to Sandra Mallory.

Additional Scope and Do Overs

1. If you find yourself on the Simple Checklist and didn't include a scope of work category you need, delete the Simple Checklist tab and start over.
2. If you have already generated an Expanded Checklist and the scope of the project changes, delete all tabs (excepting Project Summary) and start again.
3. Or simply close out of the project#.xls file and then delete it. If you have already filled in calculators, be sure to rename the toolkit.xls file. Then see Step One.

Understanding Scope Categories

The Scope of Work categories filter the more than 100 possible sustainable strategies to reflect only strategies associated with specific project scopes. Filters are major building elements and systems. There is no distinction made between new construction, additions, alterations or tenant improvement projects. Some categories have significant overlap to ensure all possible work scopes are accommodated. Choose all categories that apply.

Demolition: Removal of existing buildings; portions of buildings or site improvements. Includes destructive work to remediate building or site contamination.

Sitework: Exterior site improvements which may or may not be associated with a building. Includes grading, utilities, landscape, irrigation, paving, parking areas, roads, drives and pedestrian plazas.

Building Structure: New building structural elements or modifications to a building's structural elements. Includes, foundations, bearing walls, below grade walls, columns, floors and floor/ceiling structures and roof structure.

Building Envelope: Elements which create the building's weather tight enclosure. May, or may not be structural. Includes roofing, roof sheathing, exterior walls and cladding, fenestration, insulation, slab on grade and floors over crawlspaces or unheated space.

Interior Construction: Permanently installed interior partition walls, ceiling systems, doors and relites.

Interior Finishes: Permanently installed casework, flooring, trim and/or other finishes.

Specialties & Equipment: Appliances, commercial kitchen equipment or other specialty refrigeration or fuel systems.

Furnishings: Systems furniture, ancillary furnishings. Includes non-permanently installed partitions, desks, file storage, conference tables, task chairs, conference chairs, side tables and coffee tables.

HVAC: Heating, ventilating and air conditioning systems or portions of thereof and water heating systems. Includes, space heating and cooling equipment, water heating equipment, ductwork, controls, and airflow devices. May also include renewable energy systems.

Plumbing: Domestic water systems and fixtures, storm water systems, sanitary systems and fluid distribution systems for space conditioning.

Electrical: Interior and exterior lighting and associated controls, power distribution and metering systems, renewable energy systems and vehicle charging stations.

Fire Suppression: Fire detection, sprinkler systems, and warning systems.

Parks Project: A project which includes, but may not be limited to work on a City of Seattle park.

Each sustainable strategy contained in the Data_Source file is coded to reflect the one or more scope categories it relates to. (For example, while a low flow water fixtures strategy may only apply to Plumbing, a low emitting adhesives and sealants strategy might apply to Interior Finishes for flooring but also to HVAC for duct sealant and to Plumbing for pipe cement. If any of these scope categories are checked, the low emitting adhesives and sealants strategy will appear.)

Understanding Toolkit Calculators

The separate Toolkit file contains a variety of calculators that are linked to strategies that require calculations to demonstrate compliance. Along with a link to the City's Construction Waste Diversion calculator, the following are included:

- Recycled Material
- Regional materials
- Sustainably Harvested Wood and Rapidly Renewables
- Building Reuse
- Heat Island
- Room Sound Absorption
- Building Flushout

Each calculator has its own Tab, while the linked Project Summary information will be reflected on the first tab. These calculators can be accessed via a calculator hyperlink provided adjacent to each strategy or directly through the toolkit file. The results of each calculator used will feed to the Project Summary page on the first tab of the Toolkit.xls file.



ArchEcology LLC is a Seattle-based sustainable consulting firm that specializes in practical solutions for incorporating environmentally responsible practices into design and construction projects. Our projects range from civic and municipal buildings to mixed use housing and from commercial office buildings to recreational facilities and retail. We partner with non-profit organizations, building owners, public agencies, private developers, and design consultants to offer a breadth of sustainable consulting services for new and existing buildings. See www.archecology.com.



Date Entered:

Project Name:	Seattle Project	Project No.:	<i>2016test</i>
Department:	fas	Project Manager:	dm
Brief Description:			
Address:	asdf		

Building Area (for building project only):		OR Building Area Undergoing Work:	
Site Area:		OR Site Area Undergoing Work:	
Budget (Const. Cost):		(exclude labor, equipment, mechanical, electrical and plumbing):	
Project Material Cost			

Design Team:		Other Consultant:	ser
Architect:	ser	Other Consultant:	ser
Mechanical Engineer:	ser	Other Consultant:	ser
General Contractor:	ser	Other Consultant:	ser

Strategies Available:	#REF!
Strategies Achieved:	#REF!
at Baseline:	#REF!
at Target:	#REF!
% Achieved:	#REF!

SUMMARY OF METRICS:

#DIV/0!	% Materials manufactured w/in 500 miles of project site
#DIV/0!	% Materials harvested w/in 500 miles of project site
#DIV/0!	% Wood from sustainable sources
#DIV/0!	% Rapidly renewable materials
#DIV/0!	% Construction Waste Diverted (fill in cell manually)
#DIV/0!	% Recycled Content Materials



Date Entered:

Project Name:	<input type="text" value="Seattle Project"/>	Project No.:	<input type="text"/>
Department:	<input type="text"/>	Project Manager:	<input type="text"/>
Brief Description:	<input type="text"/>		
Address:	<input type="text"/>		

Step One: Capture the scope of your project below
Step Two: On the Abbreviated Checklist remove strategies that don't apply by selecting NA
Step Three: Use the Expanded Checklist as your ongoing project checklist throughout design and construction
Step Four: Use separate toolkit file calculators for relevant strategies
Step Five: Tally results on the Final Checklist and make PDF with the Final Summary for reporting

Design Team:		
Architect:	<input type="text"/>	Other Consultant: <input type="text"/>
Mechanical Engineer:	<input type="text"/>	Other Consultant: <input type="text"/>
General Contractor:	<input type="text"/>	Other Consultant: <input type="text"/>

SCOPE OF WORK: *(select as many of the elements below as apply to your scope of work)*

- Demolition
- Sitework
- Building Structure
- Building Envelope
- Interior Construction
- Interior Finishes
- Specialties & Equipment
- Furnishings
- HVAC
- Plumbing
- Electrical
- Fire Suppression
- Parks Project

[More information](#)

How to use the Capital GREEN Toolkit

The Capital GREEN Toolkit consists of a folder with two Excel files – the capital green form.xls and toolkit.xls. These two files must stay together in the folder, and the toolkit must be open for macros to run. These two source files should never be changed or overwritten. You can save as and rename a toolkit file to keep calculators.

Step One – The Project Overview Form

1. Open both files
2. In the capital green form.xls file Enable Macros by clicking the Options button next to Security Warning on your navigation bar
3. Enter basic project information.
4. Check boxes for as many categories as necessary to reflect the scope of work of the project. (See Information Tab for more on work category definitions.)
5. Click Generate Checklist button to create new tab called Simple Checklist.

Step Two – The Simple Checklist

1. You are now on a tab called Simple Checklist in a NEW file called Project#.xls with a list of potential sustainable strategies for your project.
2. Select "NA" in the right column to remove any sustainable strategies that do not apply to your project scope.
3. Click Generate Expanded Checklist to open a new tab.
4. If you already have a Toolkit file from a previous run, you must rename it now and click Okay to continue.
5. Go to the Summary tab and explain each NA. Then return to the Expanded Checklist tab.

Step Three – The Expanded Checklist

1. Each strategy is now presented in more detail with links to relevant resources and calculators.
2. Mark strategies Y or N for pursuit as they are incorporated or rejected. This Expanded Checklist serves as your project checklist throughout the process and can be distributed to consultants and subcontractors. This Checklist is about pursuit, not achievement.

Step Four – The Toolkit File Calculators

1. Use Toolkit file calculators to track progress of materials, heat island, flushout and sound absorption strategies.
2. Add project detail on Final Report tab.

Step Five – Final Checklist and Reporting

1. When the project is substantially complete and you are ready to make your final report, click Generate Final Checklist.
2. You are now on the Final Checklist tab, and a tally has appeared in the upper right corner showing how many sustainable strategies are available to your project scope.
3. For each strategy achieved, select the baseline or target level attained. The tally above will change to reflect your selections.
4. Make sure any calculators in Toolkit file are complete. Metrics will feed the Final Report tab.
5. Output both the Expanded Checklist and the Final Summary from the Toolkit file as your Final Report.
6. Send to Sandra Mallory.

Additional Scope and Do Overs

1. If you find yourself on the Simple Checklist and didn't include a scope of work category you need, delete the Simple Checklist tab and start over.
 2. If you have already generated an Expanded Checklist and the scope of the project changes, delete all tabs (excepting Project Overview) and start again.
 3. Or simply close out of the project#.xls file and then delete it. If you have already filled in calculators, be sure to rename the toolkit.xls file. Then see Step One.
-

Understanding Scope Categories

The Scope of Work categories filter the more than 100 possible sustainable strategies to reflect only strategies associated with specific project scopes. Filters are major building elements and systems. There is no distinction made between new construction, additions, alterations or tenant improvement projects. Some categories have significant overlap to ensure all possible work scopes are accommodated. Choose all categories that apply.

Demolition: Removal of existing buildings; portions of buildings or site improvements. Includes destructive work to remediate building or site contamination.

Sitework: Exterior site improvements which may or may not be associated with a building. Includes grading, utilities, landscape, irrigation, paving, parking areas, roads, drives and pedestrian plazas.

Building Structure: New building structural elements or modifications to a building's structural elements. Includes, foundations, bearing walls, below grade walls, columns, floors and floor/ceiling structures and roof structure.

Building Envelope: Elements which create the building's weather tight enclosure. May, or may not be structural. Includes roofing, roof sheathing, exterior walls and cladding, fenestration, insulation, slab on grade and floors over crawlspaces or unheated space.

Interior Construction: Permanently installed interior partition walls, ceiling systems, doors and relites.

Interior Finishes: Permanently installed casework, flooring, trim and/or other finishes.

Specialties & Equipment: Appliances, commercial kitchen equipment or other specialty refrigeration or fuel systems.

Furnishings: Systems furniture, ancillary furnishings. Includes non-permanently installed partitions, desks, file storage, conference tables, task chairs, conference chairs, side tables and coffee tables.

HVAC: Heating, ventilating and air conditioning systems or portions of thereof and water heating systems. Includes, space heating and cooling equipment, water heating equipment, ductwork, controls, and airflow devices. May also include renewable energy systems.

Plumbing: Domestic water systems and fixtures, storm water systems, sanitary systems and fluid distribution systems for space conditioning.

Electrical: Interior and exterior lighting and associated controls, power distribution and metering systems, renewable energy systems and vehicle charging stations.

Fire Suppression: Fire detection, sprinkler systems, and warning systems.

Parks Project: A project which includes, but may not be limited to work on a City of Seattle park.

Each sustainable strategy contained in the Data_Source file is coded to reflect the one or more scope categories it relates to. (For example, while a low flow water fixtures strategy may only apply to Plumbing, a low emitting adhesives and sealants strategy might apply to Interior Finishes for flooring but also to HVAC for duct sealant and to Plumbing for pipe cement. If any of these scope categories are checked, the low emitting adhesives and sealants strategy will appear.)

Understanding Toolkit Calculators

The separate Toolkit file contains a variety of calculators that are linked to strategies that require calculations to demonstrate compliance. Along with a link to the City's Construction Waste Diversion calculator, the following are included:

- Recycled Material
- Regional Materials
- Sustainably Harvested Wood and Rapidly Renewables
- Building Reuse
- Heat Island
- Room Sound Absorption
- Building Flushout

Each calculator has its own Tab, while the linked Project Summary information will be reflected on the first tab. These calculators can be accessed via a calculator hyperlink provided adjacent to each strategy or directly through the toolkit file. The results of each calculator used will feed to the Project Summary page on the first tab of the Toolkit.xls file.



ArchEcology LLC is a Seattle-based sustainable consulting firm that specializes in practical solutions for incorporating environmentally responsible practices into design and construction projects. Our projects range from civic and municipal buildings to mixed use housing and from commercial office buildings to recreational facilities and retail. We partner with non-profit organizations, building owners, public agencies, private developers, and design consultants to offer a breadth of sustainable consulting services for new and existing buildings. See www.archecology.com.



Regional Material Calculator

Date Completed: 9/23/2022

Project Name: **Seattle Project**
 Department: fas

Project No.: 0.00
 Project Manager: dm

Project Material Cost (from Final Summary): \$ -

M1.1.A and M1.1.B - Use materials manufactured and/or harvested within 500 miles of project site: Fill in highlighted cells for each product which contains locally manufactured and/or harvested content. White cells will calculate results. Material cost is considered the cost to the project and should include taxes and transportation expenses to the jobsite. Once the material is on the jobsite, all labor and equipment associated with the material should be excluded. Products with multiple components should be broken into components. The percentage of each component is based on weight (see example at bottom of sheet). Do not include Mechanical Electrical or Plumbing systems.

M1.1.A Compliant?

M1.1B Compliant?

Baseline: 20%	#DIV/0!	Baseline: 5%	#DIV/0!
Target: 40%	#DIV/0!	Target: 10%	#DIV/0!

Product	Material Cost	% Manufactured w/in 500 miles	% Harvested w/in 500 miles	Manufactured Value	Harvested Value
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Totals:		#DIV/0!	#DIV/0!	\$ -	\$ -



Capital GREEN
 Sustainably Harvested Wood and
 Rapidly Renewable Material Calculator

Date Completed: 9/23/2022

Project Name: **Seattle Project**
 Department: fas

Project No.: 2016test
 Project Manager: dm

Project Material Cost (from Final Summary): \$ -

M1.2.A - Use wood from Forest Stewardship Council (FSC) Sources: Fill in highlighted cells for each product which contains FSC wood and/or rapidly renewable materials. White cells will calculate results.

Baseline: 20% #DIV/0!
 Target: 50% #DIV/0!

Product	Material Cost	% Product that is Wood	% FSC	Product Wood Value	Sustainably Sourced Wood Value
	\$ -			\$ -	\$ -
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Totals:			#DIV/0!	\$ -	\$ -

M1.2.B - Use rapidly renewable materials. Instructions: Use this calculator to demonstrate compliance. Fill in highlighted cells for each product which contains rapidly renewable materials. White cells will calculate results.

Baseline: 1% #DIV/0!
 Target: 2.5% #DIV/0!

Product	Material Cost	Rapidly Renewable Material	% Rapidly Renewable	Rapidly Renewable Value	Total % Rapidly Renewable
	\$ -			\$ -	#DIV/0!
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Totals:				\$ -	#DIV/0!



Capital GREEN
Recycled Material Calculator

Date Completed: 9/23/2022

Project Name: **Seattle Project**
Department: fas

Project No.: 2016test
Project Manager: dm

Project Material Cost: (exclude labor, equipment and mechanical, electrical, plumbing): \$ -

M3.2.D - Use building materials that contain recycled content: Fill in highlighted cells for each product which contains pre-consumer and/or post-consumer recycled content. White cells will calculate results. Do not include mechanical, electrical, plumbing or equipment.

Baseline: 5% #DIV/0!

Target: 20% #DIV/0!

Product	Material Cost	% Pre-consumer	% Post-consumer	Pre-consumer Value	Post-consumer Value
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Subtotals:		#DIV/0!	#DIV/0!	\$ -	\$ -
				Total Recycled Material Value: \$ -	
				Total Percentage Recycled Content: #DIV/0!	



Project Name: **Seattle Project**
Department: fas

Project No.: 2016test
Project Manager: dm

M3.1.A - Retain non-structural interior elements of existing buildings: Fill in highlighted cells for each retained building element. White cells will calculate results. Only include permanently installed building elements. Do not include systems furniture.

Baseline: 40% #DIV/0!
Target: 60% #DIV/0!

Interior Non-structural element	Existing Surface Area (SF)	Surface Multiplier	Total Existing Area (SF)	Retained Surface Area (SF)	Total Retained Area (SF)	% Reused
Finished Flooring		1	0.00		0.00	#DIV/0!
Finished Ceiling		1	0.00		0.00	#DIV/0!
Full Height Partitions - enter area of one wall surface less doors and openings		2	0.00		0.00	#DIV/0!
Partial Height Partitions - enter area of one wall surface less doors and openings		2	0.00		0.00	#DIV/0!
Demising Walls (walls separating tenant spaces) - enter area of wall surface w/in space less doors and openings		1	0.00		0.00	#DIV/0!
Interior Finished Surface of Exterior Walls - enter area of wall surface w/in space less doors and windows		1	0.00		0.00	#DIV/0!
Interior Glazing		1	0.00		0.00	#DIV/0!
Casework - enter lineal feet x height		1	0.00		0.00	#DIV/0!
Countertops - enter surface area		1	0.00		0.00	#DIV/0!
Doors - enter area of one surface		1	0.00		0.00	#DIV/0!
Totals:			0.00		0.00	#DIV/0!

M3.1.B - Retain structural components of existing buildings: Fill in highlighted cells for each retained building element. White cells will calculate results.

Baseline: 50% #DIV/0!
Target: 75% #DIV/0!

Structural Element	Existing Area (SF)	Surface Multiplier	Total Existing Area (SF)	Retained Surface Area (SF)	Total Retained Area (SF)	% Reused
Roof - enter surface area less skylights		1	0.00		0.00	#DIV/0!
Floor		1	0.00		0.00	#DIV/0!
Columns- enter area of wide side if rectangular. For round columns use diameter times height.		2	0.00		0.00	#DIV/0!
Interior Structural Walls - enter area of one wall surface less doors and openings		2	0.00		0.00	#DIV/0!
Exterior Walls - enter exterior surface area less doors and windows.		1	0.00		0.00	#DIV/0!
Totals:			0.00		0.00	#DIV/0!



Capital GREEN
Heat Island Calculator

Date Completed:

Project Name:
Department:

Project No.:
Project Manager:

Instructions: Use this calculator to demonstrate compliance with S2.1.B - Use light colored or open grid pavement for pedestrian hardscape; S.2.1.C - Provide shade for parking areas; and E2.1.C - Select light colored roofing material. Fill in highlighted cells with area and SRI for each roof or hardscape element. White cells will calculate results.

S2.1.B - Use light colored or open grid pavement for pedestrian hardscape. In the table below enter area for all pedestrian hardscape material. For materials with a default SRI provided do not enter an SRI. For other materials, enter the actual SRI. Use the value for new materials, not aged.

Baseline: 30% #DIV/0!

Target: 50% #DIV/0!

Pedestrian Hardscape Material	Area Provided	Default SRI	Actual SRI	Required SRI	Area Weighted Avg	% of Total
Sidewalks - Natural Gray Concrete		35		29	0.00	#DIV/0!
Concrete Pavers - Natural Gray		35		29	0.00	#DIV/0!
Asphalt		0		29	0.00	#DIV/0!
Other				29	0.00	#DIV/0!
Other				29	0.00	#DIV/0!
Open Grid Pavement (50% open)					0.00	#DIV/0!
Totals:	0.00				0.00	#DIV/0!

S2.1.C - Provide shade for parking areas. Use any combination of the following - 1) tree shading; 2) shade from structures or architectural elements with an SRI of at least 29; 3) shade from structure covered with solar panels; 4) paving material with an SRI of at least 29 and 5) open-grid paving system that is a minimum of 50% pervious. In the table below enter area of surface parking lot, the tree types and spread diameter from the Seattle Master Tree List. Click on Link Below to go to list. Use Shade Coverage Diagram to the right to determine the percentage of shade coverage offered by each tree.

Baseline: 50%

#DIV/0!

[Seattle Master Tree List](#)

Target: 80%

#DIV/0!

Covered Parking Area Material	Area Provided	Default SRI	Actual SRI	Required SRI	Area Weighted Avg	% of Total
Roof membrane and/or shingles				29	0.00	#DIV/0!
Other				29	0.00	#DIV/0!
Structure covered with solar panels					0.00	#DIV/0!
Subtotal:		0.00			0.00	#DIV/0!
Uncovered Parking Area Material	Area Provided	Default SRI	Actual SRI	Required SRI	Area Weighted Avg	% of Total
Concrete - Natural Gray		35		29	0.00	#DIV/0!
Asphalt		0		29	0.00	#DIV/0!
Other				29	0.00	#DIV/0!
Other				29	0.00	#DIV/0!
Open Grid Pavement (50% open)					0.00	#DIV/0!
Subtotals:		0.00			0.00	#DIV/0!
Tree Scientific or Common Name	Spread in ft (from Seattle Master Tree List)	Quantity @ 100% Coverage	Quantity @ 75% Coverage	Quantity @ 50% Coverage	Quantity @ 25% Coverage	Total (SF)
<i>example: Acer nigrum</i>	10	1	1	2	2	255.3
Bald Cypress						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Total Tree Shade						0.0
Total Parking Area:		0.00	Total Compliant:		0.00	#DIV/0!

E2.1.C -Select light-colored roofing materials. Enter area and SRI (Solar Reflectance Index) in the table below for each roofing material. Exclude mechanical equipment, solar panels, green roof, and skylights. For roof materials that have unknown SRI enter 0 (zero) in actual SRI column.

Baseline: 75% #DIV/0!

Target: 100% #DIV/0!

Low Slope Roofing Material (≤2:12)	Area	Actual SRI	Required SRI	Area Weighted Avg	% of Total
Material #1			78	0.00	#DIV/0!
Material #2			78	0.00	#DIV/0!
Material #3			78	0.00	#DIV/0!
Material #4			78	0.00	#DIV/0!
Subtotal:	0.00			0.00	#DIV/0!

Steep Slope Roofing Material (>2:12)	Area	Actual SRI	Required SRI	Area Weighted Avg	% of Total
Material #1			29	0.00	#DIV/0!
Material #2			29	0.00	#DIV/0!
Material #3			29	0.00	#DIV/0!
Material #4			29	0.00	#DIV/0!
Subtotal:	0.00			0.00	#DIV/0!

Total Non-Vegetated Roof Area: 0.00 Total Compliant: 0.00 #DIV/0!



Capital GREEN
Building Flush-Out Calculator

Date Completed:

Project Name:
 Department:

Project No.:
 Project Manager:

IE.1.5.B - Perform building flush-out prior to occupancy: Fill in highlighted cells with information from mechanical plans. Required time for building flush-out will calculate at bottom for both the baseline and target performance options. Compliance is also based on the heating capacity of the equipment. If the heating capacity is insufficient, reduce amount of outside air (OSA). When flush-out has been performed, enter dates at the bottom of the form. This form calculates results for one air handling unit. If project has multiple air handlers, create a copy of this sheet and enter values for each air handling unit.

Baseline: 3,500 CF/SF #DIV/0!
Target: 14,000 CF/SF #DIV/0!

Mechanical Unit Data for <enter air handling unit number>

Instructions

Total Square footage:		SF	Enter area served by a single main air handling unit. For example - a VAV system with two roof top units would have two flush-out calculations.
Required Outside Air (OSA) - Baseline	0	CF	
Required OSA - Target	0	CF	
Total Supply Air for Building/Space		CFM	From Mechanical Schedules
Amount of OSA available		CFM	OA provided during flush-out NOT design OA
Month of Flushout		°F	Select month of flush-out from drop down
Expected OSA Low temp	#N/A	°F	From National Climatic Data Center for Boeing Field
Minimum thermostat setpoint	#N/A	°F	Setpoint during flushout can be higher than this value, but should not be lower.
Expected Return Air temp		°F	Approximation - change if expectation varies
Expected Mixed Air temp	#N/A	°F	
Unit heating (KW)		KW	If heat source is electric then enter heat capacity from mechanical schedule.
Unit heating (btu/hr)		btu/hr	If heat source is fossil fuel then enter heat capacity here.
Heat btuH	0	btu/hr	If heat source is fossil fuel then enter heat capacity here.
Average Heat Rise	#DIV/0!	°F	Formula
Expected Max Room Temperature	#N/A	°F	Is Capacity Sufficient? #N/A
Time required for baseline flush out	#DIV/0!	Days	Baseline Compliance Test: #DIV/0!
Time required for target flush out	#DIV/0!	Days	Target Compliance Test: #DIV/0!

Actual Flush-Out Dates:

Flush out start		Enter dates as 00/00/00
Flush out finish		Enter dates as 00/00/00
Total Days	0	



Project Name: **Seattle Project**
Department: fas

Project No.: 2016test
Project Manager: dm

IE1.4.A - Provide a comfortable acoustic environment: Fill in highlighted cells for each surface of a space to determine the average sound absorption. Only include permanent elements such as walls, floors, ceilings and doors. Do not include furniture or furnishings. White cells will calculate results. Data entered in cells is for example only and should be changed.

Two tables are provided below. If you have more than two space types create a copy of this sheet.

Baseline \leq : 0.7 YES

Target: Have acoustical engineer evaluate space

Space ID: Example Space Room Volume (ft³) 22500

Space Type: Courtroom - unamplified speech Reverb time requirement 0.7

Surface	Material Area (SF)	Material	Sound Absorption Coef (α) at 500 Hz	Sound Absorption Coef (α) at 1000 Hz	Sound Absorption Coef (α) at 2000 Hz
Floor	2,500.00	Concrete or Terrazzo	0.015	0.020	0.020
Ceiling	2,500.00	Random Fissured Panel, 3/4" thick	0.600	0.800	0.920
Walls	1,350.00	Gypsum Board	0.050	0.030	0.030
Window wall	450.00	Glass, Ordinary Window Glass	0.180	0.120	0.070
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
Total Sound Absorbing Units (sabins)			1686.000	2144.500	2422.000
Reverberation Time (T60)			0.654	0.514	0.455

Baseline \leq : 0.0 YES

Target: Have acoustical engineer evaluate space

Space ID: Room Volume (ft³)

Space Type: Select Reverb time requirement 0

Surface	Material Area (SF)	Material	Sound Absorption Coef (α) at 500 Hz	Sound Absorption Coef (α) at 1000 Hz	Sound Absorption Coef (α) at 2000 Hz
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
		Select	0.000	0.000	0.000
Total Sound Absorbing Units (sabins)			0.000	0.000	0.000
Reverberation Time (T60)			0.000	0.000	0.000

Sound absorption data from Acoustical Ceilings Use & Practice and provided courtesy of CISCA.

General Resources

[ACEEE – American Council for an Energy-Efficient Economy Commercial Sector: Buildings & Equipment](#)

[City of Seattle Green Purchasing Website](#)

[Seattle Code Directory](#)

[ecoScorecard – free product assessment tool available for SketchUp and Revit](#)

[eQUEST – building energy use analysis tool from Energy Design Resources](#)

[Green Footstep – of Rocky Mountain Institute \(copyrighted\) online assessment tool for reducing carbon emissions from building construction projects](#)

[Pharos Project – project of Healthy Building Network provides product assessment](#)

U.S. Department of Energy - Pacific Northwest National Lab series of articles:

[HVAC Efficiency Controls Could Mean Significant Savings \(April 27, 2012\)](#)

[LED Lighting Facts: Anatomy of the Label](#)

[NREL – National Renewable Energy Laboratory – NREL & Athena Institute developing publically available Life Cycle Inventory \(LCI\) Database \(available in different formats\)](#)

[Standard ASHRAE 189.1 – Standard for the Design of High Performance, Green Buildings can be purchased](#)

[AIA - American Institute of Architects Guide to Building Life Cycle Assessment in Practice published 2010 & AIA copyright \(see software for tool links\)](#)

[Advanced Buildings Energy Performance Solutions from NBI \(New Buildings Institute\) includes links to Core Performance, Advanced Lighting Guidelines & Daylighting Pattern Guide](#)

[Plug Load Best Practices Guide “Managing Your Office Equipment Plug Load” Guide to Savings](#)

APPENDIX C

City of Seattle Information Technology Standards

SeaIT Telecommunications Distribution Methods & Standards

SeaIT Telecommunications Standards

SeaIT Grounding Standards

SeaIT Communications Infrastructure Standards & Specifications

Floor Box Spec 16132

Cable Tray Spec 161839

SEATTLE INFORMATION TECHNOLOGY (Seattle I.T.)

TELECOMMUNICATIONS STANDARDS

TELECOMMUNICATION DESIGN CONSIDERATIONS:

- Telecommunication design should follow ANSI/TIA/EIA standards of 568-B and 569-A
- Pathways should be easily accessible even after the facility is built.
- Piping containing water should be routed around the telecommunications room.
- Major HVAC ducting systems should be routed around the telecommunications room.
- Centralize the telecommunication room as not to exceed 200ft from a work station in any direction.

Pathways: Pathways in larger buildings will be provided by the project depending on the requirements of the facility. These types of pathways may include cable trays, 4” conduit sleeves or horizontal/vertical conduits

Cable Trays: Refer to the cable tray standards specification document. Ladder rack type tray within a telecommunication room/closet will be installed by Seattle I.T.

Outlet Boxes: Shall be 4” square, 2 1/8 deep minimum, with a 1 gang plaster ring. All other mud rings should be of a metal type and not plastic.

Floor Boxes and Poke thru: Refer to the floor box standards specification document. (If design drives floor boxes or poke through). This specification provided when requested.

Conduits: Workstations that require a conduit shall have a minimum of 3/4" conduit that will be run from the outlet location to the nearest cable tray or open plenum space. All conduits will contain a pull string and be tied to each end of the conduit. All conduits should have bushings at both ends. There will be a requirement that no length of conduit run shall exceed 150ft and shall not contain more than two 90-degree bends without a pull box. These requirements include provisions for bend radius protection; pull box requirements, and other considerations as outlined in TIA standards. Conduits should be cleaned and free of dirt and water.

Room Design sizes: The standard room sizes design considerations will depend on the size of the building sq ft.

Design criteria should follow the ANSI/TIA/EIA standards of 569-A.

EX: Small building size requires a walk in closet 4ft X 6ft.

Some room sizes may differ from standards because the complexity of the building or amount of telecommunications equipment that may be housed in the room.

CONTINUED ON NEXT PAGE

DESIGN CONSIDERATIONS CONTINUED

Work stations: A work station should not exceed a distance of 200ft from a telecommunications room. This allows for patchcord length at the work station and in the Main Distribution Frame.

Doors: The door shall be a locking door with a key, even if a department installs a card reader. (If the electricity fails the card readers no longer work and the only access is via a key).

Flooring: Preferred is VCT or sealed concrete.

Room Walls: All walls will be lined with 4x8 ACX Douglas fir plywood with A side out. The height should be at least 8.5" A.F.F to the finished ceiling. Backboards shall have two coats Fire Retardant white, satin finish (washable) paint.

Ceiling: Preferred dropped ceiling with acoustical type tiles.

Grounding: Refer to the building grounding standards specification document. (A typical NEMA bar will be needed and a ground from the main building.) Refer to section A and B and C

Electrical: Provide 1 quad 20 amp dedicated circuit per equipment rack. (These will need to be mounted to the top of the cable tray that Seattle I.T. installs in the MDF)
Provide 1 or 2 convenience outlets (Coordinate with Seattle I.T. for exact location).
Lighting: Design the lighting to be adequate and uniform within the room.

Room Temperatures: The temperature in the Telecommunication closets will need building air or ventilation.
The temperature shall not exceed 68-72 F and the humidity level shall not exceed 30%-55%RH.

SEE PRODUCT STANDARDS ON NEXT PAGE

PRODUCTS

All material, components and equipment shall be new and of high quality. The components and equipment furnished must have a proven track record and if required, the contractor must furnish satisfactory evidence as to the kind and quality of materials and equipment. Avaya/CommScope part numbers are listed to establish a basis of design. In some cases, other equal products are acceptable, but must be approved by Seattle I.T. before submittals are accepted.

DATA/PHONE OUTLETS

Please check with the Seattle I.T. if another product is being considered.

Label jacks individually

Description: Cat 6 Ivory or use color appropriated by the architectural design.

Category 6 modular RJ45 jacks, 568B termination pattern.

Manufacturer: Avaya/CommScope; **Model#:** 700 206 717 for Ivory Jack, other colors will be different, but same model type.

DATA/PHONE OUTLET FACEPLATES

Description: Faceplate Avaya /CommScope 6 port Ivory. Use matching blanks in unused ports.

Manufacturer: Avaya; **Model#:** 108 168 592

DATA/VOICE CABLE

Description: Category 6, 23-gauge, plenum, 4pr use color appropriate for building design

Manufacturer: Mohawk or Equal product, **Model#:** M58283B,

FIBER OPTIC CABLE

Description: 62.5um strands count dependant on application design, Use colored blanks in unused ports.

Manufacturer: Siecor, AMP or equal

TELEPHONE BACKBONE/RISER CABLE

Use standard Category 3 24 gauge riser cable. Pair count is dependant on design needs

TERMINATION BLOCK//WIRE MANANGEMENT

Description: In a small to medium environment, we use the 110-style type with legs that can support up to 1000mb connections. In a large environment we use Systimax Visipatch system.

All wire management should match manufacturer the type of system installed Visipatch system vs 110 type system. This will be used for both voice and data terminations, however it is dependent on the technology design of the facility and customer needs.

Manufacturer: Avaya; **Model#:** 108 232 737

PATCHPANEL SYSTEMS-

Generally the city doesn't use patch panels in our standard environment but when we do use them we use.

Description: 24/48 port CAT 6 dependent on design requirements

Manufacturer: Siemon; **Model#:** HD6-24

RACKS/CABINETS

Chatsworth standard 7x19 racks, Rittal cabinets, size is dependent on application

City of Seattle Grounding Standards, July 2004

Part One

Main Distribution Frame Room Grounding

Section A: Grounding Conductor and connection to the building's Main Ground Array:

1. A single copper stranded insulated Grounding Conductor not smaller than 4/0 shall be exothermically welded to the building's underground Main Ground Array or terminated to the building's Main Electrical Master Ground Bar as per the NEC.
2. The Grounding Conductor shall be run to the MDF Room via the most direct and shortest route possible and in accordance with the NEC.
3. The Grounding Conductor must be continuous with no splices or sharp bends and shall not make any other electrical contact along its route from the building's underground Main Ground Array or Master Ground Bar to the MDF Room.
4. The Grounding Conductor shall be run exposed or in NEC approved plastic conduit. The Grounding Conductor shall not be run in metallic conduit.

Section B: Grounding Termination in the MDF Room:

1. The MDF Grounding Conductor shall be routed into the MDF Room and take the shortest and most direct route possible to the location of the MDF Ground Bar.
2. The MDF Ground Bar shall be installed on the wall in the MDF Room at the same height as the MDF Cable Tray. This will permit equipment grounding conductors routed along the cable tray to make the shortest connection route possible to the MDF Ground Bar.
3. The electrical connection of the MDF Grounding Conductor to the ground bar shall be in accordance with the NEC.

Section C: MDF Ground Bar:

1. The MDF Grounding Conductor will terminate to a wall mounted copper buss bar.
2. The buss bar shall be mounted at the level of the cable tray distribution system and installed as per the manufacturer specifications.
3. The buss bar shall be a B-Line Telcom model SB-476 (Graybar # 93159411) or equivalent.

Part Two(Only Applicable if a City Radio system will be installed in the building)

Amateur Radio and Radio Communications Room Grounding

Section A: Grounding Conductor and connection to the building's Main Ground Array:

1. A single insulated copper stranded Grounding Conductor not smaller than 4/0 shall be exothermically welded to the building's underground Main Ground Array or terminated to the building's Main Electrical Master Ground Bar as per the NEC.
2. The Grounding Conductor shall be run to the Radio Room via the most direct route possible and in accordance with the NEC.
3. The Grounding Conductor must be continuous with no splices or sharp bends and shall not make any other electrical contact along its route from the building's underground Main Ground Array or Master Ground Bar to the Radio Room.
4. The Grounding Conductor shall be run exposed or in NEC approved plastic conduit. The Grounding Conductor shall not be run in metallic conduit.

Section B: Grounding Termination in the Radio Room:

1. The Grounding Conductor shall be routed into the Radio Room and take the shortest and most direct route possible to the location of the Radio Room Ground Bar.
2. The Ground Bar shall be installed on the wall in the Radio Room at the same height and as close as possible to the Antenna Coaxial Entrance Ports. This will permit lightning arrester grounding conductors to take the shortest connection route possible to the Ground Bar.
3. The electrical connection of the Radio Room Grounding Conductor to the ground bar shall be in accordance with the NEC.

Section C: Radio Room Ground Bar:

1. The MDF Grounding Conductor will terminate to a wall mounted copper buss bar.
2. The buss bar shall be mounted to the wall as close as possible to and at the same level of the Antenna Coaxial Entrance Ports. Installation shall be per the manufacturer specifications.
3. The buss bar shall be a B-Line Telcom model SB-477 (Graybar # 93162801) or equivalent.

Part Three

Telecommunications Utility Entrance Room Grounding

Section A: Grounding Conductor and connection to the building's Main Ground Array:

1. A single copper stranded insulated Grounding Conductor not smaller than 4/0 shall be exothermically welded to the building's underground Main Ground Array or terminated to the building's Main Electrical Master Ground Bar as per the NEC.
2. The Grounding Conductor shall be run to the Entrance Room via the most direct and shortest route possible and in accordance with the NEC.
3. The Grounding Conductor must be continuous with no splices or sharp bends and shall not make any other electrical contact along its route from the building's underground Main Ground Array or Master Ground Bar to the Entrance Room.
4. The Grounding Conductor shall be run exposed or in NEC approved plastic conduit. The Grounding Conductor shall not be run in metallic conduit.

Section B: Grounding Termination in the Entrance Room:

1. The Grounding Conductor shall be routed into the Entrance Room and take the shortest and most direct route possible to the location of the Entrance Room Ground Bar.
2. The ground bar shall be installed on the wall in the Entrance Room at a height of not more than 24 inches off the floor at a location as close to the outside of the last through slab entrance conduit, either right or left of the conduit row. In the event the entrance conduits enter the Entrance Room from above, the Ground Bar shall be located below the area designated for copper cable protectors.
3. The electrical connection of the Entrance Room Grounding Conductor to the ground bar shall be in accordance with the NEC.

Section C: Entrance Room Ground Bar:

1. The Entrance Room Grounding Conductor will terminate to a wall mounted copper ground bar.
2. The ground bar shall be mounted to the wall as close as possible to the outside of one end of the row of utility entrance conduits coming up through the slab. The ground bar shall be mounted no higher than 24 inches from the floor. If the entrance utility conduits enter the room from overhead, locate the ground bar below the area designated for the copper cable protectors. Installation of the ground bar shall be per the manufacturer specifications.
3. The ground bar shall be a B-Line Telcom model SB-477 (Graybar # 93162801) or equivalent.



**City of Seattle
Seattle Information Technology (Seattle
I.T.)**

Communications Infrastructure Standards and Specifications

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About This Document

This section describes the purpose, scope, and use of this document, as well as the procedure for updating it.

Purpose of This Document

The Communication Technology Division supports telecommunications in a multi-product, multi-vendor environment in a commercial city and non-city buildings. The purpose of this document is to provide guidelines and standards for the City of Seattle's:

- Telecommunications equipment
- Cabling
- Planning and installation of structured cabling systems

Who Should Use This Document

This document is intended for use by City of Seattle employees, vendors, and contractors who install, upgrade and/or support telecommunications equipment and cabling for the City of Seattle.

Structure of This Document

This document is structured as follows:

- Chapter 1, "Infrastructure Design",
- Chapter 2, "Communications",
- Chapter 3, "Horizontal Distribution System",
- Chapter 4, "Labeling Standards",

How to Update This Document

For updates to this document or questions about this document contact Josh Kilfoyle at 206 684 3797 or email Josh.Kilfoyle@seattle.gov

1. Infrastructure Design

1.1. Overview

1.2. There are five major components of infrastructure design: Entrance Room, Communications Room, Riser System, Horizontal Distribution System—Cable, and Horizontal Distribution System—Station Conduit and Outlets.

1.3. Entrance Room

The Entrance Room (ER) is the most permanent element in the communications infrastructure.

FUNCTION	<ul style="list-style-type: none"> Provides racking equipment to terminate cabling that enters the building. Provides a point-of-presence for telecom service providers(Ex: Qwest, AT&T, etc.) Functions as the interconnection between buildings internal systems.
LOCATION	Can be located on the outside or inside of a building
DESIGN	<ul style="list-style-type: none"> This area must be designed exclusively for communications services, and cannot be shared with electrical components, janitorial services, or fire alarm systems. Plumbing, electrical, and ventilation systems must be routed outside of this room. Walls must have ¾ fire rated plywood and 2 coats of white paint.

1.4. Communications Room

Note: Communications Room specifications are discussed in Chapter 2 (see page 7).

FUNCTION	<ul style="list-style-type: none"> Provides a controlled environment to house telecommunication equipment, connecting hardware and splice closures. Provides space and access to pathways that support voice, data, video, and radio services. Provides termination of horizontal cable distribution on compatible connection hardware.
LOCATION	Near permanent feature (i.e. staircases and airshafts for utilities, ventilation, and elevators), or in the core area.
DESIGN	<ul style="list-style-type: none"> Communications Room perimeters must not exceed 250 ft. from the farthest distance point of a work station. Provide direct access off of public hallways. Walls must have ¾ plywood fire rated and 2 coats of white paint.

1.5. Riser System and Closets

The riser system ...

FUNCTION	A backbone distribution system is the part of a premises distribution system that provides connection between equipment rooms, telecommunications rooms and telecommunications service entrance facilities.
LOCATION	Closets within buildings, 2-story building and Multi-story building
DESIGN	Walls must have $\frac{3}{4}$ plywood fire rated and 2 coats of white paint.

1.6. HDS—Cable

The Horizontal Distribution System (HDS) ...

FUNCTION	Provides a physical means for transporting telecommunications signals between the telecommunications outlet/connector in the work area and the horizontal cross-connect in the telecommunication room.
LOCATION	
DESIGN	All pathways considered must run in the most direct route as possible (usually parallel to building lines) all branches from the parallel line should have 90 degree branches to individual groups of work stations.

1.7. HDS—Station Conduit and Outlets

The Horizontal Distribution System (HDS) ...

FUNCTION	Provides media connectivity to the infrastructure
LOCATION	Within buildings
DESIGN	Each work station will receive a faceplate outlet to support communication jacks.
CONDUIT DESIGN	Adequate conduit needs to be installed to support the cabling to the work stations.

2. Communications Design Guidelines

The information provided below will depend on the number of workstation cables going into the MDF or IDF and will affect the layout of the Avaya/CommScope system or a smaller system of simple 110 type blocks depending on size of site and workstations.

The Communications Room provides many different functions for the cabling system and is often treated as a distinct sub-system within the hierarchical cabling system. The section lists the cabling practices and guidelines for cross-connects and inter-connections.

The cross-connection of horizontal cable terminations for data, phone, and other services use jumpers or patch cords. This allows flexible connectivity when extending various services to the work area outlet.

Horizontal Distances

The maximum horizontal distance from the distribution termination block to the work area jack/outlet must not exceed 250 ft., dependent of media type. This is the distance for Category 6 copper standard, currently in use and the standard for all new cable runs.

The maximum distance from the cabling modular plug to the distribution termination block, which include cross-connects or patch cables within the IDF must not exceed 40ft.

The maximum distance from the jack/outlet to the workstation must not exceed 25ft.

Work Area Jacks/Outlets

Each four-pair cable must be terminated in an eight-position Avaya/CommScope modular jack at the work area.

Our faceplate outlet contains a minimum of 3 jacks per single gang box.

Each work station will receive an Avaya faceplate outlet.

All VoIP sites will only receive 2 jacks per station location.

An outlet can support up to a maximum of six jacks per single gang box (if needed to support additional services).

Our current jack standard is Avaya/CommScope CAT 6 - 8 position (RJ45) 568B.

2.1. Communication Room Design Guidelines

SIZE	Two types of Communications Rooms are acceptable. <ul style="list-style-type: none"> • Standard “walk-in” Communications Room. • “Shallow” Communications Rooms with double doors opening into the hallway may serve areas.
NUMBER PER FLOOR	The number of Communications Rooms per floor will be the minimum required to support the potential assignable square footage. There will be at least one Communications Room per floor, except when: <ul style="list-style-type: none"> • The area exceeds the farthest floor distance. • The maximum cable distance exceeds 250 ft. • Communications Room space is limited.
CEILINGS	False ceiling will or will not be installed, according to the Fire code jurisdiction of that Building.
DOORS	All doors must be 36-inches wide and 6-feet 8-inches high. <ul style="list-style-type: none"> • Walk-in Communications Rooms: Locate the door on one the shorter walls of the room. The door should not be centered on the wall. Locate door at the farthest corner and opposite distance from the backboard. The door must not swing in a manner that restricts access or blocks riser conduits, cable trays, or the main backboard. • Shallow Communications Rooms: Provide double doorways that open outward. Fix the left door, top and bottom, with deadbolts.
ENVIRONMENT CONTROLS	Maintaining strict control over environmental factors is important to ensure reliability of equipment in Communications Rooms. The table below lists acceptable environment parameters. <ul style="list-style-type: none"> • Temperature: Between 68°F and 72°F • Humidity:
FIRE RATING	Fire rating of walls and doors must comply with code. 2hr fire walls must have conduit down to the outlet box (usually provided by the Electricians) and must be protected by fire wool.
FLOOR LOADING	The floor must have a floor loading capacity of at least 50 pounds per square foot.
SECURITY	Communications Rooms must be secured with a cipher lock or card key pad.
TELEPHONE	One Digital Display telephone per Communications Room.
LIGHTING	Adequate lighting is required in each Communications Room. Do not place lighting above rack locations.
ELECTRICAL	Communications Room must meet the standard cable infrastructure room standards. See diagram ...
CABLE TRAY	Provide (CPI) Chatsworth cable tray around the periphery of the Communications Room to support and distribute cable within the room. The size and configuration may not require cross-room segments. Tray must be located 6-inches from the backboard.

CONDUITS

Conduits must be used for cabling that leaves the Communications Rooms. Conduits are mandatory for fire stopping between floors.

- Locate vertical riser conduit along the sidewall to the right of the backboard.
- 4" conduits support an average of 50-60 Category 6 cables.
- Conduits must be at least 6" from the wall to the right of the backboard (Riser).
- Conduits must be at least 6" from the wall below or above the distribution horizontal cabling blocks.
- Fire Block Putty or Brick must be used at cable entry points, as shown in Figure 1.
- The type of fire stopping used is dependent on the fill ratio of cabling used in a conduit.

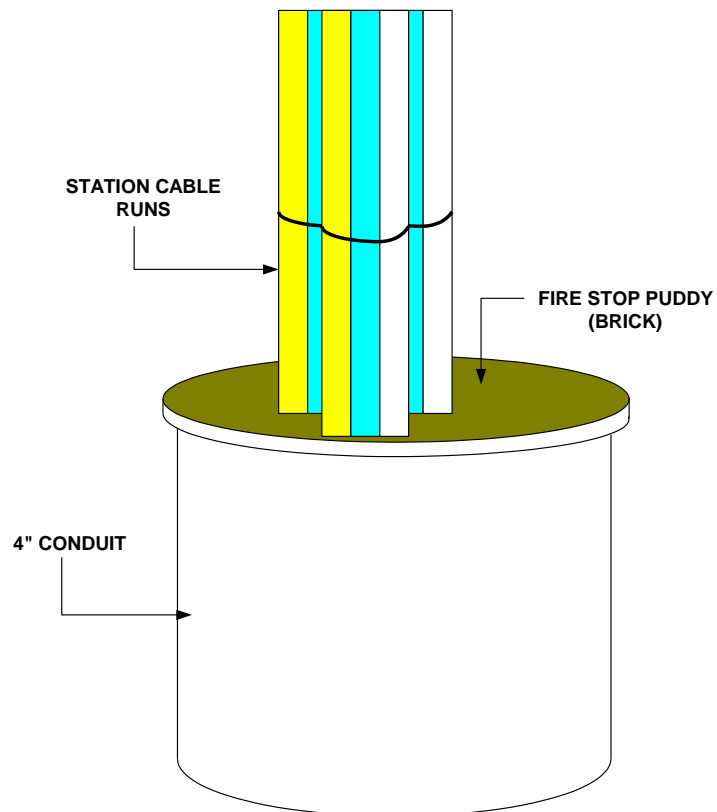


Figure 1: Conduit Diagram

SUPPLIES

The following items will be mounted on Communications Rooms walls:

- Broom and dust pan
 - First-aid kit
 - Phone
 - 3' wood ladder
 - Trash can
-

-
- HOUSEKEEPING**
- No surplus equipment will be kept in Communications Rooms, except for patch cables, jumpers or short notice items.
 - Electronic equipment will not be stored in Communications Rooms. Spares and other necessary electronic components will be stored in designated locations.
-

2.2. Cable Trays and Racks

The information provided below will depend on the number of work station cables going into the MDF or IDF.

All ladder rack and equipment racks are CPI(Chatsworth) standard gray

Equipment racks are standard size 7'x19"

Install 18" cable tray in the Communications Room. The cable tray will support all copper distribution from the work in area, data, and voice equipment. Figure 2 shows a cable tray diagram.

Electrical outlets for data racks and room should be coordinated with Seattle I.T. before specs are written into bid documents.

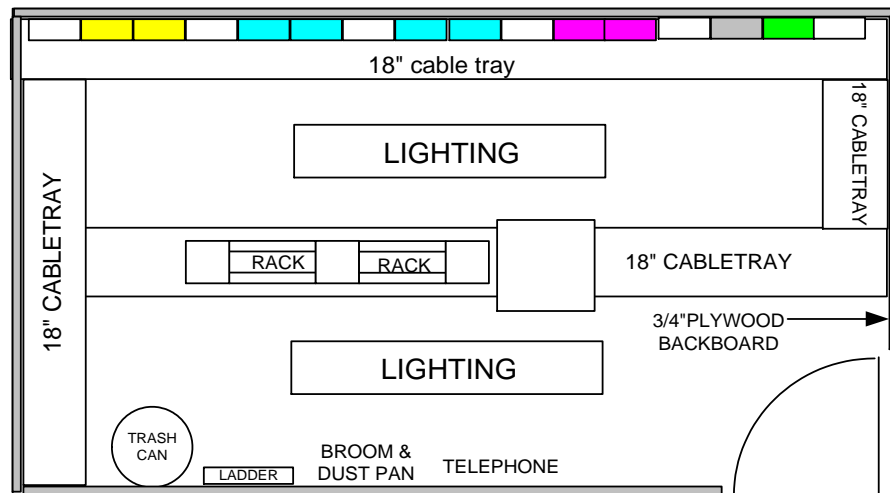


Figure 2: Cable Tray Diagram

Size a cable tray for a 40% maximum fill capacity.

The following factors affect tray capacity:

- Number of outlets
- Square footage
- Unknown departmental cable quantities
- Low voltage cable
- Cable quantities, bottlenecks

Increase the size of those areas of cable tray most likely to incur heavy pathway use by localized cable, to decrease potential bottlenecks.

The following cable tray parts may be used when designing CPI(Chatsworth)cable trays in the Communications Room: Rod Mounts, Angle Support Brackets, Triangular Support Brackets, Ground Brackets, Junction Splice Kits, Butt-Splice Kits, Brace Plates, and J-Bolts

2.2.1. Rod Mounts

Figure 3 shows a standard rod mount bracket.

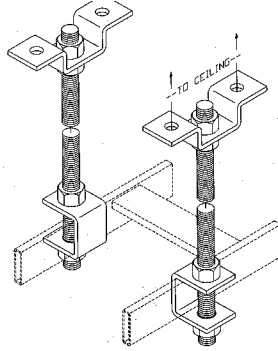


Figure 3: Rod Mount Bracket

The standard separation between rod mount brackets is 4 feet, as shown in Figure 4.

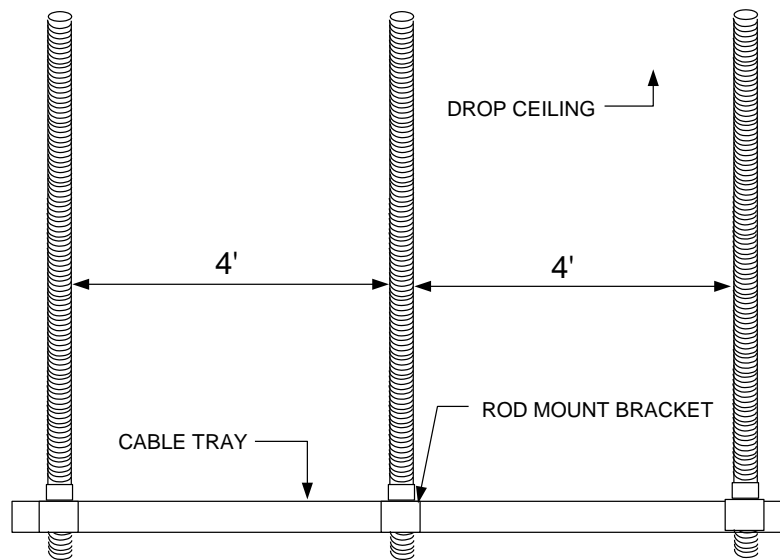


Figure 4: Side View of Cable Tray with Rod Mount Brackets

Standard 18" cable tray is used for all Intermediate Distribution Frames (IDF's). Use 6" cable tray for corner angle bracing on cable tray, as shown in Figure 5.

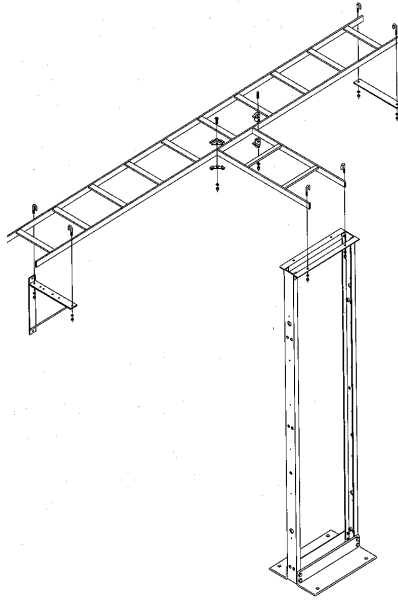


Figure 5: Layout View of Corner Angle Bracing

2.2.2. Angle Support Brackets

Figure 6 shows a standard angle support bracket.

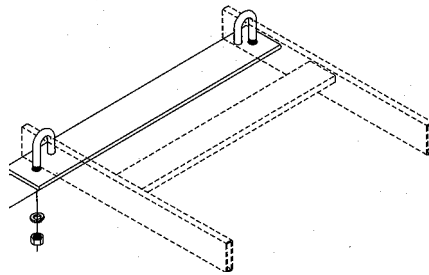


Figure 6: Angle Support Bracket

Angle support brackets are used to support the end of the cable tray to the wall, as shown in Figure 7.

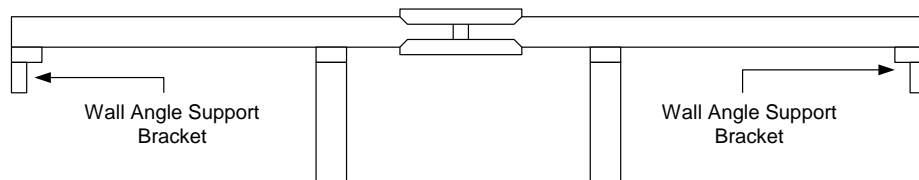


Figure 7: Side View of a Cable Tray with Wall Angle Support Brackets

2.2.3. Triangular Support Brackets

Figure 8 shows a standard triangular support bracket.

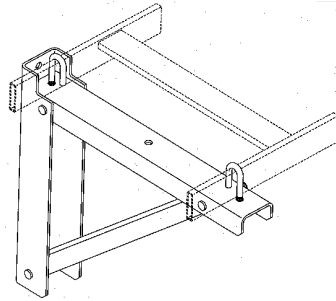


Figure 8: Triangular Support Bracket

Triangular support brackets provide wall support for the cable tray, as shown in Figure 9.

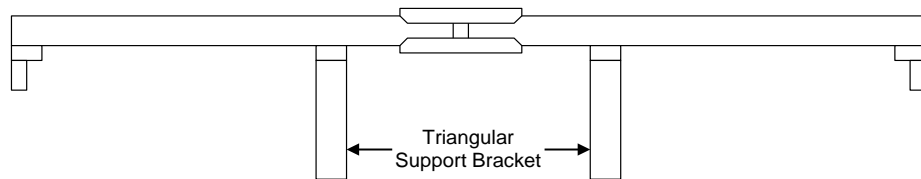


Figure 9: Side View of Cable Tray with Triangular Support Bracket

2.2.4. Ground Brackets

Figure 10 shows a standard ground bracket.

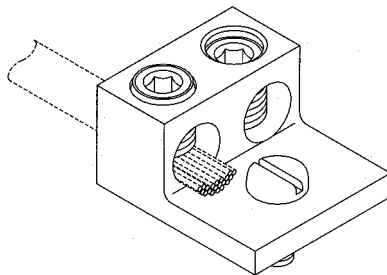


Figure 10: Ground Bracket

2.2.5. Junction Splice Kits

Figure 11 shows a standard junction splice kit.

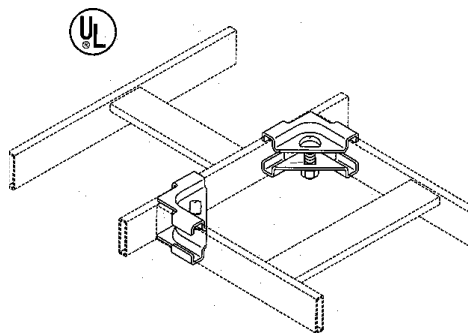


Figure 11: Junction Splice Kit

2.2.6. Butt-Splice Kits

Figure 12 shows a standard butt-splice kit.

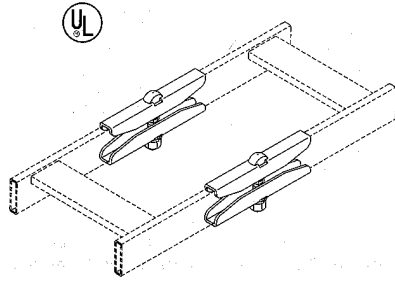


Figure 12: Butt-Splice Kit

Butt-splice kits are used to connect two cable trays together, as shown in Figure 13.

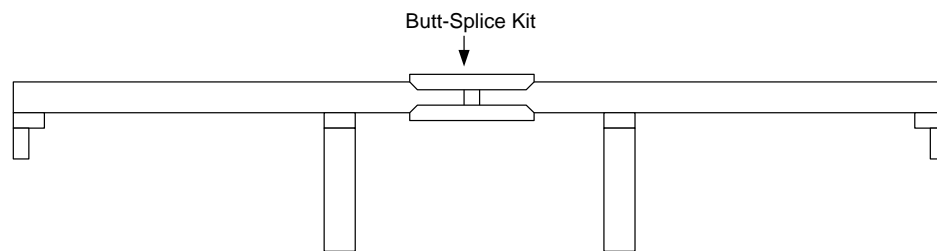


Figure 13: Side View of Cable Tray with Butt-Splice Kit

2.2.7. Brace Plates

Figure 14 shows two ways to install standard brace plates.

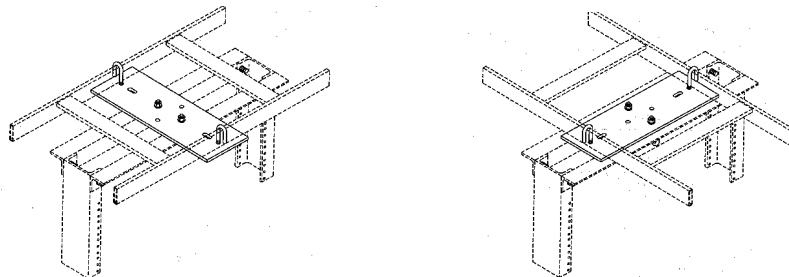


Figure 14: Brace Plates

2.2.8. J — Bolts

Figure 15 shows a standard J-bolt. J-bolts are used to mount the cable tray to any of the support brackets.

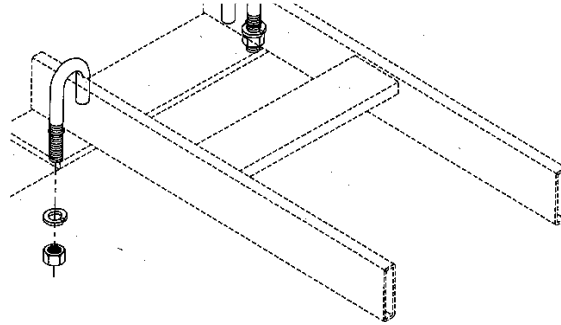


Figure 15: J-Bolt

2.3. Backboard

- The Backboard is used to terminate cabling blocks and other components not mounted in a floor rack.
- Designate the longest wall farthest from the doorway of the Communications Room as the “main backboard”.
- Backboards must have two coats of fire retardant matte paint. Paint color is white.
- Use ¾-inch plywood. Mount plywood from floor to ceiling on all four walls.

2.4. Cable Management

Cable management is the physical layout of cables and wires within Communications Rooms. Cable management is required for the telephone, data backboard, and Racks.

2.4.1. Telephone Cables

...

2.4.2. Data Backboard Cables

All cables and cross-connect wire must route through horizontal and vertical cable management.

- Horizontal cable management is required at the top of every column of blocks. Depending on the number of distribution cables, recommended adding horizontal cable management in the center of the backboard.
- Vertical cable management is required on each side of the column of blocks.

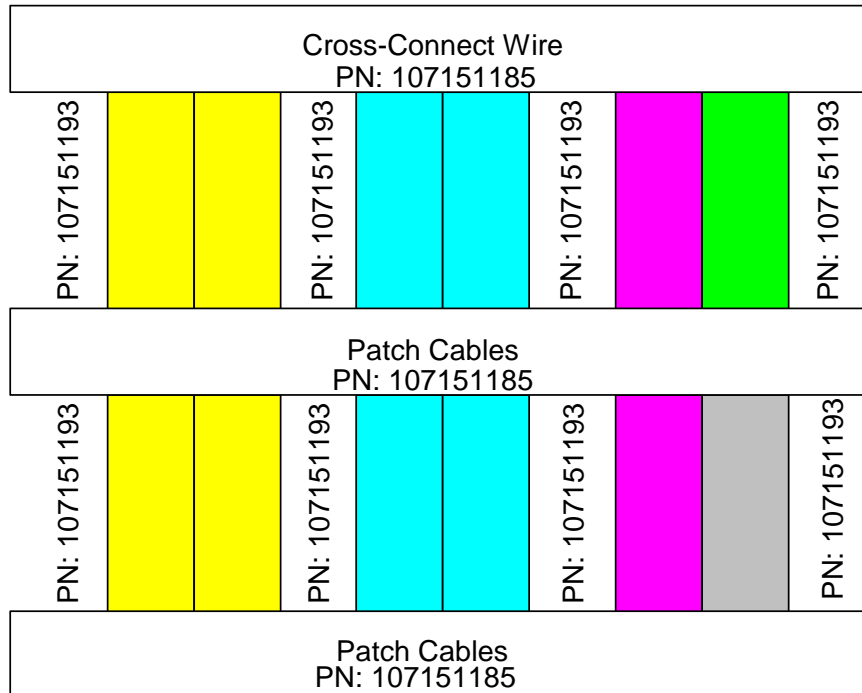


Figure 16: Data Backboard Diagram

The information provided below will depend on the number of workstation cables going into the MDF or IDF and will affect the layout of the Avaya/CommScope system or a smaller system of simple 110 type blocks depending on size of site and work stations.

All cables connecting from the front of a block to another block within the same rack or column must be routed through whatever rings or cable tray system available.

Cables connecting to the right of the block will route through the cable rings to the right of the block.

Cables connecting from one column to another column will route across the top of the column.

2.4.3. Cable Racks

Vertical cable management is required for racks in MDF and IDF Communications Rooms.

- For MDFs: Use double-sided wide vertical rack cabling, color: clear. Rack dimensions: 7' high X 6" wide X 12.75" deep.
- For IDFs: Use double-sided narrow or wide vertical rack cabling (depending on cabling quantities). Double-sided narrow, color: clear. Rack dimensions: 7' high X 3.65" wide X 12.75" deep.

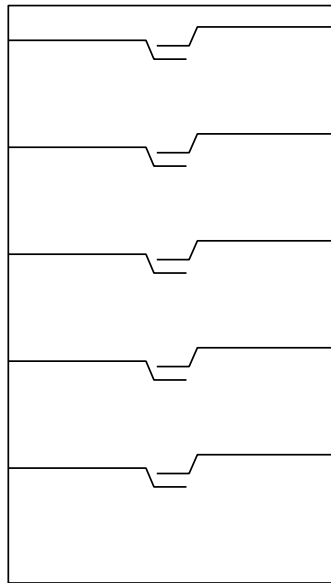


Figure 17: 900 Pair Cable Management with VisiPatch 110 Patch System

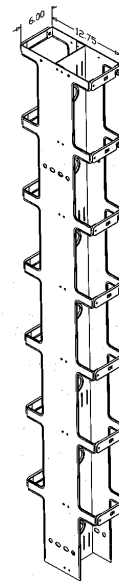


Figure 18: Vertical Cable Management with Floor Mount Racks

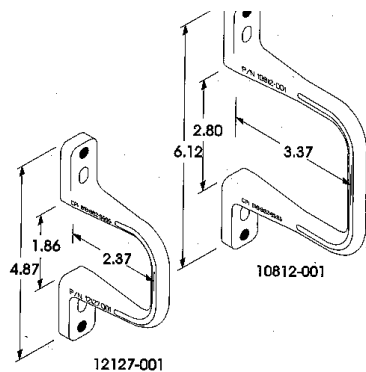


Figure 19: D-Rings

D-Rings are used to mount cables to the backboard. Use D-Rings when no block or rack management is available.

2.5. Equipment Racks

Equipment racks will only be housed in Communications Rooms if they contain hardware that:

- Services multiple departments
- Needs to be held in a secured area for reasons of public safety (i.e., for the Police Department)

2.5.1. General Specifications

DIMENSIONS

Data Network Racks: 7' high X 19" wide

	Telephone Network Racks: 7' high X 23" wide
	Fiber Riser Racks: 7' high X 19" wide
COLOR	Silver CPI (Chatsworth)

2.5.2. Rack Layout

INSTALLATION	Bolted to the floor, with seismic bracing to the cable tray above.
LABELING	One-inch label, placed at the top.

2.5.3. Arranging Equipment Racks in Communications Rooms

All equipment racks designed for or added to Communications Rooms must comply with the following guidelines:

- There must be no less than 36" from the front, rear, and side of rack to a blank board or wall. There must be no telephone or data blocks on the wall.
Exception: The side of the rack or row of racks can be less than 36" against the wall, as long as access to the rear and front of the rack is not compromised.
- There must be 48" clearance in front and rear of the rack if there is a telephone or data blocks.
- There must be at least 6" space between racks to accommodate cable management.

The above guidelines are illustrated in Figure 20.

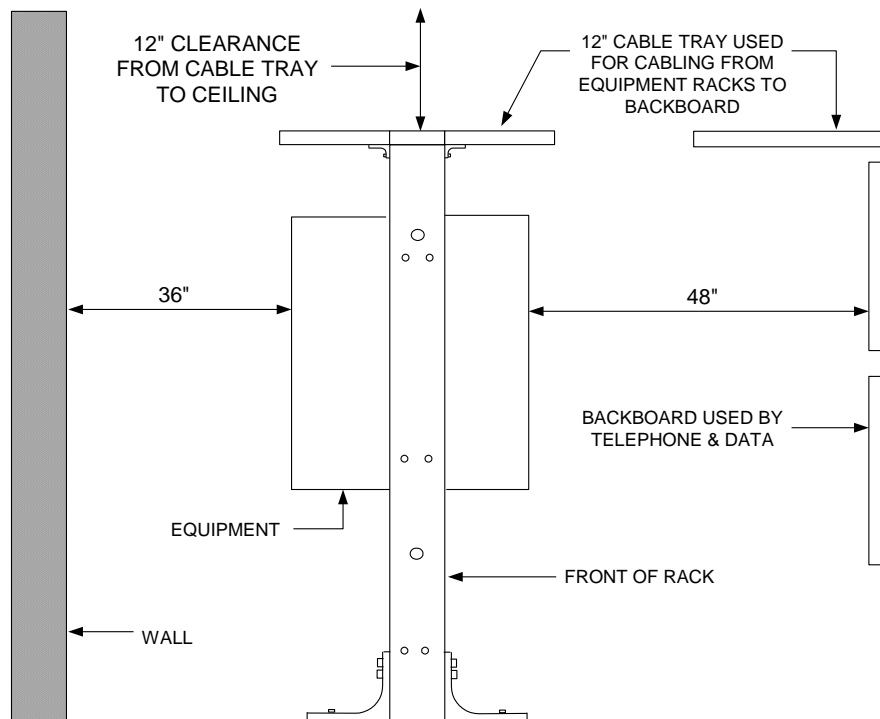


Figure 20: Layout of Equipment Racks in Communications Rooms

2.6. Equipment Cabinets

Equipment cabinets will only be housed in Communications Rooms if they contain hardware that:

- Services multiple departments
- Needs to be held in a secured area for reasons of public safety (i.e., for the Police Department)

2.6.1. General Specifications

BRAND	Rittal
MODEL	Dependent on facility design
DIMENSIONS	Dependent on facility design
COLOR	Dependent on facility design

2.6.2. Cabinet Layout

MONITORS	Each monitor supports equipment in three cabinets; three monitors per row of 10 cabinets. Cabinets that house a flat screen monitor will also have one 1u Great Lakes keyboard tray, one keyboard, and one mouse.
APEX SWITCHES	1 APEX 280ES console switch per cabinet APEX switches in cabinets without monitors will attach to aggregate 280ES switch located in the cabinet with the monitor
PDUs	2 Pulizzi PDUs per cabinet, mounted at 0u on the side rails (Type of PDU dependent on design)
CABLING	24 CAT 6 cables pulled to each cabinet 1 Siemons CAT 6 - 24 port patch panel per cabinet 8 seven-foot APEX cables per cabinet 2 Siemons 1u wire managers Horizontal cable management (rings) will be installed on each side of the back of the cabinet, as necessary
LABELING	Patch panel labeling scheme based on cabinet numbering APEX switch labeling scheme ... APEX switch port labeling scheme should be the EXACT name of the server (if characters are supported) Cisco 6509 switch ports must be labeled with the EXACT name of the server before the port is activated

2.7. Seismic Bracing

CABLE RACKS

CABLES	All cables must be attached to the backboard or racking by either tie wraps or a horizontal/vertical cable management system.
---------------	---

HARDWARE RACKS	Each rack or cabinet are bolted by at least 2 points
-----------------------	--

DATA/PHONE DEVICES	All devices must be either mounted in a rack or braced with tie-wraps or a strap.
---------------------------	---

3. Horizontal Distribution System

The information provided below will depend on the number of work station cables going into the MDF or IDF and will affect the layout of the Avaya/CommScope system or a smaller system of simple 110 type blocks depending on size of site and work stations.

Horizontal cabling is the part of the telecommunications cabling system that extends from the work area jack or outlet to the Intermediate Distribution Frame (IDF). This cabling is laid from the IDF “horizontally” above ceilings and under (or along) floors. Cross-connects and patch cables are also part of the horizontal cabling system.

Horizontal cabling systems are designed to allow any service to use a universal system. Primary uses are telephone and data.

3.1. Cable Systems

CABLE RUNS	Bundles of cable must be tie wrapped at each cross-section on the cable tray, as shown in Figure 21. The diameter of each bundle must not exceed 2”.
-------------------	--

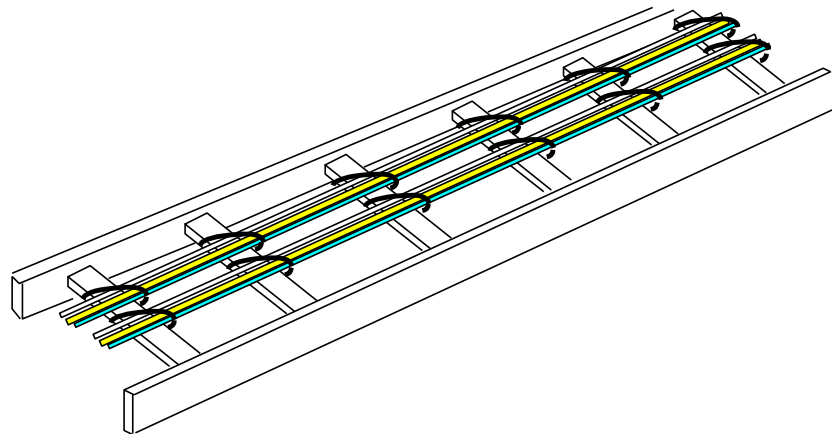


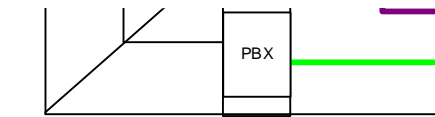
Figure 21: Cable Runs

CABLE TRAYS	Bundles of cable must be piled loosely on top of a cable tray. This allows cable to be pulled easily for extended distances. Cable bundles must never be tie-wrapped to a cable tray.
--------------------	---

HANGER BARS	Each bundle of cable lay loosely on hanger bar.
--------------------	---

**DATA EQUIPMENT
WHIPS**

**PHONE
EQUIPMENT
WHIPS**



UTP D

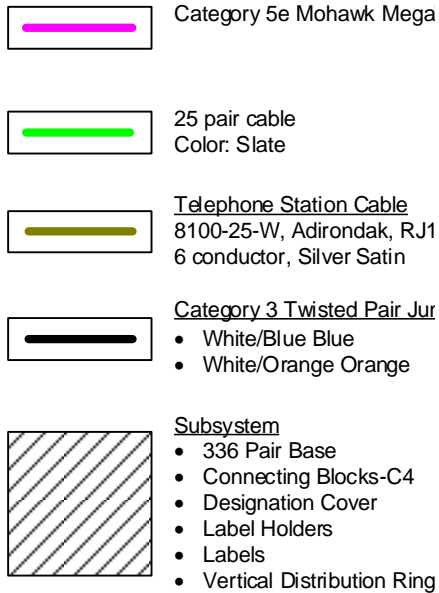


Figure 22: Unshielded Twisted Pair Distribution System

3.2. 110 System-CommScope Systemax VisiPatch Wall Mount

The 110 VisiPatch System features a unique reverse direction patch cord, integrated cable management and increased density to clean up clutter for a neat, cordless appearance.

3.2.1. System Specifications

The information provided below will depend on the number of work station cables going into the MDF or IDF and will affect the layout of the Avaya system or a smaller system of simple 110 type blocks depending on size of site and work stations.

MODEL **VisiPatch Field Terminated Kit: 110UB1-336FT**
VisiPatch Wall Mount Bracket: 110UP-WB (see Figure 23)

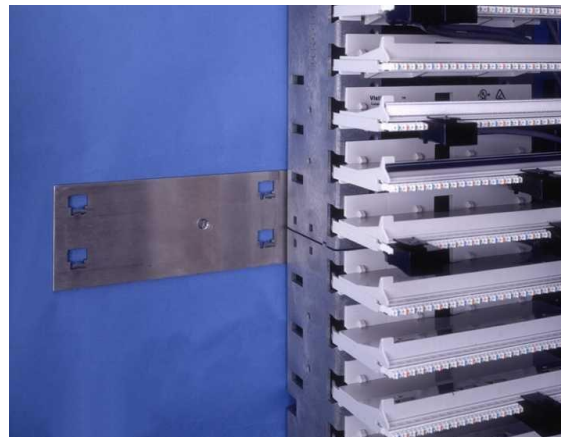


Figure 23: 110UP-WB VisiPatch Wall Mount Bracket

DIMENSIONS 21.6' high X 8.53' wide X 8.5' deep

BACK PANEL This is a wall mounting hardware that has two identical "L" shaped halves that snap together. The back panel holds 12 wiring blocks, is stackable and provides better retention and tie down points for cable routing.

WIRING BLOCK The wiring block snaps to the back panel and accepts 28 conductor pairs, three more than traditional 110 systems. Slots and grooves allow versatile cable management, keeping the cables close to the termination point and permitting technicians to maintain the tight twist of pairs required for high-speed systems. The wiring block supports seven 110C4 connecting blocks. The wiring block accepts 4 and 25 pair cables. The wiring block is included in the Field Terminated Kit.

DESIGNATION STRIPS/ COVER PLATE The cover plate snaps directly on the wiring block and protects the termination cables. It also includes a large label-holding surface to assist with circuit identification. And, it serves as a positive attachment point for the latching of the 4-pair patch cord. The cover plate and the wiring block provide a built in horizontal patch and management trough. The cover plate is included in the Field Terminated Kit.

LABEL HOLDERS AND LABELS Label holders mount onto the cover plate with an adhesive backing, and accept any of the nine colored labels. Twelve holders and 12 white labels are included in the Field Terminated Kit. Additional labels are sold separately. Please contact your City contact to provide the Labels for you specific needs.

HORIZONTAL AND VERTICAL MANAGEMENT Horizontal and vertical cable managers support a maximum cable count of 900 cable pairs. Each component is sold separately.

- **Horizontal Cable Manager:** 64", part number 107151185.
- **Vertical Cable Manager:** 21.6", part number 107151193.

WEB SITE http://awapps.commscope.com/catalog/systimax/product_details.aspx?id=18728

3.2.2. VisiPatch Terminal Block Installation

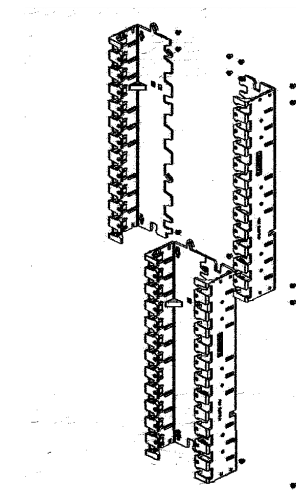


Figure 24: Terminal Block Panels

Step 1: Mount Terminal Block Panels

- The mounting surface must be capable of supporting 30 pounds for each 336 pair panel to be mounted. Flame retardant $\frac{3}{4}$ inch thick plywood is suitable.
- Place the panel halves against a flat surface and snap them together.
- Determine the number of 336-pair terminal block panel rows to be mounted—one row or multiple rows. For multiple rows of panels, the bottom row will be installed first.
- Partially insert one #12 x 1 inch long Wood Screw along the horizontal line.
- Hang the first panel on the partially inserted screw, level the panel, then mark the next screw along the horizontal line.

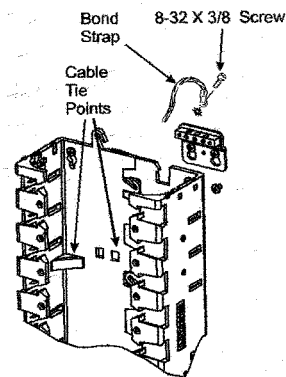


Figure 25: Terminal Block Panel (Detail)

Step 2: Prepare the Cable

- Position cable and remove outer sheath above terminal block.
- Secure the cables to the back or sides of the panel with cable ties at the top and bottom, as shown in Figure 25.

Note: When large pair count cables are being terminated, the slots serve as temporary holding areas. If 25 pair cables are to be terminated, one cable goes into each of the 12 slots, either right or left. If 4-pair cables are to be terminated, seven cables can be stored in one slot or split between the left and right slots. The mounting surface must be capable of supporting 30 pounds for each 336 pair panel to be mounted. Flame retardant $\frac{3}{4}$ inch thick plywood is suitable.

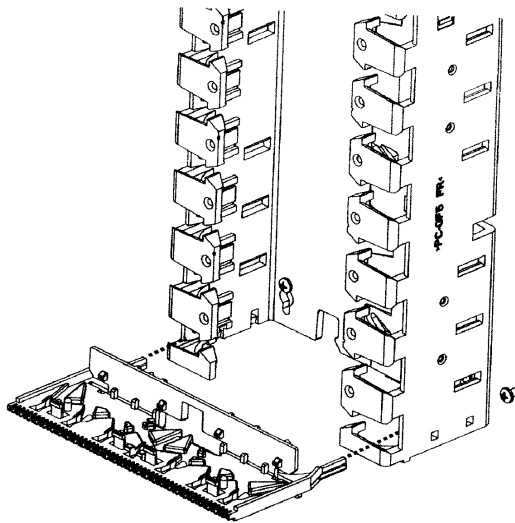


Figure 26: Wiring Block (Detail)

Step 3: Install Wiring Blocks

- It is recommended that you start with the lowest pair of slots at the bottom of the panel. Position the wiring block so that the rails line up with the lower grooves in the terminal block panel, and secure by pressing until it snaps in place, as shown in Figure 26.
- Dress the 25 pair binder groups or 25 pair cable through the cable slot in the center of the wiring block. Four-pair cables can be dressed either from the center, from both sides, or any combination.
- Place the conductors in the index strip following the even-count color code.
- Seat and cut conductors using a 788 impact tool. With the blade side down. Remove cut conductor and check to make sure no short pieces of cut conductors are wedged in the wiring slots.
- Repeat until all wiring blocks are in place.

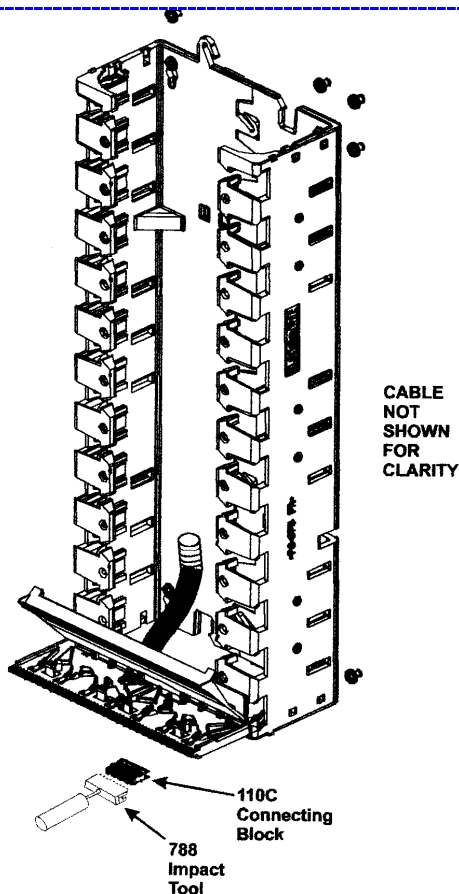


Figure 27: Connecting Block (Detail)

Step 4: Install Connecting Blocks

- Position 4-pair connecting blocks in index strip (slate side down) and seat using a 788 Impact Tool, as shown in Figure 27.
- When the wires and 110 connecting blocks are in place, hook the wiring block cover under the rear hooks first, then press down on the front until the cover snaps in place.

Step 5: Complete Installation

- Continue installation of connecting blocks as required.
- Install horizontal cable management.
- Mount vertical cable management.
- Slide the paper inserts into the designation strips, remove the paper covering the adhesive, and install on the wiring blocks.
- Determine the proper length patch cords and place the patch cord in its appropriate location.

3.2.3. VisiPatch Cable Packages

3.2.3.1. One Four-Pair VisiPatch Patch Comcodes

DESIGNATION	LENGTH	COMCODE
110P8UP-GS-2	2 feet	108 537 101
110P8UP-GS-3	3 feet	108 537 119
110P8UP-GS-4	4 feet	108 537 127
110P8UP-GS-5	5 feet	108 537 135
110P8UP-GS-6	6 feet	108 537 143
110P8UP-GS-7	7 feet	108 537 150
110P8UP-GS-8	8 feet	108 537 168
110P8UP-GS-9	9 feet	108 537 176
110P8UP-GS-12	12 feet	108 537 184
110P8UP-GS-15	15 feet	108 537 192
110P8UP-GS-18	18 feet	108 537 200

3.2.3.2. One Pair Cable Comcodes

DESIGNATION	LENGTH	COMCODE
110P2UP-GS-2	2 feet	108 535 527
110P2UP-GS-3	3 feet	108 535 576
110P2UP-GS-4	4 feet	108 535 584
110P2UP-GS-5	5 feet	108 535 592
110P2UP-GS-6	6 feet	108 535 600
110P2UP-GS-7	7 feet	108 535 618
110P2UP-GS-8	8 feet	108 535 626
110P2UP-GS-9	9 feet	108 535 634
110P2UP-GS-12	12 feet	108 535 642
110P2UP-GS-15	15 feet	108 535 659
110P2UP-GS-18	18 feet	108 535 667

3.2.3.3. Two Pair Cable Comcodes

DESIGNATION	LENGTH	COMCODE
110P4UP-GS-2	2 feet	108 535 675
110P4UP-GS-3	3 feet	108 535 683
110P4UP-GS-4	4 feet	108 535 691
110P4UP-GS-5	5 feet	108 535 709
110P4UP-GS-6	6 feet	108 535 717
110P4UP-GS-7	7 feet	108 535 725
110P4UP-GS-8	8 feet	108 535 733
110P4UP-GS-9	9 feet	108 535 741
110P4UP-GS-12	12 feet	108 535 758
110P4UP-GS-15	15 feet	108 535 766
110P4UP-GS-18	18 feet	108 535 774

4. Labeling Standards

Labels are used to identify point A to point B on equipment, termination blocks, horizontal cables and data patch cord and fiber patch cords.

4.1. Labeling Data Switch Cables

- Cables will be labeled with “From” and “To” location on **both** ends to minimize workstation downtime.
- Cables from hardware to termination blocks will be labeled with port numbers.
- Power Cables will be labeled with the device they are associated with.
- Use Brady LS2000 labels to mark cables.

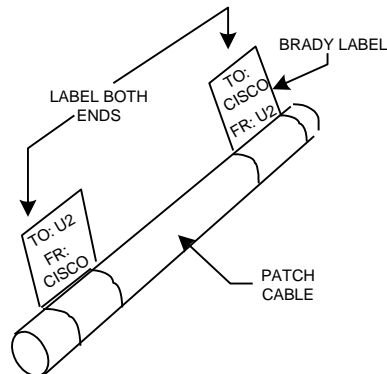
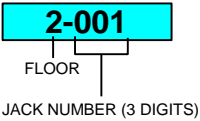
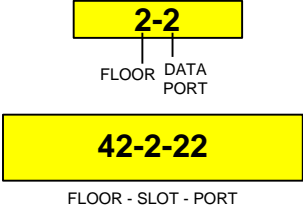


Figure 28: Labeling Cables

4.2. Labeling Blocks

Blocks will be labeled with a background color that identifies the system they support.

DISTRIBUTION SYSTEM	Label Color: Blue Block Type: Jacks or outlets	
MANAGEMENT SYSTEM	Label Color: Yellow Block Type: Data switches or hubs	
PBX SYSTEM	Label Color: Purple Block Type: PBX	
RISER SYSTEM	Label Color: Green Block Type: Vertical riser cabling	
FEED SYSTEM	Label Color: Slate Block Type: Horizontal cabling between data closets (IDF's)	
RADIO SYSTEM	Label Color: N/A Block Type:	

4.3. Labeling the 110 System

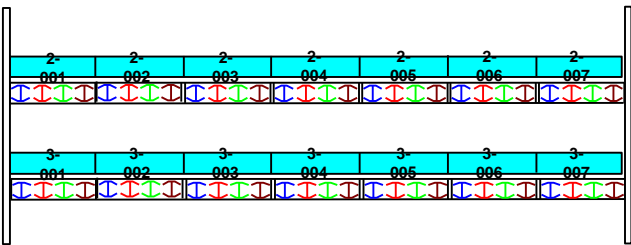
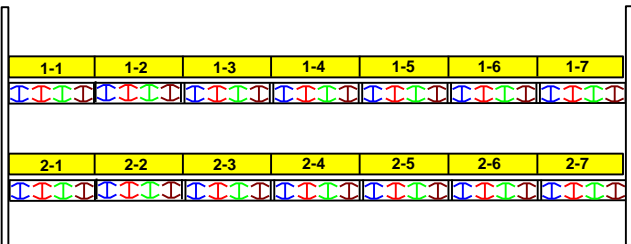
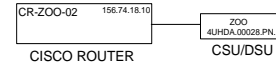
DISTRIBUTION OUTLET/JACKS ...	
DATA COMPONENTS-MANAGEMENT ...	

Figure 29 Labeling 110 System Distribution Outlet/Jacks

Figure 280: Labeling 110 System Data Components

4.4. Labeling Hardware

DATA	<p>Data hardware labels must include the following information:</p> <ol style="list-style-type: none"> 1. IP Address 2. Device Name (in accordance with the naming standards document) 3. Circuit IDs or SPIDs
-------------	---



PHONE	<p>Phone hardware labels must include the following information:</p> <ol style="list-style-type: none"> 4. Intercom and ext # label under hand
--------------	---

4.5. Labeling Jacks/Outlets

- Panduit Surface mount housing boxes are the standard. All jacks/outlets must be labeled with a unique numbering scheme.
- No duplicate numbers within the same floor.
- When multiple floors share the same IDF, floor numbers will be present on the jack/outlet.
- When using single gang boxes, write jack/outlet numbers on top and in front of box.
- Use P-Touch labels or the equivalent in the window of the faceplate and use a ultra fine point Sharpie to write on the top angled edge of the faceplate.
- In cases where surface mount boxes are used or furniture faceplates please ensure that the faceplate is turned 90 degrees counter-clockwise.
- When labeling a faceplate that is turned 90 degrees counter-clockwise, the P-Touch labels or equivalent should still be in the window of the faceplate. The Sharpie labels would be written on the top of the surface mount box, in the same fashion.
- Faceplate blanks, please ensure that they are pushed in all the way.
- No special color scheme is used when labeling jacks/outlets.

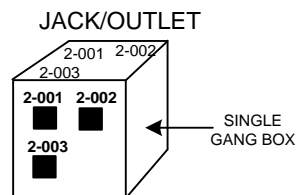



Figure 291: Labeling Jacks/Outlets

5. Cable Standards

The City of Seattle uses various category types in the existing building cabling system. The current standard for new cable runs/jacks is the category 5e.

5.1. Four-Pair 100 UTP Cables (Category 5e)

FUNCTION	<p>Four-pair 100 Unshielded Twisted Pair (UTP) cable is used in the horizontal cabling system. The cable is restricted to four-pair size to support a broad range of applications.</p> <p>To provide connectivity between work stations and IDF's. The standard for all new locations is 3 cables bundled per outlet.</p>
COMPONENTS	<p>24 AWG thermoplastic insulated solid conductors formed into four individually twisted pairs, and enclosed by a thermoplastic jacket.</p>
COLOR CODES	<p>Pair 1: White-Blue/Blue</p> <p>Pair 2: White-Orange/Orange</p> <p>Pair 3: White-Green/Green</p> <p>Pair 4: White-Brown/Brown</p>
	
CURRENT COLORS	<p>Yellow, white, blue</p>
STANDARD	<p>Mohawk, Ber-Tek</p>

5.2. VisiPatch 119 4-Pair Adapter Cords

FUNCTION	Creates a connection from point A to point B
COMPONENTS	
COLOR CODES	

Use of patch cables will be used for all data connections in any new campus locations (i.e. Key Tower, Justice Center, and Seattle City Hall). Patch cord cables support Fast Ethernet and Gigabit Ethernet speeds.

The VisiPatch 119 4-pair Adapter Cords are slate in color and feature the same “reverse patch cord” design as the VisiPatch 4-pair cord. The VisiPatch 119 Adapter Cord has a 4-pair 110 VisiPatch Plug on one end and the new D8CM 8-Pin Modular Plug on the other end. Also, comes in both ends with the 110 VisiPatch Plug. These cords are available in EIA/TIA 568B wiring and accommodate transitioning from the network equipment to the VisiPatch cross-connect field

Use the 4 Pair GigaSpeed Patch Cable for all data jacks using the Visipatch Cable System.

The 4 Pair GigaSpeed Patch Cable (plug to RJ45) used for testing devices. (i.e. FLUKE)

5.2.1 Cross-connect Wire

Color Standards

Data	Red/Blue	Red/Orange	Category 5 (100Mhz)
Phone	White/Blue	Blue	Category 3 (20Mhz)
Phone 2pr	White/Blue	White/Orange	Category 3 (20Mhz)
911	White	Red	Category 3 (20Mhz)
ISDN	Yellow	Blue	Category 3 (20Mhz)

6. Cable Testing

BASIC CABLE TESTING & STANDARD

All copper meter (Fluke, Micro tester, Omni Scan) tests results completed by a contractor for a City of Seattle site or project must be returned and reviewed to the DoIT Project Manager before a job site is sign off for acceptance...The lowest Headroom result that the City will accept is 5db

LAN cables have a number of characteristics in common with other types of electrical cables. All electrical cables have continuity, which means that they serve as a complete path for electrical current flow. Each end of the cable has some connector for connecting the cable to a appropriate electrical device. Cables with multiple wires usually have a pin assignment that describes how the wires are arranged in the connectors.

Twisted Pair Cable

Twisted pair cable consist of wires that twist together to minimize crosstalk between the pairs.

Each cable pair forms a complete electrical path for signal transmissions. The current flows through the wires in each pair are equal, but flow in opposite directions. These currents produce electromagnetic fields that could transmit electrical noise to nearby wires. The fields surrounding the two wires have opposite polarities. Twisting the wires together causes the fields to cancel out, which minimize the electrical noise, or crosstalk, generated by each cable pair.

Attenuation

Attenuation is a decrease in the strength of a signal over the length of a cable. Attenuation is caused by a loss of electrical energy in the resistance of the wire and by leakage of energy through the cable's insulating material.

Noise

Electrical noise is unwanted electrical signals that alter the shape of the signals transmitted on a LAN cable. Signals that are severely distorted by noise can cause communication errors in a LAN.

Electrical noise is generated by any device that uses or generates voltages that vary over time. Power, generators, electric heaters, refrigerators, elevators and fluorescent lighting devices are examples. LAN cables act as antennas that can pick up noise.

Split Pairs

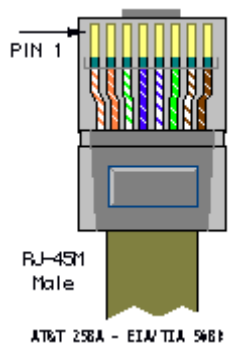
A split pair occurs when one wire from a cable pair is twisted together with a wire from a different cable pair. Split pairs most frequently result from improper termination at the termination blocks and cable connectors.

Split pairs causes crosstalk because the signals in the twisted pairs come from different circuits.

6.1. How to make a Crossover Cable.

- Crossover cables are needed when connecting data devices to each other (daisy-chain).
- Straight-through cables are used for connecting workstations.
- You need a standard straight through UTP-Cat5, 5e, or 6 cable.
- Strip at least 1 inch of the main cable insulation and carefully trim the eight internal wires using the factory assembled end (RJ45) as a guide to the proper length. Just make sure each wire is equal length and that the connector cable lock pinches the main cable insulation.
- Note: Even though pins 4,7,8 are not used it is mandatory that they are present in the cable.

6.1. PIN out Table

Crossover Cable			Straight Through Cable	
RJ-45 PIN	RJ-45 PIN		RJ-45 PIN	RJ-45 PIN
1 Rx+	3 Tx+		1 Tx+	1 Rc+
2 Rc-	6 Tx-		2 Tx-	2 Rc-
3 Tx+	1 Rc+		3 Rc+	3 Tx+
6 Tx-	2 Rc-		6 Rc-	6 Tx-

PIN #	Signal	EIA/TIA 568B
1	Transmit+	White/Orange
2	Transmit-	Orange/White or Orange
3	Receive+	White/Green
4	N/A	Blue/White or Blue
5	N/A	White/Blue
6	Receive-	Green/White or Green
7	N/A	White/Brown
8	N/A	Brown/White or Brown

7. Recommended Cabling Practices

Do's:

- Use connecting hardware that is compatible with the installed cable.
- Terminate each horizontal cable on a dedicated telecommunications outlet.
- Locate the MDF/IDF near the center of the building to limit cable distances.
- Maintain the twist of horizontal and backbone cable pairs up to the point of termination.
- Tie and dress horizontal cables neatly and with a minimum bend radius of 4 times the cable diameter.

Don'ts:

- Do not use connecting hardware that is of a lower category than the cable being used.
- Do not split out a cable's pairs at one work station...EX white/blue blue/white to 1 jack and white/orange orange/white to another jack.
- Do not create multiple appearances of the same cable at several distribution points (called bridged taps).
- Do not locate cross-connects where cable distances will exceed the maximum distance.
- Do not leave any wire pairs untwisted
- Do not over-tighten cable ties, use staples, or make sharp bends with cables.
- Place cabling at a sufficient distance from equipment.
- Do not place cable near equipment that may generate high levels of (EMI) electromagnetic interference.
-

7.1. UTP Cabling Installation Practices

- To avoid stretching, pulling tension must not exceed 110N (25 lb.) for 4-pair cables.
- Installed bend radii must not exceed: - 4 times the cable diameter for horizontal UTP cables. - 10 times the cable diameter for multi-pair backbone UTP cables.
- Avoid cable stress, as caused by: - cable twist during pulling or installation - tension in suspended cable runs - tightly cinched cable ties or staples - tight bend radii
- Horizontal cables must be used with connecting hardware and patch cords (or jumpers) of the same performance category or higher.
- Important Note: Installed UTP cabling must be classified by the least performing component in the link.

7.2. UTP Connector terminations:

- Pair twists must be maintained as close as possible to the point of termination.
- Untwisting must not exceed 25mm (1.0 in) for category 4 links and 13mm (0.5 in) for category 5, category 5e, and category 6 links. Follow manufacturer guidelines for category 3 products, if no guidelines exist, then untwisting must not exceed 75mm (3.0 in).
- Connecting hardware must be installed to provide well-organized installation with cable management and in accordance with manufacturer's guidelines.
- Strip back only as much jacket as is required to terminate individual pairs.

8. Glossary

A

AWG: Acronym for ...

B

C

Cable Management: Provides organized pathways for x-connects

D

DoIT: Acronym for Department of Information Technology

E

F

FDU: Acronym for Fiber Distribution Unit

G

H

I

IDF: Acronym for Intermediate Distribution Frame.

J

K

KVM: Acronym for Keyboard, Video, and Mouse.

L

M

MDF: Acronym for Main Distribution Frame.

N

O

P

Patch Cable: A cable to connect Point A and Point B

PBX: Public Branch Exchange

PDU: Power Distribution Unit.

Q

R

S

SPID: Acronym for ...

T

U

UTP: Acronym for Unshielded Twisted Pair.

V

W

X

Y

Z

FIRE STATION #10 REPLACEMENT PROJECT
SECTION 16132
FLUSH FLOOR OUTLETS

1.01 **TYPES Floor Boxes**

- A. Type A: Walker Multiservice shallow steel recessed floor box for tile/carpet. RFB4-SS with RAKMII, two RFB-RB-SS and two RFB-2T-SS. Provide blank off plate for those boxes not being energized. With carpet flange type cover when located in carpet.
- B. Type B: Combination Power/Low Voltage type for raised floor application. ACS/Unit-Fab AMF50/M50 12" by 12" by 5.5" deep recessed flush floor box complete assembly with cover, power plates and data plates. Furnish each with M50 complete assembly cover, AFm50-P4 power plate and AFm50-D1 data plate.
- C. Type C: Combination Power/Low Voltage type for Poke through concrete floor applications. Thomas & Betts or Hubbell System One 4x4 poke through coordinate exact type with City of Seattle (Department of Information Technology)

All other floor box types please confer with the City of Seattle Department of Information Technology before specifying box types.

1.01 MATERIALS AND FINISHES

- A. Cable Trays, Fittings, and Accessories: Steel, hot dip mill galvanized to ASTM 653A, G-90 coating, 1.05 mils thick.

1.02 TYPE 1 TRAY FOR MAIN PATHWAY OVERHEAD USE

- A. Aluminum, 4" high (minimum) side rails, rolled edges with 9" maximum rung spacing.
- B. Cable tray width: 24" unless otherwise approved.
- C. Load Rating: NEMA 12C in accordance with NEMA VE 1.
- D. Provide interior surfaces which are smooth and free of offset edges, projections or misalignment. Assembly bolts for end-to-end connections shall have a pattern, which does not cause any damage to cable sheaths or jackets. All edges smooth, de-burred.
- E. Provide accessories and special transitions (with 90 degree turns with custom inside radius) for all changes in direction and offsets. Use manufacturer's custom fittings including bolting assemblies for all end-to-end connections.
- F. Manufacturer: B-line.
- G. Location: All cable tray except that under raised floor.

1.03 TYPE 2 - FLEXTRAY FOR UNDER RAISED FLOOR USE

- A. Steel wire Flex Tray, 4" high type CF 105.
- B. Cable tray width: 18" unless otherwise approved.
- C. Provide interior surfaces which are smooth and free of offset edges, projections, or misalignment. Assembly bolts for end-to-end connections shall have a pattern, which does not cause any damage to cable sheaths or jackets. All edges smooth, de-burred.
- D. Provide accessories and special transitions (with standard radius turns) for all changes in direction and offsets. Use manufacturer's standard fittings including bolting assemblies for all end-to-end connections.
- E. Furnish three 6" high UFS support stands, for each ten feet of flextray. Width per tray.
- F. Manufacturer: Cablofil EZ Tray.
- G. Location: All under raised floors.

1.04 CABLE TRAY ACCESSORIES

- A. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray. Custom where called for on Architectural drawings.
- B. Cable tray connectors, including bonding jumpers, as recommended by cable tray manufacturer.

PART 2 - EXECUTION

2.01 INSTALLATION

- A. Install cable tray level and plumb according to manufacturers written instructions, coordination drawings, seismic design, and referenced standards.
- B. Mount bottom of tray per architectural details. Coordinate cable tray support with structural and seismic design. Do not use wall brackets unless approval is obtained from structural engineer.
- C. Support type 2 cable tray from 6" high underfloor support stands every 5 feet. Bolt each stand to the floor with 4 bolts per the seismic design. Brace type 2 cable tray to floor with diagonal braces spaced 15' maximum on center and per the seismic design.
- D. Support type 1 cable tray to structural ceiling with 1/2" threaded rods, spacing 5' on center in accordance with 12-gauge minimum channel and per the seismic design.
- E. Brace type 1 cable tray to structure with diagonal braces spaced 15' maximum on center.

2.02 COORDINATION

- A. Coordinate installation of the cable tray with mechanical ductwork, piping, structural members, fireproofing and sprinkler system piping so that tray remains accessible (minimum 1 foot clear above tray bottom) after installation. Coordinate exact routing with all trades to avoid interference.

2.03 PENETRATIONS OF BUILDING FIRE SEPARATIONS

- A. Where cable tray is penetrating building fire separations, seal penetration according to Division 7 Firestopping. Seal penetration only after cables have been installed.
- B. Sleeves for Future Cables: Install capped sleeves for future cables through firestopping-sealed cable tray penetrations of fire and smoke barriers.

2.04 CONNECTIONS

- A. Tighten electrical connectors and joints according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

SECTION 16139
CABLE TRAYS

2.05 GROUNDING

- A. Ground cable trays as required for conductor enclosures in accordance with NFPA 70.
- B. Provide a #6 bare ground cable the length of the tray. Bond to every tray section using clamps manufactured for the purpose.

2.06 CLEANING

- A. On completion of cable tray installation, including fittings, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damage finishes, including chips, scratches, and abrasions.
- B. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.

END OF SECTION

APPENDIX D

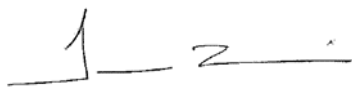
City of Seattle Fire Department / Miscellaneous Information

Administrative Rule 9.02.19 – Inspection, Testing, Maintenance and Reporting Requirements for Fire Protection Systems and Emergency Responder Radio Amplification Systems

Administrative Rule 9.04.20 – Impaired Fire Protection Systems and Emergency Responder Radio Amplification Systems

Client Assistance Memorandum (CAM) 5971 – Testing of Fire Protection Systems
Report of Impaired System Form

Administrative Rule 9.02.19

SUBJECT: INSPECTION, TESTING, MAINTENANCE AND REPORTING REQUIREMENTS FOR FIRE PROTECTION SYSTEMS AND EMERGENCY RESPONDER RADIO AMPLIFICATION SYSTEMS	EFFECTIVE DATE: January 1, 2020
REFERENCES: Seattle Fire Code NFPA 10, 11, 12, 12A, 15, 16, 17, 17A, 25, 72, 92A, 92B and 2001.	SUPERSEDES: Administrative Rule 9.02.18, November 1, 2018
	FCAB REVIEW DATE: September 17, 2019
NOTICE: Administrative Rules are established per Seattle Fire Code Section 104.1, and they are subject to the Administrative Sections 104.8 Modifications, Section 104.9 Alternate Materials and Methods, and Section 108.1 Appeals.	APPROVED:  TIMOTHY J. MUNNIS, FIRE MARSHAL/FIRE CODE OFFICIAL

Section 1. SCOPE

This rule shall apply to inspection, testing, maintenance and reporting requirements for fire protection systems, emergency responder radio amplification systems, and equipment as defined in the Seattle Fire Code, and any other systems as set forth by the fire code official.

Exceptions:

1. NFPA 13D sprinkler systems.
2. Single and multiple station smoke alarms.
3. Fire hydrants and fire service mains owned by the City of Seattle.

Section 2. DEFINITIONS

For the purposes of this rule the following words and terms have the meanings indicated below:

Certified Technician. A technician currently certified by the Seattle Fire Department in accordance with Seattle Fire Department Administrative Rule 9.01 Certificates of Competency for

Installing, Inspecting, Testing, and Maintaining Fire Protection Systems, and any future revisions of this rule adopted by the fire code official.

Deficiency. A condition in which a system or portion thereof is damaged, inoperable, or in need of service, but does not rise to the level of an impairment.

Emergency Impairment. An abnormal condition where a system, component, or function is out of service due to an unexpected deficiency.

Impairment. A condition where a fire protection system or unit or portion thereof is out of service, and the condition can result in the fire protection system or unit not functioning in a fire event.

Impairment Coordinator. The person responsible for the maintenance of a particular fire protection system.

Impairment Tag. A red tag used to indicate that a system, or portion thereof, has been removed from service.

Planned Impairment. An abnormal condition where a system, component, or function is out of service due to work that has been planned in advance.

Service Tag and Label. A white or yellow tag or label with black type formatted in accordance with this rule used for the purpose of indicating the status of a fire protection system.

Test Report. A complete record of a fire protection system test, including problems found and any corrections made.

Testing. A procedure used to determine the status of a system to verify it is operating as intended by conducting periodic checks on fire protection systems such as waterflow tests, fire pump tests, shaft pressurization tests, fire alarm tests etc. The term “testing” includes acceptance testing, reacceptance testing and confidence testing.

Section 3. INSPECTION, TESTING AND MAINTENANCE REQUIREMENTS

All fire protection systems listed in Table 1 are required to be inspected, tested and maintained in accordance with applicable NFPA standards by individuals who have obtained the proper certificate from the fire code official in accordance with Administrative Rule 9.01.18, Certificates of Competency for Installing, Inspecting, Testing, and Maintaining Fire Protection Systems, and any future revision of this rule adopted by the fire code official.

Exception: Although national standards generally require standpipe testing every five years, in Seattle, marina standpipes are required to be tested annually.

An anniversary date will be established one year from the date of the initial system acceptance test for all new fire protection systems. The anniversary date shall remain fixed and establish the due date each year for subsequent tests.

Exception: Non-marina standpipes shall have an anniversary date established five years from the date of initial acceptance. The anniversary date shall remain fixed and establish the due date every fifth year for subsequent tests.

Fire alarm systems in high-rise buildings may have one fourth of the entire system tested quarterly so that the entire system is tested annually.

The building owner is responsible for ensuring the tests are performed and correcting deficiencies in a timely manner.

Section 4. TEST RECORDS AND TEST REPORTS

A record of all fire protection system inspections, testing and maintenance must be maintained on the premises for a minimum of three years. Records may be electronic or printed documents. A copy of all fire protection systems test reports is required to be submitted to the Seattle Fire Department per Section 5 of this rule.

Section 5. MANDATORY PROCESS FOR SUBMITTING TEST REPORTS TO THE SEATTLE FIRE DEPARTMENT

Effective July 1, 2017 for fire protection systems and November 1, 2018, for emergency responder radio amplification systems, the following process is mandatory for submitting test reports to the Seattle Fire Department.

1. All systems test reports for tests of fire protection systems and emergency responder radio amplification systems conducted within Seattle as included in Table 1 are required to be sent to the Seattle Fire Department electronically via the Seattle Fire Department's third party vendor who will collect, organize, categorize, and provide to the Seattle Fire Department.
2. Certified technicians are required to register and utilize the third-party vendor's single point repository service. Companies employing certified technicians are required to set up an account at the company level so that certified technicians are registered under the account of the companies employing them.
3. The company employing the certified technician shall be responsible for paying the systems test report filing fees as established in Seattle Municipal Code 22.602.090.
4. All completed test reports as listed in Table 1 shall be completely entered into to the third-party vendor's website here: www.thecomplianceengine.com, using the Seattle-standard system test report forms that are incorporated into the third-party vendor's website and also available for review on the Seattle Fire Department web site at <http://www.seattle.gov/fire/business-services/systems-testing>. The company employing the certified technician shall ensure that all test reports are submitted within the time frames established by the section 6 of this rule, so that the Seattle Fire Department can receive timely system test report information and confirm compliance.
5. When reporting on the tests required in Table 1, a single report can contain test documentation for multiple fire protection systems of the same type. For example, a single sprinkler report can contain information about five sprinkler systems in the same building. If deficiencies are identified, the location of each deficient system and the nature of the deficiency in that system shall be clearly identified.

6. After deficiencies are repaired, a report documenting that the system functions with no deficiencies (a “clean test report” or a “white tagged report”) shall be submitted. If more than one deficient system was identified on a single report as described in item 5 of this section, the certified technician or the company employing them has two reporting options:
 - a. Submit one clean test report documenting that each deficient system identified on the original report has been corrected. This option is most useful when all the corrections are completed on a very similar timeline.
 - b. Submit information about repairs to each deficient system identified on the original report as repairs are completed, rather than waiting until all deficiencies have been corrected. In this case, the third-party vendor’s application will not consider the original report to be resolved until each of the deficient systems has been updated as corrected. This option is most useful when the system repairs are not able to be completed on similar timelines. In this case, the per report fee as specified in item 3 is only charged once all the deficiencies listed on the original report have been reported as corrected. In other words, multiple correction reports may be filed related to deficiencies contained in the original report, however only one reporting fee will be charged, at the point when all the deficiencies have been corrected.

NFPA standards have additional inspection requirements beyond annual testing and the building owner shall be responsible to continue performing these inspections and maintaining records on the premises. These testing and inspection results are not required to be submitted to the Seattle Fire Department. The building owner is responsible for ensuring that correctly certified individuals are conducting the tests.

Table 1: Required Systems Test Reports and Submittal Frequency

Fire Protection System Type	Code/Standard	Frequency
Extinguishing Systems other than sprinkler systems	Seattle Fire Code	
Gaseous(Carbon dioxide and clean agent)	904.8 & 904.10	Annual
Dry Chemical Systems	904.6.1	Every six months
Automatic Sprinkler Systems – Dry or Wet	Seattle Fire Code 901.6	Annual
Emergency Alarm Systems (Haz Mat)	Seattle Fire Code 5003.2.9	Annual
Emergency Generators	Seattle Fire Code 604.3	Annual
Emergency Responder Radio Amplification Systems – BDA/DAS	Seattle Fire Code 510	Annual
Fire Alarm Systems	Seattle Fire Code 901.6	Annual
Fire Escapes	Seattle Fire Code 1104.16.5.1 SFD Administrative Rule 11.01	Every five years
Fire Pumps	Seattle Fire Code 913.5 NFPA 25 Chapter 8	Annual
Rangehoods	Seattle Fire Code 904.12	Every six months
Smoke Control Systems	Seattle Fire Code 901.6	Annual
Standpipe Systems	Seattle Fire Code 901.6	Every five years
Standpipe Systems – Marinas	Seattle Fire Code 901.6	Annual

Section 6. MARKING FIRE PROTECTION SYSTEMS

A service label or tag conforming to this section shall be securely attached to each fire protection system, emergency responder radio amplification system or item of fire protection equipment at the time of initial acceptance testing, and after all subsequent inspection, testing and maintenance.

Exception: Fire escape labelling and tagging requirements are enumerated in Administrative Rule 11.01 Fire Escape Stair Structural Examination, Testing and Repair Requirements.

The following information shall be printed on all yellow or white service tags or labels:

1. The words "**DO NOT REMOVE BY ORDER OF THE FIRE MARSHAL.**"
2. Name, address and telephone number of the business or firm performing the testing.
3. Date that work was performed.
4. Printed name of person performing work.
5. Seattle Fire Department certification number of person performing work.
6. Description of work performed (for white tags), or description of any deficiencies found (for yellow tags).

White Tag – No Deficiencies

Systems with no deficiencies shall be tagged with a white service tag or label. The system test report shall be added to the third-party vendor's website so that the Seattle Fire Department can review the reports **within 7 calendar days of the test**. Failure by the company performing the testing to submit reports within this timeline is citable offense under 2015 SFC Section 109.4 as amended in 2019.

Note: If the system has any deficiencies listed on the test report, then it cannot be certified as a white tag.

Yellow Tag – System Has Deficiencies

Systems that are functioning, but have deficiencies, shall be tagged with a yellow service tag or label and the system test report shall be added to the third-party vendor's website so that the Seattle Fire Department can review the reports **within 7 calendar days of the test**. Failure by the company performing the testing to submit reports within this timeline is citable offense under 2015 SFC Section 109.4 as amended in 2019.

Red Tag – Impaired System/System Out of Service

Fire protection system(s) that are impaired for any length of time shall be tagged with a red impairment tag and the system test report shall be added to the third-party vendor's website so that the Seattle Fire Department can review the reports **before the end of the day of the test**. Failure by the company performing the testing to submit reports within this timeline is citable offense under 2015 SFC Section 109.4 as amended in 2019.

Note: If a planned or emergency impairment is anticipated to take a system out of service for more than eight hours, **in addition to submitting a test report to third-party vendor's website, the Seattle Fire Department must be also notified in accordance with Administrative Rule 9.04.18 Impaired Fire Protection Systems** and any future revisions to that rule adopted by the fire code official.

Formats for Tags or Labels

The tag or label shall be of the self-adhesive type or the wire-hanging type. In addition, for red tags, the tag or label shall be clearly visible, weather resistant, and of sufficient size (typically 4 inches x 6 inches). All tags shall clearly specify the status of the system. There shall be no lack of clarity regarding whether the system tag indicates a red/impaired, yellow/deficient, or white/normal status. Failure to clearly tag systems is a violation of this administrative rule. The following formats shall be used for all service tags and labels:

No DEFICIENCIES			
DO NOT REMOVE By Order of the Fire Marshal	Year	Month	Next Due Date
	Testing Firm		
	Address		
	Phone		
	Serviced by		
	Seattle Fire Dept. Certificate No.		
Description of work			

SYSTEM DEFICIENCIES			
DO NOT REMOVE By Order of the Fire Marshal	Year	Month	Next Due Date
	Testing Firm		
	Address		
	Phone		
	Serviced by		
	Seattle Fire Dept. Certificate No.		
Description of deficiencies			

IMPAIRED SYSTEM			
DO NOT REMOVE By Order of the Fire Marshal	Date and Time Impairment Began	Anticipated Date and Time System Will Be Returned to Service	Impairment Type <input type="checkbox"/> Planned <input type="checkbox"/> Emergency
	Testing Firm		
	Address		
	Phone		
	Serviced by		
	Seattle Fire Dept. Certificate No.		
	Impairment Coordinator		
Description of impairment:			

Section 7. LOCATION OF SYSTEM TAGS

Table 2 lists the location for placement of systems tags for non-impaired systems (yellow and white tags) and impaired systems (red tags). White tags that are older than three years may be removed by an SFD-certified technician when a more current white tag is present. Non-current yellow and red status tags shall be removed and documentation of the corrected deficiencies shall be uploaded by the certified technician performing the maintenance to the Fire Department via the department’s third party vendor’s website, www.thecomplianceengine.com.

Table 2: Location of System Tags

Fire Protection System Type	Location of White and Yellow System Tags	Location of Red Impairment Tags
Extinguishing Systems other than sprinkler systems (Carbon dioxide, clean agent, dry chemical)	On the agent supply tank or pull device	Same as White/Yellow
Automatic Sprinkler Systems	On or adjacent to the sprinkler control valve	Same as White/Yellow, and at each fire department connection (FDC)
Emergency Alarm Systems (Haz Mat)	In a readily viewable location	Same as White/Yellow


Table 2: Location of System Tags

Fire Protection System Type (cont'd)	Location of White and Yellow System Tags (cont'd)	Location of Red Impairment Tags (cont'd)
Emergency Responder Radio Amplification Systems – BDA/DAS	Fire alarm control panel	Same as White/Yellow
Emergency Generators Required by Fire Code	At the generator and/or FCC	Same as White/Yellow
Fire Alarm Systems	Fire alarm control panel	Same as White/Yellow, and at Fire Command Center (FCC) if FCC present
Fire Escapes	See Administrative Rule 11.01.18	See Administrative Rule 11.01.18
Fire Pumps	On the pump controller	Same as White/Yellow, and at Fire Command Center (FCC) if FCC present
Portable Fire Extinguishers	On the control valve of the extinguisher or cylinder	Replace Fire Extinguisher
Rangehoods	Control valve of extinguisher or cylinder	Same as White/Yellow
Smoke Control Systems	On the manual control panel, or fire alarm control panel if no smoke control panel is installed	Same as White/Yellow, and at Fire Command Center (FCC) if FCC present
Standpipe Systems	On or adjacent to the lowest outlet	Same as White/Yellow, and at each fire department connection (FDC)
Standpipe Systems – Marinas	On or adjacent to one fire department connection	At each fire department connection (FDC) where multiple connections are present

Section 8. NOTIFICATION REQUIREMENTS FOR IMPAIRMENTS

If a planned or emergency impairment is anticipated to take a system out of service for more than eight hours, the Seattle Fire Department must be notified in accordance with Administrative Rule 9.04.18 and any future revisions adopted by the fire code official.

Administrative Rule 9.04.20

SUBJECT: IMPAIRED FIRE PROTECTION SYSTEMS AND EMERGENCY RESPONDER RADIO AMPLIFICATION SYSTEMS	EFFECTIVE DATE: February 1, 2020
REFERENCES: Seattle Fire Code NFPA 72 NFPA 25	SUPERSEDES: Administrative Rule 9.04.19, January 1, 2020
	FCAB REVIEW DATE: January 7, 2020
NOTICE: Administrative Rules are established per Seattle Fire Code Section 104.1, and they are subject to the Administrative Sections 104.9 Alternate Materials and Methods, Section 104.8 Modifications, and Section 108.1 Appeals.	APPROVED:  TIMOTHY J. MUNNIS, FIRE MARSHAL/FIRE CODE OFFICIAL

Section 1. SCOPE

This rule specifies requirements for fire department notification and mitigation measures for impaired fire protection systems and shall apply to fire protection systems, emergency responder radio amplification systems and equipment as defined in the Seattle Fire Code, and any other systems as set forth by the fire code official.

Section 2. DEFINITIONS

For the purposes of this rule the following words and terms have the meanings indicated below:

Deficiency. A condition in which a system or portion thereof is damaged, inoperable, or in need of service, but does not rise to the level of an impairment.

Emergency Impairment. An abnormal condition where a system, component, or function is out of service due to an unexpected deficiency.

Fire Watch. A temporary measure intended to ensure continuous and systematic surveillance of a building or portion thereof by one or more qualified individuals for the purposes of identifying and controlling fire hazards, detecting early signs of unwanted fire, raising an alarm of fire and notifying the fire department.

Impairment. A condition where a fire protection system or unit or substantial portion thereof is out of service, and the condition can result in the fire protection system, unit or substantial portion thereof not functioning in a fire event.

Impairment Coordinator. The person responsible for the maintenance of a particular fire protection system.

Impairment Tag. A tag used to indicate that a system, or portion thereof, has been removed from service.

Planned Impairment. An abnormal condition where a system, component, or function is out of service due to work that has been planned in advance.

Section 3. GENERAL

The term impairment broadly encompasses a range of circumstances where a fire protection system, substantial portion of such a system, connection to central station monitoring, or a system component is not functioning properly for any number of reasons. Temporarily shutting down a fire protection system as part of performing the routine inspection, testing, and maintenance on that system while under constant attendance by qualified personnel, and where the system can be restored to service quickly, is not considered an impairment.

Additionally, fire alarm systems are routinely impaired in areas with automatic detection during construction or during theatrical performances involving pyrotechnics, smoke or flame effects as well as to conduct normal fire alarm system maintenance and testing. Such impairments can be limited to specific initiating devices and/or functions (e.g., disconnecting the supervising station connection during system testing), or they can involve taking entire systems or portions of systems out of service.

Impairments can be planned or may be of an emergency nature, in either case the impairment coordinator is responsible to implement several steps outlined in Chapter 9 of the Seattle Fire Code.

Addition of new fire alarm devices or appliances, reprogramming of system software, or revisions to the water supply or sprinkler system piping for an automatic fire sprinkler system are examples of planned impairments.

Physical damage to a control unit or wiring, an operated sprinkler or system leakage, interruption of water supply, frozen or ruptured piping, and equipment failure are examples of emergency impairments.

When fire protection systems that exclusively protect appliances such as kitchen ranges, spray booths, and other similar appliances are out of service or impaired, the protected appliances shall not be used until restored to normal operational condition. Because the appliance being protected by the impaired system shall not be used, fire watch is not required for these types of systems. In rare circumstances, an impairment mitigation plan may be submitted to the Fire Code Official and if approved, may allow the use of the appliance under specific conditions.

Fire watch requirements in this rule do not apply to emergency responder radio amplification systems. All other requirements in this rule apply to fire protection systems and emergency responder radio amplification systems.

Section 4. IMPAIRMENT COORDINATOR

The building owner shall assign an impairment coordinator to comply with the requirements of Chapter 9 of the Seattle Fire Code and this Administrative Rule. In the absence of a specific designee, the owner shall be considered the impairment coordinator.

Where the lease, written use agreement, or management contract specifically grants the authority for inspection, testing, and maintenance of the fire protection system(s) to the tenant, management firm, or managing individual, the tenant, management firm, or managing individual shall assign a person as impairment coordinator.

Section 5. IMPAIRMENT TAG

IMPAIRMENT (RED) TAG – Impaired System/System Out of Service

Fire protection system(s) that are impaired for any length of time shall be tagged with a red impairment tag.

The code requires the use of a clearly visible tag to alert building occupants and the fire department that all or part of the required fire protection system is impaired. The tag or label shall be clearly visible, weather resistant, of sufficient size (typically 4 inches x 6 inches) and be of the self-adhesive type or the wire-hanging type. The tag shall include the following information:

1. The words "DO NOT REMOVE BY ORDER OF THE FIRE MARSHAL."
2. Name, address and telephone number of the business or firm performing the testing.
3. Date that work was performed.
4. Printed name of person performing work.
5. Seattle Fire Department certification number of person performing work.
6. Description of work performed.
7. Name of impairment coordinator.

The following format should be used for all red impaired system tags and labels:

IMPAIRED SYSTEM			
DO NOT REMOVE By Order of the Fire Marshal	Date and Time impairment Began	Anticipated Date and Time System Will Be Returned to Service	Impairment Type <input type="checkbox"/> Planned <input type="checkbox"/> Emergency
	Testing Firm		
	Address		
	Phone		
	Serviced by		
	Certificate No.		
	Impairment Coordinator		
	Description of impairment:		

Note: The Seattle Fire Department must be notified when a system is anticipated to be impaired for eight hours or more. See the separate section below regarding mandatory notification requirements for impairments.

Unless otherwise directed the impairment tag shall be posted at the following locations:

Table 5.1 Location of Impairment Tags for Fire Protection Systems and Emergency Responder Amplification Systems

System Type	Location of Red Impairment Tags
Alternative Extinguishing Systems (CO ² , clean agent, dry chem)	On the agent supply tank or pull device
Automatic Sprinkler Systems	On or adjacent to the sprinkler control valve, and at each fire department connection (FDC)
Emergency Alarm Systems (Haz Mat)	In a readily viewable location
Emergency Generators	On the control panel
Emergency Responder Radio Amplification Systems-BDA/DAS	On the fire alarm control panel
Fire Alarm Systems	Fire alarm panel/annunciator, and at Fire Command Center (FCC) if FCC present
Fire Escapes	SFD Administrative Rule 11.01
Fire Pumps	On the pump controller, and at Fire Command Center (FCC) if FCC present
Portable Fire Extinguishers	Replace Fire Extinguisher
Range Hood	Control valve of extinguisher or cylinder
Smoke Control Systems	On the manual control panel, or fire alarm control panel if no smoke control panel is installed, and at Fire Command Center (FCC) if FCC present
Standpipe Systems	On or adjacent to the lowest outlet, and at each fire department connection (FDC)
Standpipe Systems – Marinas	At each fire department connection (FDC) where multiple connections are present

Section 6. NOTIFICATION REQUIREMENTS FOR IMPAIRMENTS

Section 6.1 NOTIFYING THE SEATTLE FIRE DEPARTMENT

If a planned or emergency impairment is anticipated to take a system out of service for eight hours or more, the Seattle Fire Department must be notified. This notification allows the Department to assess the risks and make any operational decisions necessary to ensure response-readiness and the safety of building occupants and fire fighters.

Timelines for Notification

Planned Impairments When a system is anticipated to be out of service eight hours or more due to a planned impairment, the Seattle Fire Department shall be notified at least

five business days in advance, with longer notice being preferable to allow the Fire Department to assess risks. We recommend that you notify the Seattle Fire Department immediately upon beginning to plan for the impairment.

Emergency Impairments When a system is anticipated to be out of service for eight hours or more due to an emergency impairment, the Seattle Fire Department shall be notified immediately.

Notification Process The notification process has three mandatory steps:

1. Call the systems impairment hotline the Seattle Fire Department at 206-233-7219 and provide the following information:
 - ✓ Caller name, company name and phone number.
 - ✓ Name and address of the building affected.
 - ✓ Name of the building owner, or occupant and phone number, if known.
 - ✓ Nature of the impairment; specifically which system has problem (fire alarm, sprinkler, etc.) including details on system locations or zones affected.
 - ✓ Estimated time before it will be restored to service, if known.
 - ✓ Mitigation measures implemented, if known.
2. E-mail a copy of the SFD Impaired System Report Form (available here: <http://www.seattle.gov/fire/business-services/systems-testing#impairedsystems>) to SFD_Impairments@seattle.gov to provide written notification to the Seattle Fire Department.
3. In addition, standard documentation/reporting requirements related to system status remains in effect, as enumerated in Administrative Rule 9.02 Inspection, Testing, Maintenance and Reporting Requirements for Fire Protection Systems and Emergency Responder Radio Amplification Systems, which requires that the system test report shall be submitted to the Seattle Fire Department's third party vendor www.thecomplianceengine.com **before the end of the day of the test.**

Section 6.2 OTHER NOTIFICATIONS REQUIRED BY SEATTLE FIRE CODE

For impairments of any length, including impairments of less than eight hours, the following parties shall be notified:

- ✓ Tenants and supervisors in the affected areas
- ✓ the building owner/manager

In addition to notifying the Seattle Fire Department when impairments are anticipated to last eight or more hours, SFC section 901.7.4 and SFC section 901.7.5 require notification of the following parties for impairments of any duration:

- ✓ the insurance carrier
- ✓ the alarm company

The notification should include information about the extent and expected duration of the system impairment(s) and the areas of the building involved.

Section 7. FIRE WATCH

A dedicated fire watch, or other approved mitigation, is required for impairments to fire protection systems of any length, unless exempted by this rule or as determined by the fire code official. The owner, agent, or lessee shall provide one or more qualified persons, as required and approved, to be on duty as a dedicated fire watch. Fire watch personnel shall remain on duty during the times affected buildings are open for general occupancy, open to the public, or as otherwise required by the fire code official.

A dedicated fire watch shall continuously patrol all areas of the building where the fire protection system is impaired or as otherwise required by the fire code official, or the entire building if a fire alarm system is impaired.

Dedicated fire watch personnel shall be provided with an immediately accessible means of notifying the Fire Department (e.g. cellular telephone, land-line telephone, two-way radio to continuously staffed position).

A fire watch log shall be maintained at the facility and must be available for viewing by representatives of the Seattle Fire Department at all times during the fire watch. The log shall contain the following information:

- Address of the facility under fire watch.
- Description of fire watch duties (e.g. patrol route, systems to check, hazards to check).
- Location of telephone or cellular phone to notify Seattle Fire Department.
- Running list of persons conducting patrol, including name, starting and ending time of patrol shift, and signature.
- Record of any communication to the Seattle Fire Department and/or central station monitoring company.

During periods when fire protection systems are impaired in buildings of the following occupancy types, a dedicated fire watch is required:

Table 7.1 Dedicated Fire Watch Required At All Times In Following Occupancy Types When Fire Protection Systems Are Impaired

Group/Division	Description
A	Assembly occupancies with posted occupant load is 50 or greater
R-1, R-2, and R-3	Hotels, apartments and congregate residences
I	Nursing homes, hospitals, day treatment centers, health care facilities providing care which render patients incapable of self-preservation, jails.
E	Schools through the 12 th grade, preschools, day care centers with six or more children

Note: Fire watch patrols are limited to the building common areas and building facilities such as laundry, maintenance, and storage areas in residential (R) occupancies. Fire watch patrols are not expected to enter individual residential units.

In a mixed-use occupancy, if any portion of the affected building contains an occupied Group A, R-1, R-2, E or, I occupancy, dedicated fire watch requirements apply.

Example: A four story R-2 occupancy is located above a retail store (M occupancy). In the process of conducting a tenant improvement to the M occupancy, the fire alarm in the retail store is placed out-of-service. If a fire occurred in the M occupancy, residents in the R-2 occupancy would not receive notification of the fire. Therefore, a dedicated fire watch is required.

Building occupants performing their regular duties, including construction workers, are acceptable in lieu of a dedicated fire watch in occupancy types listed in the table below, **after the building occupants have been notified of the impairment and of their responsibility to call 9-1-1 in case of fire.** These conditions are required during the times affected buildings are open for general occupancy, open to the public, or as otherwise required by the fire code official.

Table 7.2 Fire Watch Required Whenever Buildings of the Following Occupancy Type Are Occupied (Dedicated Personnel or Personnel Also Performing Regular Duties)

Group/Division	Description
B	Offices Eating and drinking establishments with an occupant load less than 50
M	Stores accessible to the public
H	Occupancies containing hazardous materials
F-1,F-2,S-1,S-2,U	Moderate hazard factory, industrial, storage & miscellaneous occupancies

If you have questions regarding fire watch in a mixed-use occupancy, during business hours please contact the Seattle Marshal's Office Engineering Captain at 206-386-1449 or Systems Testing Captain at 206-233-7259.

FIRE WATCH LOG – EXAMPLE

DESCRIPTION OF BUILDING: Crestwell Arms Apartment Building – 4 story building
ADDRESS OF BUILDING: 12345 Main Street, Seattle WA
REASON FOR FIRE WATCH: Fire Alarm – Impaired throughout the building
NOTIFICATION TO SFD: Fire Department notified 4-23-2018 by email and hotline, see section 6 of this document.
Patrol Route: Start in the basement, check the elevator machinery room, laundry room, storage areas, proceed upward to floors 1 through 4 checking all common areas.
One time checks: Water pressure in sprinkler system

Monday, April 23, 2018

Date	Name	Fire watch Shift Start	Fire watch Shift End	Comments/ Assignment	Signature
4-23-18	Jane Doe	11:42 pm	2:00 am		
4-24-18	Jack Smith	2:00 am	6:00 am		
4-24-18	Ted Hall	6:00 am	10:00 am		
4-24-18	Jack Smith	10:00 am	10:30 am	Repair completed at 10:30 am by ABC Alarm Company. Fire Department notified.	

Section 8. RESTORING SYSTEMS TO SERVICE

When an impaired system is restored to normal working order, the impairment coordinator shall verify that necessary inspections and tests have been made and notification has been provided to the insurance carrier, the alarm company, the building owner/manager, and/or any supervisors or tenants in the affected areas.

When impairments last more than eight hours, the Fire Department shall also be notified of the impairment, and when the impaired system has been restored to normal working order, SFD shall be notified by sending an email message to SFD_Impairments@seattle.gov. Include building address, system type, and date/time system was restored to service. In addition, the red tag shall be removed and documentation of the corrected deficiencies shall be uploaded by the certified technician performing the maintenance to the Fire Department via the department's third party vendor's website, www.thecomplianceengine.com.

Occasionally a system impairment is significant enough that the system must be fully re-tested once it has been restored to service. If you are unsure whether the repairs performed on your system require a full re-test, please contact the Fire Prevention Division Systems Testing Team at SFD_FMO_SystemsTesting@seattle.gov or 206-386-1340.



Seattle Fire Marshal's Office
220 3rd Avenue South, 2nd Floor
Seattle, WA 98104
(206) 386-1340

REPORT OF IMPAIRED SYSTEM

For planned or emergency impairments to fire protection systems with a duration of more than 8 hours

[SFD Administrative Rule 9.04](#)

SECTION 1: REPORTING PARTY INFORMATION Name of person reporting impairment: _____ Phone number: _____ Email: _____ Company name: _____ Date: _____ Time: _____	SECTION 2: BUILDING INFORMATION Building name: _____ Building address: _____ Building owner or occupant: _____ Occupant's phone (if known): _____ Email address: _____
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SECTION 3: IMPAIRED SYSTEM INFORMATION

I am reporting a: Planned Impairment Emergency Impairment

System affected and specific location: _____

Nature of impairment: _____

Technician: _____ Phone: (_____) _____ Email: _____

Impairment coordinator: _____ Phone: (_____) _____ Email: _____
(Property owner or designated agent)

SECTION 4: MITIGATION MEASURES – Complete applicable section below

Planned Impairment (to be completed by Impairment Coordinator)	Emergency Impairment (to be completed by Technician)
Impairment period start: Date: _____ Time: _____	Technician name: _____
Impairment period end (estimated): Date: _____ Time: _____	Phone: (_____) _____ Email: _____
Fire watch scheduled? <input type="checkbox"/> Yes <input type="checkbox"/> No	Expected to last 8 hours or more? <input type="checkbox"/> Yes <input type="checkbox"/> No
Building occupants notified? <input type="checkbox"/> Yes <input type="checkbox"/> No	Impairment coordinator notified of impairment? <input type="checkbox"/> Yes <input type="checkbox"/> No
Onsite responsible representative: Name: _____	Impairment coordinator notified whether a fire watch is required (see requirements/exceptions in Client Assist Memo 5991)? <input type="checkbox"/> Yes <input type="checkbox"/> No
	Means of notification: <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> Email

INSTRUCTIONS FOR NOTIFYING THE SEATTLE FIRE DEPARTMENT OF SYSTEM IMPAIRMENTS

SFD must be notified immediately of emergency impairments that are anticipated to last 8+ hours. SFD must be notified 5 business days in advance of planned impairments that will last 8+ hours. The notification process has two mandatory steps:

1. Email this form to SFD_Impairments@seattle.gov
2. Submit report of red-tagged system to SFD using www.thecomplianceengine.com.

Seattle Permits

—part of a multi-departmental series on City services & permitting

Testing of Fire Protection Systems and Emergency Responder Radio Amplification Systems

Updated October 2021

Code Requirements

Fire protection systems (such as fire alarms, automatic sprinkler systems and standpipes) and emergency responder radio amplification systems (BDA/DAS) are among the most important components in any building for preserving lives, protecting property, and providing safety to first responders.

To ensure these systems are functional, the Fire Code requires the “responsible party” to maintain their systems in good working condition and to test their systems annually. According to the Fire Code, the “responsible party” is the building owner, building management company, or lease-designated person.

Fire protection systems testing — also called confidence testing — is performed by private sector contractors holding Seattle Fire Department (SFD) certification or, in the case of emergency responder radio amplification systems (BDA/DAS), by qualified personnel as specified in the Seattle Fire Code. These tests are separate from the regular building inspections conducted by the Seattle Fire Department firefighters.

Reports of testing and maintenance must be submitted to SFD via the department’s third party vendor, The Compliance Engine. The company performing the testing and maintenance will submit reports on behalf of the building owner.

Testing Frequency

The responsible party, generally the building owner, must ensure that valid testing of a building’s fire protection systems and emergency responder radio amplification systems (BDA/DAS) takes place within

proper intervals.

The next page of this Client Assistance Memorandum has a chart showing the test intervals for each type of system. In addition, there are secondary tests and certain maintenance processes that must be performed periodically. The testing company you hire should be able to provide more information about these tests.

Certified Technicians Must Do the Testing and Maintenance

Only SFD-certified technicians are allowed to install, maintain, test, and repair fire protection systems within the City of Seattle. Emergency responder radio amplification systems (BDA/DAS) technicians are required to have specific qualifications (see section 510.5.2 of the Seattle Fire Code) and a Seattle Fire Prevention Division certification is not required. For more information on certification, review [Administrative Rule 9.01](#) or call (206) 386-1351.

Tagging, Labelling and Reporting Requirements

After a fire protection system or emergency responder radio amplification system (BDA/DAS) is tested or repaired, the technician must update the service tag or label on the system to indicate its condition:

- Red labels/tags indicate that the system is impaired.
- Yellow labels/tags indicate that the system has deficiencies.
- White labels/tags indicate that the system operates as designed.

The design for labels and tags is prescribed in [Administrative Rules 9.02](#) and [9.04](#).

The technician must also fill out a report showing:

- What tests and inspections were performed.



- Any deficiencies that were found.
- The technician’s evaluation of the overall condition of the system (status).

The required reporting forms are available on the Seattle Fire Department’s website: <http://www.seattle.gov/fire/systemstesting>

Table 1: Required Systems Tests and Frequency

System Type	Test Frequency
Fire Alarm	Annually (Optional: Quarterly for high-rise buildings)
Fire Pumps	Annually
Standpipe and/or Hose Cabinets	Five Years
Automatic Sprinklers	Annually
Emergency Generator	Annually
Smoke Control	Annually
Foam Systems	Annually and Five Years
Fire Escapes	Five Years
Alternative Automatic Fire Extinguishing System	Annually (6 months for dry chemical systems)
Commercial Cooking Rangehood Extinguishing System	Servicing required every six months
Emergency Responder Radio Amplification System (BDA/DAS)	Annually

The Seattle Fire Code requires that the technician supply a copy of the report:

- To the responsible party on the premises—in paper or electronic copy. Reports must be maintained on the premises for a minimum of three years.
- To file at the testing company’s office.
- To SFD via the department’s third party vendor, thecomplianceengine.com. The testing company shall ensure that the annual test report is submitted to the third-party vendor’s website within 7 calendar days of the annual test. Systems that are red tagged shall have their test report submitted by the end of the day of the test. Additional reporting requirements can be found in

[Administrative Rule 9.02](#) Inspection, Testing, Maintenance and Reporting Requirements for Fire Protection Systems and Emergency Responder Radio Amplification Systems.

Test reports that are submitted past the deadlines to Seattle Fire Department’s third party vendor’s website are subject to a \$10 per test report late fee, and may also be cited as a violation of the fire code with a citation penalty amount of \$373. The company performing the testing is responsible for late fees and citation penalties.

What To Do If Your System Is Not Working Properly

Repair

Any time a deficiency is noted in a fire protection system or emergency responder communications system, the responsible party is expected to have the damaged, failed, or defective part repaired or replaced in a timely manner.

Notify SFD of Significant Problems or “Impairments”

If the system has significant problems, your contractor will red tag the system. In this case, the system is considered “impaired” and additional steps must be taken to notify SFD. This notification allows the department to assess the risks and make any operational decisions necessary to ensure response-readiness and the safety of building occupants and fire fighters.

Notify SFD immediately of emergency impairments expecting to last more than eight hours. Notify SFD at least five days in advance of a planned impairment that is expected to last more than eight hours.

In both cases, the notification requires two steps: (1) the responsible party or their impairment coordinator completes and emails the [Report of Impaired System](#), and (2) the vendor or contractor submits a red-tagged report to SFD using our third party vendor www.thecomplianceengine.com. For more information visit our website: <http://www.seattle.gov/fire/business-services/systems-testing#impairedsystems> or review [Administrative Rule 9.04](#).

Stand Fire Watch if the System is Impaired

When a fire protection system is out of order, it may be necessary for you to take mitigation measures. An approved fire-watch or other approved mitigation is required for impairments lasting more than eight hours. For additional information and limited exceptions, see Section 7 of [Administrative Rule 09.04](#).

Notify Other Parties

The insurance carrier, the alarm company, the building owner/manager, and/or any supervisors or tenants in the areas to be affected should also be notified of the impairment and provided with an estimate of how long the system(s) might be out-of-service. These same parties should be notified when the system is returned to service.

Selecting a Contractor for Testing and Repairs

The responsible party is ultimately responsible for ensuring that the testing and repairs are performed by a qualified individual. Work on fire protection systems must be performed by a contractor who holds the appropriate SFD certification. Work on BDA/DAS radio systems must be performed by a contractors who holds a Federal Communications Commission General Radio Telephone Operators License (FCC GROL) and manufacturer certification on the equipment. The Seattle Fire Department cannot make a specific recommendation about what testing company to use, but does provide a list of companies that employ certified technicians within the city: <http://www.seattle.gov/fire/business-services/systems-testing>.

To verify that a specific technician has current certifications for your type of fire protection system, call (206) 386-1351 or email SFD_FMO_certifications@seattle.gov.

Compliance

The responsible party, generally the building owner, may receive a correction notice from a Seattle Fire Department inspector requiring testing, or requiring repairs to correct deficiencies. The correction notice will establish a date for compliance. If the Seattle Fire Department inspects again after the correction notice has been issued, and violations have not been corrected within the allotted timeline, the Seattle Fire Department may issue a citation in the amount of \$373. In addition, the fire code provides other civil penalties and criminal penalties that can involve prosecution in court and fines of up to \$1,000 a day.