GWINNETT COUNTY

FACILITY CONSTRUCTION STANDARDS

First Edition

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DIVISION 01: GENERAL REQUIREMENTS

FACILITIES CONSTRUCTION STANDARDS
STATEMENT OF PURPOSE

I. Rationale

1. The development and utilization of the Gwinnett County Facilities Construction Standards (Standards) is to accomplish and support objectives related to:
    - Building functionality, comfort and aesthetics
    - Operating efficiencies
    - Lifecycle costs
    - Economies of scale in procurement
    - Environmental sustainability
    - Security and safety
    - Interface requirements with existing systems
    - Ease of maintenance

II. Application

1. The Facilities Construction Standards are universal in their application to facilities constructed or maintained by or on behalf of all County departments, agencies and elected officials, except for the Department of Water Resources and the Correctional Facilities of the Sheriff's Office and the Department of Corrections.
2. The Facilities Construction Standards apply to all vertical, enclosed and conditioned structures intended for human occupancy/utilization and all similar structures intended for materials and equipment storage that are larger than 500 sq. ft.
3. The Facilities Construction Standards apply to design, construction and installations associated with:
    - New building construction
    - Significant building and interior space renovations
    - Replacements or upgrades of major building systems, equipment, and/or building components associated with maintenance and capital funded asset renewal.

III. Scope of Standards

1. The standards are developed and organized generally in accordance with the Construction Specifications Institute's (CSI) specification categories and include performance and product standards in the following areas:
    a. General Requirements
    b. Concrete
    c. Masonry
    d. Metals
    e. Wood, Plastics and Composites
    f. Thermal and Moisture Protection
    g. Doors and Windows (Openings)

h. Finishes
i. Specialties
j. Equipment
k. Furnishings
l. Special Construction (Metal Building Systems)
m. Conveying Systems
n. Fire Suppression
o. Plumbing Systems and Fixtures
p. HVAC Systems
q. Integrated Building Automation/Controls
r. Electrical Systems
s. Communications (IT, Telephone, CATV)
t. Electronic Safety and Security Systems
u. Parking Lots and Hardscapes (Building Related)
v. Landscaping/Irrigation (Building Related)

The Standards include guidelines and/or requirements for allocating space for offices, work stations, conference rooms, break areas, waiting areas, copy/work rooms and other spatial elements.

2. The Standards recognize the diversity of functions among the County's public facilities and will reasonably allow for the variety in construction types, systems, products and materials that are necessary to insure that those varied functional needs and requirements are supported, without compromising the intent and objectives of the Standards.
3. In cases of new construction or extensive renovations, the Standards acknowledge and require adherence as necessary to County and municipal zoning ordinances, development overlay districts, historic districts, and other specific building guidelines and restrictions. This compliance should be insured while maintaining the basic performance, appearance, and systems/products quality standards that are a part of the County's Facilities Construction Standards.

IV. <u>County's Sustainability Objectives</u>

1. The Standards are intended to conform with and support the County's environmental sustainability objectives. Existing County policies included herein that are by reference a part of the Standards include the following: LEED Policy for New Construction, Energy Star Policy for New Construction, LEED and Energy Star Policy for Renovations, High Efficiency Plumbing Fixture Policy, and Landscaping Practices Policy.
2. While the Standards are consistent with and supportive of the County's environmental sustainability objectives, they are not be unduly restrictive as to a specific building systems, equipment , and products; particularly to the point of identifying specific manufacturers and model numbers. Environmental sustainability criteria typically are performance based and centered on environmentally related benchmarks. Thus, the Standards allow architects and engineers flexibility in achieving sustainability objectives; and insure that the other

reasons for standardization and the associated guidelines and directions remain considerations in facility design.

V. Specification of Products/Manufacturers/Models within County's Purchasing Ordinance/Guidelines

1. Typically, specifications of systems, equipment, products and materials within the Facilities Construction Standards are based on required function, performance or quality level and allow for multiple vendors or manufacturers, some of which may be listed in the Standards. Where the County has a single preferred provider or manufacturer, that company and the associated product are used as a "basis of design" within the Standards. This categorization still allows for other vendors or manufacturers to complete in a solicitation if they can demonstrate full compliance with standards and characteristics of that "basis of design" item.
2. a) In some instances, the Standards result in specification of systems, equipment, or other products with a single manufacturer/provider. The justification for such designations is based on one or more reasons: required interfaces or consistency with existing systems, equipment, or products; significant ease, value and/or cost effectiveness in operations and maintenances; availability of vendor support; low lifecycle costs; and potential cost savings from economies of scale.

   b) The designation of the above referenced single source items within the Standards is implemented in compliance with the requirements of the Gwinnett County Purchasing Ordinance and under the standardization review procedures of the County's Purchasing Policy and Review Committee. These reviews will be provided concurrently with at any future time when the Standards are being revised or updated. Standardization for single source manufacturers or suppliers is valid for no more than five (5) years.

SECTION 010000

GENERAL PROVISIONS

I. The Facilities Management Division of the Department of Support Services is assigned the responsibility of publishing, administering and maintaining the Gwinnett County Facility Construction Standards. The Facilities Management Division oversees and coordinates a standing committee, composed of representatives of various County departments, that regularly reviews and updates these Facility Standards. All exceptions to the Facility Standards must be made by this committee or a designated sub-committee of said committee, and must be documented and approved in writing. If determined that an exception requires a modification to the Standards, the committee will direct the incorporation of this change into the document. In addition, the standing committee or its specialized sub-committees will meet on a regular basis to review the Facility Standards, and as necessary and applicable, authorize updates, enhancements or other modifications in the document. Architects, engineers and other design professionals also are encouraged to critically review the Facility Standards and to provide feedback, new technical information, and corrections as they consider useful and supportive of the County's objectives with the Standards. The County will take this input into consideration and will modify the Standards as it determines necessary.

II. To insure compliance with these Standards, the County will require the design professionals to monitor the development of construction design drawings and specifications through a checklist at each stage of design. In addition, the Facilities Management Division or the applicable capital projects management personnel within the County's Parks and Recreation Division will review the documents for the same purpose at each stage of design.

III. The guidelines in the Standards do not relieve the design professionals and contractors from mandatory code compliance and compliance with project program requirements that are separate and apart from the primarily technical requirements of the Facility Standards.

IV. The Facility Standards are meant to be used as a basis for design and specification for Gwinnett County projects. These documents, in whole or in part, are not to be copied and used as complete or partial specifications for non-County projects.

V. Sustainability Objectives: Gwinnett County has established objectives for environmental sustainability and has several design and construction policies that support these objectives. They are as follows:
    1. LEED Policy for New Construction
    2. Energy Star Policy for New Construction
    3. LEED and Energy Star Policy for Renovations

4. High Efficiency Plumbing Fixture Policy
5. Landscaping Practices Policy

Copies of each of these policies are included herein and by reference made a part of these Standards. The design professionals are to adhere to these policies as is applicable to their work and the project undertaken. The LEED target level and specific recommended LEED points shall be reviewed with and approved by the County prior to start of Schematic Design. The pursuit of LEED Certification is at the County's discretion in accordance with the terms of the policy. Whether or not LEED is pursued, both energy conservation and water conservation are high priorities of the County, and the project design professionals will be expected to give these objectives prominence in their design and engineering.

VI. Codes and Regulations: As noted above, the design professionals have the responsibility of insuring the project is designed to meet all building related codes and ordinances of Gwinnett County, the State of Georgia and any other authorities having jurisdiction. The design team shall provide all materials required for permit applications and shall be responsible for handling all permit reviews and securing permits for development and construction as needed. The design team also is responsible for insuring any new construction or renovation is fully compliant with the minimal requirements of the Americans with Disabilities Act and its associated regulations. In fact, the County encourages user friendly design with accessibility features above the level of standards associated with ADA and will support such if within the budget of the project. Finally, the design professionals shall comply with all of the applicable portions of the Referenced (Industry) Standards listed within the Facility Standards.

VII. Record Documents and Operations & Maintenance Manuals: Although specific requirements in this area are not yet listed in the Facility Standards Manual, The County does have very specific requirements in this area, and will provide the designer with comprehensive and detail directions on what it shall require of the contractor in the production and submission of Project Record Documents and Operations and Maintenance Manuals.

GWINNETT COUNTY GOVERNMENT
LEED POLICY FOR NEW CONSTRUCTION

I. POLICY STATEMENT

All new County building projects that will include at least 5,000 square feet of conditioned space, are intended for regular occupancy, and are new construction, will be registered with the US Green Building Council's Leadership in Energy and Environmental Design (LEED) Rating System, and will be designed and constructed to achieve LEED for New Construction certification. The specified certification can be one of four certification levels: Certified, Silver, Gold, or Platinum.

II. PURPOSE

The purpose of this policy is to create sustainable public buildings that:

1. Provide healthier, more productive indoor environments for the building occupants.
2. Have lower maintenance and lifecycle costs, resulting in net savings for taxpayers.
3. Reduce energy and materials use.
4. Protect air and water quality.
5. Promote economic redevelopment and mobility by using existing infrastructure.

III. DEFINITIONS

1. *Design Consultant:* The architect or engineer responsible for the overall design of the building.
2. *Funding*: Includes Special Purpose Local Option Sales Tax (SPLOST), capital budget, debt, and grants.
3. *LEED Accredited Professional (LEED AP):* A person recognized by the USGBC as having successfully demonstrated knowledge of the green building design and construction industry and the LEED Rating System, Resources and Process.
4. *LEED for New Construction:* A set of performance standards for certifying the design and construction of commercial or institutional buildings and high-rise residential buildings in all sizes, both public and private. The intent is to promote healthful, durable, affordable, and environmentally sound practices in building design and construction.
5. *LEED Rating System:* Leadership in Energy and Environmental Design Rating Systems developed and supported by the USGBC. The LEED Rating System is voluntary, consensus-based, and market driven. Based on existing and proven technology, the system evaluates environmental performance from a whole building perspective over a building's life cycle, providing a definitive standard for what constitutes a green building in design, construction, and operation.

6. *Regular Occupancy:* Refers to traditional occupancy associated with office buildings, libraries, community centers, etc. It does not include maintenance barns, pump stations, garages, or storage facilities.
7. *USGBC:* The US Green Building Council is the nation's foremost coalition of leaders from across the building industry working to promote buildings that are environmentally responsible, profitable, and healthy places to live and work.

IV. DESCRIPTION

The following steps shall be taken for all new County building projects that will include at least 5,000 square feet of conditioned space, are intended for regular occupancy, and are new construction to ensure that they meet the requirements of this policy:

1. The Request for Proposal (RFP) for Design Consultant will include LEED components referenced to the LEED standard in place at the time the RFP is issued.
2. The proposer's experience with LEED will be part of the RFP selection criteria and process.
3. LEED Certification requirements shall be referenced into any Contracts executed between the County and the Design Consultant involving buildings that are to be LEED Certified Buildings.
4. After the contract with the Design Consultant has been executed, the Design Consultant will be directed to register the building with the Green Building Certification Institute (GBCI) as a LEED project.
5. Each LEED project must have a LEED AP on the project team.
6. LEED credit items shall be chosen to maximize the benefits to Gwinnett County as determined by the managing County department or agency.
7. In all decisions on alternative choices, proven technology is to be given priority. Experience has shown that very new systems, materials, or products can lead to unexpected results and additional costs that may not be acceptable.
8. LEED Certification requirements shall be referenced into any contracts executed between the County and any Contractors involving buildings that are to be LEED Certified Buildings. This includes all contracts and/or purchase orders for any components of the building that are entered into by the County.
9. The building design and construction shall meet all LEED prerequisite activities and Minimum Program Requirements (MPRs).
10. The building design and construction shall meet the predetermined LEED certification level (Certified, Silver, Gold, or Platinum).

V. EXCEPTIONS

1. New County building projects less than 5,000 square feet are not included in this policy.
2. County building renovation projects are not included in this policy.
3. The appropriate Department Director may exempt certain new County building projects from the provisions of this policy due to lack of funding or other serious circumstances. These exemptions shall be documented.

VI. RESPONSIBILITY

Any County Department or Agency responsible for new building projects that will include at least 5,000 square feet of conditioned space, are intended for regular occupancy, and are new construction.

VII. REFERENCES

1. U.S. Green Building Council LEED Program
2. Gwinnett County ENERGY STAR Policy for New Construction
3. Gwinnett County ENERGY STAR/LEED Renovation Policy

GWINNETT COUNTY GOVERNMENT
ENERGY STAR POLICY FOR NEW CONSTRUCTION

I. POLICY STATEMENT

All new County building projects that consist of less than 5,000 square feet of conditioned space, are intended for regular occupancy, and are new construction will be certified Designed to Earn ENERGY STAR.

II. PURPOSE

The purpose of this policy is to create energy efficient public buildings that:

1. Protect air quality by efficiently using energy and thereby reducing the level of harmful emissions associated with the energy production that would be required had the energy efficient measure not been employed.
2. Provide lower lifecycle costs due to lower energy usage and maintenance costs.
3. Exemplify the County's commitment to reducing our impact on the environment.

III. DEFINITIONS

1. *Commissioning Agent:* A certified individual who provides documented confirmation that building systems function according to criteria set forth in the project documents to satisfy the owner's operational intent.
2. *Design Consultant:* The architect or engineer responsible for the overall design of the building.
3. *Designed to Earn ENERGY STAR:* A U.S. EPA rating system that evaluates a building's design criteria to determine if its estimated energy use is intended to be in the top 25 percent as compared to similar U.S. facilities.
4. *ENERGY STAR Building Certification:* A U.S. EPA rating system that evaluates a building's energy use to determine if it is in the top 25 percent as compared to similar U.S. facilities.
5. *Funding*: Includes Special Purpose Local Option Sales Tax (SPLOST), capital budget, debt, and grants.
6. *Regular Occupancy:* Refers to traditional occupancy associated with office buildings, libraries, community centers, etc. It does not include maintenance barns, pump stations, garages, or storage facilities.

IV. DESCRIPTION

The following steps shall be taken for all new County building projects that are less than 5,000 square feet of conditioned space, are intended for regular occupancy, and are new construction to ensure that they meet the requirements of this policy:

1. The Request for Proposal (RFP) for Design Consultant will include Designed to Earn ENERGY STAR components.
2. The proposer's experience with Energy Star will be part of the RFP selection criteria and process.
3. Designed to Earn ENERGY STAR Certification requirements shall be referenced into any Contracts executed between the County and the Design Consultant involving buildings that are to be Designed to Earn ENERGY STAR Buildings.
4. After the contract with the Design Consultant has been executed, the Design Consultant shall assist the County in developing a scope of work, project budget and schedule, and assemble a multi-disciplinary team to execute an integrated design approach to establish an energy performance target that exceeds the ENERGY STAR rating requirement.
5. Designed to Earn ENERGY STAR items shall be chosen to maximize the benefits to Gwinnett County as determined by the managing County department or agency.
6. In all decisions on alternative choices, proven technology is to be given priority. Experience has shown that very new systems, materials, or products can lead to unexpected results and additional costs that may not be acceptable.
7. The Design Consultant shall prepare and submit the necessary application and associated documents to the appropriate ENERGY STAR office and attain the Designed to Earn ENERGY STAR label.
8. Designed to Earn ENERGY STAR requirements shall be referenced into any contracts executed between the County and any Contractors involving buildings that are to be Designed to Earn ENERGY STAR.
9. The Contractor shall adhere to products, methods, and quality levels specified in the construction documents. No substitutions are permitted without the approval of the design team.
10. At project completion, the County shall employ a Commissioning Agent (independent of the design team) that shall provide a documented confirmation that building systems function in compliance with energy performance goals set forth in the Project Documents to satisfy the County's operational needs.
11. The Commissioning Agent shall measure and track actual energy consumption of the building's systems to determine if energy performance goals are being achieved and maintained. The Contractor will make needed adjustments and corrections prior to expiration of the warranty period.
12. The County shall seek ENERGY STAR Building Certification within 14 months of reaching 95 percent occupancy.

V. EXCEPTIONS

1. New County building projects 5,000 square feet or greater are not included in this policy.
2. County building renovation projects are not included in this policy.
3. The appropriate Department Director may exempt certain new County building projects from the provisions of this policy due to lack of funding or other serious circumstances. These exemptions shall be documented.

VI. RESPONSIBILITY

Any County Department or Agency responsible for new building projects that consist of less than 5,000 square feet of conditioned space, are intended for regular occupancy, and are new construction.

VII. REFERENCES

1. U.S. EPA ENERGY STAR Program
2. Gwinnett County LEED Policy for New Construction
3. Gwinnett County ENERGY STAR/LEED Renovation Policy

GWINNETT COUNTY GOVERNMENT
ENERGY STAR/LEED RENOVATION POLICY

I. POLICY STATEMENT

All County regular occupancy building renovation projects involving more than 50% of the aggregate area of the building and significant modifications of the building envelope, interior layout and HVAC systems will be registered with the US Green Building Council's Leadership in Energy and Environmental Design (LEED) Rating System, and will be designed and constructed to achieve LEED for New Construction certification. If the project scope does not involve significant design and construction activities and focuses more on operations and maintenance activities, the project will be designed and constructed to achieve LEED for Existing Buildings: Operations and Maintenance certification. The specified certification can be one of four certification levels: Certified, Silver, Gold, or Platinum. Minor renovation and repair projects, such as small office build-outs and equipment replacements, shall follow ENERGY STAR guidelines.

II. PURPOSE

The purpose of this policy is to create sustainable and energy efficient public buildings that:

1. Provide healthier, more productive indoor environments for the building occupants.
2. Protect air quality by efficiently using energy and thereby reducing the level of harmful emissions associated with the energy production that would be required had the energy efficient measure not been employed.
3. Provide lower lifecycle costs due to lower energy usage and maintenance costs.
4. Exemplify the County's commitment to reducing our impact on the environment.

III. DEFINITIONS

1. *Design Consultant:* The architect or engineer responsible for the overall design of the building.
2. *ENERGY STAR Guidelines:* U.S. EPA guidelines that assists building owners in lowering building energy consumption.
3. *Funding*: Includes Special Purpose Local Option Sales Tax (SPLOST), capital budget, debt, and grants.
4. *LEED Accredited Professional (LEED AP):* A person recognized by the USGBC as having successfully demonstrated knowledge of the green building design and construction industry and the LEED Rating System, Resources and Process.

5. *LEED for Existing Buildings: Operations and Maintenance*: A set of performance standards for certifying the operations and maintenance of existing commercial or institutional buildings and high-rise residential buildings of all sizes, both public and private. The intent is to promote high-performance, healthful, durable, affordable, and environmentally sound practices in existing buildings.
6. *LEED for New Construction:* A set of performance standards for certifying the design and construction of commercial or institutional buildings and high-rise residential buildings in all sizes, both public and private. The intent is to promote healthful, durable, affordable, and environmentally sound practices in building design and construction.
7. *LEED Rating System:* Leadership in Energy and Environmental Design Rating Systems developed and supported by the USGBC. The LEED Rating System is voluntary, consensus-based, and market driven. Based on existing and proven technology, the system evaluates environmental performance from a whole building perspective over a building's life cycle, providing a definitive standard for what constitutes a green building in design, construction, and operation.
8. *Regular Occupancy:* Refers to traditional occupancy associated with office buildings, libraries, community centers, etc. It does not include maintenance barns, pump stations, garages, or storage facilities.
9. *USGBC:* The US Green Building Council is the nation's foremost coalition of leaders from across the building industry working to promote buildings that are environmentally responsible, profitable, and healthy places to live and work.

IV. DESCRIPTION

The following steps shall be taken for all County regular occupancy building renovation projects involving major HVAC renovation, significant envelope modifications, and major interior rehabilitation and are required by this policy to be designed and constructed to achieve LEED for New Construction certification. Also, the following steps shall be taken for project scopes that do not involve significant design and construction activities, but focus more on operations and maintenance activities and are required by this policy to be designed and constructed to achieve LEED for Existing Buildings: Operations and Maintenance certification.

1. The Request for Proposal (RFP) for Design Consultant will include LEED components referenced to the LEED standard in place at the time the RFP is issued.
2. The proposer's experience with LEED will be part of the RFP selection criteria and process.
3. LEED Certification requirements shall be referenced into any Contracts executed between the County and the Design Consultant involving buildings that are to be LEED Certified Buildings.
4. After the contract with the Design Consultant has been executed, the Design Consultant will be directed to register the building with the Green Building Certification Institute (GBCI) as a LEED project.
5. Each LEED project must have a LEED AP on the project team.

6. LEED credit items shall be chosen to maximize the benefits to Gwinnett County as determined by the managing County department or agency.
7. In all decisions on alternative choices, proven technology is to be given priority. Experience has shown that very new systems, materials, or products can lead to unexpected results and additional costs that may not be acceptable.
8. LEED Certification requirements shall be referenced into any contracts executed between the County and any Contractors involving buildings that are to be LEED Certified Buildings. This includes all contracts and/or purchase orders for any components of the building that are entered into by the County.
9. The building design and construction shall meet all LEED prerequisite activities and Minimum Program Requirements (MPRs).
10. The building design and construction shall meet the predetermined LEED certification level (Certified, Silver, Gold, or Platinum).

Minor renovation and repair projects, such as small office build-outs and equipment replacements, shall follow ENERGY STAR guidelines.

V. EXCEPTIONS

1. New County building projects are not included in this policy.
2. The appropriate Department Director may exempt certain County building renovation projects from the provisions of this policy due to lack of funding or other serious circumstances. These exemptions shall be documented.

VI. RESPONSIBILITY

Any County Department or Agency responsible for building renovation projects that consist of conditioned space and are intended for regular occupancy.

VII. REFERENCES

1. U.S. EPA ENERGY STAR Program
2. U.S. Green Building Council LEED Program
3. Gwinnett County ENERGY STAR Policy for New Construction
4. Gwinnett County LEED Policy for New Construction

GWINNETT COUNTY GOVERNMENT
HIGH EFFICIENCY PLUMBING FIXTURE POLICY

I. POLICY STATEMENT

All new County building projects shall have high efficiency plumbing fixtures that meet the following standards: toilets (1.28 gpf or less), urinals (0.5 gpf or less), and faucets (0.5 gpm or less).

II. PURPOSE

The purpose of this policy is to reduce the use of water in County buildings while maintaining adequate flow for plumbing fixture performance.

III. DEFINITIONS

1. *Energy Policy Act of 1992:* A United States Government act addressing energy efficiency, energy conservation, and energy management. Included in this Act are performance requirements for plumbing fixtures.
2. *gpf:* gallons per flush.
3. *gpm*: gallons per minute.

IV. DESCRIPTION

Gwinnett County requires that all new County building projects have high efficiency plumbing fixtures that meet the following standards: toilets (1.28 gpf or less), urinals (0.5 gpf or less), and faucets (0.5 gpm or less).

Plumbing fixtures manufactured prior to 1992 consume at least three times the amount of water as fixtures manufactured under current standards. After passage of the U.S. Energy Policy Act of 1992, which promoted the conservation and efficient use of energy and water, strict requirements for water fixture performance were put into place. These 1992 requirements became the standard around the country and generally have remained so; but now, plumbing codes are starting to become more restrictive, and many local governments and environmental organizations are encouraging even tighter controls on water efficiency.

The technologies for high efficiency fixtures are improving quickly, and there are now opportunities to utilize more efficient fixtures than the commonly accepted 1992 standards. It is recommended that the County adopt stricter standards in line with these technologies and require them in all new County construction. The proposed

standards are shown below relative to older fixtures and the Energy Policy Act of 1992 standard:

Plumbing Fixture	Before 1992	Energy Policy Act of 1992	Proposed Gwinnett County
Toilet	4.7 gpf	1.6 gpf	1.28 gpf
Urinal	3.5 gpf	1.0 gpf	0.5 gpf
Faucet	5 to 7 gpm	2.5 gpm	0.5 gpm

V. EXCEPTIONS

1. County building renovation projects are not included in this policy but are encouraged to use high efficiency plumbing fixtures where budgets allow and conditions permit.
2. County maintenance and repair procedures are not included in this policy but are encouraged to use high efficiency plumbing fixtures where budgets allow and conditions permit.
3. The appropriate Department Director may exempt certain new County building projects from the provisions of this policy due to lack of funding or other serious circumstances. These exemptions shall be documented.

VI. RESPONSIBILITY

Any County Department or Agency responsible for new building projects.

VII. REFERENCES

1. Energy Policy Act of 1992

GWINNETT COUNTY GOVERNMENT
LANDSCAPING PRACTICES POLICY

I. POLICY STATEMENT

Installation and maintenance of landscaping on existing and newly constructed Gwinnett County facilities and grounds shall be done in a sustainable manner to include integrated pest management practices, drought tolerant landscaping practices, and an emphasis on the planting of locally adapted plants that require minimal amounts of fertilizer or chemicals.

II. PURPOSE

The purpose of this policy is to emphasize and provide a guide for the use of sustainable landscaping practices for the landscaping of Gwinnett County's buildings, parks, and other locations. Sustainable landscaping practices:

1. Have a minimal impact on the environment.
2. Are aesthetically pleasing and environmentally sound.
3. Balance resources used and results gained.
4. Are low-maintenance.
5. Use less water.
6. Reduce the amounts of pesticides, herbicides, or other chemicals used in landscape care.

III. DEFINITIONS

1. *Integrated Pest Management:* A pest control strategy that uses a variety of complimentary approaches including: prevention, cultural controls, physical or mechanical controls, biological controls, and chemical controls.
2. *Landscape:* The turf, trees, mulch, shrubs, flowers, and other plants at Gwinnett County's buildings, parks, and other locations.
3. *pH:* A measure of the acidity or alkalinity of a solution.
4. *Sustainable Landscaping:* Low-impact, low-maintenance, low-resource use landscaping that fits a particular site and climate.

IV. DESCRIPTION

Sustainable landscapes require less water, fertilizer, pesticides, and maintenance than traditional landscapes. In addition to being environmentally sound, a sustainable landscape can also be aesthetically pleasing. Gwinnett County's sustainable landscape practices shall include integrated pest management practices, drought tolerant landscaping practices, and an emphasis on the use of locally adapted plants over non-locally adapted varieties.

Integrated pest management strategies center on preventing and managing pests with minimal impact on human health, the environment, and non-target organisms. The first steps are to choose plants that will have few pest problems and to care for them properly to keep them healthy. Choose plants that are labeled resistant to tolerant and are healthy to start with, put them in the right growing environment, and follow good sanitation practices in the landscape.

Regularly check plants for signs and symptoms of pest damage. If you see a problem, be sure to identify the cause correctly. If the damage is severe enough, select a control measure. Integrated pest management control measures include prevention, cultural controls, physical or mechanical controls, biological controls, and chemical methods.

First, determine if there are preventive or non-chemical methods that can be used to reduce the problem. For best results, combine several methods from the following categories:

1. Prevention: Prevent pests from invading or building up their populations in the first place. This might include removing pests' sources of food, water, and shelter.
2. Cultural Controls: Cultural practices are things you can do to discourage pest invasion such as good sanitation, removing debris and infested plant material, proper watering and fertilizing, growing competitive plants, or using pest resistant plants.
3. Physical or Mechanical Controls: Control pests with physical methods or mechanical devices such as knocking pests off of plants with a spray of water, using barriers and traps, cultivating, soil solarization, or heat treatments.
4. Biological Controls: Biological control is the use of beneficial organisms to manage pests. Encourage natural enemies by planting flowering and nectar-producing plants and avoiding the use of broad-spectrum pesticides.
5. Pesticides: If effective non-chemical methods are not available, consider using pesticides. Pesticides can be part of integrated pest management, but use them only as a last resort and only after you have tried other methods. Be sure that your pest problem is serious enough to warrant a pesticide treatment. Always use the least toxic, yet effective, materials available and use them in ways that reduce human and animal exposure and protect the environment.

The recent drought years have shown us that our public grounds and recreation areas can survive and remain functional and attractive with less water. Planning is the first step to a better landscape. Plants which are suited to the site need less fertilizer, water and pesticides. There are four essential components of planning:

1. Site Analysis: Check sun, wind and drainage before choosing your plant. A plant that needs shade will do poorly in the sun, becoming moisture stressed and insect prone.
2. Size: Learn what the mature size of your plants will be. A common mistake is to choose plants that will quickly outgrow the site. These plants will need constant maintenance and will require more water to remain healthy.
3. Water Needs: Develop a landscape that is water efficient. Group plants with similar moisture needs together so that water is not wasted on plants that don't need it. Many established shrubs and trees can go several weeks without supplemental water, while annual flowers may need more than an inch of irrigation per week.

4. Practical Turf Areas: Turf is the largest user of water in the landscape. Plan smaller turf areas and use mulch, shrub borders or ground covers in other areas.

Choose the right plant for the right place. Many native plants are suitable for Gwinnett landscapes and are adapted to the extremes of Georgia weather. Native plants thrive in an environment similar to that of their natural habitat and will use much less water than plants that did not originate here.

When purchasing plants, check them carefully to ensure that you are not bringing diseases or insect pests into the landscape. It is a good idea to inspect the root system for possible damage. Look for good color and strong growth as well.

Planting properly is a key to healthy plants that are able to resist drought, insects and diseases. Soil preparation is critical. A well-prepared planting bed, dug to a depth of 12-15 inches encourages strong root development for shrub masses, islands, and flower borders. Grouping plants together in a tilled bed instead of planting in individual holes keeps larger root areas cool and moist, providing better conditions for plant growth. Be sure to loosen up and spread apart the root ball of container plants to encourage roots to grow outward and to allow water to penetrate into the root mass.

Mulch immediately after planting with shredded bark, pine straw or other organic material. Mulch moderates soil temperatures and reduces water needs. Mulch also reduces weeds, prevents erosion, and eliminates damage from string trimmers and lawn mowers. Apply mulch 2 to 4 inches deep and extend it past the drip line of the plants. To prevent disease and insect damage, pull mulch away from the stem or trunk of the plant. Suitable mulches include pine straw, shredded leaves, pine bark nuggets, mini-nuggets, shredded hardwood mulch, and shredded cypress. Shredded products and pine straw are preferred on a slope because they are less likely to wash away during rain.

Watering should be done according to plant needs. Newly planted trees and shrubs need frequent watering. Once established, many plants can survive weeks without supplemental irrigation. When possible, use drip irrigation or soaker hoses because they apply water to the roots of the plants where it is needed. Sprinklers can waste 30-50 percent of the water applied. The most efficient time to use sprinklers is after dew has fallen in the evening and before it begins to dry in the morning. When you do irrigate, apply enough water to wet the soil to a depth of 6 to 8 inches to promote deep root growth. Soil moisture sensors are available for automated systems to prevent over-irrigation. Clay soils require only an inch of water to moisten soil to the recommended 6 to 8 inches in depth. Water only when needed. A rain gauge will help you to match supplemental water application to rainfall. Check sprinkler heads at least once per season to ensure that they are applying water evenly and not wasting water on walks, drives and streets. Water turf areas only when they need it. If footsteps are left when you walk across a turf area, or the grass has a blue cast, you probably need to water. Many turfgrasses such as bermuda can be allowed to go dormant during times of low rainfall. They will recover when rainfall returns to normal.

Fertilize according to a soil test. Soil pH is critical to efficient use of fertilizers. With a too high or too low pH, plants can't use the fertilizer that is applied and will perform poorly. Excess fertilizer will also stimulate plants to use more water. Slow release fertilizers release nutrients as the plants need them, according to temperature and moisture availability. This allows more even plant growth while avoiding loss of nutrients to leaching and run off. Before applying fertilizer, calibrate your spreader. Calibration methods vary according to different brands of spreaders, so contact the manufacturer or dealer if you are uncertain. Sweep up any fertilizer that is spilled onto walks, driveways and streets. Spilled fertilizer can cause serious pollution problems when it runs off into storm drains and into streams and lakes. Avoid fertilizing during dry periods. Fertilizing stimulates new growth, which requires more water.

A properly spaced plant in the landscape should not need heavy pruning for several years. If pruning to reduce size is needed within 5 years after planting, then you have probably chosen the wrong plant for the location. Avoid shearing shrubs and plants. Shearing not only is high maintenance but also increases the plant's need for water. Selective thinning of branches is preferred. Thinning gives a more natural shape and does not have to be done as often. Pruning at the proper time is important. In general, prune spring flowering shrubs immediately after flowering, and prune summer flowering shrubs before spring growth begins. Avoid pruning during times of drought. Pruning stimulates growth, which requires more water.

By choosing plants that are best suited to the local environment, using integrated pest management practices, using correct water and pruning techniques, and maintaining proper pH and soil fertility, you will help promote a healthy landscape that will save water and require fewer chemicals.

V. EXCEPTIONS

The appropriate Department Director may exempt certain landscape areas from the provisions of this policy due to lack of funding or other serious circumstances. These exemptions shall be documented.

VI. RESPONSIBILITY

Any County Department or Agency who installs or maintains landscape areas shall comply with this policy.

VII. REFERENCES

1. Reducing Water Use in the Landscape – Gwinnett Extension Service
2. Xeriscape: Seven Steps to a Water-Wise Landscape – University of Georgia Cooperative Extension
3. What is Integrated Pest Management? – University of California Statewide Integrated Pest Management Program
4. Sustainable Landscape Council

DIVISION 03: CONCRETE

SECTION 033000

CAST-IN-PLACE CONCRETE

I. GENERAL CRITERIA

A. Scope: This section is to provide preferences and guidance on specifications for typical cast-in-place concrete construction in County facilities. This guidance and directions are for enclosed structures and do not necessarily apply to exterior cast-in-place concrete. There also may occasionally be special construction situations that require supplemental instructions, which will be provided at the start of design.

B. Reference Standards: Cast-in-place concrete design and construction shall comply with the applicable requirements of the American Concrete Institute's (ACI) publication ACI 318-05, Building Code Requirements for Structural Concrete. Steel reinforcing and reinforcing supports shall be in conformance with the Concrete Reinforcing Steel Institute's (CRSI) Manual of Standard Practice, 2009 Edition (or newer of applicable). Quality assurance and testing shall be in compliance with the current editions of the American Society for Testing and Materials (ASTM) as applicable.

II. DESIGN STANDARDS

A. Structural design typically should use normal weight concrete (145 to 150 PCF). In elevated structures where spans or foundation conditions dictate that it is more economical, or where fire ratings influence material selection, semi-lightweight concrete (110-120 PCF) may be used.

B. Cement: Cement shall conform to one of the following:

IA/C150	Standard Portland Cement
IIA/C150	Provides moderate sulfate resistance or moderate heat of hydration
IIIA/CI50	Produces high early strength
CPA/C595	Type 1 cement blended with pozzolan (25% by weight maximum in the cement-pozzolan blend)
E-OKA/C845	Containers anhydrous calcium aluminosulfate, calcium sulfate, and uncombined calcium oxide.

Only one type and brand of each type of cement will be permitted in a structure or structural element.

C. Pozzolan (Fly Ash): Use of fly ash in the concrete mix may be required in projects being designed for LEED certification or to LEED standards. In such cases, up to 25% of the cement content in the concrete mix design can be replaced with fly ash. The combined percentage of fly ash and blast slag may exceed this percentage. When using fly ash, conform to ASTM C618, Class F whenever possible. Specify that fly ash shall be produced from a single and consistent source. Fly ash shall not be used in architecturally exposed concrete.

D. Aggregates: Specify aggregate types and insure that they conform to ASTM C33 and that all of each type are from a single source.

E. Admixtures: Specify that admixtures in the concrete mix must be compatible and cannot contain any intentionally added chlorides. For concrete that is to be waterproofed, specify use of a superplasticizer because it helps to produce a denser, more water-resistant concrete.

F. Reinforcing Steel: Specify that reinforcing steel shall conform to ASTM A615 Grade 60 (#3 bars may be Grade 40). All welded wire fabric shall be provided in flat sheets only, and specify that chairs be used for support of fabric.

G. Waterstops: Specify the use of waterstops at underground pits and walls (elevator pits, basement walls, etc.) to control or prevent water leakage through joints. When movement at joints is expected to be minimal, specify strip applied or mastic waterstops. These products shall have a proven life consistent with the expected life of the structure being designed. Where movement at joints is expected, specify use of flexible PVC or rubber waterstops that are manufactured with wire embedded in them to allow for the waterstop to be tied off more securely during concrete placement. Splices in waterstop material should be fused or "welded" in accordance with the material chosen and manufacturer's recommendations. The construction documents should carefully address proper placement of waterstops.

H. Curing Compounds: Specifications shall require curing of all floor slab concrete through use of plastic sheeting to control water loss or through use of curing compounds such as silicate solutions or emulsified paraffin. The specifications shall insure that there is compatibility between the curing compound and the subsequent floor finish.

I. Wet Curing: Specifications may also allow wet curing by water mist, wet burlap, or other methods that are viable in the judgment of the engineer of record.

J. Vapor Barriers: The transmission of water vapor or moisture through concrete slabs on grade is a major concern of the County, and design teams are required to specify construction products, methods and techniques that will minimize the chances of significant transmission. Critical to this effort is the specification of a vapor barrier. The County's preference is for a product manufactured by Stego Industries, Stego Vapor Barrier (15 mils). Reference Section 072600 Under Slab Vapor Barrier. Also require transmission testing and floor finish manufacturer/installer acceptance.

K. Proportioning of Concrete: Within the standards and guidance provided herein, and based on the professional judgment of the engineer of record, select the proportions of ingredients to produce a concrete having proper workability, durability, strength and appearance. Proportion ingredients to produce a mixture that will work readily into corners and angles of forms and around reinforcement using methods of placement and consolidation employed on the project. The maximum recommended allowable water/cement or water/cement-pozzolan ratio is 0.47. Include free water in the aggregate

in all ratio computations. Include air entrainment in all concrete permanently subjected to freezing temperatures.

III. DESIGN CONSIDERATIONS AND IMPLEMENTATION

A. Reinforcing: The specifications shall call for rebar splices to be in accordance with ACI 318. Mechanical methods for splicing rebar are preferred where lap splices are not permitted or are impractical; welding of reinforcing bars is prohibited. Lap splices should be designed as Class B for lengths. Mechanical rebar splices shall develop 125 percent of the specified yield strength. The specifications shall require reinforcing bars to be field cut by shearing or sawing; field cutting with a torch is not acceptable.

B. Embeds and Conduit: The structural engineer shall coordinate with other engineers in the location of conduits and pipes in the concrete structure, and shall require that placement in the field conform to ACI 318, Section 6.3 at a minimum. The specifications also shall require coordination among trades on the placement of joint covers, drains, mounting hardware and other embeds prior to formwork creation.

C. Prohibition of Field Modifications to Concrete Mix: The contract specifications shall provide that the Contractor not be allowed to place concrete more than 90 minutes after batch mix at the plant. The specifications also shall prohibit adding water to concrete on-site or making other modifications to the concrete mix on-site.

D. General Concrete Finishing: Carefully specify the types of concrete finishing required for all areas of the structure to insure proper finishing and avoid problems due to lack of definition on drawings and specifications. Finishes include the following:

1. Rough form finish shall be in accordance with ACI 301, Section 10.2.1. This is the roughest finish and is recommended for surfaces that will not be visible in the completed structure.
2. Smooth form finish shall be in accordance with ACI 301, Section 10.2.2. A smooth form finish is recommended for surfaces to be coated or where appearance is not important.
3. Smooth rubbed finish shall be in accordance with ACI 301, Section 10.3.1. A smooth rubbed finish requires an initial smooth form finish as required above. A smooth rubbed finish is recommended for surfaces that will not be coated and do not require a highly finished appearance.
4. Grout cleaned finish shall be in accordance with ACI 301, Section 10.3.2. A gout cleaned finish requires an initial smooth form finish as required above. A grout cleaned finish is recommended for surfaces that will not be coated but require a highly finished appearance. Because a grout cleaned finish is labor intensive and requires skill to produce the desired results, the specifications shall provide for close monitoring of the contractor's methods and procedures.
5. Tops of walls and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed. If exposed, float unformed surfaces to a texture consistent with that of the formed surfaces.

E. Placement and Finishing of Floor Slabs: Specify all concrete floor slabs shall be placed and finished to meet the flatness and levelness criteria below:

Non-Critical:	Specified Overall:	Minimum Local:
Slab on Grade	FF20/FL15	FF15/FL10
Elevated Slabs	FF20/FL15	FF15/FL10
Moderate:		
Slab on Grade	FF25/FL20	FF17/FL15
Elevated Slabs	FF25/FL20	FF17/FL15
Critical:		
Slab on Grade	FF35/FL25	FF24/FL17
Elevated Slabs	FF30/FL20	FF24/FL15

Notes:

1. Reference ACI 301, "Specification for Structural Concrete for Buildings".
2. FL for elevated floors is only applicable when concrete forms are shored and shoring is provided. FL shall be measured prior to removal of forms. FL does not apply to sloping slabs.
3. For unshored construction, FL values do not apply except when required FL values for elevated slabs are greater than or equal to 50.
4. All flatness tests for a given slab shall be performed within 72 hours of pour.
5. Slabs which do not meet the required flatness (FF) and levelness (FL) criteria shall be repaired by grinding, planing, surface repair, retopping, or removal of the slab. Require that contractor provide detailed drawings showing repair action and specification of materials to be used. Engineer shall approve prior to corrective action. Measures shall be taken to adjust finishing techniques to obtain the flatness and levelness criteria specified prior to additional placement of additional elevated or slab on grade.
6. Definitions of floor use for E above:
   a. Non-critical: Parking slabs, surfaces with thick set tile, surfaces to be covered by raised flooring and not to receive direct condition spaced foot traffic.
   b. Moderate: Carpeted areas of commercial or residential buildings or lightly-trafficked office/industrial buildings.
   c. Critical: Areas to have thin set flooring or a warehouse floor.
7. Sloping slabs shall be finished to a tolerance of not more than ¼" difference in 10' in any direction checked with a 10' straight edge. Carefully specify the finishing of slabs and similar flat surfaces for all areas of the structure to avoid problems due to lack of definition in the drawings and specifications and insure proper finishing. Unless there is a specific reason to do otherwise, finished slabs on building interiors will receive a troweled finish. This finish is recommended for appearance of exposed concrete and as preparation for floor coverings. Specify that all interior slab concrete be cured to minimize cracking.

F. Construction Joints: Construction joints should be shown on drawings to better insure that the Contractor does not place joints where water tightness or strength of the structure will be impaired. Include a note on the drawings that all construction joints not

shown on the drawings should be submitted to the Architect/ Engineer for approval. 100 percent of reinforcing steel shall be continuous across construction joints.

G. Control Joints; Control joints are joints in the concrete designed to allow for movement either from contraction or expansion. All control joints should be shown on the drawings.

1. Contraction joints allow for contraction of concrete and also function as construction joints. Fifty percent of reinforcing steel shall be continuous across contraction joints. Saw cutting of contraction joints is allowed if during hot weather, the saw cutting occurs within 4 to 12 hours of concrete placement; and if in cold and moist weather, the saw cutting occurs within 24 hours of concrete placement. Where applicable, use waterstops to insure watertightness.
2. Expansion joints allow for expansion of the concrete and also function as construction and contraction joints. Reinforcing steel shall not be continuous across expansion joints except to effect shear transfer through use of smooth dowels with expansion caps on one side. As a rule, expansion joints should be considered in a spacing of approximately 120 feet of floor space. Where applicable, use waterstops to insure watertightness.

H. Quality Assurance/Inspections and Testing: This sub-section outlines the provisions to be made in construction specifications for quality control of concrete placement.

1. Unless directed otherwise by the County, the contract specifications shall provide that the County shall employ and provide the services of a licensed materials testing company to test the initial mix design for each class of concrete specified; to inspect the placement of reinforcement and concrete; and to measure the slump and test the compressive strength of concrete used in foundations, walls, floor slabs and beams. Tests shall be provided for each batch mix and as required by code and the project's structural engineer. At a minimum, the field tests are expected to include molding of four cylinders for each set of tests specified. The specifications will provide that one specimen be tested at 7 days and two cylinders at 28 days. If one or both of the 28-day tests indicate a compressive strength below the strength required, the fourth specimen shall be tested at 56 days. If all tests indicate a compressive strength below the strength required, the specifications should enable the Architect/Engineer to direct the Contractor to perform testing of the in-place concrete at no cost to the County.
2. The strength of the in-place concrete will be considered deficient if the averages of two consecutive strength tests fail to equal or exceed the specified strength. Concrete work not having the required strength shall be replaced at the Contractor's expense. The Contractor shall bear all costs incurred in providing the additional testing and/or analysis required as a result of deficient in-place concrete. All costs as a result of delays due to additional testing and/or analysis also will be at the Contractor's expense, with no extension of contract length regardless of the outcome of the testing.

I. Rejection of Concrete Work: The construction documents shall allow for the Architect/Engineer to reject concrete work that is incorrectly located or has dimensions out of tolerance with those specified. This judgment will be based on whether the strength, appearance or function of the structure will be affected adversely or there will be interference with follow on work. The cost of repair or replacement of these rejected concrete elements shall be placed with the Contractor.

END OF SECTION 033000

DIVISION 04: MASONRY

SECTION 042100

UNIT MASONRY

I. GENERAL CRITERIA

A. Specify that contractor shall verify the foundations are within dimensional tolerances prior to beginning masonry work.

B. Single-Source Responsibility for Masonry Units: Specify that exposed masonry units shall be of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.

C. Single-Source Responsibility for Mortar Materials: Specify that mortar ingredients shall be of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

D. Mockup: Specify that a sample wall panel be constructed to verify selections made under sample submittals and to demonstrate aesthetic effects as well as other qualities of materials and execution. Mockups shall be built to comply with the following requirements, using materials indicated for final unit of Work.

1. A mockup shall be specified including all types and sizes of masonry approximately 72 inches long by 72 inches high (minimum) by full thickness, including face and back-up as well as accessories. Include a sealant-filled joint at least 16 inches (406 mm) long in each mockup.
    a. Typical exterior wall including masonry, brick, any stone accents and window.
2. One half of the exposed faces of mockups shall be cleaned with masonry cleaner.
3. Specify that the Architect shall be notified one week in advance of the dates and times when mockups will be constructed.
4. Mockups shall be protected from the elements with weather-resistant membrane.
5. The Architect shall issue documentation with photographs indicating any deficiencies in the mock-up within three (3) days of on-site review. If the sample is acceptable, the Architect shall issue documentation to state that the work may commence.

E. Brick construction shall be in accordance with The Brick Industry (BIA) Technical Notes on Brick Construction.

F. CMU construction shall be in accordance with National Concrete Masonry Association (NCMA) Tek Manual.

II. DESIGN STANDARDS

A. MANUFACTURERS

1. Acceptable Manufacturers
    a. Concrete Masonry Units: Block USA, Oldcastle, or approved equal.

b. Face Brick: Boral Bricks, Inc., Cherokee Brick, General Shale, or approved equal.
c. Mortar: Argos/Lafarge, Coosa, Giant, Holcim, Lehigh or approved equal.
d. Joint Reinforcement, Ties, Anchors and Cell Vents: Dur-O-Wall/Hohmann & Barnard, Masonpro, Wire-Bond, or approved equal.

B. CONCRETE MASONRY UNITS

1. General: Specify special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
2. Interior units at corners and opening shall be rounded.
3. Concrete Masonry Units: Comply with ASTM C 90.

C. BRICK

1. General: Specify units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces (no exposed holes in exposed brick).
2. Specify special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
   a. Specify special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
   b. Specify special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
3. Face Brick: ASTM-C 652: Type HBS; Grade-SW for Hollow Brick, and as follows:
   a. Unit Compressive Strength: Specify units with minimum average net-area compressive strength of 3000 psi.
   b. 24-Hour Cold Water Absorption: Does not exceed 8.0%.
   c. Efflorescence: Specify brick that has been tested according to ASTM C 67 and is rated “non effloresced.”
   d. Size: Manufactured to the following actual dimensions:
      i. Modular: 3-1/2 inches wide by 2-1/4 inches high by 7-5/8 inches long.
      ii. Other sizes may be used if approved by County.

D. MORTAR AND GROUT MATERIALS

1. Masonry Cement: ASTM C 91.
   a. For pigmented mortars, only allow premixed, colored masonry cements of formulation required to produce color desired. Pigments shall not exceed 5 percent of masonry cement by weight for mineral oxides nor 1 percent for carbon black.
2. Hydrated Lime: ASTM C 207, Type S.
3. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
4. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch (6.5 mm), use aggregate graded with 100 percent passing the No. 16 (1.18 mm) sieve.

5. Aggregate for Grout: ASTM C 404.
6. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142.
7. Water: Potable.
8. Products: Colored Masonry Cement:
    a. At locations of specified face brick, use Type N mortar, color to be selected.
    b. At locations of specified cast stone, use mortar to match cast stone

E. REINFORCING STEEL

1. Refer to Section 042200 Reinforced Concrete Unit Masonry.

F. JOINT REINFORCEMENT

1. Refer to Section 042200 Reinforced Concrete Unit Masonry.

G. ADJUSTABLE MASONRY-VENEER ANCHORS

1. General: Specify two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
2. Screw-Attached, Masonry-Veneer Anchors at metal stud framing:
    a. Basis of Design is HB-200-HS by Hohmann & Barnard, Inc.
    b. Wire tie section shall extend at least halfway through veneer but with at least 5/8-inch cover on outside face.
    c. Wire (carbon steel): Prefabricated from cold-drawn steel wire conforming to ASTM A82/A82M
    d. Tensile Strength: 80,000 p.s.i., Yield Point: 70,000 p.s.i. minimum
    e. Hot-dip Galvanized after fabrication: ASTM A153/A153M-B (1.5 oz/ft^2)
3. Screw-Attached, Masonry-Veneer Anchors at concrete:
    a. Basis of Design is HB-200 by Hohmann & Barnard, Inc.
    b. Wire tie section shall extend at least halfway through veneer but with at least 5/8-inch cover on outside face.
    c. Wire (carbon steel): Prefabricated from cold-drawn steel wire conforming to ASTM A82/A82M
    d. Tensile Strength: 80,000 p.s.i., Yield Point: 70,000 p.s.i. minimum
    e. Hot-dip Galvanized after fabrication: ASTM A153/A153M-B (1.5 oz/ft^2)
4. Masonry-Veneer Anchors at CMU:
    a. Basis of Design is Lox-All Truss Reinforcement #170 Truss Eye-Wire by Hohmann & Barnard, Inc.
    b. Wire tie section shall extend at least halfway through veneer but with at least 5/8-inch cover on outside face.
    c. Conforms to ASTM A951/A951M-06, ACI/ASCE 530 and ASTM A82/A82M
    d. Tensile Strength: 80,000 p.s.i., Yield Point: 70,000 p.s.i. minimum
    e. Hot-dip Galvanized after fabrication: ASTM A153/A153M-B2 (1.5 oz/ft^2)

H. EMBEDDED FLASHING MATERIALS

1. Refer to Section 076000 Flashing and Sheet Metal.

I. MISCELLANEOUS MASONRY ACCESSORIES

1. Masonry Mortar Management System: Specify the following:
   a. Basis of Design is Mortar Net with Insect Barrier.
   b. Specify trapezoidal shaped Mortar Net with insect barrier to suspend mortar droppings at unequal heights allowing moisture to drain from the cavity and maintain airflow within the cavity wall.
   c. Shall have 90% open-weave mesh construction, shall not oxidize, rot, promote mold or fungus growth, or react with common building materials.
2. Weep Vents: Specify the following:
   a. Cell Vents: Ultra Violet Resistant Polypropylene cell vent tested in conformance with ASTM D2240, D790B, D638 and D1238B.
      i. Basis of Design is Quadro-Vent by Hohmann & Barnard, Inc.
      ii. #3601 Cell Vent by Wire-bond.
      iii. Mortar Net Weeps not allowed.
      iv. Plastic tube weeps not allowed.
      v. Cotton weeps not allowed.
      vi. Color to be selected from standard color samples.
   b. For concrete masonry veneer greater than 4" nominal thickness use multiple vents in series to provide a water and air path to the air cavity.

J. MASONRY CLEANERS

1. Specify brick cleaning in accordance with BIA Technotes #20.
2. Specify cleaning solutions that are approved by the manufacturer to not damage the surface of the units.
3. Pressure washing is not allowed due to the potential damage to units and mortar joints (refer to Technotes listed above for limits).
4. The use of muriatic or hydrochloric acid is not allowed.

K. MORTAR AND GROUT MIXES

1. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise directed by the County.
   a. Do not use calcium chloride in mortar or grout.
2. Mortar for Unit Masonry: Comply with BIA M1, for types of mortar indicated below:
   a. For masonry below grade, in contact with earth, use Type S mortar.
   b. For reinforced masonry, use Type S mortar.
   c. For exterior, above-grade, load-bearing and non-load bearing walls; for interior load-bearing walls; for interior non-load bearing partitions, and for other applications, use Type N mortar.

3. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required.
4. Grout for Unit Masonry: Comply with ASTM C 476.
   a. Use coarse grout in grout spaces 2 inches or more in least horizontal dimension.
5. Mortar joints shall be concave, unless otherwise directed by the County.

END OF SECTION 042100

SECTION 042200

REINFORCED CONCRETE UNIT MASONRY

I. GENERAL CRITERIA

A. Reinforced concrete unit masonry design and construction shall comply with ACI 530-05, Building Code Requirements for Masonry Structures, and ACI 530.1-05, Specifications for Masonry Structures.

II. DESIGN STANDARDS

A. For ease in construction and to reduce gravity loads on elevated structure and lateral loads due to potential seismic events, specify use of lightweight concrete masonry units (CMU) whenever possible. Where wall fire ratings are required, coordinate CMU weight for load purposes with required wall thickness for fire rating purposes.

B. Specify type M or S mortar for CMU. Use type N for brick veneer only.

C. Indicate vertical reinforcing in fully grouted cells at ends of walls, at corners, tees, sides of opening, and each side of masonry control joints, plus at required spacing between these points.

D. Indicate grouted bond beam with (2) #5 minimum, or larger if required, at top of walls.

E. All unframed masonry openings shall be spanned with one-piece precast concrete headers or beams.

F. When split face concrete masonry unit veneer is utilized, veneer shall be smooth face at top course adjacent to roof, and in areas where attachments (fascia, coping, flashing, signage, etc.) are used, as well as where a sidewalk meets the wall.

G. Specify galvanized ladder-type horizontal joint reinforcing as required to meet reinforcing distribution and shear requirements, but not less than a 9 gauge wire at each side of ladder.

H. At non-loadbearing walls, indicate vertical slip connection between top of wall and structure above to avoid loading wall.

I. Specify fine grout for CMU cell grouting. Coarse may be used for bond beams.

J. Require that vertical rebar must be properly positioned within the cells. Do not allow “wet stick” CMU reinforcing or embedment of items after grout is in place.

K. Require cleanout openings for high lift (greater than 4’) grouting.

L. Do not specify corrugated veneer ties for attachment of brick veneer. Use adjustable wire or slot type or wire ties integral with the horizontal joint reinforcing.

M. CMU walls used as shearwalls should be designed as “Intermediate Reinforced Masonry Shear Walls” (or better) due to the minimal extra effort required in comparison to “Ordinary Reinforced Masonry Shear Walls” and the relatively large resulting decrease in seismic forces.

N. If CMU walls are used as shearwalls, account for interruptions in reinforcing, especially at corners and ends, for beam bearing locations, etc. Design means for continuity of reinforcing through interrupting elements, if required.

O. Specify masonry component and composite required strengths. Use 1900 psi unit compressive strength, f’m = 1500 psi, and 2000 psi grout compressive strength as minimum values.

P. Specify reinforcing lap lengths based on requirement of ACI 530. Clearly state these in terms of actual lap lengths or bar diameters for each bar size and use.

Q. Specify cylinder or cube testing of mortar per ASTM C780 (for consistency) and grout cubes cast between block units per ASTM C1019, C617, and C39. In critical applications, specify prism strength testing for f’m (not typically required).

END OF SECTION 042200

SECTION 047000

CAST STONE MASONRY

I. GENERAL CRITERIA

A. Specify each type of cast stone shape and location (for example, water table, cornice).

B. Cast stone shall be a masonry accent and shall be used as banding or transitions from masonry to another material.

B. Details shall be drawn to represent the actual size of the cost stone item. The cast stone details shall be drawn at a scale no smaller than 3”=1’-0”. The details for each profile shall indicate dimension of each length or offset, radius size and location, drip locations (no less than 1” from face of stone. All finished surfaces shall in indicated as well as type of finish desired.

C. Specify that cast stone units shall be of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics and are obtained through one source and by a single manufacturer.

D. Specify that ingredients shall be of a uniform quality, including color for exposed cast stone, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

E. Specify that the manufacturer shall have a minimum of eight (8) years of continuous successful experience in fabricating architectural cast stone with demonstrated abilities, facilities and manufacturing capacity to furnish cast stone.

F. Mockup: Specify that a sample wall panel be constructed to verify selections made under sample submittals and to demonstrate aesthetic effects as well as other qualities of materials and execution. Mockups shall be built to comply with the following requirements, using materials indicated for final unit of Work.

1. A mockup shall be specified including all types and sizes of cast stone approximately 72 inches long by 72 inches high (minimum) by full thickness, including face and back-up as well as accessories. Include a sealant-filled joint at least 16 inches long in each mockup.
    a. Typical exterior wall including masonry and brick (if applicable), cast stone and window.
2. One half of the exposed faces of mockups shall be cleaned with masonry cleaner.
3. Specify that the Architect shall be notified one week in advance of the dates and times when mockups will be constructed.
4. Mockups shall be protected from the elements with weather-resistant membrane.
5. The Architect shall issue documentation with photographs indicating any deficiencies in the mock-up within three (3) days of on-site review. If the sample is acceptable, the Architect shall issue documentation to state that the work may commence.

G. Job Site Testing: Specify that materials testing shall be required for one (1) out of every 100 pieces of cast stone delivered to the site randomly by the project materials testing agency. Field specimens shall be tested in accordance with ASTM C 1194 and C1195.

II. DESIGN STANDARD

A. CAST STONE MATERIALS

1. Comply with ASTM C 1364.
2. Portland Cement: ASTM C 150, Type I, containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
3. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation as needed to produce required textures and colors as needed to produce required cast stone colors.
4. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation as needed to produce required textures and colors as needed to produce required cast stone colors.
5. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
6. Admixtures: Do not use admixtures unless directed by the County.
7. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M. Use epoxy-coated reinforcement.
   a. Epoxy Coating: ASTM A 775/A 775M.
8. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.
   a. Specify embedded anchors for hoisting cast stone and for connection to steel supports as required by the cast stone manufacturer.
   b. Specify tie rods and anchors recommended by the manufacturer.
9. During design be careful to monitor the size and weight of the cast stone members. Oversized or extremely heavy items will be more damage proned and will decrease the finished aesthetic effect.

B. CAST STONE UNITS

1. Approved Manufacturers:
   a. Olde World Cast Stone, Lilburn, GA.
   b. Cast Stone Systems, Inc., Warrenton, NC.
   c. Corbelstone, Flowery Branch, GA.
2. Specify cast stone units complying with ASTM C 1364 using the **vibrant dry tamp with integral water repellant.**
   a. Specify units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C 1364, or are made from cast stone that has a history of successful resistance to freezing and thawing.
3. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.

a. Slope exposed horizontal surfaces 1:12, unless otherwise indicated.
b. Specify raised fillets at backs of sills and at ends indicated to be built into jambs.
c. Specify drips on projecting elements.

4. Fabrication Tolerances: Specify by the following tolerances:
   a. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
   b. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
   c. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch whichever is greater.
   d. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.

C. RAW MATERIALS

1. Portland Cement: ASTM C 150, Type I or II. Specify natural color or white cement as required to produce mortar color indicated.
2. Hydrated Lime: ASTM C 207, Type S.
3. Course Aggregates: Granite, quartz or limestone, ASTM C 33.
4. Fine Aggregates: Manufactured or natural sands, ASTM C33.
5. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
6. Masonry Cement: ASTM C 91.
   a. Approved Products:
      i. Holcim (US) Inc.; White Mortamix Masonry Cement.
      ii. Lafarge North America Inc.; Trinity White Masonry Type N.
      iii. Lehigh Cement Company; Lehigh White Masonry Cement.
7. Mortar Cement: ASTM C 1329.
   a. Approved Products:
      i. Lafarge North America Inc.; Lafarge Mortar Cement or Magnolia Superbond Mortar Cement.
8. Mortar Pigments: Inorganic iron oxides and chromium oxides, compounded for use in mortar mixes. Specify only pigments with a record of satisfactory performance in masonry mortar.
   a. Approved Products:
      i. Bayer Corporation, Industrial Chemicals Div.; Bayferrox Iron Oxide Pigments.
      ii. Davis Colors; True Tone Mortar Colors.
      iii. Solomon Grind-Chem Services, Inc.; SGS Mortar Colors.
9. Colored Cement Product: Packaged blend made from masonry cement and mortar pigments, all complying with specified requirements and containing no other ingredients.
   a. Approved Products:
      i. Colored Masonry Cement:

1) Holcim (US) Inc.; Rainbow Mortamix Custom Color Masonry Cement.
2) Lafarge North America Inc.; Florida Custom Color Masonry or [Magnolia Masonry Cement.
3) Lehigh Cement Company; Lehigh Custom Color Masonry Cement.

ii. Colored Mortar Cement:
1) Lafarge North America Inc.; Magnolia Superbond Mortar Cement.

10. Water: Potable.

D. ACCESSORIES

1. Anchors: Type and size indicated, fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.
2. Dowels: Round stainless-steel bars complying with ASTM A 276, Type 304, and 1/2-inch diameter.
3. Allowable Cleaners: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

E. SOURCE QUALITY CONTROL

1. Specify that the contractor shall employ an independent testing agency to sample and test cast stone units according to ASTM C 1364.
   a. Include one test for resistance to freezing and thawing.

F. COLOR AND FINISH

1. Specify that all surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 in. and the density of such voids shall be less than 3 occurrences per any 1 $in.^2$ and not obvious under direct daylight illumination at a 5 ft distance.
   a. ASTM D 2244 permissible variation in color between units under similar weather conditions (total color difference not greater than 6 units and total hue difference not greater than 2 units).
2. Specify that units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 ft distance.
3. Specify that minor chipping resulting from shipment, delivery or installation shall be grounds for rejection if greater than 1/4” in any direction. Minor chips shall not be obvious under direct daylight illumination from a 10 ft distance.

END OF SECTION 047000

DIVISION 05: METALS

SECTION 051000

STRUCTURAL STEEL, JOISTS AND JOIST GIRDERS, AND STEEL DECKING

I. GENERAL CRITERIA

A. Structural steel, joists and joist girders, and steel decking design, fabrication, and erection shall comply with the applicable requirements of the following:
   1. AISC 360-05, Specification for Structural Steel Buildings, dated March 9, 2005.
   2. AISC 303-05, Code of Standard Practice for Steel Buildings and Bridges, dated March 18, 2005.
   3. Specification for Structural Joints Using ASTM A325 or A490 Bolts, dated June 30, 2004, by the Research Council on Structural Connections, Committee A.1.
   4. AWS D1.1, Structural Welding Code—Steel.
   5. SJI JG-1.1-05, Standard Specification for Joist Girders.
   6. SJI K-1.1-05, Standard Specification for Open Web Steel Joists, K-Series.
   7. SJI LH/DLH-1.1-05, Standard Specification for Longspan Steel Joists, LH Series and Deep Longspan Steel Joists, DLH Series.
   8. SDI Specifications, Design Manual, Diaphragm Design Manual, and Manual of Construction with Steel Deck.

B. Structural steel construction shall be designed by a structural engineer licensed in the State of Georgia. All delegated engineering for structural components shall be the responsibility of the manufacturer's licensed structural engineer. All shop drawings shall be reviewed and approved by the design engineer of record prior to fabrication of materials.

II. DESIGN STANDARDS

Requirements for successful, economical structural steel projects include but are not limited to the following standards and assembly directives:

A. General:
   1. Provide 1/8" or larger scale plans depicting structural steel framing.
   2. Roof slope should be ¼" per foot or more to avoid ponding issues and additional required calculations.
   3. Specify means of support and attachment requirements for steel stairs. Show acceptable attachment points (and, preferably, corresponding maximum allowable loads) on Project Drawings.
   4. Specify hoist beam and provide support at top of elevator shafts.
   5. Provide steel tubes and plates for elevator rail support, where not supported by concrete or CMU walls.
   6. Insure that at least 3" of concrete cover is provided for steel columns, base plates, and anchor bolts that are below ground level, unless other means of corrosion protection are provided.
   7. Require the Contractor to be responsible for all temporary support measures.

8. Require the fabricator to provide for additional attachment points as required to meet OSHA requirements.
9. Specify base plate and beam bearing grout material and requirements.
10. Specify material and storage requirements for welding electrodes.

B. Structural Steel:
1. Design and detail steel-to-steel connections, or provide specific requirements for fabricator to design connections.
2. Specify that erector must prepare and submit a “welding plan” with equipment settings, etc. prior to starting field welding. Require that welders be AWS certified for the type of welding they are to perform, and show evidence of such to the County’s testing agency.
3. Specify that all interior structural steel except that to be in contact with freshly placed concrete or coated with fireproofing shall receive a coat of the fabricator’s standard [gray/red] primer. All bolted and welded connections in primed material shall be coated with the same type of paint after the connection is cleaned and approved by the County’s testing agency. All interior structural steel to be in contact with freshly placed concrete or coated with fireproofing shall be left bare and uncoated. All exterior structural steel (including loose masonry lintels and shelf angles) shall be hot dip galvanized, and all bolted or welded connections in such material shall be coated with a zinc rich silver priming paint after the connection is cleaned and approved by the County’s testing agency. All painted or galvanized surfaces shall be touched up in the field as required.
4. Most high strength bolts meeting requirements of ASTM A325 can be specified to be fastened to the snug tight condition (“bearing connections”), but those in slip critical connections or in other connections requiring bolts to be fully tightened should utilize “twist-off” type bolts or direct tension indicator washers rather than depending on calibrated wrenches or turn-of-nut methods. Specify faying surface preparation for slip-critical connections.
5. Specify material, length, and details of anchor bolts and rods. Use headed bolts, nuts, plates, or other rigid means of providing pull out anchorage at the ends of anchor bolts and rods. Do not use “J-bolts” for applications with appreciable tension or pull out.
6. Require that the fabricator be approved in accordance with IBC Section 1704.2.2, or else in-plant special inspections will be required. AISC certification is typically accepted as evidence of compliance.
7. Specify testing inspection and testing requirements for steel installation, bolting, and welding.

C. Joists and Joist Girders:
1. Specify all non-uniform or concentrated loads on joists. Provide details to reinforce joist webs for concentrated loads not occurring at panel points. Specify all additional axial chord forces on joists and joist girders.
2. Specify net uplift for roof joist systems.
3. Specify anchorage of joists to resist uplift, shear, and roll-over, as applicable for the design.

4. Specify joist camber if other than standard SJI camber. Coordinate joist camber with adjacent parallel members and/or wall construction to avoid abrupt changes in slope.
5. Consider joist bridging and bracing requirements, especially at end spaces and perimeter of diaphragms.
6. Require that the joist fabricator be a member of the Steel Joist Institute.

D. Decking:
1. Specify minimum structural properties for steel decking.
2. Specify deck attachment requirements to resist required diaphragm shear and direct uplift.
3. Specify testing requirements for deck attachment.
4. Specify painted roof deck unless deck is exposed to exterior atmosphere, in which case galvanized roof deck should be used.
5. Specify finish requirements for floor decking (typically, galvanized or phosphatized/painted).
6. Prohibit attachment of suspended loads to deck unless specific measures are taken by the fabricator to accommodate such attachment and loading.
7. Require that the deck fabricator be a member of the Steel Deck Institute.

END OF SECTION 051000

SECTION 054000

COLD-FORMED METAL FRAMING

I. GENERAL CRITERIA

A. Light gauge, cold-formed metal framing shall comply with the applicable requirements of the North American Specification for the Design of Cold-Formed Steel Structural Members, 2001 Edition, with 2004 Supplement. Alternatively, work may comply with the newer standard, AISI S100-07, North American Specification for the Design of Cold-Formed Steel Structural Members, 2007 Edition with Supplement 2 (S2-10).

B. Cold-formed steel member sizes and strengths shall be specified in accordance with the guidelines of the Steel Stud Manufacturers Association (SSMA) PTIC, Product Technical Information, revised 12/2010.

II. DESIGN STANDARDS

A. Prepare structural drawings of light gauge steel framing not supporting gravity loads for general size and arrangement only. Detailed design is to be by a light gauge steel component engineer licensed in Georgia, who shall submit signed and sealed calculations and drawings for review by the design team's structural engineer. Nevertheless, sizes and arrangements shown must "work" structurally and be feasible to design and construct. Geometry, loads, and deflection limits must be clearly specified on the construction documents.

B. Final pre-engineered light gauge steel truss layout and design is typically performed by the fabricator and component engineer. The building structural engineer must insure that capacity for the reactions from the truss framing, especially concentrated loads from truss girders, is accounted for. Connectors must be specified to transfer reactions from truss elements to main building frame. Geometry requirements, loads, and deflection limits must be clearly specified. Detailed design of the light gauge steel trusses is to be by an engineer licensed in Georgia, who shall submit signed and sealed calculations and drawings for review by the design team's structural engineer.

C. Design and details for transferring brace vertical and horizontal and end post vertical forces through elevated floors and into foundation must be provided. Typically this requires some type of hold downs for uplift forces, with anchor rods for uplift and shear forces, far more than the powder actuated fasteners at relatively large spacing used in typical loadbearing and non-loadbearing walls not transferring lateral forces.

D. Light gauge steel "x" strap bracing must be fastened sufficiently to transfer design forces. This typically requires welding, or at least a large number of screws.

E. Exceptionally large forces may require hot-rolled steel framing within the light gauge steel system.

F. Stability of building frame components against out-of-plane loading supported by component framing must be insured (for example, lateral bracing of W-beam bottom flanges where supporting the tops of exterior wall studs).

G. Generic screw capacities in shear and pullout (tension) for Allowable Stress Design for various material types should be in accordance with the Allowable Screw Connection Capacity chart in the SSMA Product Technical Information guide, unless manufacturer specific screws are specified. In such cases where manufacturer's data for specific allowable values and installation instructions may allow higher values, the specific screws should be specified with a requirement for the product to be submitted by the Contractor for review to ensure that the correct material is being used to obtain the required values used in the design.

H. Powder actuated fasteners have minimum edge distance and minimum spacing requirements in both concrete and steel. These vary by base material, and may vary by fastener size and embedment depth. In addition, powder actuated fasteners may not be placed in lateral force resisting members without consideration by and approval of the building structural engineer for the project.

I. Care must be taken when designing and specifying welding of light gauge steel components, to limit design thicknesses to sizes that can actually be accommodated by the component material thickness. In general, welding should only be used for 54 mils (16 gauge) and thicker material. Specify AWS standards, welder qualifications, and weld testing requirements.

J. For light gauge steel components and fastening specified by the building structural engineer, material properties, minimum structural properties, and tolerances must be given, and appropriate details must be provided.

END OF SECTION 054000

DIVISION 06: WOOD, PLASTICS, AND COMPOSITES

SECTION 061000

ROUGH CARPENTRY

I. GENERAL CRITERIA

A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   1. NLGA: National Lumber Grades Authority.
   2. SPIB: The Southern Pine Inspection Bureau.

B. Architect shall specify that for any treated wood products, contractor shall request certifications from treatment plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards. Also specify a warranty from chemical treatment manufacturer.

C. For any fire-retardant-treated wood products, specify that the contractor request certifications from treatment plant stating that materials comply with specified standards and data relative to bearing strength, stiffness, and fastener-holding capacities of treated materials. Request a warranty from chemical treatment manufacturer.

D. Require that any fire-retardant-treated wood products are obtained from a single source and a single producer.

E. Specify pressure treated wood where sills, nailers, and/or furring are in contact with concrete or masonry.

F. Specify that solid wood blocking and/or shims for finish materials be required to meet a tolerance of ¼" maximum deviation in 10 feet when measured with at 10' straight edge. Such framing shall also be plumb and true. Specify blocking for wall mounted accessories that will have live loads applied to them. Note that contractor is to provide all necessary hardware for mounting to blocking and that such hardware should be non-corrosive.

G. Specify that all rough carpentry shall be installed so that joints and connections are tight, true and well nailed; with members assembled and fastened in accordance with pertinent codes and regulations.

II. DESIGN STANDARDS

A. Treated materials: Specify that manufacturers, subject to compliance with requirements, provide products by one of the following:
   1. Wood-Preservative-Treated Materials:
      a. Baxter: J. H. Baxter Co.
      b. Chemical Specialties, Inc.

c. Continental Wood Preservers, Inc.
d. Hickson Corp.
e. Hoover Treated Wood Products, Inc.
f. Osmose Wood Preserving, Inc.

2. Fire-Retardant-Treated Materials, Interior Type A:
   a. Baxter: J. H. Baxter Co.
   b. Chemical Specialties, Inc.
   c. Continental Wood Preservers, Inc.
   d. Hickson Corp.
   e. Hoover Treated Wood Products, Inc.
   f. Dricon: Arch Wood Protection, Inc.
3. Fire-Retardant-Treated Materials, Exterior Type:
   a. American Wood Treaters, Inc.
   b. Hoover Treated Wood Products, Inc.
   c. Dricon: Arch Wood Products, Inc.

B. Lumber, General:
1. Lumber Standards: Require compliance with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.
2. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:a. RIS - Redwood Inspection Service.
   b. SPIB - Southern Pine Inspection Bureau.
   c. WCLIB - West Coast Lumber Inspection Bureau.
   d. WWPA - Western Wood Products Association.
3. Grade Stamps: Require that each piece of lumber be factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
4. Where nominal sizes are used, require that actual sizes required by DOC PS 20 for moisture content specified be provided. Where actual sizes are used, they are to be minimum dressed sizes for dry lumber.
   a. Require that dressed lumber, S4S, be used
   b. Require dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less
5. Where engineered timber is used, timber type and corresponding modulus of elasticity must be included on the project documents.

C. Wood-Preservative-Treated Materials:
1. General: Where lumber or plywood is preservative treated or is specified to be treated, require compliance with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Require that each treated item be marked with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review. Do not allow use of chemicals containing chromium or arsenic.
2. Pressure treated aboveground items shall be treated with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. (4.0 kg/cu. m). After treatment, require lumber and plywood to be kiln-dried to a maximum

moisture content of 19 and 15 percent, respectively. The following shall be treated:

a. Wood nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
b. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
c. Wood framing members less than 18 inches (460 mm) above grade.
d. Wood floor plates installed over concrete slabs directly in contact with earth.

3. Pressure treated wood members where in contact with ground or freshwater shall have waterborne preservatives to a minimum retention of 0.40 lb/cu. ft. (6.4 kg/cu. m).
4. Require complete fabrication of treated items before treatment, where possible. If cut after treatment, require field treatment complying with AWPA M4 to be applied to cut surfaces. Require each piece of lumber or plywood to be inspected after drying, and damaged or defective pieces to be discarded.
5. Where engineered timber is required to be pressure treated, require parallel strand lumber (PSL) be used. Due to past availability issues, it is recommended to consult with the manufacturer to confirm availability during anticipated construction period.

D. Fire-Retardant-Treated Materials:

1. Fire-retardant-treated wood shall comply with applicable requirements of AWPA C20 (lumber) and AWPA C27 (plywood), and shall be identified with appropriate classification marking of UL; U.S. Testing; Timber Products Inspection, Inc.; or another testing and inspecting agency acceptable to authorities having jurisdiction.
   a. Research or Evaluation Reports: Require that fire-retardant-treated wood acceptable to authorities having jurisdiction and for which a current model code research or evaluation report exists that evidences compliance of fire-retardant-treated wood for application indicated be provided.
2. Interior Type A: For interior locations, require the use of chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:
   a. Bending strength, stiffness, and fastener-holding capacities are not reduced below values published by manufacturer of chemical formulation under elevated temperature and humidity conditions simulating installed conditions when tested by a qualified independent testing agency.
   b. No form of degradation occurs due to acid hydrolysis or other causes related to treatment.
   c. Contact with treated wood does not promote corrosion of metal fasteners.
3. Exterior Type: Specify use for exterior locations.

4. Require inspection of each piece of treated lumber or plywood after drying and that damaged or defective pieces be discarded.

E. Miscellaneous Lumber:
1. Require that lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, bucks, nailers, blocking, furring, grounds, stripping, and similar members be provided.
2. Require fabrication of miscellaneous lumber from dimension lumber of sizes.
3. Moisture Content: Require 19 percent maximum for lumber items not specified to receive wood preservative treatment.
4. Grade: For dimension lumber sizes, require No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, require No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

F. Plywood & Sheathing:
1. Telephone and Electrical Equipment Backing Panels: Specify DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness required, but not less than 1/2-inch (13-mm) nominal thickness.
2. Structural plywood, sheathing, and siding for floors, roofing, and walls shall be APA Performance Rated for required load, span, and exposure. Where used as diaphragms or shearwalls, specify appropriate fasteners for required loads, and connection hardware as required to transfer loads from member-to-member and member-to-foundation.

G. Fasteners & Connectors:
1. Require that fasteners of size and type indicated be provided that comply with requirements specified in the below requirements for material and manufacture.
2. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, specify fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.
3. Nails, Wire, Brads, and Staples shall meet FS FF-N-105.
4. Power-Driven Fasteners shall meet CABO NER-272.
5. Wood Screws shall meet ASME B18.6.1.
6. Lag Bolts shall meet ASME B18.2.1.
7. Steel bolts shall comply with ASTM A 307, Grade A, with ASTM A 563 hex nuts, and flat washers.
8. Expansion Anchors: Require anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
    a. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
9. Require engineered steel connectors for wood-to-wood, wood-to-steel, and wood-to-concrete connections not otherwise specified to be sized for

required loads, and to have a hot-dip galvanized coating appropriate for exposure anticipated.

a. Type, size, and number of connectors required shall be specified for specified connector.

b. Where connectors are in contact with treated lumber, the material coating shall be suitable to the treatment type, or stainless steel connectors shall be used.

H. Pre-Engineered Wood Trusses:

1. Require that final pre-engineered wood truss layout and design be performed by a fabricator and specialty engineer. Require that bracing required for support of trusses be shown by the specialty engineer. Connectors to transfer reactions from truss elements to main building frame also must be specified by the specialty engineer. The building structural engineer must insure that capacity for the reactions from the truss framing, especially concentrated loads from truss girders, is accounted for.

   a. Require that the detailed design of the pre-engineered wood trusses be performed by an engineer licensed in Georgia, who shall submit signed and sealed calculations and drawings for review by the design team's structural engineer.

2. Required gravity and lateral load information for design of pre-engineered wood trusses must be included in the construction documents, including specific loads for top and bottom truss chords. Require that the specialty engineer designing the trusses include allowance for overbuild as appropriate.

3. Allowance for open areas in trusses for storage or mechanical areas must be specifically shown on the drawings, with required loading provision shown.

4. Where pitched roofs are used, specify end trusses as required to transfer lateral loads from roof diaphragm to shearwall below, with anchorage hardware and attachment pattern noted in the construction documents.

END OF SECTION 061000

SECTION 064000

CABINETS AND COUNTERTOPS

I. GENERAL CRITERIA

A. SUMMARY

1. The County requires that all cabinetry and similar casework be plywood and plastic laminate construction.
2. This Section includes the following:
   a. Plastic-laminate cabinets.
   b. Plastic-laminate countertops.
   c. Solid-surfacing-material countertops.

B. QUALITY ASSURANCE

1. Specify that any firm producing architectural woodwork must document 5 years of experience with a record of successful in-service performance, as well as sufficient production capacity to produce required units specified in the documents.
2. Specify that a qualified woodworking firm shall assume undivided responsibility for fabricating, finishing, and installing woodwork specified.
3. Specify that all woodwork shall comply with the following standard:
   a. AWI Quality Standard: Architectural Woodwork Quality Standards of the Architectural Woodwork Institute and Architectural Woodwork Standards 1st Edition, October 1, 2009.

II. DESIGN STANDARDS

A. MATERIALS

1. Specify that all materials shall comply with requirements of the AWI quality standard for each type of woodwork and quality grade.
2. Specify Medium-Density Fiberboard: ANSI A208.2 (latest edition), Grade MD-Exterior Glue.
3. Specify ¾ in. exterior grade plywood at sinks and wet locations
4. Specify High-Pressure Decorative Laminate: NEMA LD-3 (latest edition), grades as required by woodwork quality standard.
5. Specify that Solid-Surfacing Material shall be homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
6. The interior of all Custom grade cabinetry shall be white melamine.

B. CABINET HARDWARE AND ACCESSORIES

1. Specify cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in "Finish Hardware" section.

C. INSTALLATION MATERIALS

1. Specify Furring, Blocking, Shims, and Hanging Strips to be softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
2. Specify Screws to be select material, type, size, and finish required for each use. Comply with ASME B18.6.1 for applicable requirements.
    a. For metal framing supports, specify screws as recommended by metal-framing manufacturer.
3. Specify Nails to be select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.
4. Specify Anchors to be select material, type, size, and finish required for each substrate for secure anchorage. Specify nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Specify toothed steel or lead expansion bolt devices for drilled-in-place anchors.

D. FABRICATION, GENERAL

1. Specify the following requirements for interior woodwork grade: interior woodwork shall comply with the referenced quality standard and of the following grade:
    a. Grade:
        i. Premium Grade in public areas, executive offices, and meeting rooms. This grade shall be specified in all areas of high use and other areas requiring premium finish materials and full edge laminations.
        ii. Custom Grade in all other areas.
2. Specify the following requirements for wood moisture content: comply with requirements of referenced quality standard for wood moisture content in relation to relative humidity conditions existing during time of fabrication and in installation areas.
3. All woodwork shall have eased edges to radius indicated for the following:
    a. Corners of cabinets and edges of solid-wood (lumber) members 3/4 inch thick or less: 1/16 inch.
    b. Edges of rails and similar members more than 3/4 inch thick: 1/8 inch.
4. Specify complete fabrication, including assembly, and hardware application, before shipment to Project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
5. Specify shop-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Specify to locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Require smooth edges of cutouts and, where located in countertops and similar exposures, seal edges with a water-resistant coating.

E. PLASTIC-LAMINATE CABINETS

1. Acceptable manufacturers
   a. Pionite
   b. Wilsonart
   c. Formica
   d. Laminart
   e. Nevamar

2. Grading
   a. Horizontal General Purpose Standard (HGS) Grade
      Horizontal general purpose standard grade plastic laminate shall be 0.048 inches (plus or minus 0.005 inches) in thickness. This laminate grade is intended for horizontal surfaces where post-forming is not required.

   b. Vertical General Purpose Standard (VGS) Grade
      Vertical general purpose standard grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) in thickness. This laminate grade is intended for exposed exterior vertical surfaces of casework components where post-forming is not required.

   c. Horizontal General Purpose Post-formable (HGP) Grade
      Horizontal general purpose post-formable grade plastic laminate shall be 0.042 inches (plus or minus 0.005 inches) in thickness. This laminate grade is intended for horizontal surfaces where post forming is required.

   d. Vertical General Purpose Post formable (VGP) Grade
      Vertical general purpose post-formable grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) in in thickness. This laminate grade is intended for exposed exterior vertical surfaces of components where post forming is required for curved surfaces.

3. Specify the following requirements for Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
   a. Horizontal Surfaces: HGS
   b. Postformed Surfaces: HGP, VGP
   c. Vertical Surfaces: HGS
   d. Edges: HGS.

F. SOLID-SURFACING-MATERIAL COUNTERTOPS

1. Solid surface countertops shall be used in high abuse areas.
2. Specify that tops be fabricated in one piece. Specify compliance with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

G. CABINET HARDWARE AND ACCESSORIES

1. Specify manufacturers and BHMA numbers to designate hardware requirements.
2. Specify Butt Hinges that are semi-concealed hinges for overlay doors and comply with BHMA A156.9 Grade 1 criteria.
3. Catches if required shall be specified as push-in magnetic catches complying with BHMA A156.9 Grade 1 criteria.
4. Specify shelf rests that comply with BHMA A156.9 Grade 1 criteria.
5. Specify back mounted wire pulls, 5 inches long, 2-1/2 inches deep and 5/16" in diameter.
6. Specify shelf rests complying with BHMA A156.9, B04013.
7. Specify drawer slides that are side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings that comply with BHMA A156.9, Grade 1 criteria and rated for the following loads:
   a. Box Drawer Slides: 100 lbf
   b. File Drawer Slides: 200 lbf
   c. Keyboard Slide: 100 lbf
8. Specify locks as required that comply with ANSI 156.11, grade 1 cycle testing. Confirm if locks need to be keyed alike.
9. Specify molded-plastic grommets for cable passage through countertops. Coordinate proper size required for use. Specify number of grommets required with a minimum of one (1) at each workstation.
10. Exposed hardware Finish: Specify finish complying with BHMA A156.18 for BHMA finish:
    a. Satin Stainless Steel: BHMA 630

END OF SECTION 064000

DIVISION 07: THERMAL AND MOISTURE PROTECTION

SECTION 070000

ROOFING-GENERAL

I. GENERAL CRITERIA

A. The Design Professional shall contract with a professional roofing and waterproofing consultant to be engaged in the following capacity for all projects which include roof work:
   1. Review an assistance with the development of architectural roofing plans and details
   2. Review and assistance with the development of architectural roofing specifications
   3. Participation in roofing pre-construction conference
   4. Periodic inspections during construction phase

B. Specifications shall require a mandatory pre-roofing conference be conducted two weeks prior to any roof construction. Attendees shall include the Architect, County Project Manager, Roofing and Waterproofing Consultant, General Contractor, Roofing Sub-contractor, and Roofing Manufacturer representative.

C. Low slope membrane roofing shall be of the following two types only, detailed in Section 075000:
   1. SBS or APP modified bitumen roofing system
   2. A Fully-adhered Thermoplastic (TPO) membrane roofing system may be used in renovation of an existing system, but should be only used in new construction given special circumstances with prior written approval by Gwinnett County.

D. PVC roofing membranes area not permitted.

E. The roofing system selection shall be based upon facility type, complexity of conditions, and sustainability goals. The County must approve all roofing types prior to detail and specification.

F. Special care should be taken in specifying roof replacement assemblies. The Architect shall engage a Structural engineer to provide an analysis of the existing structure to ensure the proposed roofing system can be supported along with all other applicable loading conditions.

G. **All** roofing assemblies, both new construction and renovations, shall be approved by Factory Mutual. Refer to Factory Mutual's "RoofNav" program for a listing of approved assemblies at roofnav.fmglobal.com

H. All roofing assemblies must meet the minimum requirements of the International Energy Conservation Code, latest adopted edition.

I. All roofing systems shall comply with Underwriters Laboratories Class "A" requirements

J. Specify that the roofing system manufacturer shall have a representative permanently located within the Altanta Metropolitan Area.

K. Penetrations through roof surfaces shall be minimized whenever possible. Use curbed penetration details for multiple conduits and pipes wherever practical. Collect and centralize plumbing vents and exhaust fan duct when practical. Use NRCA and SMACNA details with curbs and hoods to protect roof penetrations from leaks. Consider soffit vents or wall louvers under overhangs when possible.

END OF SECTION 070000

SECTION 071000

DAMPPROOFING AND WATERPROOFING

I. GENERAL CRITERIA

A. QUALITY CRITERIA

1. Dampproofing shall comply with ASTM D 1227-87, Type III and Federal Specifications SS-R-1781 Type I.
2. Coordinate dampproofing material to be compatible with rigid insulation.
   a. Dampproffing material shall NOT degrade or alter the chemical composition of the rigid insulation board.
   b. Dampproofing shall NOT adversely affect the rigid insulation's performance characteristics (R value).
3. Waterproofing includes application of the TREMproof 6100 (Hot Rubberized Asphalt) System consisting of primer, waterproofing membrane, protection course, insulation and drainage.
4. Specify the contractor inspect Concrete Finish: Immediately prior to commencement of the membrane installation, the substrate finish shall be inspected at a job-site meeting of the Contractor, Architect, Waterproofing Subcontractor, and Tremco representative, to determine the recommended membrane treatments. A test area for each representative surface condition shall have been performed per the manufacturer's recommendations and shall be reviewed and approved by all parties.
5. Qualification of Installers: Waterproofing subcontractor shall be approved by Tremco in writing prior to bid.

II. DESIGN STANDARDS

A. MATERIALS

1. Acceptable products and manufacturers for dampproofing include the following:
   a. Koch Materials Co. "Mulseal"
   b. Karnak Chemical Corp. "Emulsion Coating #100" non-fibrated, protective coating
   c. Sonneborn Division of Contech, Inc. "Hydrocide 700B Semi Mastic"
   d. Reinforcing fabric: Reemay Spun Bonded Polyester Style 2014 by Tremco
   e. Joint backing: Open-cell polyethylene foam

2. Acceptable products and manufacturers for waterproofing include the following:
   a. Tremco, "TREMprime QD Low Odor Primer (use TREMprime WB for VOC compliant applications.)
   b. Tremco, TREMproof 6100 Waterproofing Membrane
   d. Tremco Elastomeric Sheeting
   d. Protection course of Powerply standard smooth; Tremco approved protection courses
   e. Drainage composite: Tremco, TREMDrain S, 1000, 2000, GS series of drainage products

END OF SECTION 071000

SECTION 072000

INSULATION, EXTERIOR FINISH AND INSULATION SYSTEMS (EIFS), AND BARRIERS

I. GENERAL CRITERIA

A. Only drainable EIFS systems are permitted.

B. Single-Source Responsibility for Insulation Products: Require each type of building insulation be obtained from a single source with resources to provide products complying with requirements indicated without delaying the Work.

C. Fire-Test-Response Characteristics: Insulation and related materials shall be specified with the fire-test-response characteristics, as determined by testing, identical products per test method indicated below. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Surface-Burning Characteristics: ASTM E 84.
   2. Fire-Resistance Ratings: ASTM E 119.
   3. Combustion Characteristics: ASTM E 136.

D. Specify that a 15 year written warranty be provided stating that the actual thermal resistance of the extruded polystyrene insulation will not vary by more than 10% from its published thermal resistance.

E. Specify that a 12 year written material and labor drainage warranty and a 5 year written finish warranty be provided for all EIFS systems.

F. Specify that manufacturers of PB EIFS system must show more than 10 years in the EIFS industry, with more than 1000 completed EIFS projects.

G. Specify that a mockup be constructed of all EIFS systems included in a project, in order to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution and set quality standards for fabrication and installation. The mockup should include a representative wall finish sample, standard control joint, expansion joint, reveal, window head and sill flashing detail, and full cornice detail.

H. Specify that manufacturers of air barrier materials shall show a minimum of 20 years in the production and sales of waterproofing products. Installer of air barrier materials shall demonstrate qualifications to perform the work by submitting the following: Written confirmation or certification from the air barrier manufacturer that the installer has been trained and is recognized by the manufacturer as suitable for the execution of the work.

I. Materials: Fluid-applied vapor permeable air barrier material shall be specified and shall be water-based and an elastomeric, single-component, polymer-modified, asphaltic membrane, and contain less than 100 gm/l VOC.

J. All details shall be in accordance with the basis of design manufacturer's recommendations and shall be clearly indicated on the construction documents.

K. The drainage track at the base of the wall or at any termination of EIFS material shall remain unobstructed.

L. EIFS systems from 0 to 3'-4" above finished grade shall be high impact systems and shall only be specified with the County's approval.

M. All areas to receive EIFS that are subject to high abuse shall be high impact systems.

N. All perimeter walls shall be insulated full height and sealed tight against air infiltration at the deck using spray foam insulation.

O. No exposed insulation is permitted within a plenum air space.

II. DESIGN STANDARDS: INSULATION

A. Insulation Approved Manufacturers:
   1. Extruded-Polystyrene Board Insulation (1") Cavity Wall:
      a. Dow Chemical Co. (Basis of design).
   2. Formaldehyde-Free Building Insulation:
      a. Johns-Manville (Basis of design).
   3. Formaldehyde-free concealed sound control batts:
      a. Johns-Manville (Basis of design).
   4. Closed-cell Spray Polyurethane Foam Insulation with separate Ignition Barrier Coating:
      a. Johns-Manville (Basis of design).

B. Extruded-Polystyrene Board Insulation: Rigid closed cell extruded polystyrene thermal board insulation. Comply with ASTM C 578-95 and with other requirements indicated below:
   1. Type IV, density 1.6 lb/cu. ft. min., compressive strength 25 psi (ASTM D 1621-94).
   2. Thermal resistance: 5-year aged R-values of 5.4 and 5.0 min. deg F-ft^2-h/Btu^2/inch at 40deg F and 75deg F respectively (ASTM C 518-91).
   3. Water absorption: Max 0.1% by volume (ASTM C 272-91(96)).
   4. Surface-Burning Characteristics:
      a. Flame-spread: 5.
      b. Smoke Developed: 165.
   5. Thickness: 1" (R-5) & 1-1/2" (R-7.5)
   6. Acceptable manufacturer's product: The Dow Chemical Company "STYROFOAM CAVITYMATE Plus" material.

C. Formaldehyde-free™ FSK-25 Faced Batts:
   1. Thermal Resistance (R-Value) (ASTM C518): R-19, R-30.
   2. Combustion Characteristics (ASTM E136): Pass.
   3. Critical Radiant Flux (ASTM E970): Greater than 0.11 Btu/ft2 × s (0.12 W/cm2).
   4. Water Vapor Permeance (ASTM E96): 0.05 perm (3 ng/Pa × s × m2).
   5. Water Vapor Sorption (ASTM C1104): 5% or less.
   6. Odor Emission (ASTM C1304): Pass.
   7. Corrosiveness (ASTM C665, 13.8): Pass.
   8. Fungi Resistance (ASTM C1338): Pass.

9. Recycled Content: Certified by Scientific Certification Systems to contain minimum of 20% post-consumer and 5% pre-consumer recycled glass product, on average of manufacturer's products.
10. Prove through documentation that product passes CIWMB Section 01350 for indoor air quality.
11. Flamespread (ASTM E84): 25, maximum.
12. Smoke Developed (ASTM E84): 50, maximum.
13. Material Standard: ASTM C665, Type III, Class A, Category 1.

D. Formaldehyde-Free Sound Control Batts: comply with requirements indicated below:
1. Thickness: 3-5/8" in partitions and 6-1/2" over ceilings. Refer to Gypsum Board assemblies for additional requirements.
2. Noncombustible per ASTM E136.
3. Recycled Content: Certified by Scientific Certification Systems to contain minimum of 20% post-consumer and 5% pre-consumer recycled glass product, on average of manufacturer's products.
4. Prove through documentation that product complies with CIWMB Section 01350 for indoor air quality.
5. Flamespread (ASTM E84): 25 or less.
6. Smoke Developed (ASTM E84): 50 or less.
7. Material Standard (ASTM C665): Type I.

E. JM Corbond III Closed-cell Spray Polyurethane Foam with separate Ignition Barrier Coating:
1. Nominal Density (ASTM D1622): 2.0 lb/cu ft.
2. Compressive Strength (ASTM D1621): 25 psi.
3. Closed-cell Content (ASTM D1940): >90%.
4. R-value (ASTM C518-initially): 6.6
5. R-value (ASTM C1029-07-180 day aged): 6.4
6. Water Absorption (ASTM D2842): 0.020 gm/cc
7. Water Vapor Transmission (ASTM E96): 0.61 perms @ 1.5"

III. DESIGN STANDARDS: EXTERIOR INSULATION AND FINISH SYSTEM (CLASS PB)

A. Approved Manufacturers:
1. Parex, USA
2. Dryvit

B. Secondary Water-Resistive Barrier:
1. Specify Roll-on water resistive barrier coating
2. Sheathing Tape: Non-woven synthetic fiber tape to reinforce roll on water-resistive barrier at sheathing board joints, into rough openings and other terminations into dissimilar materials available in 4 in, 6 in and 9 in. All Seams in exterior sheathing shall be taped prior to waterproofing.
3. Specify Flashing Membrane: Self sealing, Polyester faced, rubberized asphalt membrane, 30 mils (0.76 mm) thick.
4. Base Coat & Adhesive, for concrete and masonry when drainage is required over these substrates

C. Adhesives:
   1. Base Coat & Adhesive: 100% acrylic polymer based, requiring the addition of Portland cement; used as an adhesive to laminate EPS Insulation Board to the roll on water-resistive barrier.
   2. Dry Base Coat & Adhesive: Copolymer based, factory blend of cement and proprietary ingredients; requiring the addition of water only, used as an adhesive to laminate EPS Insulation roll on water-resistive barrier

D. Insulation Board: In compliance with manufacturer's requirements for EIFS system.
   1. Insulation shall be produced and labeled under a third party quality program as required by building code
   2. Insulation shall conform to ASTM C578, ASTM E2430, Type I and the specification for Molded Expanded Polystyrene Insulation board
   3. Maximum size of a single board shall be 2 ft x 4 ft (610 mm x 1219 mm)
   4. Minimum thickness: ¾ in, minimum (19 mm)

E. Base Coats:
   1. Base Coat shall be 100% acrylic polymer base, requiring the addition of portland cement.
   2. Dry Base Coat shall be Copolymer based, factory blend of cement and proprietary ingredients requiring addition of water
   3. Base Coat & Adhesive shall be 100% acrylic polymer base, ready to use, applied without the addition of cement

F. Reinforcing Mesh:
   1. Standard Mesh: Minimum weight: 4.5 oz. per sq. yd., coated for protection against alkali.
   2. High Impact Mesh and Ultra High Impact Mesh shall be as required by the manufacturer.
   3. Reinforcing mesh shall be used for back wrapping, details, and all joints in Exterior grade gypsum sheathing
   4. Self Adhesive Detail Mesh shall be used on all complex details
   5. Minimum Mesh Weight to achieve a High impact strength rating, ASTM E2486 shall be 15 oz. per sq. yd. and shall be used at all elevations at or below 3'-4" above finished grade and at any location that will be subject to abuse.

G. Primers:
   1. Primer: 100% acrylic based coating to prepare surfaces for EIFS finishes
   2. Sanded Primer: 100% acrylic based coating to prepare surface for other specialty finishes as required by the product manufacturer

H. Finish:
   1. Standard Finish shall be Factory blended, 100% acrylic polymer based finish with integr colored

I. Portland Cement: ASTM C150, Type I or Type I-II

IV. DESIGN STANDARDS: AIR BARRIER

A. Performance:

1. Design a vapor permeable air barrier constructed to perform as a continuous air and vapor barrier, and as liquid water drainage plane flashed to discharge any incidental condensation or water penetration in accordance with the following:
   a. Air leakage, ASTM E2357.: 0.002 cfm/sf @ 75 Pa
   b. Air permeance, ASTM E2178-01. 0.00120 L/s/m^2
   c. Elongation, ASTM D412 Die C: 900%
   d. Water vapor permeance , ASTM E96: 12
   e. Nail sealability, ASTM D1970: Pass
   f. Maximum V.O.C. 100 grams/liter.
   g. Tensile strength, ASTM D412 Die C. 325psi

2. The building envelope shall be designed with a continuous air barrier to control air leakage into, or out of the conditioned space. An air barrier shall also be provided for interior partitions between conditioned space and space designed to maintain temperature or humidity levels which differ from those in the conditioned space by more than 50% of the difference between the conditioned space and design ambient conditions. The air barrier shall have the following characteristics:
   a. It must be continuous, with all joints made airtight.
   b. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
   c. It shall be durable or maintainable. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:
      i. Foundation and walls.
      ii. Walls and windows or doors.
      iii. Different wall systems.
      iv. Wall and roof.
      v. Wall and roof over unconditioned space.
      vi. Walls, floor and roof across construction, control and expansion joints.
      vii. Walls, floors and roof to utility, pipe and duct penetrations.
3. Air barrier penetrations:
   a. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

B. Materials

1. Approved Manufacturers:
   a. Facilities other than those containing EIFS as a primary exterior finish material: “ExoAir 220” fluid-applied air barrier membrane by Tremco Inc.
   b. Other manufacturers as approved by the County prior to final specification.
   c. Facilities containing EIFS as a primary exterior finish material: Barrier must be compatible with or as specified by the EIFS system manufacturer.

2. Auxiliary Materials:
   a. Transition Membranes must be self-adhered air and vapor barrier membrane, 36 mils (.90mm) of self-adhering SBS rubberized asphalt laminated to a 4 mil (.10mm) cross-laminated, high-density polyethylene film with a siliconized release liner. Product shall be: ExoAir 110 and ExoAir 110LT (Low-Temperature) membrane as manufactured by Tremco.
   b. Flashing Membrane: Self-adhered through-wall flashing membrane, 32 mils (.80mm) of self-adhering SBS rubberized asphalt laminated to a 8 mil (.20mm) cross-laminated, high-density polyethylene film with a siliconized release liner. Product shall be: ExoAir™ TWF (Thru-Wall Flashing) membrane as manufactured by Tremco.
   c. Transition and Flashing Membrane Primer: Solvent-based liquid primer for concrete, masonry, gypsum sheathing, wood, metal, and painted substrates. Product shall be: ExoAir Primer™ as manufactured by Tremco.
   d. Butyl-based Self-Adhered Membrane: Transition between air and vapor barrier membrane and TPO or EPDM membranes.
   e. Mastic: Liquid mastic for sealing around brick ties, penetrations and lap and T-joints. Product shall be: ExoAir Termination Mastic as manufactured by Tremco.

END OF SECTION 072000

SECTION 072600

UNDER SLAB VAPOR BARRIER

I. GENERAL CRITERIA

A. Vapor barrier seam tape and mastic shall be by the same manufacturer.

B. Detail vapor barriers to lap over footings and seal to foundation walls.

C. Vapor barrier joints shall lap a minimum of six (6) inches and be sealed with manufacturer's seaming tape.

D. All penetrations shall be sealed per the manufacturer's recommendations.

E. Penetrations of the vapor barrier except for reinforcing steel and permanent utilities are prohibited.

F. All lap seams in a vapor barrier must be properly sealed in accordance with the manufacturer's recommendations.

G. All vapor barriers must be installed with the longest dimension parallel to the direction of concrete placement.

II. DESIGN STANDARDS

A. VAPOR BARRIERS

1. Basis-of-Design Product: "Stego Wrap" Vapor Barrier by Stego Industries, LLC.
   Or a comparable product by one these manufacturers:
   a. WR Meadows
2. Provide products with the following properties
   a. Permeance of less than 0.01 Perms as tested in accordance with ASTM E 1745
   b. Thickness: 15 mils minimum
   c. Strength: ASTM E 1745 Class A
      i. Puncture Resistance: 2200 grams in accordance with ASTM D 1709, Method B.
      ii. Tensile Strength: 45.0 lbf./in. in accordance with ASTM D882

B. VAPOR BARRIER MASTIC

1. Basis-of-Design Product: "Stego Mastic" Vapor Barrier by Stego Industries, LLC.
   Other acceptable manufacturers:
   a. WR Meadows
2. Specify mastic products with the following properties
   a. Permeance, ASTM E96: less than 0.17 Perms

b.	Tensile Strength, ASTM D412:	32PSI
c.	Accelerated Aging, ASTM G23:	No effect
d.	Hydrostatic Pressure, ASTM D751:	28 psi
e.	Methane Transmission, ASTM D1434	0
f.	Adhesion to Concrete and Masonry ASTM C836:	7lbf/in.
g.	Hardness, ASTM C836	85
h.	Crack Bridging, ASTM C836	No Cracking
i.	Low Temp Flexibility, ASTM C836	No Cracking at -20°C
j.	Resistance to Acetic Acid	30%
k.	Resistance to Hydrochloric Acid	15%
l.	Stable Temperature effect	248°F
m.	Flexible Temperature effect	13°F

C. VAPOR BARRIER TAPE

1. Specify mastic products with the following properties

a.	Thickness	6 mils
b.	Permeance, ASTM E96:	less than 0.03 Perms
c.	Tensile Strength	17 lbs/in. width
d.	Elongation	1060%
e.	Adhesion (20 min dwell ss, PSTC 101)	95-oz./in. width
f.	Utraviolet Resistance	Excellent

END OF SECTION 072600

SECTION 073000

ASPHALT SHINGLES

I. GENERAL CRITERIA

A. QUALITY ASSURANCE AND COMPLIANCE INFORMATION

1. Roof Assemblies shall meet the following standards
2. UL 790 – Tests for Fire Resistance of Roof Covering Materials.
3. UL 997 – Wind Resistance of Prepared Roof Covering Materials.
4. UL-90 and FM I-90- Asphalt shingle system must meet underwriters Laboratories UL-90 and Factory Mutual standard FM-I90 for uplift resistance. This requirement is for the whole roof assembly.
   a. FACTORY MUTUAL APPROVAL – The Architect shall coordinate with Factory Mutual to obtain approval for any proposed roof assembly that contains asphalt shingles and submit final approval letter issued by FM as part of the record for the project. This approval shall be obtained prior to issuance of the project for Bid.
5. Specify a company specializing in manufacturing the roofing shingle products with minimum of 25 years of experience.
6. Installers of asphalt shingle roof assemblies on all County facilities shall be certified Installers as defined by the applicable roof manufacturer and shall provide proof of certification during the submittal process.

II. DESIGN STANDARDS

A. ACCEPTABLE MANUFACTURERS

1. GAF Materials Corporation, Timberline Ultra Shingles (basis of design)
2. Tamko Heritage Premium
3. Certain Teed Landmark Premium
4. Owens Corning Tru-Definition Duration

B. SHINGLES

1. Super-heavyweight, granule surfaced, self sealing asphalt shingle with a strong fiberglass reinforced Micro Weave core and a mineral granule surfacing. Architectural laminate styling provides a wood shake appearance with a 5 inch (127 mm) or 5 5/8 inches (143 mm) exposure. Meets ASTM D 3018, ASTM D 3161, and ASTM D 3462; UL 790.
2. Specify GAF Golden Pledge warranty beginning at the date of substantial completion (or equivalent by other manufacturer).

C. HIP AND RIDGE SHINGLES

1. Self-sealing hip and ridge cap shingle matching the color of selected roof shingle.

D. UNDERLAYMENT

1. Ice & Water Shield Leak Barrier:
   a. Self-adhering, self-sealing, bituminous leak barrier surfaced with fine, skid-resistant granules. Material shall be .58 mils (1.5 mm) thick. Specify installation in all locations required by manufacturer and where needed to obtain GAF Warranty or equivalent.
2. Moisture Shedding Roof Deck Protection:
   a. Specify two (2) layers of Shingle Mate Roof Deck under-layment over entire roof deck. Must meet or exceed the physical requirements of ASTM D226, D4869, UL.

E. ASSOCIATED PRODUCTS AND ACCESSORIES

1. Fasteners:
   a. Standard round wire shingle type, zinc-coated steel or aluminum; 10 to 12 gauge (3.416 mm to 2.657 mm for steel) (2.588 mm to 2.052 mm for aluminum), barbed or deformed shank, with 3/8 inch (9.5 mm) to 7/16 inch (11 mm) in diameter; length sufficient to penetrate at least 3 /4 inch (19 mm) into solid wood or just through plywood or oriented strand board. Fastening pattern must meet I-90 wind up-lift requirements.
2. Roofing Cement:
   a. General purpose asphalt roofing cement meeting the requirements of ASTM D 4586 Type I or II. Matrix Standard Wet/Dry Roof Cement #204 by BMCA.
3. Metal Flashing:
   a. 16 oz/sq ft (0.56 mm) copper sheet, complying with ASTM B 370.
   b. Specify use of metal flashing at:
      1) Eave edges.
      2) Rake edges.
      3) Step flashing at chimneys/roof penetrations, side walls, etc.
4. Vented Nail Base Insulation:
   a. Shall be polyisocyanurate composite insulation board that consists of a 4’ X 8” panel of HCFC face zero ozone depletion product with solid wood spacers and a top layer of APA/TECO rated OSB board. Insulation boards shall have the following physical properties:
      1) Total thickness 4.0”.
      2) LTTR Value Core 15.3.
      3) Nailable surface shall be tongue and groove or rabbeted 1/8”.
      4) Spacers shall be less than 12” apart to minimize deflection.
      5) Insulation shall be vented to provide: minimum 75% lateral air movement.
      6) Insulation shall be vented to provide 92% open air space.
      7) Insulation shall meet the following criteria:
         a) ASTM C1289-05A Type II
         b) FM-4450. FM 4470 (foam core only)
         c) UL 263
         d) Miami Dade NOA NO: 04-1018.01
5. Vapor Barrier over Metal Deck:
   a. Shall be a self-adhesive SBS Modified bitumen designed for application directly onto metal deck with the following physical properties. Vapor barrier shall be installed

completely over metal decking to receive vented nail base and shingle. Specify that the vapor barrier be installed per manufacturer written requirements.

i. Thickness minimum 32 mls
ii. Anti-slip surface
iii. High tensile strength designed to resist foot traffic
iv. Tear resistance (lb) ASTM D 5601 84/90
v. Static puncture (lb) ASTM D 5602 90

END OF SECTION 073000

SECTION 074000

METAL ROOFING

I. GENERAL CRITERIA

A. QUALITY ASSURANCE

1. Manufacturer's Qualifications:
   a. Require minimum twenty (20) years of experience in the fabrication of structural standing seam metal roof systems on projects of similar size and scope. Upon request, Manufacturer must submit a minimum of five (5) project references for Architect's review.
   b. Specify that no other manufacturer of structural standing seam metal roof systems will be accepted without prior written approval of the Architect and based upon the manufacturer's verification that the product can meet or exceed all performance criteria listed in these specifications.
   c. Specify the installer shall be approved by the manufacturer prior to the Bid. Roofing Contractor shall submit certification that foreman has been trained in the installation of the system to be installed.
   d. Specify factory-manufactured panels only complying with Factory Mutual FM I-90 Rating

2. Installer Qualifications/Specifications shall provide the following:
   a. Installer must have a minimum of five (5) years of experience in the installation of structural standing seam metal roof systems.
   b. Panel Installer must be factory trained by the metal roof system manufacturer prior to the bid date in order to obtain a contract for installation.
   e. Single Source Responsibility: Single Roofing Contractor shall provide all items of structural standing seam metal roof system work specified herein to provide undivided responsibility.

3. Independent Roofing Inspector:
   a. Indicate in Construction Documents an independent roofing consultant will provide inspection services at critical points during installation of the metal roof system.

B. ROOF SYSTEM PERFORMANCE TESTING

1. Water Penetration: When tested per AAMA 501.2, there shall be no uncontrolled water penetration through the panel joints.

2. Roof System shall be designed to meet International Building Code wind load requirements.

3. Roof System and all roof components shall meet Factory Mutual Approved Class I-90 rated roof, or complying with Corps of Engineers Test Precedence CEGS-07416 or FM Risk Service Test; ASTM E-1646, USACOE CEGS 07416, and ASTM E-1592.

C. WARRANTIES

1. Type/Term: Require a 20-year manufacturer's water-tight warranty. Warranty shall include all products supplied by metal roof system manufacturer; including all roof system edge metal, all roof flashings and roof insulation.

2. Type/Term: Require a 20-year manufacturers finish warranty for Kynar 500 or Hynar 5000 finish for the standing seam roof system, including all flashings, sheet metal, and rain carrying equipment as supplied by the manufacturer and roofing contractor. This warranty shall be for a period of 20 years from the date of substantial completion and shall cover chalking in accordance with ASTM D-4214-89 method A (D659) number 8 rating; fading with a color change of less than or equal to 5.0 Hunter E units as determined by ASTM Method D-2244-02 after removal of external deposits and chalk, and overall integrity of the finish against cracking, checking, peeling or loss of adhesion.

3. Coverage:
   a. Limit of Liability: No dollar limitation or full system flashing
   b. Scope of Coverage: Repair any leak in the roofing system caused by the ordinary wear and tear of the elements, manufacturing defects in materials, and the workmanship used to install these materials.
   c. The roofing contractor shall supply to the County his own company's industry standard two-year warranty, which covers leak repairs due to his company's workmanship for the first two years after installation of the new roof system.

D. FACTORY MUTUAL APPROVAL

1. The design, material, products, assemblies must be approved by Factory Mutual Research, prior to issuance of procurement documents.

II. DESIGN STANDARDS

A. PANEL DESIGN

1. Roof panels shall be standing seam in 16" widths with 2" high seams that are mechanically seamed together @ 180 degrees per FM I-90 requirements. Panels shall be factory-tensioned leveled and shall be produced with factory striations in the pans of the panels.

B. ACCEPTABLE MANUFACTURERS

1. Primary Basis of Design Manufacturer: Petersen Aluminum Corporation "Tite-LOC Plus" panel; Other acceptable manufacturers include:

a. IMETCO
b. MCBI

All Systems must be Factory Mutual approved I-90 minimum

C. MATERIALS AND FINISHES

1. Face Sheet Material shall meet the following performance criteria
   a. Steel per ASTM 446
   b. Grade A, with zinc coating conforming to ASTM A 525 G-90.
   c. Steel shall be tension leveled (temper passed and stretcher leveled) with camber a maximum of 1/4 inch in 20 feet
   d. Manufactured in the USA
   e. Manufactured within 500 miles of the project site if the project is pursuing LEED certification
   f. 24 U.S. standard gauge
   g. Product must meet FM I-90 Design Standards.

2. Miscellaneous:
   a. Finish:
      i. Finish shall be Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over 0.25 to 0.31 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mil. Bottom side shall be coated with a primer with a dry film thickness of 0.25 mil. Finish shall conform to al tests for adhesion, flexibility and longevity as specified by Kynar 500 or Hylar 5000 finish supplier.
      ii. Color shall be selected by the Architect and County from the manufacturer's full range.
      iii. Strippable coating shall be applied on the coil to the top side to protect the finish during fabrication, shipping and field handling. This strippable coating shall be removed prior to installation.
      iv. Require field protection by the Contractor at the job site so material is not exposed to weather and moisture.
   b. Exposed Flashing and Trim: All exposed adjacent flashing and trim shall be of the same material and finish as panel system.
   c. Forming: Use continuous end rolling method. No end laps on panels.
   d. No "portable roll forming machines will be permitted.
   e. No installer-owner or installer rented machines will be permitted.
   f. Panels must be Factory-Manufactured panel systems.
   g. Trim: Trim shall be fabricated of the same material and finish to match the profiled sheeting and press broken in lengths of 10 to 12 feet. Trim shall be formed only by the manufacturer or its approved dealer.
   h. Trim shall be erected in overlapped condition.
   i. Miter conditions shall be factory welded material to match the sheeting.
   j. Closures: Use composition or metal profiled closures at top of each elevation to close ends of the panels. Metal closures to be made in the same material and finish as face sheet.

k. Fasteners: Fasteners shall be 400 series stainless steel, dished washers stainless steel with bonded neoprene.
l. Zees: Where required by design of primary structural framing system zees shall be used to span between beams and/or joists. Thermally responsive base and top clips shall be fastened to the zees on 12" centers.

D. ROOF UNDERLAYMENTS

1. On all surfaces to be covered with roofing material, a 40 mil “Ice and Water Shield’ will be required as outlined by the metal panel manufacturer to attain the 20 year water-tightness warranty.

2. The underlayment must be approved by the standing seam roofing manufacturer to comply with the required 20 year water-tightness warranty required on this project.

3. Type: Spun bonded polypropylene sheet coated with a layer of UV stabilized polypropylene on both sides.
   a. Size: 10 square roll weighing 30 pounds.
   b. Color: Gray – UV stable.
   c. Codes: Must comply with all national building codes as well as those required herein.
   d. Warranty: Shall be warranted against material defect by the manufacturer for 20 years.
   e. Manufacturer: Tri Flex 30 by Flexia, Inc.

4. SBS modified bitumen, self-adhered membrane.
   a. Size: Minimum 40 mil thickness.
   b. Color: White or gray upper surface.
   c. Codes: Must comply with all national building codes as well as those required herein.
   d. Warranty: Shall be warranted against material defect by the manufacturer.
   e. Design: Must be approved for use in high temperature applications under metal roof systems.
   f. Manufacturer: W.R. Grace, Inc., Soprema, Inc.

E. SEALANTS

1. Specify two part polysulfide class B non-sag type for vertical and horizontal joints, or;
2. One part polysulfide not containing pitch or phenolic extenders, or;
3. Exterior grade silicone sealant recommended by roofing manufacturer, or:
4. One part non-sag, gun grade, exterior type polyurethane recommended by roofing manufacturer.

F. FABRICATION

1. Fabrication of roofing shall comply with dimensions, profile limitations, gauges and fabrication according to manufacturer's standards.
2. All components of the system shall be fabricated in the factory, ready for field assembly.
3. All components and assemblies shall comply with fire and performance requirements

based on the design conditions.

4. All finishes shall be applied in conformance with manufacturer's standards, and according to manufacturer's instructions.

G. PIPE PENETRATIONS

1. ITW Buildex Dektite flexible pipe flashing system or Soprema asphaltic urethane membrane flashing system.

END OF SECTION 074000

SECTION 075000

LOW-SLOPE MEMBRANE ROOFING

MODIFIED BITUMEN ROOFING SYSTEM

I. GENERAL CRITERIA

A. Installer Qualifications: Require a qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

B. Specify components for roofing system are obtained from the roofing system manufacturer or a vendor approved by the roofing system manufacturer.

C. Manufacturer of Membrane: Specify a manufacturer with not less than 20 years of successful experience in producing materials of types required for project applications equivalent to requirements for each project.

D. Acceptable Installer: Specify that the roofing installer shall be approved in writing by the manufacturer a minimum of one year prior to bid date.

E. Performance Requirements/Ratings:

1. Roofing membranes and base flashings shall remain watertight and shall not permit the passage of water; system shall resist specified fire resistance and wind uplift pressures, thermally induced movement, and exposure to weather without failure.
2. Require one or more layers of insulation under area of roofing to achieve the minimum specified R-value in accordance with the most recent adopted edition of the International Energy Conservation Code.
3. All membrane roofs shall include 36” wide (minimum) 24” long (maximum) strips of walkway membrane connecting roof access point and any roof mounted equipment to be maintained. Indicate 2-inch gaps between each strip for draining.
4. Pitch pans, pitch pockets, and pitch boxes are not permitted.
5. Roofing materials must be compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
6. Roof system must conform to all local and state building codes.
7. The roof structure or roof assembly shall slope a minimum of ¼” (0.25”) per foot to achieve positive drainage in all locations. Water shall be directed to the primary scuppers via tapered insulation and shall be clearly denoted on the roof plan. Tapered crickets shall be sloped at 1/2” (0.50”) per foot minimum.
8. All gutters and downspouts shall be sized appropriately for the area of the roof to be served and clearly indicated on the roof plans and building elevations.
9. All downspout discharge shall be piped into the storm water management system unless otherwise approved the County. Downspout boots shall be clearly detailed in the construction documents and shall have a local cleanout.

10. Overflow scuppers shall be indicated at an elevation that is two (2) inches higher than primary scuppers to provide drainage in case of blockage. All roof drainage components shall be clearly sized and labeled on the roof plan and building elevations.
11. Overflow drains may be fabricated integral to primary scuppers; however, this is not a substitute for the separate overflow scuppers required by these standards.
12. All flashing at primary and overflow scuppers shall be clearly indicated in the construction documents.
13. Wind and Fire Design Requirements:
    a. The Roof system, including all edge metal, copings and flashings shall meet FM Design Requirements for I-90 wind uplift.
    b. The Roofing system shall have a UL Class A fire rating using a modified bitumen cap sheet with ceramic granules or reflective film.
    c. Surface Burning Characteristics: ASTM E 84
    d. Fire Resistance Ratings: ASTM E 119

F. Manufacturer's Warranty: Specify Manufacturer's Roofing System Warranty, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
1. Warranty includes all components of roofing system such as roofing membrane, base flashing, penetration flashings, roof insulation, fasteners, metal copings, gravel stops and cover board.
2. Coverage shall be a total system warranty from the deck up with no dollar limitations including up to 90 mph, 3 second gusts of wind. There shall be no exclusions for ponding water.
3. Warranty Period: Straight 25-year term beginning at the date of Substantial Completion.

G. In addition to the manufacturer’s warranty listed above, specify in the contract documents the Contractor provides a bond covering the 100% of the roof labor and material value for a minimum term of two (2) years.

II. DESIGN STANDARDS

A. MODIFIED BITUMINOUS SHEET ROOFING SYSTEM

1. Manufacturers: Subject to compliance with the requirements of these standards, require contractor provide products by one of the following
    a. Modified Bituminous Membrane Roofing:
        i. Firestone
        ii. Johns Manville
        iii. Soprema, Inc.
        iv. Siplast-Icopal, Inc.
2. The Membrane manufacturer must have produced modified bitumen membranes in their own manufacturing facilities in North America for a minimum of 20 years.
3. The new roofing membrane assembly shall consist of 2-plies of a prefabricated, reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) block copolymer

modified asphalt membrane, applied over and fully adhered to a properly prepared substrate.

4. Both reinforcement mats shall be impregnated/saturated and coated each side with a high quality SBS modified bitumen blend.
5. The roof system shall pass 500-cycles of ASTM D 5849 Resistance to Cyclic Joint Displacement (fatigue) at 14°F. Passing results shall show no signs of membrane cracking or interply delamination after 500-cycles. The roof system shall pass 200-cycles of ASTM D 5849 after heat conditioning performed in accordance with ASTM D 5147.
6. The assembly shall possess waterproofing capability, such that a phased roof application, with only the modified bitumen base ply in place, can be achieved for prolonged periods of time without detriment to the watertight integrity of the entire roof system.

B. MISCELLANEOUS MATERIALS

1. All roof system materials must be manufactured by, or approved by, the roof system manufacturer.
2. Cant Strips: Non-combustible, water repellant, vapor permeable rigid mineral wool fiber cant strips designed for commercial roofing applications. Shall meet ASTM E84, zero flame spread test requirements.
3. Perlite, wood and/or wood fiber cants are not acceptable.
4. Wood in connection with roofing shall be fire treated.
5. Walkway Protection Boards shall be mineral surfaced bituminous composition boards, 4.5 mm thick, manufactured specifically for application on modified bitumen sheet roofing as a protection course for foot traffic.
6. Asphalt Roofing Cement shall meet ASTM D 4586 standards, be asbestos free, as required by roofing system manufacturer for application.
7. Mastic Sealant shall be Polyisobutylene, plain or modified bitumen, non-hardening, non-migrating, non-skinning, and non-drying.
8. Specify Ceramic-coated roofing granules, color to match roofing membrane and as required by roof system manufacturer for specified warranty.
9. Insulation Adhesive (where required): Use roof membrane manufacturers own urethane insulation adhesive designed for use with the specified roof system for this project. When used, adhesive must be included in roof membrane manufacturer's warranty.

C. ASPHALT PRIMER

1. Primer composed of a specific blend of elastomeric bitumen and solvents meeting ASTM D 41, and specifically designed for use with the specified roof membrane system.

D. FASTENERS

1. Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane components to a substrate, tested by manufacturer for required pullout strength.

2. Fasteners shall be specifically approved by the manufacturer of the primary roof system.
3. Screw and plate roof insulation fasteners for metal deck: As approved by the roofing materials manufacturer. Fasteners must pass a minimum of 15 cycles in the Kesternich SFW 2.0s DIN 50018 test with less than 15% red rust.
4. Roofing Nails: With minimum 1" head, such as Simplex nails or approved equal.
5. Screw and plate roof insulation fasteners for metal deck: As approved by the roofing materials manufacturer. Fasteners must pass a minimum of 15 cycles in the Kesternich SFW 2.0s DIN 50018 test with less than 15% red rust.
6. Base Sheet Fastener: Olympic Fastener, or approved equal. For use with lightweight insulating concrete fill deck systems. Use fasteners with nominal 2.75" diameter, G-90 galvanized steel plates.
7. Low-Rise Foam Adhesive: OlyBond 500 as manufactured by OMG Roofing Products

E. INSULATION

1. Polyisocyanurate Insulation: ASTM C 1289, Type II, Class I felt or glass-fiber mat facer on both major surfaces. Typical for both flat and tapered insulation.
   a. Flat Insulation Boards: Provide thickness required to comply with currently enforced Gwinnett County Energy Codes or project specific LEED requirements.
   b. Board size shall not exceed 4'x4'
   c. The long term thermal resistance shall be a minimum of 6.0 per inch
   d. Insulation density shall be a minimum of 20pcf
   e. Tapered Insulation Board ASTM C728-97, Type 2. Require monolithic board only.
      i. Field: Where there is no slope in the roof deck; minimum tapered insulation slope is 1/4" per foot.
      ii. Crickets: Minimum slope is 1/2" per foot
   f. Factory laminated board is not acceptable
2. Approved manufacturers:
   a. Membrane manufacturers own insulation compatible with the roofing assembly.

F. COVER BOARD

1. Specify cover boards over rigid insulation where required by roofing manufacturer for the system specified.

G. MEMBRANE ADHESIVE (COLD APPLIED)

1. Modified bitumen roof systems can either be cold or hot applied.
2. Specify Modified bitumen based cold adhesive containing a bituminous binder with sticking agents along with a low solvent content. Adhesive shall be designed for modified bitumen membrane adhesion over approved substrates.
3. Adhesive shall meet the requirements of ASTM D4479.
4. Vertical applications shall use a trowel grade adhesive designed for vertical membrane applications. Horizontal applications shall use a squeegee grade adhesive designed for horizontal membrane applications.
5. Only the membrane manufacturers own adhesive is permitted.

H. BITUMINOUS ROOFING MATERIALS

1. Asphalt, Flat Grade: ASTM D312-00, Type II
2. Asphalt, Steep Grade: ASTM D312-00, Type III.
3. Asphalt, Extra Steep Grade: ASTM D312-00, Type IV
4. Primer: ASTM D41-94(2000)
5. Black Plastic Roof Cement (Asphalt): ASTM D2822-91(1997), Class I. Class II cement will be used if applied to damp or wet surfaces.
6. Flashing Cement (Asbestos Free): ASTM D4586-00
7. Fiber Glass Roofing Felt: ASTM D2178-97a, Type IV or VI
8. Styrene-butadiene-styrene (SBS) sheet with white mineral granules, polyester reinforcement. Membrane sheet shall conform to ASTM D6164-05, Grade G, Type II.
9. Atactic polypropylene sheet, polyester reinforcement. Membrane shall conform to ASTM D6222, Grade G, Type II.
10. Atactic Polypropylene sheet, polyester reinforcement. Membrane sheet shall conform to ASTM D6222-08, Grade S, Type I.

I. MODIFIED BITUMEN BASE AND INTERPLY SHEET

1. Specify Modified bitumen sheet with factory high brush silica sanded top and bottom surfaces designed for cold adhesive application or mechanical attachment meeting the one of the following ASTM standards:
   a. SBS-modified bitumen membrane meeting ASTM D 6163 or 6164, Type I, Grade S.
2. Physical Properties: Bituminous membrane materials shall have the following properties when tested according to ASTM D 5147-91:
   a. Thickness: 2.2 mm. (minimum)
   b. Maximum filler content in elastomeric blend 32% by weight
   c. Low temperature flexibility @ -15°F: PASS (MD and XD)
   d. Peak Load (avg) @ 73°F:57-lbf/inch (MD) and 57-lbf/inch (XD)
   e. Peak Load (avg) @ 0°F: 116-lbf/inch (MD) and 104-lbf/inch (XD)
   f. Elongation @ 73°F: 4% (MD and XD)
   g. Elongation @ 0°F: 4.2% (MD) and 4.0% (XD)
   h. Tear strength @ 73°F: 82-lbf/inch (MD) and 73-lbf/inch (XD)

i. Dimensional Stability (max): 0.1% (MD and XD)
j. High Temperature Stability (min): 215°F (MD and XD)
k. Approvals: UL Class listed, FM Approved (products shall bear seals of approval)

J. MODIFIED BITUMEN CAP SHEET

1. Modified bitumen sheet with factory high brush silica sanded bottom and factory applied white reflective top surfaces designed for cold adhesive application meeting the one of the following ASTM standards:
   a. SBS-modified bitumen membrane meeting the requirements of ASTM D 6163 or 6164, Type I or II, Grade S or G.
2. Physical Properties: Specify modified bituminous membrane materials with the following properties when tested according to ASTM D 5147-91:
   a. Thickness: 2.8 mm. (minimum)
   b. Maximum filler content in elastomeric blend 32% by weight
   c. Low temperature flexibility @ -15°F: PASS (MD and XD)
   d. Peak Load (avg) @ 73°F: 57-lbf/inch (MD and 57-lbf/inch (XD)
   e. Peak Load (avg) @ 0°F: 116-lbf/inch (MD and 104-lbf/inch (XD)
   f. Elongation @ 73°F: 4% (MD and XD)
   g. Elongation @ 0°F: 4.2% (MD) and 4.0% (XD)
   h. Tear strength @ 73°F: 82-lbf/inch (MD) and 73-lbf/inch (XD)
   i. Dimensional Stability (max): 0.1% (MD and XD)
   j. High Temperature Stability (min): 215°F (MD and XD)
   k. LEED Solar Reflectance Index: Minimum 91 (ASTM E1980)
   l. Approvals: Energy Star Approved, UL Class listed, and FM Approved (products shall bear seals of approval).
3. Top Surface: Shall be factory applied white reflective surface. Factory and/or field applied coating products over granules are not acceptable. No exceptions.

K. BASE FLASHING SHEET MATERIALS

1. Base Flashing Cap Ply shall be the same as field SBS cap ply.
2. Base Flashing Base Ply shall be the same as field base sheet.

L. PENETRATION FLASHING MATERIALS

1. Specify liquid (cold fluid) applied membrane flashing system approved by specified roof system manufacturer.
2. Cold fluid applied membrane shall be a fully reinforced, liquid applied roofing and waterproofing membrane designed for fully watertight, warranted installations in conjunction with the specified primary roof system. Shall be manufactured and approved by the roof system manufacturer.
   a. Asphaltic urethane resin with polyester fleece reinforcement
   b. Polymethyl methacrylate resin with polyester fleece reinforcement (PMMA).
3. All liquid (cold fluid) applied membrane flashings shall be included in the specified warranty for the roof system.

M. METALS AND ACCESSORIES

1. All roof system edge metal such as copings, gravel stops and drip edges shall meet the following minimum requirements:
   a. Factory formed
   b. Specify edge metal from the roof membrane system manufacturer
   c. FM tested and approved up to the requirements of FM I-90
   d. Warranted and wind speed tested up to 90 mph, 3 second wind gust.
   e. Comply with ANSI/SPRI ES-1 Wind Design Standard in accordance the International Building Code
2. Galvanized Steel: Specify structural quality galvanized steel Coating meeting Class G-90, ASTM A446
3. Metal flashings shall have a factory applied Kynar 500-based finish and must meet the performance criteria of AAMA 605.2-90 specification
4. Metal Flashing finish coat thickness shall be a minimum of 1.0 mil
5. Metal Flashing Primer coat thickness shall be a minimum of 0.3 mil
6. Specify a ten (10) year finish warranty for factory finished metals
7. Solder shall meet ASTM D32-66T with 50% lead and 50% tin
8. Lead: 4 lb. soft lead. Flanges on soil pipe vents shall be a minimum of 24" x 24" in size.
9. Sealant: NP-1
10. Self-Adhering Modified Bitumen Membanes shall be specified where required
11. 20 mil PVC Sheeting
12. Wall to wall expansion joints shall be bellows type expansion joints
13. Fry-Reglet counter flashing shall be pre-manufactured galvanized steel

N. MINIMUM ACCEPTABLE METAL WEIGHTS

Counterflashing:	24 ga. galvanized steel
Gravel Stop-Fascia:	24 ga. galvanized steel
Coping:	24 ga. galvanized steel
Primary/Overflow Scuppers:	24 ga. galvanized steel
Bonnet Flashings:	24 ga. galvanized steel
Downspouts:	24 ga. galvanized steel
Conductors:	24 ga. galvanized steel
Pipe Penetration Curb Cover:	24 ga. galvanized steel

FULLY-ADHERED SINGLE-PLY ROOFING (TPO)

I. GENERAL CRITERIA

A. GENERAL NOTES

1. TPO membranes shall be used for renovation projects only where the roof system being replaced is a TPO membrane.
2. TPO membranes for new construction shall not be permitted unless approved by the County prior to final specification.
3. Specify that all work shall be performed by competent, trained, and properly equipped personnel in strict accordance with good roofing design practices and all applicable industry standards.

B. FIELD QUALITY CONTROL

1. Specify that a qualified independent testing agency shall be responsible for taking samples and conducting tests to verify that the installation of the roofing system is installed per manufacturer's requirements. These tests shall include:
   a. Seam Probing: At the completion of roofing construction activities for each building the testing agency shall manually probe all seams using a blunt rounded instrument. Any fishmouths or other seam defects where the seam is not fully adhered shall be repaired by the Contractor in accordance with the roofing system manufacturer's instructions and shall be done at no additional cost to the County.
   b. Seams shall be tested in accordance with the roofing system manufacturer's instructions and evaluated for seam integrity. Seams that fail this test shall be subject to additional test cuts, as directed by the Architect and/or roofing system manufacturer, in order to further quantify the extent of the deficient condition. Repairs to deficient seams and/or test cut locations shall be performed by the Contractor in accordance with the roofing system manufacturer's instructions and shall be done at no additional cost to the County.

C. REFERENCES

1. National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual.
2. Sheet Metal Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

D. QUALIFICATIONS

1. Manufacturer:
   a. Specify a company specializing in manufacturing the roofing membrane specified in this Section with 10 years of manufacturing experience.
   b. System supplier must have ISO 9002 certified.

c. Manufacturer must be able to provide the project with the membrane, edge metal systems and Isocyanurate insulation that is produced in their facilities.

2. Applicator:
   a. Shall be a roofing contractor certified by the manufacturer.
   b. Shall have at least five (5) years of experience in installing TPO systems.
   c. Shall have a fully staffed office within 100 miles of the job site.

E. REGULATORY REQUIREMENTS

1. Roofing assembly shall conform to applicable local building code requirements.
2. Underwriters Laboratories, Inc. (UL): Class A Fire Hazard Classification.

F. QUALITY INSPECTION/OBSERVATION

1. Require Inspection by Manufacturer: Require contractor to provide a final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer.
   a. Technical Representative shall not perform any sales functions.

G. WARRANTY

1. Type/Term:
   a. Require a 20-year No Dollar Limit Warranty. Warranty shall include membrane, roof insulation, perimeter metal flashings and membrane accessories.

II. DESIGN STANDARDS

A. MANUFACTURERS - MEMBRANE MATERIALS

1. Carlisle Syntec – Sure-Weld Reinforced TPO Membrane 60-Mil.
2. GAF Everguard TPO.
3. Johns Manville.
4. Architect approved equal prior to bid.

B. ROOF INSULATION PRODUCTS

1. Polyisocyanurate Roof Insulation
   a. Description: Roof insulation consisting of closed cell polyisocyanurate foam core bonded on each side to fiber reinforced facers.
   b. Environmentally friendly construction with 0% ozone-depleting components and CFC free.

END OF SECTION 075000

SECTION 076000

FLASHING AND SHEET METAL

I. GENERAL CRITERIA

A. All edge metal flashings and copings associated with roof assemblies shall meet ES-1 and FM I 90 requirements.

B. All flashing and sheet metal shall comply with SMACNA and NRCA standards.

C. Require all flashing to be included in all required mockups.

D. Provide all details required to illustrate industry standard assemblies suitable for intended use and capable of providing a complete, proper, weather proof and water proof installation.

E. Provide details for terminations and corners of parapets, expansion joints, and similar non typical situations.

II. DESIGN STANDARDS

A. BITUMINOUS SHEET FLASHING

1. Acceptable Manufacturers
   a. WR Grace and Company
   b. Pecora Corporation
   c. Polyguard Products
   d. Protecto Wrap Company
2. Flashing schedule
   a. Masonry Ledges
   b. Shelf Angles
   c. Lintels
   d. Window sills
   e. Intersections of masonry sills and masonry walls
   f. Continuous perimeter flashing at bottom of all masonry walls level just above finished floor. Walls shall be grouted solid below flashing.
3. Flashing shall be flexible, self-sealing through-wall flashing with a polyethylene facer and paper release sheet.
4. Flashing must be a minimum of 40 mils thick
5. Flashing and all accessories, including but not limited to, primer, tape, and joint sealer shall be manufacturer's standards and procured from a single source.
6. Specify all substrates are to be prepared and primed according to the manufacturers' recommendations.
7. Specify extension of flashings from a point ½ inch behind exterior wall faces, across cavity to back-up surfaces; extend 6 inches minimum up back-up surfaces. At steel shelf angles and lintels extend flashings 4 inches minimum above top of steel.

8. Horizontal joints in flashing are not permitted.
9. Require 4" lapped end joints minimum.
10. Require a two (2) year warranty covering defects in materials or workmanship for leakage of water into the building or within the construction.

B. METAL

1. Stainless Steel: ASTM A167, Type 302 or 304, No. 2D, dull finish, 0.018-inch thick, unless otherwise shown.
2. Galvanized Sheet Steel: ASTM A653/A653M, G90, commercial quality copper bearing steel, thickness 0.0217-inch (26 U.S. Standard gauge), unless otherwise shown.
3. Factory-Painted Aluminum Sheet shall conform to ASTM B209 (ASTM B209M), 3003-H14, with a minimum thickness listed below.
   a. 0.040 inch (18 gauge) at all standard gutter/downspout conditions.
4. All exposed edges of sheet metal shall be hemmed.
5. Metal flashing is required at the base of all EIFS applications. Flashing shall be hemmed and form a drip just below the drainage track of the finish system. Refer to 072000 for additional requirements.
6. Metal through wall flashing used in masonry construction shall be prefinished to match the color of the wall assembly and shall extend a minimum of ½" from the face of the wall and form a drip. The exposed edge of all metal through wall flashing shall be hemmed.
7. Preformed drips shall be specified for all exterior doors.
8. Metal flashing shall be factory or shop curved as required by the design and shall be in continuous lengths to the greatest extent possible. Segmented flashing is not an acceptable substitute for factory or shop curved flashing.
9. Architect shall pay close attention to the gauge of material used and the proposed application to minimize oil canning.

C. REGLETS AND COUNTERFLASHING

1. For Concrete:
   a. Stainless steel, 0.015 inch.
   b. Manufacturers and Products:
      i. Fry Reglet Corp.; Fry Springlok Type CO and Springlok Flashing.
      ii. Cheney Flashing Co.; Type A reglet and Snap Lock Cap Flashing.
2. For Masonry:
   a. Stainless steel, 0.015 inch.
   b. Manufacturers and Products:
      i. Fry Reglet Corp.; Fry Springlok Type MA and Springlok Flashing.
      ii. Cheney Flashing Co.; Type B reglet and Snap Lock Cap Flashing.
3. Surface Mounted:
   a. Stainless steel, 0.015 inch.
   b. Manufacturers and Products:
      i. Fry Reglet Corp.; Fry Springlok Type SM and Springlok Flashing.
      ii. Cheney Flashing Co.; Type D reglet and Snap Lock Cap Flashing.

D. ANCILLARY MATERIALS

1. Solder: ASTM B32, alloy composition Sn 50 and Sn 60 for stainless steel.
2. Soldering Flux: ASTM B32, Type RA.
3. Sealer Tape: Polyisobutylene sealer tape.
4. Isolation Paint: ASTM D1187, asphalt.
5. Isolation Tape: Butyl or polyisobutylene, internally reinforced, or 20-mil thick minimum polyester.
6. Plastic Roof Cement: ASTM D4586, Type II.
7. Fasteners:
   a. For Galvanized Steelwork: Steel, galvanized per ASTM A153/A153M or stainless steel fasteners.
   b. For Zinc or Aluminum Work: Stainless steel or aluminum; reglet fasteners may be galvanized or cadmium-plated steel.
   c. For Stainless Steelwork: Stainless steel.
   d. Nails: Roofing nailhead, 10-gauge spiral or ring shank, lengths as required to penetrate wood at least 3/4 inch.

E. GUTTERS AND DOWNSPOUTS

1. Quality Assurance
   a. Conform to SMACNA Manual for nominal sizing of components for rainfall intensity determined by a storm occurrence of 1 in 10 years.
2. Products
   a. Components
      i. Gutters: SMACNA 'Ogee'. or rectangular
      ii. Downspouts: SMACNA 'Rectangular'.
      iii. Downspout elbows.
      iv. Anchorage Devices: SMACNA Requirements for bracket supports.
      v. Gutter Splash Guards shall be installed at valley intersections.
   b. Fabrication - Require the contractor to perform the following:
      i. Form gutters and downspouts of profiles to SMACNA requirements.
      ii. Field measure site conditions prior to fabricating work.
      iii. Fabricate with required connection pieces.
      iv. Form sections square, true, and accurate in size, in maximum possible lengths and free of distortion of defects detrimental to appearance or performance. Allow for expansion at joints.
      v. Hem exposed edges of metal.
      vi. Seal metal joints to create a water-tight condition.
      vii. Fabricate gutter and downspout accessories; seal watertight.

END OF SECTION 076000

SECTION 077000

ROOF ACCESSORIES

I. GENERAL CRITERIA

A. Roof accessories shall meet the following standards:
   a. SMACNA "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap-flashing to coordinate with type of roofing indicated.
   b. NRCA "Roofing and Waterproofing Manual" details for installation of units.

B. All roof hatches shall be located more than ten (10) feet from the edge of the roof or parapet.

C. Roof hatches shall be accessed from maintenance spaces only. Roof access shall be considered and designed in accordance with the following hierarchy
   a. Internal stair access
   b. Ships ladder access to roof hatch
   c. Wall mounted ladder access to roof hatch

D. If an internal roof ladder is unavoidable, specify a minimum clearance of 6 inches between the rung of the ladder and the wall for adequate toe space. All rungs of the ladder shall be equipped with grip tape and constructed using 36ksi smooth, round steel stock, ½" minimum. All access ladders shall be painted, welded steel.

E. Exterior roof access ladders serving as primary roof access are not permitted.

F. Exterior parapet and transition access ladders are permissible and shall be galvanized steel painted to blend with the exterior of the building. All anchorage and flashing shall be coordinated with the roof membrane manufacturer's recommendations.

G. Walkway pads shall be provided around all equipment requiring maintenance. Refer to Roofing standards for further information.

H. All edge metal and coping shall meet ES-1 and FM I 90 requirements.

J. Specify that roof warranty information and contact information shall be posted at all roof access points.

K. All roof hatches shall be 36" x 36" minimum and include a standard safety post.

L. Roof Hatches shall have a five (5) year warranty against defects in material or workmanship.

II. DESIGN STANDARDS

A. MANUFACTURERS

1. Manufacturers: Subject to compliance with these requirements, specify contractor shall provide products by one of the following:
   a. Roof Hatches:
      i. Bilco Co.
      ii. Milcor, Inc.
      iii. Wasco Products, Inc.

B. MATERIALS

1. Aluminum Sheets shall meet ASTM B 209 (ASTM B 209M) for Alclad alloy 3005H25 or alloy and temper required to suit forming operations with mill finish unless otherwise requested by the County.
2. Extruded Aluminum shall meet ASTM B 221 (ASTM B 221M) alloy 6063-T52 or alloy and temper required to suit structural and finish requirements. Specify a mill finish unless otherwise requested by the County.
3. Commercial-Quality Galvanized Steel Sheet: ASTM A 526 (ASTM A 526M) with G90 (Z275) coating complying with ASTM A 525 (ASTM A 525M).
4. Insulation: Manufacturer's standard rigid or semirigid glass-fiber board of thickness indicated.
5. Wood Nailers: Softwood lumber, pressure treated with water-borne preservatives for above-ground use, complying with AWPA C2; not less than 1-1/2 inch (38 mm) thick.
6. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.
   a. Where removal of exterior exposed fasteners affords access to building, provide nonremovable fastener heads.
7. Gaskets: Manufacturer's standard tubular or fingered design of neoprene or polyvinyl chloride, or block design of sponge neoprene.
8. Bituminous Coating: SSPC-Paint 12, solvent-type bituminous mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4 mm) dry film thickness per coating.
9. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
10. Elastomeric Sealant: Generic type recommended by unit manufacturer that is compatible with joint surfaces; ASTM C 920, Type S, Grade NS, Class 25, and Uses NT, G, and, A.
11. Roofing Cement: ASTM D 4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

C. FINISHES

1. General: Comply with NAAMM "Metal Finishes Manual" for recommendations on applying and designating finishes.
2. Finish designations prefixed by AA conform to the system for designating aluminum finishes established by the Aluminum Association.

D. ROOF HATCHES

1. General: Require fabrication of units to withstand 40-lbf/sq. ft. (1.9 kPa) external loading and 20-lbf/sq. ft. (0.95 kPa) internal loading pressure. Specify frame with 12-inch high, integral-curb, double-wall construction with 1 inch insulation, cant strips and cap flashing (roofing counterflashing), with welded or sealed mechanical corner joints. Provide for double-wall cover (lid) construction with 1 inch insulation core. Provide for gasketing and equip corrosion-resistant or hot-dip galvanized hardware including pintle hinges, hold-open devices, interior padlock hasps, and both interior and exterior latch handles.
2. Type: Single-leaf personnel access.
   a. Non Security Scuttle

      Type E, as manufactured by The Bilco Company. Insulation shall be glass fiber 1" (25.4 mm) in thickness, fully covered and protected by a metal liner. Curb shall be 12" in height. It shall be formed with a 3 1/2" flange with holes provided for securing to the roof deck. Curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, full welded at the corners for weathertightness. Capflashing shall be equipped with integral flashing system, including stamped tabs and Pak-Rope. Insulation on the exterior of the curb shall be rigid fiberboard 1" in thickness. Scuttle shall be completely assembled with heavy pintle hinges, positive snap latch with turn handles and padlock hasps inside and outside and a mechanically retained thermoplastic rubber gasket. Compression spring operators enclosed in telescopic tubes shall be provided for smooth, easy and controlled door operation throughout the entire arc of opening and closing. Operation shall not be affected by temperature. Cover shall be equipped with an automatic hold-open arm complete with red vinyl grip handle to permit easy release and one-hand control of the cover to its closed and latched position. All hardware shall be zinc plated and chromate sealed and factory finish shall be aluminum.

END OF SECTION 077000

SECTION 078000

FIREPROOFING AND FIRESTOPPING

I. GENERAL

A. QUALITY ASSURANCE

1. Require experienced Installer who is certified, licensed, or otherwise qualified by the fire-stopping manufacturer as having the necessary experience, staff, and training to install manufacturer's products per specified requirements.
2. Single-Source Responsibility: Specify that all fire stopping be performed by a single contractor who procures all fire stopping materials from a single source.

B. WARRANTY

1. Manufacturer's standard warranty covering fire stopping materials.
2. Applicator's standard warranty covering workmanship for a period of one (1) year following substantial completion.

C. SYSTEM PERFORMANCE REQUIREMENTS

1. General: Specify fire stopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases as required by code.
2. Specify through-penetration fire stop systems with F ratings as determined per ASTM E 814/UL1479, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.
3. Specify joint sealants with fire-resistance as determined per ASTM E 1966/UL 2079, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
4. For fire stopping exposed to view, traffic, moisture, and physical damage, specify products that do not deteriorate when exposed to these conditions.
    a. For piping penetrations for plumbing and wet-pipe sprinkler systems, specify moisture-resistant through-penetration fire stop systems.
    b. For penetrations involving insulated piping, specify through-penetration fire stop systems not requiring removal of insulation.
5. For fire stopping exposed to view, specify products with flame-spread values of less than 25 and smoke-developed values of less than 450, as determined per ASTM E 84

II. DESIGN STANDARDS

A. FIREPROOFING MANUFACTURERS

1. The spray-applied fire resistive material shall be manufactured by:

a. ISOLATEK INTERNATIONAL
b. W. R. GRACE CONSTRUCTION PRODUCTS

2. Equivalent manufacturers not listed will be considered should their products meet or exceed the performance specifications herein.

B. INTUMESCENT FIRE PROTECTION MATERIALS

1. CAFCO® BLAZE-SHIELD® II, Isolatek International (basis of design)
2. CAFCO® 300, Isolatek International
3. Monokote® MK-6, W. R. Grace

C. TEST CRITERIA

1. Specify the materials listed above or approved equals shall meet the criteria herein.
2. Deflection: When tested in accordance with ASTM E759, the material shall not crack or delaminate when the non-concrete topped galvanized deck to which it is applied is subjected to a one time vertical centerload resulting in a downward deflection of 1/120th of the span.
3. Bond Impact: When tested in accordance with ASTM E760, the material shall not crack or delaminate from the concrete topped galvanized deck to which it is applied.
4. Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have an average bond strength of 150 psf.
5. Air Erosion: When tested in accordance with ASTM E859, the material shall not be subject to losses from the finished application greater than 0.025 grams per sq. ft. (0.27 grams per square meter).
6. Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 750 psf (35.9 kPa).
7. Corrosion Resistance: When tested in accordance with ASTM E937, the material shall not promote corrosion of steel.
8. Non-combustibility: When tested in accordance with ASTM E136 or CAN4-S114, the material shall be non-combustible.
9. Surface Burning Characteristics: When tested in accordance with ASTM E84 or CAN4-S102, the material shall exhibit the following surface burning characteristics:
   a. Flame Spread 0
   b. Smoke Developed 0
10. Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL/ULC design or as required by the authority having jurisdiction, or shall have a minimum average of 15 pcf (240 kg/m3).

D. INTUMESCENT FIRE PROTECTION SYSTEM

1. Specify that intumescent fire resistive material shall have been tested in accordance with the procedures of UL 263 or ASTM E119 or CAN/ULC-S101, and reported by Underwriters Laboratories, Inc. or Underwriters Laboratories of Canada only.
2. Thin-Film Fire-Resistive Intumescent Mastic Coating shall be a Factory-mixed formulation.
3. Water-Based Formulation shall be approved by manufacturer and authorities having jurisdiction for indicated use.
4. Verify with manufacturer that products specified and selected are suitable for all intended uses.
5. UL Fire Tested Designs Only based on UL 263 (ASTM-E119).
6. No mesh is permitted.
7. Specify that the application of intumescent fire protection shall occur at exposed structural steel columns, diagonal braces, beams and all associated structural steel components as required by and applicable to the International Building Code.

E. DECORATIVE TOPCOATING

1. Topcoat materials shall be as required for color-coding, aesthetics or additional surface protection, approved by the thin-film fire resistive material manufacturer and applied in full accordance with the coating manufacturer's written instructions.

F. FIRESTOPPING MATERIALS

1. Acceptable manufacturer: Tremco, Inc.
2. Proprietary Product(s)/System(s): Tremco Firestop Systems Products.
    a. TREMstop IA+ High Performance Intumescent Acrylic Sealant
    b. TREMstop Acrylic Flexible Acrylic Sealant
    c. TREMstop Acrylic - SP Sprayable, Flexible Acrylic Sealant
    d. Fyre-Sil Fire Resistant Silicone Sealant
    e. Fyre-Sil S/L Self-Leveling Fire Resistant Silicone Sealant
    f. Dymeric 240/240FC Two Part Urethane Sealant
    g. Dymonic One Part Modified Polyurethane Sealant
    h. THC 900 Multi-Component Chemically Curing Polyurethane Sealant
    i. TREMstop Fire Mortar Trowelable Firestop Mortar
    j. TREMstop MCR Flexible Metal Restricting Collar for Wrap Strips
    k. TREMstop MP Moldable Putty Pad for Electrical Outlet Boxes
    l. TREMstop SuperStrip Flexible Intumescent Strip

3. Product(s)/System(s) Testing: UL Fire Resistance Directory, *Fill, Void or Cavity Materials (XHHW)* and *Firestop Devices (XHJI)* for listed product(s)/system(s).

H. FIRESTOPPING, GENERAL

1. Specify that spray-applied fire resistive materials shall be applied at the required thickness and density to achieve the following ratings:
   a. Composite Floor System (Spray Beams Only) 1 hour
   b. Metal Decking at bottom of roof trusses) 1 hour
2. Specify that potable water shall be used for the application of spray-applied fire resistive materials.
3. Specify that spray-applied fire resistive materials shall be free of all forms of asbestos, including actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite. Material manufacturer shall specify certification of such upon request.
4. Specify that primers shall be approved by manufacturer and applied in full accordance with the primer manufacturer's written instructions.
5. Compatibility: Specify fire stopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the fire stopping under conditions of service and application, as demonstrated by fire stopping manufacturer based on testing and field experience.
6. Accessories: Specify components for each fire stopping system that are needed to install fill materials and to comply with "System Performance Requirements" article in Part 1. Use only components specified by the fire stopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:
   a. Permanent forming/damming/backing materials including the following:
      i. Semi refractory fiber (mineral wool) insulation.
      ii. Ceramic fiber.
      iii. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
      iv. Fire-rated form board.
      v. Joint fillers for joint sealants.
   b. Temporary forming materials.
   c. Substrate primers.
   d. Collars.
   e. Steel sleeves.
7. Applications: Specify fire stopping systems composed of materials specified in this Section that comply with system performance and other requirements.
8. Fire-stopping schedule: Include applicable details on drawings for fire stopping assemblies.

I. FIRESTOPPING SCHEDULE

Penetrating Item	Concrete	Gypsum	Wood Floor/Ceiling
Plastic Pipe	CAJ2109 CAJ2110 FA2054 FA2053 FA2157 CAJ2615 CAJ2184 CAJ2233	WL2078 WL2098 WL2125 WL2364 WL2129	FC2025 FC2049
Metal Pipe	CAJ1226 CAJ1155 FA1017 FA1016 CAJ1302 FA1084 FA1008	WL1054 WL1058 WL1158 WL1327 WL1328	FC100 9 FC1050
Insulated Metal Pipe	CAJ5091, CAJ511 CAJ5090, CAJ5120 CAJ5111 CAJ5120 CAJ5121	WL5029 WL5025 WL5083 WL5081 WL5082 WL5204 WL5209 WL5115	FC500 4 FC5055
Insulated Cable	CAJ3095 CAJ3141	WL3065 WL3131	FC301 2 FC3037
Cable Tray	CAJ4035 WJ4012	WL4011 WL4012	
Busway	CAJ6017 CAJ6007*		
Glass Pipe	CAJ2118 CAJ2549		
Blank	CAJ0055 CAJ0058 CAJ0011		
Joints	HWD-0042 HWD-0045 HWD-0092 HWD-0251	HWD-0091	

*Underwriters Laboratories, Inc., Fire Resistance Directory

END OF SECTION 078000

SECTION 079000

JOINT SEALANTS

I. GENERAL CRITERIA

A. QUALITY ASSURANCE

1. Require that work be performed in accordance with ASTM C 1193.

B. QUALIFICATIONS

1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.
2. Applicator Qualifications: Company specializing in performing work of this section with minimum three years documented experience, minimum three successfully completed projects of similar scope and complexity, and approved by manufacturer.

C. WARRANTY

1. Require signed copies of the following warranties against adhesive and cohesive failure of sealant and against infiltration of water and air through sealed joint for period of 3 years from date of completion.
   a. Manufacturer's standard warranty covering sealant materials.
   b. Applicator's standard warranty covering workmanship.

II. DESIGN STANDARDS

A. GENERAL

1. Silicone sealants shall be specified for joints exposed to UV Light or joints subject to movement or joints intended to provide a weatherproof seal. Urethane sealants are not permitted to be used for these applications.
2. All joints in new construction requiring sealant shall be specified with a non-adhesive backer rod.
3. All sealed joints shall be coordinated with other materials as required by the design to be compatible with the applicable construction.

B. MANUFACTURERS

1. Tremco Sealant/Weatherproofing Division of RPM International, Inc.
2. Equivalent manufacturers not listed will be considered should their products meet or exceed the performance specifications herein.

C. URETHANE SEALANTS

1. Multi-Component Urethane: ASTM C920, Type M, Grade NS, Class 50; Uses T, NT, M, A, and O; two component, chemical curing, nonstaining, nonbleeding, color as selected.
   a. Dymeric 240FC
2. Single Component Urethane: ASTM C 920, Type S, Grade NS, Class 100/50, Uses NT, M, A, O; single component, moisture curing, nonstaining, non-bleeding, color as selected.
   a. Dymonic FC
   b. Dymonic.
   c. Vulkem 116.
   d. Vulkem 45.or Vulkem 45 SSL
3. Multi-Component Self-Leveling Urethane: ASTM C920, Type M, Grade P, Class 25, Uses T; self leveling, multi-component, chemical curing, nonstaining, nonbleeding, color as selected.
   a. THC 900.
   b. THC 901.
   c. Vulkem 45 SSL + Catalyst (water = catalyst)
4. Single Component Self-Leveling Urethane: ASTM C920, Type S, Grade P, Class 100/50; self leveling, single component, moisture curing, nonstaining, nonbleeding, color as selected, green concrete acceptable.
   a. Vulkem 45 SSL.

D. SILICONE SEALANTS

1. Multi-Component Silicone: ASTM C920, Type M, Grade NS, Class 50; Uses NT, M, G, A and O: multi-component, neutral curing, nonstaining, nonbleeding, color as selected
   a. Spectrem 4-TS.
2. Single Component Silicone: ASTM C920, Type S, Grade NS, Class 50; Uses NT, M, G, A and O: single component, neutral curing, nonstaining, nonbleeding, color as selected.
   a. Spectrem 1.
   b. Spectrem 2.
   c. Spectrem 3.
3. Single Component Silicone: ASTM C920, Type S, Grade NS, Class 25; Uses NT, G, A and O: single component, neutral, nonstaining, nonbleeding, color as selected.
   a. Proglaze.
   b. Tremsil 200.
   c. Tremsil 600.
4. Single Component Traffic Silicone: Low modulus, high performance, single component, self leveling sealant.
   a. Spectrem 800.
   b. Specterm 900SL.

E. OTHER SEALANTS

1. Latex Sealant: ASTM C 834; single component, solvent curing, nonstaining, nonbleeding, nonsagging; color as selected.
   a. Tremflex 834.
2. Synthetic Rubber Sealant:
   a. Acoustical Sealant.
3. Butyl Sealant: ASTM C 1311, butyl or polyisobutylene, single component, nondrying, non-skinning, non-curing.
   a. Butyl Sealant.

F. ACCESSORIES

1. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
2. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
3. Joint Backing: Round foam rod compatible with sealant; oversized 25 to 50 percent larger than joint width; recommended by sealant manufacturer to suit application
4. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.
5. Masking Tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

G. SCHEDULE – SEALANT JOINTS

1. Exterior Sealant Joint [Type A]:
   a. Applications:
      1) Control and expansion joints in cast-in-place concrete.
      2) Joints between architectural precast concrete units.
      3) Control and expansion joints in unit masonry.
      4) Joints between different materials listed above.
      5) Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
      6) Control and expansion joints in soffits and overhead surfaces.
      7) Other exterior joints in vertical surfaces and non-traffic horizontal surfaces for which no other sealant is specified.
   b. Multi-Component Urethane Sealants:
      1) Dymeric 240FC.
   c. Single Component Urethane Sealants:
      1) Dymonic FC.
      2) Dymonic.
      3) Vulkem 116.
   d. Multi-Component Silicone Sealants:
      1) Spectrem 4-TS.
   e. Single Component Silicone Sealants:
      1) Spectrem 1.

2) Spectrem 2.
3) Spectrem 3.

2. EIFS Sealant Joint [Type B]:
   a. Applications:
      1) Joints between EIFS and other materials.
      2) Other joints within or abutting EIFS materials.
   b. Single Component Urethane Sealants:
      1) Dymonic FC.
      2) Dymeric 240/240FC.
   c. Multi-Component Silicone Sealants:
      1) Spectrem 4-TS.
   d. Single Component Silicone Sealants:
      1) Spectrem 1.
      2) Spectrem 3.
3. Interior Sealant Joint [Type C]:
   a. Applications:
      1) Control and expansion joints on exposed interior surfaces of exterior walls.
      2) Perimeter joints on exposed interior surfaces of exterior openings.
      3) Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefronts, louvers, elevator entrances and similar openings.
      4) Other interior joints in vertical surfaces and non-traffic horizontal surfaces subject to movement for which no other sealant is specified.
   b. Multi Component Urethane Sealants:
      1) Dymeric 240/240FC.
   c. Single Component Urethane Sealants:
      1) Dymonic FC.
   d. Single Component Silicone Sealants:
      1) Spectrem 1.
      2) Spectrem 2.
      3) Spectrem 3.
   e. Other Sealants:
      1) Tremflex 834.
4. Traffic Sealant Joint [Type D]:
   a. Applications:
      1) Control, expansion and isolation joints in cast-in-place concrete.
      2) Tile control and expansion joints.
      3) Joints between different materials listed above.
      4) Other interior and exterior traffic bearing joints in horizontal and sloped traffic surfaces
   b. Multi Component Urethane Sealants:
      1) THC-900/901, self leveling.
      2) Vulkem 116 plus catalyst.(Vulkem 227)
      3) Vulkem 45 SSL plus catalyst
   c. Single Component Urethane Sealants:

1) Vulkem 45, self leveling.
2) Vulkem 45 SSL, semi self leveling.

d. Single Component Silicone Sealants:
1) Spectrem 800.
2) Spectrem 900SL.

5. Interior Sanitary Sealant Joint [Type G]:
a. Applications:
1) Joints in toilet room and bathroom counter tops.
2) Joints between plumbing fixtures and adjacent materials.
3) Other interior joints in wet areas where needed to limit mold and mildew growth.

b. Single Component Silicone Sealants:
1) Tremsil 200.

6. Concealed Metal Lap Sealant Joint [Type J]:
a. Applications:
1) Concealed lap and hook joints in sheet metal flashing and trim.

b. Single Component Non-Curing Sealants:
1) Tremco Butyl Sealant.
2) Tremco Acoustical Sealant.

7. Concealed Bedding Sealant Joint [Type K]:
a. Applications:
1) Bedding joints under metal thresholds and saddles.
2) Bedding joints between sheet metal flashing and other materials.

b. Single Component Urethane Sealants:
1) Dymonic FC.
2) Dymonic.
3) Vulkem 116.

c. Single Component Silicone Sealants:
1) Proglaze.
2) Spectrem 2.
3) Spectrem 3.

d. Single Component Non-Curing Sealants:
1) Tremco Butyl Sealant.
2) Tremco Acoustical Sealant.

END OF SECTION 079000

DIVISION 08: OPENINGS

SECTION 081000

DOORS AND FRAMES

I. GENERAL CRITERIA

A . This Section includes the following:

1. Hollow metal doors
2. Hollow metal frames
3. Interior Flush Wood Doors

B. QUALITY ASSURANCE

1. AWI Quality Standard: "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute for grade of door, core, construction, finish, and other requirements.
2. Fire-Rated Wood Doors: Specify wood doors that comply with NFPA 80; are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152; and are labeled and listed by UL, Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction.
3. Single-Source Responsibility: Require that Contractor doors from one source and by a single manufacturer including non-rated and rated doors.
4. Door Manufacturer's Warranty: Specify that a written agreement by submitted on door manufacturer's standard form with an agreement to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch (6.35 mm) in a 42-by-84-inch (1067-by-2134-mm) section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span, or do not conform to tolerance limitations of referenced quality standards. Warranty shall be in effect during the following period of time after date of Substantial Completion. Solid Core Interior Door warranty shall be for the life of the installation.
5. Specify that all rated doors and frames are labeled according to listing requirements of Underwriter’s Laboratories (UL).
6. Specify one of the acceptable manufacturers standard core materials according to SDI standards:
   a. Vertical steel stiffeners.
   b. Honeycomb
   c. Polystyrene
7. Clearances for hollow metal doors and frames:
   a. Jamb and Head: 1/8 inch, except not more than 1/4 inch
   b. Between non-fire-rated pairs of doors. Not more than 3/4 inch at bottom. For fire doors, specify clearances according to NFPA 80.
8. Exposed Fasteners: Specify countersunk flat or oval heads for exposed screws and bolts.

9. Thermal-Rated (Insulating) Assemblies: Specify doors fabricated as thermal-insulating door and frame assemblies at all exterior locations and as required to meet the design intent. Doors shall be tested according to ASTM C 236 or ASTM C 976.
10. Hardware Preparation: Specify doors and frames prepared to receive hardware. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.
11. All doors and frames shall be reinforced to receive surface-applied hardware.

II. DESIGN STANDARDS

A. GENERAL

1. All doors shall be 36” x 84” unless otherwise directed by the County
2. Non-standard door sizes shall be specified to accommodate equipment in mechanical rooms, electrical rooms and other maintenance spaces containing oversize equipment. These doors can be either single leaf or double leaf doors.
3. Doors shall be solid core wood doors except for the following locations. Any question regarding the use of wood doors shall be verified by the County prior to final design and specification.
    a. Exterior doors
    b. Doors in maintenance or shop facilities
    c. Doors subject to abuse and or damage due to moving equipment
    d. Doors subject to high hazard or explosion
    e. Dock doors
    f. Entrance or vestibule doors (these are typically glass doors)
    g. Other locations as determined appropriate by the Architect or the County.

B. HOLLOW METAL DOORS

1. Acceptable Manufacturers:
    a. Curries Manufacturing.
    b. The Ceco Corp.
    c. Mesker Industries, Inc.
    d. Pioneer Industries.
    e. Republic Steel Corp.
    f. Steelcraft Manufacturing Co.
    g. Premier Steel Doors and Frames
    h. Amweld Building Products, Inc.
2. Materials shall meet the following requirements.
    a. M A366A 366M or hot rolled, pickled and oiled steel conforming to ASTM A 569/A 569M. Steel shall be free of scale, pitting, coil breaks or other surface blemishes. Steel shall also be free of buckles, waves or any other defects caused by the use of improperly leveled sheets.

b. Exterior Doors: Face sheets shall be 14 gauge minimum thickness and shall have a zinc coating applied by the hot-dip process conforming to ASTM A 653/A 653/M. All exterior doors shall be insulated.

c. Interior Doors: Face sheets shall be 16 gauge minimum thickness. Where scheduled, face sheets of interior doors shall have a zinc coating conforming to ASTM A 653/A 653/M (A60).

d. ASTM A167, Type 316 stainless steel.

3. Specify that construction of hollow metal doors shall be as follows:

a. Door thickness shall be 1 3/4".

b. Doors shall be neat in appearance and free from warpage and buckle. All edge bends shall be true and straight and of minimum radius for the material used.

c. Door face sheets shall be joined at their vertical edges.

d. Door edges shall be joined by internally applied tack welds no more than 6" on center extending the full height of the door. There shall be a visible seam at both edges of the door.

e. Top and bottom edges of all doors shall be closed with continuous recessed steel channels no less than 16 gauge thickness, spot welded to both face sheets.

f. Exterior doors shall have an additional flush closing channel at the top edge. Where required for specified hardware, the bottom edge of exterior doors shall have an additional flush closing channel. Opening shall be specified in the bottom closure channel of exterior doors to permit the escape of entrapped moisture.

g. Edge profiles shall be specified on both vertical edges of door as follows:

i. Single-acting doors – beveled 1/8" in 2"

ii. Double-acting doors – rounded on 2-1/8" radius

h. All hardware for single-acting doors shall be designed for beveled edges.

i. Hardware reinforcements:

i. Specify that doors shall be prepared in the factory to receive all hardware specified and approved by the County and to be in accordance with templates specified by the hardware supplier.

ii. Minimum thicknesses of hardware reinforcements shall be as follows:

a) Full mortise hinges & pivots: 10 gauge

b) Lock fronts, flush bolts, closers: 14 gauge

c) For all other Surface-mounted hardware: 16 gauge

j. Glass moldings and stops:

i. If doors contain glass panels, doors shall be specified with flush moldings to secure glazing by others, in accordance with glass sizes and thicknesses shown on approved drawings.

ii. Fixed molding shall be securely welded to the door on the security side.

iii. Removable glass stop shall be no less than 20 gauge channel, with butted corner joints, and secured with #6 cadmium or zinc-plated countersunk sheet metal screws spaced 10" o.c. maximum.

iv. Require that the metal surfaces to which glazing stops are secured and the inside of the glazing stops be chemically treated for

maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the door.

v. Snap on moldings and surface applied light kits are not permitted.

k. Louvers shall be factory installed flush type, and louver vanes shall be of the inverted vee type design. Louver vanes and louver channel shall be 18 gauge minimum thickness.

l. Insect screens and/or bird screens shall be specified on louvered doors in exterior locations.

m. At rated doors requiring louvers, specify a factory installed listed fire rated fusible link louver.

C. HOLLOW METAL FRAMES

1. Materials for hollow metal frames shall comply with the following standards:
   a. Specify that frames be constructed of commercial quality, cold rolled steel conforming to ASTM A 366/A 366M or hot-rolled pickled and oiled steel conforming to ASTM A 569/A 569M.
   b. Steel for exterior openings shall be 14 gauge, and shall have a zinc coating applied by the hot-dip process conforming to ASTM A 653/A 653M (A60).
   c. Steel for interior openings shall be 16 gauge.
   d. Steel for exterior openings subject to abuse shall be 14 gauge.
2. Construction:
   a. All Hollow metal frames may be either knockdown for renovations and retrofits or welded type for new construction according to the design intent, with integral stops and trim.
   b. All door frames in masonry construction shall be fully grouted.
   c. Corner joints at welded corners shall have all contact edges closed tight, with faces mitered and continuously welded. Stops shall be butted.
   d. Minimum height of stops shall be 5/8".
   e. Hollow metal frames for multiple openings shall have mullion members.
   f. Door Silencers: Except on weather stripped frames, all doors shall have 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.
   g. Plaster Guards: Specify minimum 0.0179-inch- (0.45-mm-) thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.
   h. Hardware reinforcements:
      i. Specify that frames shall be prepared in the factory to receive all hardware specified and approved by the County and in accordance with templates specified by the hardware supplier.
         a) Frames prepared for anchor hinges shall be reinforced only. Drilling and tapping of mounting holes shall be done in the field by the hardware installer.
      ii. Minimum thickness of hardware reinforcing shall be as follows:
         a) Hinge: 7 gauge x 1 –1/2” x 10” in length
         b) Strike reinforcements: 12 gauge or 16 gauge extrusion
         c) Flush bolt reinforcements: 12 gauge

d) Closer reinforcements: 12 gauge
e) Surface applied hardware reinforcements: 12 gauge

k. Floor Anchors:
i. Floor anchors shall be specified with two holes. Fasteners shall be secured welded inside each jamb for anchorage to floor.
ii. Material thickness of floor anchors shall be 16 gauge.
iii. Floor anchors are not required for existing wall conditions. An additional frame anchor shall be specified in lieu of a floor anchor.

l. Jamb Anchors:
i. Frames for installation in masonry walls shall be specified with adjustable jamb anchors of the T-strap or strap and stirrup type no less than 16 gauge; or wire type no less than 0.156" in diameter. Straps shall be no less than 2' x 10" in size, either perforated or corrugated. The number of anchors specified on each jamb shall be as follows:
a) Frames up to 60" height: 2 anchors
b) Frames greater than 60" up to 90" : 3 anchors
c) Frames greater than 90" up to 96": 4 anchors
d) Frames greater than 96" shall have 4 anchors plus one for each 24" or fraction thereof over 96", spaces 24" maximum between anchors.
ii. Welded frames for installation in stud partition shall be specified with 18 gauge steel anchors, secured inside each jamb as follows:
a) Frames up to 60" height: 2 anchors
b) Frames greater than 60" up to 90": 4 anchors
c) Frames greater than 90" up to 96": 5 anchors
d) Frames greater than 96" shall have 5 anchors plus one for each 24" or fraction thereof over 96", spaces 24" maximum between anchors.
iii. Frames for installation in pre-finished concrete, masonry or steel openings shall be specified with anchoring system of suitable design and quality. Fasteners for such anchors shall be specified as recommended by the manufacturer.
iv. Knock down frames shall be specified with a single adjustable tension anchor in each jamb and provision secure attachment of each jamb base to stud runners.
v. The Architect shall verify anchor requirements with all UL listed frames prior to final specification.

m. Mortar guard shall be 26 gauge steel and shall be welded in place at all hardware mortises on frames to be set in masonry or concrete openings.
i. Mortar guards are not be required at hardware preparations in frames for drywall partitions.

n. All welded frames shall be specified with a temporary steel spreader welded to the bottom of jambs to serve as bracing during shipping and handling.

o. Removable Glazing Stops:

i. Removable glass stops shall be no less than 20 gauge channel, with butted corner joints, and secured with #6 cadmium or zinc-plated countersunk sheet metal screw spaced 10" o.c. maximum.

ii. The frames underneath the glazing stops and the inside of the glazing stop shall be treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the frame.

3. Clearances for hollow metal doors and frames:
   a. Jamb and Head: 1/8 inch, except not more than 1/4 inch
   b. Between non-fire-rated pairs of doors. Not more than 3/4 inch at bottom. For fire doors, specify clearances according to NFPA 80.

D. INTERIOR FLUSH WOOD DOORS

1. Acceptable Manufacturers:
   a. Graham – (basis of design).
   b. Mohawk Flush Doors.
   c. Osh Kosh Corporation.
   d. VT Industries.
2. Flush wood doors shall comply with the following characteristics:
   a. Architect shall coordinate species, cut, and veneer matching with the County prior to final specification.
   b. Faces: wood veneer.
   c. Grade: Premium.
   d. Construction: 5 plies.
   e. Core: Particleboard core.
   f. Bonding: Stiles and rails bonded to core.
   g. Units shall be abrasive planed before veneering.
3. Fire-Rated Solid Core Doors shall comply with the following requirements:
   a. Faces and Grade: Specify faces and grade to match non-fire-rated doors in same area of building.
   b. Construction shall be Manufacturer's standard core construction as required to specify fire-resistance rating indicated.
   c. Blocking: shall be as follows:
      i. 5-inch (125-mm) top rail blocking.
      ii. 5-inch (125-mm) bottom rail blocking.
      iii. 5-by-18-inch (125-by-450-mm) lock blocks.
      iv. 5-inch (125-mm) midrail blocking.
4. Specify pair matching and set matching for pairs of doors and doors hung in adjacent sets.
5. Require that flush wood doors be fabricated to comply with the following requirements:
   a. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-resistance-rated doors.
   b. Hardware shall be located to comply with DHI-WDHS-3 and DHI A115-W series standards, and hardware templates.
6. Specify that all new wood doors are finished at the factory.

7. In renovation projects, specify doors that are to be relocated require sealing or refinishing.

END OF SECTION 081000

SECTION 084000

ALUMINUM STOREFRONTS AND ENTRANCES

I. GENERAL CRITERIA

A. QUALITY ASSURANCE

1. System Performance. Specify exterior entrance and storefront assemblies that have been designed and fabricated to comply with system performance characteristics listed below as demonstrated by testing systems according to test methods designated.
   a. Wind Loading. Specify capacity to withstand loading specified by structural design, tested in accordance with ASTM E 330.
2. Specify that transmission characteristics of fixed framing shall comply with requirements indicated below.
   a. Air infiltration shall be not more than 0.06 CMF per square foot of fixed area in accordance with ASTM E 283.
   b. No uncontrolled water penetration shall occur at pressure differential of 6.24 psf in accordance with ASTM E 331 (excluding operable door edges).
   c. Condensation resistance shall be not less than 51 CRF in accordance with AAMA 1502.7.
   d. The specified thermal transmittance U-value shall comply with the currently enforced International Energy Conservation Code requirements.
3. Specify that transmission characteristics of entrances (doors with jamb and head frames) shall comply with requirements indicated below.
   a. Air infiltration per linear foot of perimeter crack shall be not more than 0.50 CFM for single doors and 1.0 CFM for pairs of doors at pressure differential of 1.567 psf in accordance with ASTM E 283.
   b. Condensation resistance shall be not less than 48 CRF in accordance with AAMA 1502.7.
   c. The specified thermal transmittance U-value shall comply with the currently enforced International Energy Conservation Code requirements.
4. Installer Qualifications: Specify that the contractor shall engage a firm who can provide evidence to indicate successful experience in the installation of work specified herein.
5. Welding Qualifications: Specify that welding shall comply with requirements of AWS D1.1 Structural Welding Code, for welding design, workmanship, techniques, inspection, and qualification of welding operators.
6. Specify separation between aluminum surfaces and sources of corrosion or electrolytic action, such as copper or untreated steel, by coating area of dissimilar metals with heavy-bodied bituminous paint.
7. Specify that aluminum surfaces in contact with lime mortar or concrete shall be painted with alkali-resistant coating.
8. Specify impact resistant glazing for police precincts and other police buildings. Confirm requirements with the County prior to final design and specification. Refer to 088000 for glazing characteristics.

II. DESIGN STANDARDS

A. SOURCE QUALITY CONTROL

Specify that a single manufacturer or source shall provide materials of each type to ensure matching of quality, color, pattern and texture. Source or brands shall not be changed during the course of construction.

B. MATERIALS

1. Specify basis of design of aluminum storefront system doors and frames shall be Standard Flush Glaze System as manufactured by Kawneer. Frames and door stiles shall be tubular extrusions with 1/8 inch minimum wall thickness.
2. Other approved manufacturers:
   a. YKK
   b. Vista Wall Series 3000
3. Specify that swinging doors shall be Model 35D wide stile (6”) doors.
4. Specify that frames shall be 451-T.
5. Specify that glazing stops shall be square type.
6. Specify that all exposed surfaces shall be free of scratches and other serious blemishes and shall receive Kynar 500 or be anodized.
7. Specify that extrusions shall be 6063-T5 alloy and temper (ASTM B 221 alloy G.S. 10A-T5). Fasteners, where exposed, shall be aluminum, stainless, steel, or plated steel in accordance with ASTM A 164. Perimeter anchors shall be aluminum or steel, providing the steel is property isolated from the aluminum. Glazing gaskets shall be elastomeric extrusions.
   a. Specify that the framing system shall provide for flush glazing on all sides with no projecting stops. Vertical and horizontal framing members shall have a nominal face dimension of 2". Overall depth shall be 4 ½". Entrance framing members shall be compatible with glass framing in appearance. All single acting entrance frames shall include the Sealair positive barrier weathering.

C. FABRICATION

1. Specify the following requirements for shop assembly: Perform fitting and assembly of the work in the shop to the greatest extent possible. Work that cannot be permanently shop-assembled shall be completely assembled, marked, and disassembled before shipment, to assure assembly in the field. Require the following:
   a. Preglazing: Preglaze door and frame units to greatest extent possible, in coordination with installation and hardware requirements.
   b. Surface Mounted Hardware: Do not drill and tap for surface mounted hardware items until time of installation.
   c. Welding: Comply with AWS recommendations.

END OF SECTION 084000

SECTION 087000

DOOR HARDWARE

I. GENERAL CRITERIA

A. SUMMARY

1. Door hardware includes, but is not necessarily limited to, the following:
   a. Mechanical door hardware.
   b. Electromechanical door hardware, power supplies, back-ups and surge protection.
   c. Cylinders specified for doors.
2. Standards: All hardware shall comply with the following industry standards:
   a. ANSI/BHMA Certified Product Standards - A156 Series
   b. UL10C – Positive Pressure Fire Tests of Door Assemblies

B. COORDINATION

1. Door Hardware and Electrical Connections: The Architect shall coordinate the specification of scheduled electrified door hardware and related access control equipment with required connections and compatibility with the source power, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
2. Door Hardware and keying systems shall match existing in building renovations unless otherwise directed by the County.
3. Require the contractor to field verify hardware templates and feasibility for the reuse of door panels to receive new hardware in building renovations.

C. WARRANTY

1. Special Warranties shall be in addition to, and run concurrent with, other warranties made under requirements of the Contract Documents.
2. Warranty Period: Specify written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the County. Failures include, but are not limited to, the following:
   a. Structural failures including excessive deflection, cracking, or breakage.
   b. Faulty operation of the hardware.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   d. Electrical component defects and failures within the systems operation.
3. Standard Warranty Period
   a. One (1) year from date of Substantial Completion, unless otherwise directed by the County.
4. Special Warranty Periods shall be specified as follows:
   a. Twenty-five (25) years for heavy duty cylindrical (bored) locks and latches.

b. Twenty-five years (25) for manual door closers.
c. Two (2) years for electromechanical door hardware.

D. MAINTENANCE SERVICE

1. Require a complete set of specialized tools and maintenance instructions as needed for County's continued adjustment, maintenance, and removal and replacement of door hardware.
2. Require (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Maintenance agreement shall include parts and labor. The term of the maintenance agreement shall begin at substantial completion and run concurrent with all applicable warranties.

II. DESIGN STANDARDS

A. SCHEDULED DOOR HARDWARE

1. Designations: Insure that requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are clearly indicated in the Door Hardware specifications. Products should be identified using door hardware designations, as follows:
   a. Named Manufacturer's Products: Product designation and manufacturer should be listed for each door hardware type required for the purpose of establishing requirements.
2. Substitutions: Any substitutions to standard hardware must be approved by the County prior to final design and specification.

B. HANGING DEVICES

1. Acceptable Manufacturers:
   a. Bommer (BO).
   b. McKinney (MC).
   c. PBB Hinges (PB).
   d. Stanley (ST).
2. Hinges shall meet ANSI/BHMA A156.1 for certified butt hinges with number of hinge knuckles clearly specified in the Door Hardware Specification.
3. Specify the following hinge quantity, unless otherwise directed:
   a. Two Hinges: For doors with heights up to 60 inches.
   b. Three Hinges: For doors with heights 61 to 90 inches.
   c. Four Hinges: For doors with heights 91 to 120 inches.
   d. For doors with heights more than 120 inches, specify 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
4. Hinge Size: Specify the following hinge widths sized for door thickness and clearances required:
   a. Widths up to 3'0": 4-1/2" standard or heavy weight as required.
   b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as required.

5. Hinge Weight and Base Material: Specify the following:
    a. Exterior Doors: Heavy weight, non-ferrous, ball bearing hinges unless conditions require standard weight.
    b. Interior Doors: Standard weight, steel, ball bearing hinges unless conditions require heavy weight.
    c. Tornado Resistant Assemblies: At a minimum, specify heavy weight hinges with stainless steel screws used in accordance with and specified as part of a Severe Storm Shelter Opening meeting ICC 500 and FEMA 361.
6. Hinge Options: Comply with the following:
    a. Non-removable Pins: Specify set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:
        i. Out-swinging exterior doors.
        ii. Out-swinging access controlled doors.

C. DOOR OPERATING TRIM

1. Flush Bolts and Surface Bolts:
    a. Acceptable Manufacturers:
        i. Burns (BU).
        ii. Rockwood Manufacturing (RO).
        iii. Trimco (TC).
    b. Flush Bolts and surface bolts must meet ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts.
    c. Manual flush bolts shall be specified with top rod of sufficient length to allow bolt location approximately six feet from the floor.
    d. Specify dust proof strikes for bottom bolts.
    e. Surface bolts shall be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
    f. Specify related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
2. Push Plates and Pulls
    a. Acceptable Manufacturers:
        i. Burns (BU).
        ii. Rockwood Manufacturing (RO).
        iii. Trimco (TC).
    b. Door Push Plates and Pulls shall meet ANSI/BHMA A156.6 certified door pushes and pulls.
    c. The Architect shall coordinate and specify proper width and height as required by the design.
    d. Push/Pull Plates shall be .050 inch thick, 4-inches wide by 16-inches high, with square corners and beveled edges, secured with exposed screws.
    e. Straight Pulls shall be 1-inch diameter stainless steel bar or tube stock pulls with 2 1/2-inch projection from face of door.
    f. Offset Pulls shall be 1-inch diameter stainless steel bar or tube stock pulls with 2 1/2-inch projection and offset of 90 degrees.

g. Push Bars shall be 1-inch diameter horizontal push bars with minimum clearance of 2 1/2-inch projection from face of door.
h. Fasteners: Specify manufacturer's designated fastener type as required by each application.
i. Other Push Pull plates may be specified, but must be approved by the County prior to final design and specification.

D. CYLINDERS AND KEYING

1. General
   a. Cylinder manufacturer to have minimum (10) years of experience designing master key systems.
   b. Specify each type of keyed cylinder and keys from the same source manufacturer as locksets.
2. **Acceptable Manufacturers:**
   a. Best (BE) * Basis of Design @ Parks and Recreation
   b. Cal-Royal (CA) * Basis of Design @ Fire and Emergency Services
   c. Schlage (SC) * Basis of Design @ Police
   d. Sargent (SA) * Basis of Design @ Library
   e. Yale (YA) * Basis of Design @ Support Services on GJAC campus
   f. Corbin Russwin (RU)
3. Cylinders shall comply with the following:
   a. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
   b. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   c. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Keying System
   a. Each type of lock and cylinders shall be factory keyed. The Architect shall conduct a "Keying Conference" to define and document keying system instructions and requirements with the County and User Group. Keys shall be specified to be factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by County. Incorporate decisions made in keying conference, and as follows
      i. Master Key System: Cylinders are operated by a change key and a master key.
      ii. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.
5. Key Quantity
   a. Specify the following minimum number of keys, or as directed by the County.
      i. Top Master Key: One (1)
      ii. Change Keys per Cylinder: Two (2)
      iii. Master Keys (per Master Key Group): Two (2)
      iv. Grand Master Keys (per Grand Master Key Group): Two (2)
      v. Construction Control Keys (where required): Two (2)
      vi. Permanent Control Keys (where required): Two (2)
6. Construction Keying

a. Specify construction master keyed cylinders or temporary keyed construction cores and construction master keys in quantity expected to be required by project Contractor.
b. Specify that all construction cores be replaced with permanent cores.

7. Key Registration List
   a. Specify keying transcript list to the County representative in the proper format for importing into key control software.

E. MECHANICAL LOCKS AND LATCHING DEVICES

1. Acceptable Manufacturers:
   a. Best (BE) – 9K Series.
   b. Cal-Royal (CA) – Genesis Series.
   c. Schlage (SC) – ND Series.
   d. Sargent (SA) – 10 Line Series.
   e. Yale (YA) – 8700 Series (mortise lock @ GJAC campus)
   f. Corbin Russwin (RU) – CL3300 Series
2. Cylindrical Locksets shall be Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1, certified cylindrical (bored) locksets furnished in the functions as required by the specific application.
3. Lock chassis shall be fabricated of heavy gauge steel, zinc dichromate plated, with through-bolted application. Specify with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latch bolt.
4. Locks shall be non-handed.
5. Lock Trim shall be designed to fit the application.
6. Specify knurling or abrasive coating to all levers on doors leading to hazardous areas such as mechanical rooms, boiler and furnace rooms, janitor closets, and as otherwise required.

F. LOCK AND LATCH STRIKES

1. Specify manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame:
   a. Flat-Lip Strikes: For locks with three-piece antifriction latch bolts, as recommended by manufacturer.
   b. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
   c. Specify manufacturer's special strike box fabricated for aluminum framing.
2. Strikes shall comply with the following standards:
   a. Strikes for Mortise Locks and Latches: BHMA A156.13.
   b. Strikes for Bored Locks and Latches: BHMA A156.2.
   c. Strikes for Auxiliary Deadlocks: BHMA A156.5.
   d. Dustproof Strikes: BHMA A156.16.

G. EXIT DEVICES

1. Acceptable manufacturers:
   a. Corbin Russwin
   b. Sargent
   c. VonDuprin
2. Provide Electrified Exit Device options at all access controlled doors as required by the design.
3. Specify Panic Devices complying with NFPA 80 that are listed and labeled by a testing and inspection agency acceptable to the authority having jurisdiction, for fire and panic protection based on testing according to UL 305 and NFPA 252.

H. DOOR CLOSERS

1. Acceptable Manufacturers:
   a. LCN (LC) – 4040 Series.
   b. PDQ (PD) -- 7100 Series.
   c. Sargent (SA) - 280 Series
   d. Rixson (RX)
2. Heavy duty door closers shall meet ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and be fully operational adjustable according to door size, frequency of use, and opening force.
3. Closers shall be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable back check and separate non-critical valves for closing sweep and latch speed control. Specify non-handed units and high impact, non-corrosive plastic covers standard.
4. Specify that contractor shall adjust closers to fully comply with ADA requirements.

I. ARCHITECTURAL TRIM

1. Acceptable Manufacturers:
   a. Burns (BU).
   b. Rockwood Manufacturing (RO).
   c. Trimco (TC).
2. Protection plates (kick, armor, or mop) shall be specified and sized not more than 2" less than door width (LDW) on stop side and not more than 1" less than door width on pull side. Coordinate and specify proper width and height as required by the design condition.
3. Metal Protection Plates shall conform to ANSI/BHMA A156.6 beveled on four edges (B4E), and be of the materials indicated below:
   a. Stainless Steel: 050-inch thick, with countersunk screw holes (CSK).
4. Specify manufacturer's designated fastener type for each application.
5. Door protection edging shall be .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Specify appropriate leg overlap to account for protection plates as required. Height to be determined by application.

J. DOOR STOPS AND HOLDERS

1. DOOR STOPS AND BUMBERS - Acceptable Manufacturers:
   a. Burns (BU).
   b. Rockwood Manufacturing (RO).
   c. Trimco (TC).
2. OVERHEAD DOOR STOPS AND HOLDERS - Acceptable Manufacturers:
   a. ABH (AB).
   b. Glynn Johnson (GJ).
   c. Rixson (RF).
3. Door Stops and Bumpers shall meet ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Specify wall bumpers, either convex or concave types based on application with proper anchorage.
4. Do not mount floor stops where they will impede traffic.
5. Where floor or wall bumpers are not appropriate, specify overhead type stops and holders.
6. Overhead Door Stops and Holders shall meet ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders.
7. Specify surface or concealed types as required by the application.
8. Track, slide, arm and jamb brackets shall be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Specify non-handed design with mounting brackets as required for proper operation and function.

K. ARCHITECTURAL SEALS

1. Thresholds, weatherstripping, and gasket seals to be of type and designed as required by the application.
2. Specify continuous weatherstrip gasketing on exterior doors
3. Specify smoke, light, or sound gasketing on interior doors where required. At exterior applications specify non-corrosive fasteners.
4. Smoke Labeled Gasketing Assemblies shall comply with NFPA 105 and shall be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings and tested in accordance with UL 1784.
5. Specify smoke labeled perimeter gasketing at all smoke labeled openings.
6. Fire Labeled Gasketing Assemblies shall comply with NFPA 80 and shall be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings required, based on testing according to UL-10C.
7. Specify intumescent seals as required to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.
8. Sound-Rated Gasketing Assemblies shall be specified that are listed and labeled by a testing and inspecting agency, for sound ratings required, based on testing according to ASTM E 1408.
9. Replaceable Seal Strips: Specify only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

10. Acceptable Manufacturers:
    a. National Guard Products (NG).
    b. Pemko Manufacturing (PE).
    c. Reese Enterprises, Inc. (RS).

L. FABRICATION

1. Fasteners: Specify door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Specify screws according to manufacturers recognized installation standards for application intended.

M. FINISHES

1. Specify US15 unless otherwise directed by the County. Finishes must comply with ANSI/BHMA A156.18
2. The Architect shall coordinate with the County and product manufacturer prior to final design and specification.
3. Specify quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
4. Specify hardware with strippable, temporary protective coverings.
5. Antimicrobial Finishes shall be specified where required on locksets, latchsets, exit devices and push/pull trim to incorporate an FDA recognized. Silver Ion, antimicrobial coating (MicroShield™) listed for use on equipment as a suppressant to the growth and spread of a broad range of bacteria, algae, fungus, mold and mildew.

END OF SECTION 087000

SECTION 088000

GLAZING

I. GENERAL CRITERIA

A. Specify that the Manufacturer provide the installer with specifications and installation instructions for each type of glazing sealant, gasket and associated miscellaneous material required. Include manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the requirements and is intended generally for the specific application.

B. Specify that the Manufacturer provide the installer with Material Data Indicating that glazing materials will withstand the forces specified in the design documents which shall include basis for determining wind loading criteria and indicate concurrence with glazing channel dimensions.

C. Specify that Glass units shall be handled and stored in accordance with manufacturer's instructions.

D. A written warranty from the glass manufacturer shall be provided as follows:
   1. Insulating glass: Manufacturer's standard warranty shall be provided guaranteeing that insulating units will not develop material obstruction of vision between the interior glass surfaces caused by failure of the hermetic seal due to faulty construction for ten (10) years from date of Architect's Certificate of Substantial Completion of the Project.
   2. All units: Manufacturer's standard warranty that glass units supplied to Project will be free from defects in material and workmanship shall be provided.

E. Specify that all glass installations shall be watertight and airtight installation of each piece of glass is required. Each installation must withstand normal temperature changes, wind loading, impact loading (for operating sash and doors) without failure of any kind including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

F. Specify that glazing channels shall provide for necessary minimum bite on the glass, minimum edge clearance and adequate sealant thicknesses, within allowable tolerances. The installer is responsible for correct glass size for each opening, within the tolerances and necessary dimensions established.

G. Specify that all glass shall be protected from edge at all times during handling, installation and operation of the building. Glass breakage during the warranty period will be considered a form of faulty material or workmanship (resulting from edge damage) unless known to result from vandalism or other causes not related to materials and workmanship.

H. All glass shall bear the manufacturer's label to identify type, thickness and quality.

I. Require that at a minimum all glass installations shall comply with published recommendations of glass product manufacturers and organizations below.
   1. FGMA Publications: "FGMA Glazing Manual."
   2. LSGA Publications: "LSGA Design Guide."
   3. SIGMA Publications: TM-3000 "Vertical Glazing Guidelines"

J. Specify that all glass shall be a minimum 1/4 inch minimum thickness.

K. Specify that all glass panels shall be field measured to fit in provided openings.

L. Specify that the sizes for glass shall be measured and determined from the installed frames, doors and sash.

M. Require that Workmanship shall be in accordance with the Standards of the Flat Glass Marketing Association Glazing Manual.

N. Glass material shall be specified according to the following performance criteria:
   1. Light Transmittance
   2. Reflectance
   3. U Value
   4. Shading Coefficient
   5. Solar Heat Gain

6. Specify UL Level l glass at all police transaction windows and at locations determined by the County at all Police facilities.

7. Specify Abuse and Attack resistant Glazing at locations as determined by the County.

II. DESIGN STANDARDS

A. Acceptable Manufacturers:
   1. PPG Industries
   2. Old Castle
   3. ACG Flat Glass of North America
   4. Global Security Glazing (Bullet Resistant and Impact resistant)
   5. Other Manufacturers as approved by the County

B. Primary Float Glass: Type I (transparent glass, flat)
   1. Follow ASTM C 1036

C. Insulated Glass Units: For insulated Glass Units, require the following:
   1. All exterior glass shall be insulated glazing, including spandrel glass, full and partial lite glass doors.
   2. Insulating glass shall consist of two lites of glass with a hermetically and permanently sealed air space, and shall conform to Sealed Insulating Glass Manufacturer's Association (SIGMA) No. 65-7-2, "Sealed Insulating Glass Units."

3. Exterior lite shall be 1/4 inch (6.0 mm) thick float glass and fully tempered where applicable.
4. Interior glazing use clear glass, single lite and be fully tempered where applicable.
5. Interior lite shall be 1/4 inch (6.0 mm) thick float glass and fully tempered where applicable.
6. Air space shall be ½ inch (120 mm) Type B system.
7. Insulated glass must be approved by the County for the intended use and shall meet the minimum requirements of the International Energy Conservation Code, currently adopted edition.

D. Tempered Glass shall follow ASTM C 1048, Type 1 (transparent, flat glass), Quality-03, provide kind FT (fully tempered) float glass in place of annealed float glass. Use in interior and exterior "hazardous" locations, defined to include:
1. Any glazing in doors.
2. Any glazing within 24" of a door whose bottom edge is less than 60" A.F.F.
3. Any glazing which meets all of the four following characteristics:
   a. Greater than 9 sq. ft. in area.
   b. Bottom edge less than 18" A.F.F.
   c. Top edge greater than 36" A.F.F.
   d. Closer than 36" from an adjacent walking surface.

E. Interior View Panels or Fire Windows in Corridors - In the International Building Code, such panels are allowed but cannot compose more than 25% of the corridor wall area, cannot exceed 1,296 sq. inches or 54" in greatest dimension, and are ¼" wired glass (or special fire glass) in steel frame.

F. Fire Rated Glass shall meet the following minimum criteria:
1. 3/16" thick fire-rated and impact safety-rated glazing material composed of Fire Lite and surface-applied fire-rated film.
2. Weight: 2.4 lbs./sq. ft.
3. Fire Rating: 20 minutes to 3 hours for doors.
4. Approximate Visible Transmission: 88%
5. Impact Safety Rating: Meets or exceeds ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
6. Surface Finish: Premium
7. Labeling: Permanently label each piece of glass with the company logo, UL logo and fire rating.

G. Bullet resistant glass shall meet the following minimum criteria: Basis of design is Secure-Tem +poly Ul Level 1
1. Ballistic Rating: UL Standard 752 – Level 1, 9mm Full Metal Copper Jacket with Lead Core – No spall, No penetration
2. Thickness: 3/4" within .640"/.730"
3. Weight 7.14 lbs./square foot
4. Uvalue:.86
5. Shading Co-efficient: .81
6. Light transmission: .79
7. Applicable standards: ANSI Z97.1, CPSC 16 CFR 1201 (CATEGORY I AND II), ASTM C 1036, ASTM C1349

8. Labeling: Permanently label each piece of glass with the UL Ballistic rating.
9. Verify UL rating with the County prior to final design and specification.

H. Impact resistant glass shall meet the following minimum criteria: Basis of design is "Secure-Tem 3" by Global Security Glazing
1. Components:
   a. 1/8" heat strengthened glass
   b. .090 polyvinyl butyral (PVB)
   c. 1/8" heat strengthened glass
   d. .090 polyvinyl butyral (PVB)
   e. 1/8" heat strengthened glass
2. Overall thickness: 9/16" within .525"/.582"
3. Weight 4.89 lbs./square foot
4. Uvalue: 1.00
5. Shading Co-efficient: .74
6. Light transmission: .83
7. Applicable standards: ANSI Z97.1, CPSC 16 CFR 1201 (CATEGORY I AND II), ASTM C 1036,
8. Labeling: Permanently label each piece of glass with the applicable rating.

I. Glazing Compound: For metal frames, require conformance with section "Glazing Materials" of the FGMA Glazing Manual. Compound used for glazing aluminum shall be pigmented with aluminum powder to match aluminum unit without staining or discoloring, shall be non-hardening and shall be a type not requiring painting.

J. When flexible vinyl gasket channels are used, require conformance with ASTM D 2287.

K. Not Permitted: metal sash putty, non-skinning compounds, non-resilient type preformed sealers, and preformed impregnated type gaskets.

L. Require supplemental accessories to provide a complete installation, including glazing points, clips, shims, angles, heads, setting blocks and spacer strips.

END OF SECTION 088000

DIVISION 09: FINISHES

SECTION 092000

GYPSUM ASSEMBLIES

I. GENERAL CRITERIA

A. Require contractor to obtain each type of gypsum board, other panel products, and finishing materials from a single manufacturer.

B. Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are required, specify gypsum board assemblies that comply with requirements as follows in C, D and E.

C. Fire-Resistance Ratings shall comply with GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

D. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, specify materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

E. STC-Rated Assemblies: For STC-rated assemblies, specify materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

F. Gypsum board manufactured outside the Continental United States is not permitted.

G. Gypsum Wallboard shall comply with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

H. Include the following statement verbatim on the Life Safety Plan as required by Gwinnett County:

> Contractor shall permanently identify all fire resistant rated walls (and corresponding fire resistant rating) including fire barrier walls, smoke barrier walls, fire partitions, fire walls, and shaft enclosures either by installing signs or by stenciling in concealed spaces the following: (( ) HOUR FIRE AND SMOKE BARRIER, PROTECT ALL PENINGS), Identification shall be spaced mot more than twelve (12) feet on center with a minimum letter size of two (2) inches in height on a contrasting background (SBC section 7035 of the 2003 Georgia State Amendments (Title 25 State Fire Marshal's Rules and Regulations Chapter 120.3.3).

I. All Interior Gypsum wall assemblies shall have a level 4 finish with the exception of any assembly that will receive a semi-gloss, gloss, or epoxy coating. These assemblies shall have a level 5 finish.

J. Ceiling soffits shall have a level 5 finish and have expansion joints at intersecting corners.

K. Walls shall have control joints at all spans that exceed twenty five (25) feet.

L. All curved assemblies shall be multi-layer applications sufficient to achieve the design intent without compromising the integrity of the panels.

M. All Gypsum wall board shall be finished with metal edges where abutting other materials.

N. All Gypsum assemblies shall be applied using screws. Nails are not permitted.

O. All Gypsum finishing shall be accomplished by vacuum sanding.

P. Specify all gypsum board patching to be from stud to stud.

Q. Interior gypsum assemblies at exterior walls shall be full height.

R. Access panels shall be provided in all assemblies for any equipment or item requiring maintenance or periodic replacement.

S. Acoustic sealant shall be provided at the top and bottom, and around all penetrations of assemblies classified as “sound” or “acoustic” rated assemblies.

T. All gypsum assemblies surrounding private offices, conference rooms, and meeting rooms shall contain sound attenuation blankets for the full height of the assembly.

U. All Gypsum assemblies used for rooms requiring a high degree of privacy and/or security shall have an STC of greater than 50.

II. DESIGN CRITERIA

A. Specify products from one of the following Manufacturers:
   1. Georgia-Pacific Building Products
   2. United States Gypsum Corporation
   3. Quiet Solution, Inc.
   4. National Gypsum Corporation

B. Regular gypsum board:
   1. 5/8" Type X gypsum board.

C. Gypsum board at shower locations and wet walls containing plumbing fixtures
   1. 5/8" Durock Cement Board Next Gen.

D. Gypsum board at non-wet restroom walls scheduled to receive painted gypsum board and wall tile and ceilings scheduled to receive gypsum board shall receive the following:
   1. 5/8” Sheetrock Brand Mold Tough Drywall.

E. High Impact Gypsum Board shall be used at high abuse areas

1. Sheetrock Brand® 5/8” Mold Tough® VHI Firecode® Core Gypsum Panel
    a. Abrasion Resistance ASTM C1629: Level 2.
    b. Indentation Resistance ASTM C1629: Level 2.
    c. Soft Body Impact Resistance ASTM C1629: Level 3.
    d. Hard Body Impact ASTM C1629: Level 3.

F. Gypsum Board Base Layer(s) for Multilayer Applications: Gypsum wallboard, ASTM C 36, and as follows:
1. Type: Type X as required for fire-resistance-rated assemblies.
2. Edges: Manufacturer's standard.
3. Thickness: 5/8” layers to achieve desired condition.
4. Curved assemblies: 1/4” to 5/8” layers as required by conditions

G. Exterior Gypsum Board Sheathing: Glass Mat Gypsum Substrate, ASTM C117 and as follows:
1. Securock Glass-Mat Sheathing 5/8” by United States Gypsum.
2. DensGlass Gold 5/8” Type X Glass-Mat Faced Gypsum Sheathing by Georgia Pacific.
    a. Edges: Square.

H. Gypsum Board at Sound Wall Partitions
1. QuietRock 527 by Quiet Solution, Inc./Serious Energy, Inc. www.quietrock.com
    a. Edges: Tapered.
    b. Thickness: 5/8”.
    c. Weight: 2.7 psf.

I. Accessories for Interior Installation: Corner bead, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:
1. Material: Formed metal, with metal complying with the following requirement:
    a. Steel sheet zinc coated by hot-dip process or rolled zinc.

J. Specify joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

K. Joint Tape for Gypsum Board: Specify Paper reinforcing tape.

L. Drying-Type Joint Compounds for Gypsum Board shall be factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.
1. Ready-Mixed Formulation: Factory-mixed product.
    a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
    b. Topping compound formulated for fill (second) and finish (third) coats.
    c. All-purpose compound formulated for both taping and topping compounds.

M. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, non-staining latex sealant complying with ASTM C 834 and the following requirements:

1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

N. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

O. Sealant Products: Subject to compliance with these requirements, specify that the contractor shall provide one of the following:

1. Acoustical Sealant for Exposed and Concealed Joints:
   a. PL Acoustical Sealant; ChemRex, Inc.; Contech Brands.
   b. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
   c SHEETROCK Acoustical Sealant; United States Gypsum Co.
2. Acoustical Sealant for Concealed Joints:
   a. BA-98; Pecora Corp.
   b. Tremco Acoustical Sealant; Tremco, Inc.

END OF SECTION 092000

SECTION 093000

TILING

I. GENERAL CRITERIA

A. This Section includes the following:
   1. Unglazed Porcelain Tiles
   2. Glazed Wall Tile
   3. Quarry Tile
   4. Ceramic mosaic tile
   5. Mortar Materials
   6. Grout Materials
   7. Setting Materials
   8. Accessories
   9. Installation Schedule

B. Tiling shall be used in Public Lobbies/corridors, kitchens and restrooms only, except in special circumstances as authorized by the County.

C. Tile grading and certification shall comply with ANSI-A137.1. Certificates are required for tile materials and should be issued by the manufacturer.

D. Maximum allowable tolerances in finish work shall be +/- 1/4".

E. Specify that required submittals include product and technical data, instruction for all materials related to tile work, and full size samples of each type of tile specified.

F. Require Shop drawings be submitted that indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds and setting details.

G. Require extra materials that match the specified products. Attic stock shall be packaged in the original containers with protective cover and identified with labels describing the contents. All attic stock shall be full size units equal to 5% of the amount for each material installed.

H. Require the contractor to field verify existing conditions prior to the start of work.

I. Specify floor leveling requirements for floors with variations of greater than 1/8” in ten feet unless tile is specified to slope to floor drains.

J. All restroom floors, and all tile floors containing floor drains, shall be designed with mortar beds and recessed floor slabs. The finished floor level shall be flush with adjacent floor surfaces and shall slope a minimum of 1/8” per foot to floor drains.

K. Partial Tiles shall not be less than 6” in width.

L. All threshold details shall be included on the drawings and coordinated with the project specifications.

M. Porcelain tile shall be stain resistant.

N. Require mildew resistant additive and penetrating sealer on all grout.

O. Require fungicide in silicone sealant in high humidity areas.

P. Require metal edge strips for thin set applications, angle or L-shape: metallic or combination of metal and PVC or neoprene base for flooring applications, white zinc alloy exposed edges.

Q. Unless directed otherwise by the County, require all thresholds be marble meeting MIA Group A, honed finish, with beveled edges at 1:2 slope, height limited to ½" or less, finish bevel to match face of threshold.

R. Expansion and control joint strips to be specified as follows:
   1. Surface expansion joint: rigid PVC
   2. Screed expansion joint: flexible PVC
   3. Control joint: two part, polyurethane-based sealant with separate pre-packaged color agent; latex additive to be undiluted liquid type as recommended by manufacturer.

S. Require a neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

T. Specify that tile shall be installed, per TCA F113-90 sloping to floor drains, where applicable, in accordance with ANSI specification A-108.5. Wall tile shall be installed per TCAW202-90.

U. Specify that tile shall be installed in grid pattern with continuous and properly aligned joints in all directions.

V. Thresholds shall be installed at all wall openings where quarry tile abuts other floor finishes.

W. Maximum threshold height ½".

X. Where tile abuts doorframes or other items of dissimilar material, a ⅛" joint shall be specified. The joints shall be caulked with caulking compound that matches grout.

Y. Tile shall be spaced on surfaces to be covered to a minimum width of one-half tile.

Z. Require that cutting of all tile be with a masonry saw.

AA. Require that accent wall tile be installed level and true to line.

BB. Floor tile in toilet rooms shall be epoxy grouted. Floor tile in kitchens and ancillary spaces shall be specified with epoxy grout that is charcoal in color.

CC. Specify that all installation be in accordance with TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation."

DD. All tile floors shall have "soft" joints at perimeter walls, corridor intersections, and when determined by the room size.

II. DESIGN STANDARDS

Acceptable Manufacturers	
Product	Manufacturer
Wall and Floor Tiles	Specialty Tile
	Dal Tile
	American Olean
	Crossville Tile
	Florida Tile
	Summitville Tile
	Buchtal Corporation
	Metropolitan Ceramics
	Graniti Fiandre
	Interceramic
	Porcelainite
	Seneca Tiles
	United States Ceramic Tle
	Winburn Tile Manufacturing
Adhesives, Mortar, Grout, Leveling Compounds	Bostik
	Laticrete International
	Mapei
	Custom Building Products
Combination Waterproofing and Adhesive	Mapei
	Bostik
	Southeastern Metals
Expansion Joints and Edge Strips	Schluter Systems
	County Approved Equal
Leveling Compounds	Ardex
	County Approved Equal
Dry Set Grout	Bostik
	Hydroment
Acid Alkali Resistant Epoxy Grout	Mapei
	Keropoxy

A. UNGLAZED PORCELAIN CERAMIC TILE (PCT)

1. Specify standard grade ceramic glazed wall and floor tile conforming to ANSI A137.1.
2. Specify tiles manufactured to specific thicknesses after firing to be nominal 8mm or greater for larger tiles or 6mm for mosaics.
3. Tile sizes shall be no larger than 12” x 12” unless otherwise directed by the County.
4. Trim shapes shall be the same material and finish as the tiles.
5. Tile shall meet or exceed the ADAAG slip resistance coefficient of 0.6 on static surfaces.
6. Tile wainscoting shall be specified in all public restrooms up to 60” above finished floor.
7. Porcelain Wall Tile Trim, Specify the following installation characteristics:
    a. Size, color, and shade to match field tile.
    b. Bull nose at top tile
    c. Standard, square top, cove base at tile floors.
    d. Square top, set-on type, cove base at other floors.
    e. Square edges at inside corners.
    f. Bull nose edges at outside corners, jambs and top course

B. CERAMIC WALL TILE (CT)

1. Specify standard grade ceramic glazed wall tile conforming to ANSI A137.1.
2. Specify standard sizes by 5/16" thick minimum, matte glazed tile with cushioned edge.
3. Specify standard grade ceramic unglazed floor tile conforming to ANSI A137.1.
4. Tile shall meet or exceed the ADAAG slip resistance coefficient of 0.6 on static surfaces.
5. Grout Joint: 1/4”
6. Tile Wainscoting shall be specified in all public restrooms up to 60” Above finished floor.
7. Glazed Wall Tile Trim, Specify the following:
    a. Size, color, and shade to match field tile.
    b. Bull nose at top tile
    c. Standard, square top, cove base at tile floors.
    d. Square top, set-on type, cove base at other floors.
    e. Square edges at inside corners.
    f. Bull nose edges at outside corners, jambs and top course

C. QUARRY TILE (QT): Square-edge tile as follows:

1. Module Size: 6” x 6”
2. Thickness: 1/2 inch.
3. Wearing Surface: Unglazed quarry textures
4. Grout Joint: 3/8”
5. Matching cove base

D. CERAMIC MOSAIC TILE (CMT)

1. Tile products shall meet or exceed the ADAAG slip resistance coefficient of 0.6 on static surfaces
2. Specify standard grade ceramic mosaics conforming to ANSI A137.1.
3. Specify standard 1” or 2” square by ¼" thick tile type with all-purpose edges and patterns.
4. Specify master-set, back mounted sheets.
5. All tiles shall be specified with 7½% abrasive grain content in wet areas only.

E. MORTAR MATERIALS

1. Specify Products as required by the design conditions in accordance with acceptable manufacturers listed in section II conforming to ANSI A118.
   a. Dry set mortar
   b. Latex Portland Cement Mortar
   c. Chemical Resistant, Water Cleanable, Tile setting and Grouting Epoxies

F. GROUT MATERIALS

1. Dry set grout for wall tile:
   a. Specify Mix in accordance with manufacturer's instructions using acrylic latex additive.
   b. Color to be selected from manufacturer’s standards.
   c. Specify Dry set gout with a mildew resistive additive.
   d. Specify a penetrating sealer to grout after installation.
   e. Grouting materials and admix materials shall be from the same manufacturer as setting material, compatible with setting bed.
2. Acid alkali resistant epoxy grout at all floor tile.
   a. 100% epoxy 2 part or 3 part composition meeting ANSI A118.3.
   b. TCA licensed for acid alkali resistance.

G. SETTING MATERIALS

1. Portland Cement Mortar Installation Materials: Specify materials complying with ANSI A108.1A and as follows:
   a. Cleavage Membrane: Asphalt felt, ASTM D226, Type 1 (No. 15), or polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.
   b. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2" by 2" by 0.062" diameter, comply with ASTM A185 and ASTM A82, except for minimum wire size.
2. Dry-Set Portland Cement Mortar: ANSI A118.1
   a. For wall applications, Specify non-sagging, latex Portland cement mortar complying with ANSI A118.4 for mortar of this type defined in Section F-2.1.2.
3. Latex Portland Cement Mortar: ANSI A118.4, composed as follows:

a. Mixture of Dry-Mortar Mix and Latex Additive: Mixture of pre-packaged dry-mortar mix and liquid-latex additive complying with the following requirements:
b. Latex Additive: Acrylic Resin

4. Chemical-Resistant, Water-Cleanable, Ceramic Tile-Setting and Grouting Epoxy: ANSI A118.3.
   a. Specify product capable of resisting continuous and intermittent exposure to temperatures of up to 140°F and 212°F, respectively as certified by mortar manufacturer for intended use.

H. ACCESSORIES

1. Elastomeric Sealants: Elastomeric sealants shall be of base polymer and characteristics indicated. Sealants shall be specified that conform to ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates.
   a. Available Products:
   b. Bostik; Chem-Calk 550.
   c. Mameco International, Inc.; Vulkem 245.
   d. Pecora Corporation; NR-200 Urexpan.
   e. Tremco, Inc.; THC-900.
2. Cementitious Backer Units: ANSI A118.9 in maximum lengths available to minimize end-to-end butt joints.
   a. Thickness: 1/2 inch (12.7 mm).
   b. Available Products:
   c. C-Cure; C-Cure Board 990.
   d. Custom Building Products; Wonderboard.
   e. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
   f. USG Corporation; DUROCK Cement Board.
3. Trowelable Underlayments and Patching Compounds shall be Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials.
   a. Quick set type, as recommended by membrane manufacturer, as required for positive drainage to floor drains.
4. Edge strips (for thin set applications).
   Metal Edge Strips: Utilize Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, white zinc alloy exposed-edge material.
   a. Metal Edge strip shall be designed at change in floor elevation or a change of material
5. Surface expansion joint:
   a. Rigid PVC.
   b. Thickness: As required.
   c. Color: select from manufacturers standards.
6. Screed expansion joint:
   a. Flexible PVC.
7. Control joint material:
   a. Two-part, polyurethane-based sealant with separate pre-packaged color agent.

b. Color: select from manufacturers standards.

8. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.
9. Latex Additives:
   a. Specify Undiluted liquid type for field mixing. Additives shall be manufactured or approved in writing by mortar and grout manufacturers.
10. Tile Cleaner shall be a neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers
11. Waterproof Membrane:
   a. General: Specify provision of products that comply with ANSI A118.10.
   b. Polyethylene Sheet Waterproofing: Manufacturer's standard sheet material consisting of composite sheets, 60" wide by a nominal thickness of 0.030", composed of an inner layer of non-plasticized, chlorinated polyethylene sheet faced on both sides with laminated, high strength, non-woven polyester material, designed for embedding in latex-Portland mortar and as the substrate for latex-Portland mortar setting bed.
12. Shower Pan Membrane (use at tiled shower locations)
   a. Mud-Set Method: Materials specified shall be equal to "Chloraloy" 40 mil chlorinated polyethylene shower pan membrane by The Noble Co.
   b. Thin-Set Method: Materials specified shall be equal to "Nobleseal TS" 30 mil chlorinated polyethylene sheet membrane as manufactured by The Noble Co.
13. Marble thresholds shall be used at all changes of materials, maximum of ½" thick to meet handicap requirements. Schluter Transitions may also be used if application is appropriate.

I. FLOOR TILE APPLICATION SCHEDULE – Specify leveling beds and mortar beds as required by the design.

1. Shower area floors-Interior floor applicaiton on waterproof membrane over concrete; thin-set mortar; TCA F122 (wet areas- showers).
   a. Thin-Set Mortar: Latex-portland cement mortar.
   b. Grout: Polymer-modified unsanded grout.
2. Interior floor application on concrete; thin set mortar; TCA F113 (general tile areas atrestrooms).
   a. Thin-Set Mortar: Latex-portland cement mortar.
   b. Grout: Polymer-modified unsanded grout.

J. WALL TILE APPLICATION SCHEDULE

1. Interior wall application over masonry or concrete; thin-set mortar; TCA W202.
   a. Thin-Set Mortar: Latex- portland cement mortar.
   b. Grout: Polymer-modified unsanded grout.
2. Interior wall application; thin-set mortar; over gypsum board; TCA W243.
   a. Thin-Set Mortar: Latex- portland cement mortar.
   b. Grout: Standard unsanded cement grout.
3. Interior wall and shower-receptor application; thin-set mortar; over cementitious backer units; TCA B415 and TCA W244

a. Thin-Set Mortar: Latex- portland cement mortar.
b. Grout: Polymer-modified unsanded grout.

END OF SECTION 093000

SECTION 095000

ACOUSTICAL PANEL CEILINGS

I. GENERAL CRITERIA

A. Should a building under renovation contain ceiling tiles that differ from that listed as the standard, tiles shall be removed and replaced as directed by County.

B. Specialty Ceiling Types shall be approved by County prior to specification.

C. Acoustic Panels shall meet the following standards:
   a. Acoustical Tile Standard: Manufacturer's standard tiles shall be of configuration that complies with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance values.

D. Acoustic Panels shall meet the following standards regarding fire performance characteristics:
   a. Surface-Burning Characteristics: All Acoustical panels must comply with ASTM E 1264 for Class “A” materials, when tested per ASTM E 84.
   b. Fire-Rated Assembly: Design fire-rated ceiling systems according to tested fire-rated design.
   c. Design acoustical tile ceilings to comply with ASTM C 636, UL fire-rating classification, UBC Standard 25-2 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

E. Acoustic Panels shall meet the following standards regarding performance characteristics for bacteria and mold growth:
   a. Specify acoustical tiles treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

F. Warranty Requirements:
   a. Require a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
      1. Acoustical Panels: Sagging, warping and mold/mildew protection.
      2. Grid System: Rusting and manufacturer’s defects.
   b. Warranty Period shall be thirty (30) years from date of Substantial Completion.

G. To obtain lifetime ceiling system warranty, 30-year ceiling system warranty, color match or ceiling panel and suspension system compatibility, all acoustical panel and suspension system components shall be produced and supplied by one manufacturer.

H. Specify certified Installer shall have not less than three (3) years of successful experience in the installation of ceiling suspension systems on projects with requirements similar to requirements specified.

I. Specify extra material in full size units equal to 5.0 percent of quantity installed of ceiling panel and suspension system described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

J. Show all Seismic bracing details on the drawings.

K. Gypsum wallboard bulkheads are allowed and should be clearly indicated on the reflected ceiling plans and detailed to show bracing conditions. Bulkheads constructed using the Acoustic Panel Ceiling System are not permitted.

L. All ceiling tiles shall be square and installed in an orthogonal direction to the space under consideration. Diagonal or sloped applications of ceiling tiles must be approved by County.

M. All ceiling tiles shall be centered in the room and in corridors. Limit partial tiles to 12 inches or greater.

N. All lighting, ceiling mounted devices, and sprinkler heads shall be centered in ceiling tiles.

O. Provide hold down clips for all tiles within areas where security is a primary concern. Verify all areas in question with the County prior to specification. Hold-down clips shall be compatible with ceiling panels specified. Specify minimum 12 ga., galvanized, soft-annealed, mild steel hanger wire, 18 ga., galvanized, annealed steel tie wire. Prefabricated metal clamps for fastening to building structure. 16 ga. cold-rolled steel, carrying channels, 1-1/2” deep.

P. Do not support ceilings from ductwork, conduit, sprinkler piping, or any other equipment located in a plenum or above the finished ceiling. All wire ties must extend to structure above. Do not support any equipment load from the ceiling grid. Space hanger wires on main tees a maximum of 48” on center attaching hangers directly to structure above. A hanger wire shall occur directly adjacent to the fire expansion notch on every main tee, and as required by Code or the local jurisdiction. Provide additional hanger wires where lighting fixtures and/or air supply and return units occur in ceiling.

Q. Size attachment devices for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

R. Edge Moldings shall be nominal 9/16” x 15/16” hemmed, prefinished angle molding, screw attached at intervals at not less than sixteen inches (16”) on center and not more than three inches (3”) from the end.

S. Exposed fasteners and pop rivets are not permitted.

T. Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

U. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating

finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

II. DESIGN STANDARDS

A. **(APC-1)** - ACOUSTICAL TILES FOR ACOUSTICAL PANEL CEILING

Areas of use: **General office space, storage, restrooms, janitor closets, break rooms, vestibules and circulation areas**

1. Basis-of-Design Product: **Frost ClimaPlus** by USG,
   Or a comparable product by one these manufacturers:
   a. Armstrong World Industries, Inc.
   b. CertainTeed.
2. Provide fire-resistance-rated tiles complying with ASTM E 1264 for type, form, and pattern as follows:
   a. Type III, mineral base with painted finish; Form 4, water felted.
   b. Pattern: E (perforated, small holes and lightly textured).
   c. Color: White.
   d. LR: Not less than 0.83
   e. NRC: Not less than 0.70
   f. CAC: Not less than 38
   g. Edge/Joint Detail: FL (fine line)
   h. Thickness: 3/4 inch
   i. Modular Size: 24 by 24 inches
   j. Recycled Content: 71%
   k. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based

B. **(APC-2)** - ACOUSTICAL TILES FOR ACOUSTICAL PANEL CEILING

Areas of use: **Private offices, conference rooms, meeting rooms, classrooms, training rooms and other spaces requiring acoustical control**

1. Basis-of-Design Product: **Frost ClimaPlus High NRC** by USG,
   Or a comparable product by one these manufacturers:
   a. Armstrong World Industries, Inc.
   b. CertainTeed.
2. Provide fire-resistance-rated tiles complying with ASTM E 1264 for type, form, and pattern as follows:
   a. Type III, Form 4.
   b. Pattern: E.
   c. Color: White.
   d. LR: Not less than 0.88
   e. NRC: Not less than 0.75
   f. CAC: Not less than 38
   g. Edge/Joint Detail: FL (fine line)
   h. Thickness: 7/8 inch
   i. Modular Size: 24 by 24 inches

j. Recycled Content: 71%

C. **(APC-3)** - ACOUSTICAL TILES FOR ACOUSTICAL PANEL CEILING

Areas of use: **Kitchens, Locker Rooms, Fitness Rooms, and other areas subject to high humidity levels and potential sagging**

1. Basis-of-Design Product: **Sheetrock Lay-in Ceiling Panel ClimaPlus Vinyl** by USG, Or a comparable product by one these manufacturers:
   a. Armstrong World Industries, Inc.
   b. CertainTeed.
2. Provide fire-resistance-rated tiles complying with ASTM E 1264 for type, form, and pattern as follows:
   a. Pattern: Vinyl Faced
   b. Color: White.
   c. LR: Not less than 0.77
   d. CAC: Not less than 35
   e. Edge/Joint Detail: SQ (square edge)
   f. Thickness: 1/2 inch
   g. Modular Size: 24 by 24 inches
   h. Recycled Content: 40%
   i. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based

D. **(MSS-1)** - METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING

Use with the following: **(APC-1, APC-2)**

1. Basis-of-Design Product: USG Interiors, Inc. 'Donn Centricitee DXT' or a comparable product by one of the following:
   a. Armstrong World Industries, Inc.
   b. CertainTeed
   c. Chicago Metallic-1200
2. Indirect-Hung, Fire-Rated Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, pre painted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z90) coating designation.
   a. Structural Classification: Intermediate duty system.
   b. Carrying Channels: Cold-rolled steel, 0.059850-inch- (1.52-mm-) minimum base (uncoated) metal thickness, not less than 3/16-inch- (4.7-mm-) wide flanges by 1-1/2-inch- (38-mm-) deep steel channels, 475 lb/1000 feet (0.707 kg/m), hot-dip galvanized according to ASTM A 653/A 653M, with protective coating .
   c. Access: Where access is indicated, provide special cross runners or split splines to allow for removal of acoustical units in indicated access areas. Identify access tile with manufacturer's standard unobtrusive markers for each access unit.
   d. Provide coordinating wall angle molding.
   e. Color: White
   f. Recycled Content: 25% (40% min. for projects seeking LEED® certification)

E. **(MSS-2)** - METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING

Use with the following **(APC-3)**

a. Basis-of-Design Product: USG Interiors, Inc. 'Donn ZXLA' or a comparable product by one of the following:
   a. Armstrong World Industries, Inc.
   b. Certainteed Fire-rated capped system
   c. Chicago Metallic

b. Indirect-Hung**,** Fire-Rated Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, pre painted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z90) coating designation.
   a. Structural Classification: Intermediate-duty system.
   b. Carrying Channels: Cold-rolled steel, 0.059850-inch- (1.52-mm-) minimum base (uncoated) metal thickness, not less than 3/16-inch- (4.7-mm-) wide flanges by 1-1/2-inch- (38-mm-) deep steel channels, 475 lb/1000 feet (0.707 kg/m), with rust-inhibitive aluminum cap, hot-dip galvanized according to ASTM A 653/A 653M, G60 (Z180) coating designation.
   c. Access: Where access is indicated, provide special cross runners or split splines to allow for removal of acoustical units in indicated access areas. Identify access tile with manufacturer's standard unobtrusive markers for each access unit.
   d. Provide coordinating wall angle molding.
   e. Recycled Content: 25% (57% min. for projects seeking LEED® certification)

END OF SECTION 095000

SECTION 096000

FLOORING

I. GENERAL CRITERIA

A. This section includes the following:
   1. Carpet tile
   2. Resilient floor tile
   3. Resilient base
   4. Accessories
   5. Adhesives and primers.

B. Resilient flooring shall be used in break rooms, copy/workrooms, storage rooms, file rooms, service closets and corridors.

C. Tile carpeting shall be used in office areas, secondary lobbies, public and office corridors, training rooms, conference rooms, meeting rooms, and related administrative spaces. No broadloom carpeting shall be used unless approved by County for a specific space.

D. Manufacturer's recommendations shall be used for preparation of floor surfaces prior to installation.

E. Require substrate moisture content and pH levels to be within range recommended by the manufacturer.

F. Require temperatures and humidity levels be maintained in accordance with manufacturer's recommendations.

G. Specify an appropriate transition strip between dissimilar flooring materials.

H. Require that extra material shall be provided as follows:
   1. 5% of installed amount (not less than one full carton) of each type, color and pattern of material for maintenance.
   2. 50 LF of each color and type of base for maintenance.
   3. 6 each preformed inside and outside corners.
   4. Provide materials in clearly labeled containers.

II. DESIGN STANDARDS

A. CARPET TILE

   1. Specify Interface FLOR Cubic Glasbac Modular Carpet Tile. Require substitute products to be equivalent to the quality indicated below and approved by the County to be considered.

a. Yarn System: Aquafil Premium Nylon. Other premium branded type 6 fibers, will be considered; but mill extruded nylons shall not be considered premium.
b. Dye Method: I 00% Solution Dyed.
c. Mergeability shall be warranted by the manufacturer.
d. Construction and Physical Characteristics: Tufted Textured Loop. Patterning must be integrated; topical application or wet patterning are not permitted. Gauge/Stitch: Minimum 'h inch. Pile Height: Minimum .145 inch. Pile Weight: 18 oz/per yard. Total Recycled Content: 60% (Post Consumer 4%).
e. Backings: Primary Backing must be non-woven; woven primary backings shall be unacceptable. Secondary Backing shall be Fiberglass Reinforced Composite containing not less than 39% post-consumer and/or post-industrial material content. Secondary Backing must be 100% recyclable at the end of its useful life.
f. Sustainability: Product shall meet Sustainable Carpet Assessment Standard NSF-140 GOLD. Product shall pass Carpet and Rug Institute "Green Label Plus" certification.
g. Soil/Stain Resistance: Soil and stain resistance applications are required from fiber producer and carpet manufacturer.
h. Antimicrobial Standards: AATCC 171 Washed and AATC 174 Parts 2 & 3. Product must pass both Part 2 and Part 3 of AATCC 174 with a minimum of 90% reduction in both gram negative and gram positive bacteria and no macroscopic growth against the fungi. The preservative should be incorporated into the primary latex coating of the product during the manufacturing process, not topically applied to the carpet fibers.
i. Installation: Product shall be designed for Random Installation, meaning that each and every tile can be installed in any of the four possible directions without regard to pile direction, pattern, or orientation of any adjacent tiles while still creating a finished carpet tile assembly that appears to be a visually continuous carpeted surface with no tile appearing out of place or improperly positioned. Method of installation shall be Tactile glueless method except in libraries which shall be fully adhered.

2. Performance: Require that the modular carpet tile shall meet or exceed the following performance standards:

Category	Standard/Requirement
a. Carpet Flammability	
i) Pill Test (ASTMD2859 or CPSC FF-1-70)	passes
ii) Radiant Panel Test (ASTM E648)	≥ 0.45 watts/cm^2, Class 1
b. Smoke Density (ASTM E662)	≤ 450 Flaming Mode
c. Dimensional Stability (Aachen Method Din 54318)	≤ 0.1% Change
d. Static Generation@ 70"F (AATCC 135 w/neolith)	≤ 2.5 kV @ 20% R.H.
e. Lightfastness (AATCC 16E)	4.0 after 60 hours.
f. Gas Fade (AATC 23)	4
g. Ozone Fade (AATC 19)	4
h. Antimicrobial (AATC 174, Part II)	≥ 95.0% reduction
i. Fungicidal (AATC 174, Part III)	No growth

j. Soil/Stain Protection (AATC 175-1991) ≥ 8.0 on Red40 stain scale
k. California 01350 Passes

3. Warranty: Specify that the modular carpet tile manufacturer shall provide a written warranty for a period of not less than 15 years that covers all of the following performance standards and product wear situations.
   a. Wear – Surface wear shall not be more than 10% by weight in 15 years. Wear warranty shall not require use of chair pads.
   b. Static – Static generation shall be maintained at less than 3.0 kV at 70%F, and 20% R.H.
   c. Dimensional Stability – There shall be no shrinkage, curling, doming or other dimensional instability that adversely affects the ability of the carpet to lie flat.
   d. There shall be no delamination and no edge ravel.
   e. Mergeability shall be warranted.

B. RESILIENT FLOOR TILE

1. Acceptable Manufacturers:
   a. Mannington
   b. Armstrong World Industries
   c. Tarkett
   d. Azrock
2. Require that tile be alternated 90 degrees if a pattern is directional.
3. Design floor pattern to avoid less than a half tile at permanent walls.
4. Where tile color changes or floor finish material changes, design feature strips directly under doors when in closed position.
5. Require cleaning, waxing, and polishing of all resilient flooring as part of final cleaning after all work has been accepted.
6. Require the contractor to provide product certifications on wet and dry conditions for ADA Compliance for slip resistance.
7. Require Moisture testing in accordance with the manufacturer's recommendation.
8. Specify that tiles extend into toe spaces, door reveals, and similar openings.
9. Specify tiles to be installed on covers for telephone and electrical ducts and similar items in finished floor area.
10. Resilient floor products shall meet the following standards:
    a. Class 2, Through pattern tile
    b. Wearing surface: smooth
    c. Thickness: 0.125 inch
    d. Size: 12 inch x 12 inch
    e. Fire Test Response Characteristics:
       i. Critical Radiant Flux Response: Class I, not less than 0.45 W/sq. cm per ASTM E648.
    f. Color: As required by the design and approved by the County.

C. RESILIENT BASE

1. Specify resilient Base by Allstate, Roppe, Armstrong, Johnsonite, Mannington, Mercer or Burke.
2. Specify roll goods and preformed inside and outside corners.

D. FLOORING SCHEDULE

1. Carpet edging:
   a. Roppe, Vinyl Tile/ Carpet Joiner 177
   b. Mercer, Carpet to Resilient Transition 710
   c. Thickness to match carpet
   d. Color to match corresponding base
2. VCT: 12 x 12 x 1/8 in. square; static coefficient of friction: 0.6
3. RB: 1/8 x 4 in., 1/4 in. wide at bottom
   a. Rubber top set, coved type
   b. Factory formed external and internal corners, continuous rolls, min. 120 ft.
   c. Shall meet ASTM F1861 Type TP, group I solid

E. ACCESSORIES

1. Thresholds of molded or extruded rubber, full length of openings without joints, to match corresponding resilient base
2. Rubber reducers of same thickness as abutting floor materials; tapered edges
3. Primers, wax and buffing compounds of types recommended by manufacturers
4. Metal edge strips for VCT shall be extruded aluminum with mill finish. Height shall be as required to protect exposed edges of tiles, and in a maximum length to minimize running joints.

F. ADHESIVES

1. Carpet: Non-staining, non-bleeding strippable type as required by carpet manufacturer compatible with concrete sealer, adhesive, seam sealer, and seam cleaner.
2. VCT: Specify Adhesives that are Low VOC and water resistant type as recommended by the manufacturer and compatible with the concrete sealer and curing compound.

G. ADHESIVES AND PRIMERS

1. Acceptable solvent-based adhesive as recommended by manufacturer, no water-based adhesives

END OF SECTION 096000

SECTION 099000

PAINTING, STAINING AND COATINGS

I. GENERAL CRITERIA

A. This section includes painting of all surfaces exposed to view, including preparation of surfaces by back priming.
B. All interior and exterior wood trim and millwork shall be back primed with one coat interior alkyd enamel primer before installation.
C. Prime coats are not required on items delivered with prime or shop coats.
D. Require that manufacturer's recommendations be followed with respect to temperature and surface conditions.
E. Require proper preparation of all surfaces before application of paint or coatings, including removal and neutralization of acids, removal of dirt, dust, grease, oil or other contaminants. Metals shall be free of rust, and wood shall be sanded to a smooth, even surface.
F. Require that drywall or plaster be thoroughly dry before application of any coating.
G. Do not allow thinning or otherwise changing materials unless recommended by the manufacturer.
H. Do not allow spray application unless specifically approved by the County.
I. Require one gallon of extra stock for every 50 gallons of each applied coating.
J. Manufacturer's standard paint colors shall be utilized for selection.

II. DESIGN STANDARDS

A. Acceptable paint manufacturers shall include Sherwin-Williams, Porter Paints, Pratt and Lambert, Pittsburgh, Glidden, Devoe or Duron, unless other manufacturers are approved prior to bidding.
B. Painting materials such as thinners, oils, driers, etc., shall be of the highest quality and have identifying labels on the containers.
C. Number of coats required below shall be the minimum for the various surfaces.
D. Epoxy paint shall not be utilized on any renovation project in an occupied building.
E. Concrete stain shall not be utilized on a broom finish floor.
F. Break rooms and restrooms shall be painted with semi-gloss paint.
G. Door frames shall be painted with semi-gloss paint.
H. Items listed below are based upon Sherwin Williams products, except for concrete stain products.
I. Paint Schedule:
    1. Exterior iron and steel: 2 coats of two component epoxy primer
    2. Interior concrete and cement plaster walls: Eg-Shel / Satin Finish
        a. 1st Coat: S-W Loxon Acrylic Masonry Primer, A24W8300
        b. (8 mils wet, 3.2 mils dry)
        c. 2nd Coat: S-W ProMar® 200 Latex Eg-Shel Enamel, B20W2200 Series
        d. 3rd Coat: S-W ProMar® 200 Latex Eg-Shel Enamel, B20W2200 Series
        e. (4 mils wet, 1.3 mils dry per coat)
    3. Interior concrete masonry walls
        a. 1st Coat: S-W PrepRite® Block Filler, B25W25
        b. (75-125 sq ft/gal)
        c. 2nd Coat: S-W ProGreen™ 200 Interior Latex Semi-Gloss, B31-600 Series

d. 3rd Coat: S-W ProGreen™ 200 Interior Latex Semi-Gloss, B31-600 Series
e. (4 mils wet, 1.6 mils dry per coat)

4. Interior gypsum surfaces
   a. 1st Coat: S-W ProGreen™ 200 Interior Latex Primer, B28W600 Series
   b. (4 mils wet, 1.5 mils dry)
   c. 2nd Coat: S-W ProGreen™ 200 Interior Latex Eg-shel, B20W651
   d. 3rd Coat: S-W ProGreen™ 200 Interior Latex Eg-shel, B20W651
   e. (4 mils wet, 1.6 mils dry per coat)
5. Interior stain-grade wood
   a. Clear Finish
   b. 1st Coat: S-W Minwax 250 VOC Oil Stain (Optional)
   c. 2nd Coat: S-W Wood Classics® Waterborne Polyurethane Varnish, Gloss or Satin
   d. 3rd Coat: S-W Wood Classics® Waterborne Polyurethane Varnish, Gloss or Satin
   e. (4 mils wet, 1.0 mil dry per coat)
   f. Sand lightly between coats.
6. Interior paint-grade wood
   a. 1st Coat: S-W PrepRite® ProBlock Latex. B51 Series
   b. (4 mils wet, 1.4 mils dry)
   c. 2nd Coat: S-W ProGreen™ 200 Interior Latex Semi-Gloss, B31-600 Series
   d. 3rd Coat: S-W ProGreen™ 200 Interior Latex Semi-Gloss, B31-600 Series
   e. (4 mils wet, 1.6 mils dry per coat)
7. Interior exposed ferrous surfaces
   a. 1st Coat: S-W Pro Industrial Pro-Cryl® Primer, B66-310 Series
   b. (2-4 mils dry)
   c. 2nd Coat: S-W ProGreen™ 200 Interior Latex Semi-Gloss, B31-600 Series
   d. 3rd Coat: S-W ProGreen™ 200 Interior Latex Semi-Gloss, B31-600 Series
   e. (4 mils wet, 1.6 mils dry per coat)
8. Interior galvanized surfaces
   a. 1st Coat: S-W Pro Industrial Pro-Cryl® Primer, B66-310 Series
   b. (2-4 mils dry)
   c. 2nd Coat: S-W ProGreen™ 200 Interior Latex Semi-Gloss, B31-600 Series
   d. 3rd Coat: S-W ProGreen™ 200 Interior Latex Semi-Gloss, B31-600 Series
   e. (4 mils wet, 1.6 mils dry per coat)
9. Ferrous surfaces of factory primed mechanical and electrical equipment
   a. Two coats. Alkyd enamel (eggshell).
   b. Two coats. Two component epoxy.
10. Metal surfaces subject to temperatures above 150 degrees F. (66 degrees C.)
   a. One coat. Universal type primer.
   b. Two coats. Alkyd enamel heat resistant (eggshell).
11. Covered or wrapped pipes and ducts
   a. One coat. Latex primer.
   b. One coat. Alkyd enamel eggshell.
12. Interior Concrete Floors (Stained): Semi-Transparent Stain and Sealer
   a. One or more coats. H&C Semi-transparent Decorative Stain or approved equal.
   b. Two coats. H&C High Performance Industrial Clear or approved equal.
13. Interior Concrete Floors (Sealed): Urethane Floor System
   a. Spot prime bare areas with 1 ct. ArmorSeal Floor Plex 7100 Primer 1.5-2.0 mils
   b. Two (2) coats Armorseal 1K WB urethane floor enamel 4.0 mil

14. Surfaces not to be painted
    a. Galvanized ductwork
    b. Surfaces in pipe chases, pipe tunnels, crawl spaces, attics, and elevator shafts, other than ungalvanized ferrous surfaces
    c. Factory-finished mechanical and electrical equipment
    d. Code-required labels, such as UL and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates

END OF SECTION 099000

DIVISION 10: SPECIALTIES

SECTION 102000

TOILET COMPARTMENTS AND ACCESSORIES

I. GENERAL CRITERIA

A. This section includes:
   1. Ceiling-Mounted/Wall-Braced Solid Plastic Toilet Compartments
   2. Ceiling-Mounted/Wall-Braced Stainless Steel Toilet Compartments
   3. Floor-Mounted/Overhead-Braced Solid Plastic Toilet Compartments
   4. Floor-Mounted/Overhead-Braced Stainless Steel Toilet Compartments
   5. Wall-Hung Urinal Screens
   6. Solid Plastic Locker Room Benches
   7. Toilet, bath, washroom, and custodial accessories

B. Require a one-year guarantee against defects in materials and workmanship for all items.

C. Require Manufacturer's 25 year warranty against breakage, corrosion, and delamination for all solid plastic units.

D. Require Manufacturer's 15 year warranty against rusting of panels from the inside for all stainless steel units.

II. DESIGN CRITERIA

A. Acceptable manufacturers:
   1. Solid plastic units: Scranton Products, Hadrian or approved equal
   2. Stainless steel units: Bradley Corporation, Hadrian or approved equal
   3. Toilet accessories: Bradley Corporation, A&J, Bobrick, Palmer Fixture Company

B. Toilet Compartments shall be Ceiling-Mounted/Wall-Braced, unless specifically directed by the County to be Floor-Mounted/Overhead-Braced for smaller facilities or for budget reasons.

C. For Solid Plastic Toilet Compartments and Urinal Screens: Doors, panels and pilasters shall be 1" thick constructed from High-Density Polyethylene (HDPE) resins. Partitions shall be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments. All plastic components shall be covered with a protective plastic masking.
   1. Hardware:
      a. Hinges shall be 8" and fabricated from heavy-duty extruded aluminum (6463-T5 alloy) with bright dipped anodized finish with wrap-around flanges, through bolted to doors and pilasters with stainless steel, torx head sex bolts. Hinges operate with field adjustable nylon cams. Cams

can be field set in 30-degree increments OR, hinges shall be integral, fabricated from the door and pilaster with no exposed metal parts.

b. Door strike/keeper shall be 6" long and made of heavy-duty extruded aluminum (6436-T5 alloy) with bright dipped anodized finish, with wrap around flanges and secured to the pilasters with stainless steel, torx head sex bolts. Bumper shall be made of extruded black vinyl.

c. Latch and housing shall be made of heavy-duty extruded aluminum (6463-T5 alloy). The latch housing shall have a bright dipped anodized finish, and the slide bolt and button shall have a black anodized finish.

d. Each door shall be supplied with one coat bumper/hook and 2 door pulls made of chrome plated Zamak. Outswing doors shall be supplied with a door stop made of chrome plated Zamak.

e. Pilaster shoes or caps shall be 3" high (type 304, 20 gauge) stainless steel. These shall be secured to the pilaster with a stainless steel, torx head bolt.

f. Wall brackets shall be 1" stirrup type made of heavy-duty aluminum (6463-T5 alloy) with a bright dipped anodized finish. Stirrup brackets shall be fastened to pilasters and panels with stainless steel, torx head bolts.

g. Headrail (where applicable) shall be made of heavy-duty extruded aluminum (6463-T5 alloy) with anti-grip design. The headrail shall have a clear anodized finish and shall be fastened to the headrail bracket by a stainless steel, torx head sex bolt, and fastened to the top of the pilasters with stainless steel, tamper resistant torx screws. Headrail brackets shall be 20 gauge stainless steel with a satin finish, secured to the wall with #14 stainless steel screws.

D. For Stainless Steel Toilet Compartments and Urinal Screens: 1" thick panels shall be manufactured from 22 gauge stainless steel, spaced and insulated with a moisture-resistant honeycomb core, adhered to the inner surfaces and set under pressure to cure.

1. Permaseal Doors: l" thick doors shall be manufactured from 22 gauge stainless steel, spaced and insulated with a moisture-resistant honeycomb core, adhered to the inner surfaces and set under pressure to cure. 16 and 14 gauge welded reinforcements shall be provided at top and bottom hinges. Concealed molybdenum cam to be factory installed. Door top to be drilled to receive top hinge pin providing three-point anchor. Slide latch holes to be pre-punched to permit field installation of concealed ADA-compliant slide latch.

2. Permaseal Pilasters: 1-1/4" thick pilasters shall be manufactured from 20 gauge stainless steel, spaced and insulated with a moisture-resistant honeycomb core, adhered to the inner surfaces and set under pressure to cure.

a. For ceiling mounted systems, supports shall be provided below panels during installation, and the ceiling edge of the pilaster shall be leveled from one compartment to the next by adjusting support nuts on threading rods.

b. For floor mounted systems, the floor edge of the pilaster shall be provided with an internally welded 18 gauge reinforcement that will accept a 3/8" zinc-plated jack bolt for leveling. The bracket shall connect

to two “'L" brackets that are secured to the floor and will allow for a full range of adjustment.

3. Headrail (where applicable) of etched and anodized aluminum shall be extruded with "anti-grip" profile clamps over pilasters and shall be secured to the wall with stainless steel brackets.
4. 3' high one-piece shoe of 300 Series stainless steel shall be secured by concealed retainer clips.
5. Hardware: Mills heavy-duty chromed Zamac hardware and fasteners
    a. Hinges shall be wraparound and thru-bolted to the pilasters and shall have true gravity cams concealed within the door. The closing position of each hinge shall be fully adjustable.
    b. Concealed slide latch shall provide emergency egress, shall not require any twisting motion and shall be ADA compliant.
    c. Strike and keeper to be provided as surface-mounted.
    d. Coat hook and wall bumper shall be provided for in-swing doors. Door pulls shall be added for outswing doors.
    e. Stirrup-type, single-ear, double-ear and U-brackets shall be provided at appropriate locations.
    f. Wall brackets and ceiling fasteners shall be provided for ceiling mounted units, including anchoring devices and expansion shields.
    g. Fasteners for hinges, slide latch and keeper shall be zinc-plated with theft-resistant heads.
    h. Fasteners for brackets shall be zinc-plated with torx-heads.
6. Finishes:
    a. Stainless Steel with a 5WL textured finish.
    b. Self-adhesive coating for protection from scratches during installation.

E. Reinforcement for Ceiling-Hung Toilet Partition Systems: Design and specify an adequate reinforcement system for compartment attachments, and direct contractor to coordinate compartment installation with work of other trades, particularly those involved in above ceiling work and ceiling installation. Require secure, plumb, and square installation of compartments and all accessories. Insure that all are attached to steel framing, wood blocking, studs, compartment partitions, and CMU walls as applicable.

F. For Solid Plastic Locker Room Benches, bench tops shall be 1 1/2” thick with all edges rounded to a 1/4” radius. Locker room bench tops shall be 1 1/2” thick with homogeneous color throughout, constructed from High-Density Polyethylene (HDPE) resins. Locker room bench tops shall be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments. All plastic components shall be covered with a protective plastic masking.
    1. Basis of Design: Bradley Lenox Bench -12” x 48”, surface mounted
    2. Hardware: Steel pedestals shall be 16 1/4" high, and secured to bench tops with stainless steel, torx screws and secured to the floor using lead expansion shields and stainless steel, Phillips head screws.

G. Toilet Accessories shall be the products of a single manufacturer, with the exception of toilet tissue dispensers and towel dispensers.

1. Operation of accessories shall comply with guidelines set forth by the American Disabilities Act, Title III.
2. Stainless Steel: ANSI Type 302/304, with polished No. 4 finish, 22 gauge minimum, unless otherwise directed by the County.
3. Sheet Steel: Cold-rolled, commercial quality ASTM A366, 20-gauge minimum, unless otherwise directed by the County.
4. Fasteners: Screws, bolts, and other devices of same materials as accessory unit or of galvanized steel where concealed.
5. For multi-fixture and all public restrooms, soap dispensers and paper towel dispensers shall be automatic and motion sensor type.
6. For multi-fixture restrooms with vanity countertops, waste receptacles shall be under counter type, accessed by openings in the countertop. See below for waste receptacles in single restrooms.
7. Toilet Accessory Product Schedule:
    a. Mirror (for single restrooms)
        1) Basis-of-Design Product: Bradley Model #780-2436-2.
        2) Frame: Stainless steel channel.
        3) Size: 24” x 36”.
    b. Mirror (for multi-fixture restrooms)
        1) Frame: None.
        2) Size: Match length of vanity
    c. 36” Grab Bar
        1) Basis-of-Design Product: Bradley Model #812-001-36-2.
    d. 42” Grab Bar
        1) Basis-of-Design Product: Bradley Model #812-001-42-2.
        2) Mounting: Flanges with concealed fasteners.
    e. L shaped Grab Bar
        1) Basis-of-Design Product: Bradley Model # 8122-0302436
        2) Mounting: Flanges with concealed Fasteners
    f. Toilet Tissue Dispenser (for single and multi-fixture restrooms)
        1) Basis-of-Design Product: Bradley Model #5234.
        2) Mounting: Surface mounted.
    g. Towel Dispenser (automatic)
        1) Acceptable Products:
            a. Georgia Pacific enMotion Classic Wall Mount
            b. Bradley Model #2496.
        2) Mounting: Surface mounted.
    h. Waste Receptacle (for single restrooms)
        1) Basis of Design Product: Bradley Model #346-10
        2) Mounting: Semi-recessed.
    i. Liquid Soap Dispenser (for single restrooms)
        1) Basis-of-Design Product: Bradley Model #655.
        2) Mounting: Surface Mounted.
    j. Motion Sensor Soap Dispenser
        1) Acceptable Products:
            a. Sloan Optima Electronic Battery Powered

b. Bradley Model #6315

2) Mounting: Lavatory Mounted

k. Napkin Disposal with Shelf

1) Basis of Design Product: Bradley Model #4791-15

2) Mounting: Surface Mounted

l. ADA Shower Seat

1) Basis-of-Design Product: Bradley Model #956-30(LH) or 9561-30(RH)

m. Baby Changing Station

1) Basis-of-Design Product: Bradley Model #9612 Ivory

n. Shower Curtain; Rod; Hooks

1) Basis of Design Product:

a. Curtain: Bradley Model #9533-4272 (7 Hooks)

b. Rod: Bradley Model #9539-36

c. Hooks: Bradley Model #9536

END OF SECTION 102000

SECTION 104000

FIRE PROTECTION EXTINGUISHERS AND CABINETS

I. GENERAL CRITERIA

A. This section describes the requirements for fire extinguishers, fire extinguisher cabinets and fire extinguisher brackets.

B. Quality Assurance:

1. Fire extinguishers shall be of the types and sizes required by NFPA 10 and the local authority having jurisdiction. The fire extinguishers must be UL listed with a UL listing mark for type, rating and classification of each extinguisher.
2. Fire-rated fire protection cabinets shall be labeled and listed to comply with requirements in ASTM E814 for fire resistance rating of walls where they are installed. Cabinets and placement of cabinets shall conform to requirements of the Americans with Disabilities Act 1990 as to maximum projection into corridors and height from finished floor.
3. Warranty: Extinguishers shall have manufacturer's standard form warranty in which manufacturer agrees to repair or replace fire extinguishers that fail in materials and workmanship within a specified warranty period of six years. Failures include, but are not limited to, the following: failure of hydrostatic tests according to NFPA 10 and faulty operation of valves or release levers.

II. DESIGN STANDARDS

A. Manufacturers: Subject to the requirements herein, the fire extinguisher and cabinet shall be products of one of the following manufacturers:

1. Larsen's Manufacturing Company
2. J.L. Industries, Inc. a division of Activar Construction Products Group
3. A product equivalent to the above.

B. Application: In public lobbies and corridors and all occupied interior rooms, use either semi-recessed or fully recessed cabinets. In enclosed and unoccupied storage rooms, equipment and mechanical rooms, and similar service areas; standard bracket mounted extinguishers may be used.

C. Fire Extinguishers: Fire extinguishers shall be provided in the locations and quantity required by NFPA 10 and the authority having jurisdiction. Typically, fire extinguishers shall be the multi-purpose dry chemical type, UL rated 4A-80BC, 10/lb. nominal capacity, contained in enameled steel containers.

D. Fire Extinguisher Cabinet:

1. Cabinet Mounting: Cabinets shall be semi-recessed style, mounted in walls of sufficient depth to suit the style of trim indicated; with one piece combination

trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge.

2. Cabinet Trim: Trim shall be fabricated in one piece with corners mitered, welded and ground smooth. Rounded edge trim shall have 5/16 inch backbend depth. Trim metal shall be stainless steel.
3. Cabinet Doors: Cabinet doors shall be stainless steel in specified manufacturer's standard construction. Door shall be unlocked hinged door with clean acrylic view panel. Door hardware shall be either lever handle with cam-action latch, or exposed (or concealed) door pull with friction latch. Concealed or continuous type hinge shall permit door to open 180 degrees. The cabinet shall be identified with lettering FIRE EXTINGUISHER applied to the door in the letter style, size, spacing, color and location required by the authority having jurisdiction. Application of lettering shall be by silk screen.

E. Mounting Brackets:
1. Type: Where mounting brackets are used, the brackets shall be galvanized steel designed to secure fire extinguisher of size and type specified to the wall. Finish shall be plated or baked red enamel.
2. Identification: Identify bracket mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface in the letter style, size, spacing, and location required by authority having jurisdiction.

END OF SECTION 104000

SECTION 105000

LOCKERS

I. GENERAL CRITERIA

A. This section describes the product standards for general use and staff lockers. The furnishing of lockers is to include the supplying of the locker units and all fasteners, accessory features, connections to building structure and other items not mentioned specifically herein, but which are necessary to make a complete installation. Locker units and such accessories shall be sourced from a single manufacturer.

B. Quality Assurance: The lockers shall be warranted for two years against defective parts and workmanship excluding vandalism and improper installation.

II. DESIGN STANDARDS

A. Application: Lockers are to be provided as called for in the development programs for various facilities. The specific products called out herein are those that are most typical for general use. The Dept. of Community Services/Parks and Recreation Division may have other specific public locker needs for gymnasiums and aquatic centers that will be described in program requirements for those specific facilities.

B. Solid Plastic Lockers: Solid plastic lockers shall be “Lenox” manufactured by Bradley Corporation or an approved equal that meets or exceeds the standards herein. Specified lockers shall be solid plastic, 30 % post industrial recycled HDPE, and 100% post consumer recycled HDPE, with integral color. Lockers shall be 18 " wide x 18" deep x 72" high with flat tops and a “closed style base” 6" high. Lockers may be in any of the tier configurations provided by the company. Lockers may include coat hooks, number plates, and other accessories as directed by County. Locker doors shall have latches with provisions for padlock attachments.

C. Metal Lockers: Metal lockers shall be “Vanguard” manufactured by Penco Products, Inc. and may be in any of the tier configurations provided by the company. Other manufacturers’ products that meet the product description and standards herein will be considered. Specified lockers shall be made of steel and provided with a baked powder coat enamel finish applied over a phosphatized smooth surface. Lockers shall be 18" wide x 18"deep x 72" high with flat top and “closed style base” 6" high. Lockers may include coat hooks, number plates and other accessories as directed by County. Locker doors shall have latches with provisions for padlock attachments.

D. Other Manufacturers/Models: As noted, the Parks and Recreation Division also may require other products for gymnasiums and aquatic centers. These include:
   1. Tufftec 2.0 by Scranton Industries
   2. SPL Locker by American Security Locker Systems

END OF SECTION 105000

SECTION 107000

FLAGPOLE

I. GENERAL CRITERIA

A. This section describes the requirements and standards for metal flagpoles on facility sites. A single flagpole for displaying the United States and Georgia flags will be included in the designs for major facilities of the Police Department and Department of Fire and Emergency Services and any other facilities designated by the County.

II. DESIGN STANDARDS

A. Flagpole: The flagpole shall be manufactured by one of the following companies:
   1. Morgan Francis Flagpole Manufacturing (AABEC Pole)
   2. Pole-Tech Company, Inc.
   3. American Flagpole Co.
   4. Approved equal that meets or exceeds the descriptions and standards herein.

B. The pole shall be seamless, cone tapered standard line satin brush aluminum type. Overall length of the pole shall be 38.5 feet with an exposed length of 35 feet. Outside butt diameter shall be 7 inches. Outside top diameter shall be 3.5 inches. Minimum aluminum wall thickness shall be 3/16 inch.

C. Pole Anchorage: Architect shall detail and specify the concrete foundation for the pole in accordance with manufacturer's recommendations. Pole base shall be provided with a standard foundation tube consisting of a 16 gauge, galvanized corrugated steel sleeve, steel base plate, steel plate support, ¾ inch diameter steel lightning ground spike and lower internal steel wedges. Interior and exterior pole surfaces below grade shall be coated with black asphaltum paint. Metal base shall be MF-3354 as manufactured by AABEC pole division or equal, of the same material and finish as specified for the pole.

D. Fittings: Fittings and accessories to be provided with the pole assembly include a standard 6" diameter 14 gauge spun aluminum clear anodized ball, standard ball bearing revolving truck, two 9 inch cast "g" aluminum cleats, and one 5/16 inch polypropylene halyard rope with two thermo-plastic flag clasps per flag. Truck body shall be aluminum.

E. American flag and State of Georgia flag to be nylon material, 5 feet by 8 feet.

END OF SECTION 107000

DIVISION 13: SPECIAL CONSTRUCTION

SECTION 133000

METAL BUILDING SYSTEMS

I. GENERAL CRITERIA

A. This section includes pre-engineered metal building frames, metal wall panels, metal roof panels, accessories and miscellaneous materials for a complete enclosure, including supports for building components.

B. Structural systems must be designed according to professionally recognized methods and standards and legally adopted building codes.

C. Designs must be stamped by a professional engineer licensed in the jurisdiction of the project.

D. Frame must be designed for the following allowable deflections: Vertical: Clear span/240 for total load; clear span/360 for live load.

E. Metal wall panels (interior and exterior) shall not be designed for use as shear elements.

F. Assembly must be designed to permit movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects, when subject to temperature range of 100 degrees F (37 degrees C).

G. Roof panel assemblies must meet requirements of Factory Mutual (FM) for the following wind uplift resistance:
   1. Class I-60 in the field.
   2. Class I-90 along the perimeter.
   3. Class I-120 at the corners.

H. Require Submittals and Shop Drawings to include detailed design criteria and calculations prepared by a licensed structural engineer in the State of Georgia. Shop drawings shall include anchor bolt installation drawings with minimum bolt diameters and must be submitted by the General Contractor to the Architect for submittal to Gwinnett County Planning and Development for review and approval.

I. Require that Manufacturer have not less than 5 years of experience in actual production of specified products. Manufacturer must also be a member of Metal Building Manufacturer's Association (MBMA) and certified by AISC in the Metal Building Category.

J. Require that Installer be experienced in application or installation of similar systems, as well as having not less than 5 years of experience with similar systems and having successfully completed not less than 5 comparable projects.

K. Require the following warranties:
   1. Materials and Workmanship Warranty: 3 years.

2. Finish Warranty: Finish coating shall not change color or fade in excess of 5 NBS units as determined by ASTM D2244; Panel finish: 20 years.
3. Performance Warranty: Written warranty stating sheet metal roofing system and flashing under this Section will be maintained in watertight condition and defects resulting from the following items will be corrected without cost to Owner for a period of 20 years (to include faulty workmanship, defective materials including sealants and fasteners, and water infiltration).

II. DESIGN STANDARDS

A. Acceptable Manufacturer: VP Buildings, Inc.; Varco Pruden Buildings, Inc., 3200 Players Club Circle; Memphis, TN 38125; Toll Free Tel: 800-238-3246; Tel: 901-748-8000; Fax: 901-748-9323; Web: www.vp.com. or approved equal.

B. Structural Steel Framing:
1. Primary Framing: Rigid Frame (RF Series) solid web framing consisting of tapered or uniform depth rafters rigidly connected to tapered or uniform depth columns. Provide a clear span that supports the loads at bay spacing indicated.
2. End Wall Framing: Corner posts, end posts and rake beams.

C. Secondary Framing:
1. Purlins: Zee-shaped; depth as required; with minimum yield strength of 55,000 psi (345 MPa); simple span or continuous span as required for design.
2. Girts: Zee- or Cee-shaped; depth as required, with minimum yield strength of 55,000 psi (345 MPa); simple span or continuous span as required for design.
3. Wind Bracing: Portal, torsional, diagonal bracing or diaphragm in accordance with manufacturer's standard design practices; utilizing rods, angles, and other members, with minimum yield strengths as required for design.
4. Primary Frame Flange Bracing: Attached from purlins or girts to the primary framing, minimum yield strength as required for design.

D. Miscellaneous Framing:
1. Sag angles and bridging: steel angles with minimum yield strength of 36,000 psi).

E. Roof Covering System:
1. Roof Panels: SSR Standing Seam Roof Panels; 24 inches wide net coverage, with 3 inches high major ribs formed at the panel side laps, formed for field seaming using only manufacturer provided, pre calibrated electrically operated seaming machine.
   a. Side joints: Factory applied sealant for field seaming.
   b. Material: Galvalume steel.
   c. Thickness: 24 gauge.
   d. Side laps: Two factory-formed interlocking ribs, with one weather sealed joint, field-seamed into place to form a double-fold 360 degree seam.
   e. Length: Continuous from eave to ridge up to 41 feet in length.
   f. End laps, where required: 7 inches wide, located at a support member.
   g. Panel-to-roof purlin structural attachments: SSR clips with movable tabs

which interlock with seamed SSR panel ribs and provide for 1-1/2 inches of panel movement in either direction from center of clip to compensate for thermal effects.

h. Ridge assembly for high end of slopes: SSR Ridge; draw-formed aluminum seam caps factory-attached to SSR ridge panels that are seamed together along the center of the ridge, utilizing only one weather sealed joint and providing a true expansion joint for panel movement.

F. Wall Covering System

1. Wall Panels: Crimped Base Panel Rib; 36 inch wide net coverage, with 1-1/4 inch high major ribs at 12 inches on center with minor ribs spaced between the major ribs.
   a. Material: Galvanized steel, with G90/Z275 coating.
   b. Thickness: 24 gauge (0.61 mm).
   c. Side laps: Two fully overlapping major ribs secured together with 1/4 inch (6 mm) diameter color-matched carbon steel fasteners.
   d. Length: Continuous from sill to eave up to 41 feet (12.5 m) in length.
   e. End laps, where required: 4 inches (100 mm) wide, located at a support member.
   f. Crimp panels at the base and notch to match roof panel configuration at the eave.

G. Insulation – Dictated by Project Specific Requirements

H. Roof Accessories

1. Eave Gutters: Roll-formed 26 gauge steel sheet, with gutter straps, fasteners and joint sealant.
2. Roof Curbs: CFR roof curb for SSR roofs. Welded units fabricated for shingled installation with roof panels; minimum 18 gauge Galvalume coated steel, with welds cleaned and treated with protective coating compatible with the Galvalume substrate.
   a. Top of curbs horizontal with 1-1/2 inch perimeter flange.
   b. Curb walls insulated with 1-1/2 inch, 3 pcf (48 kg/cu m) density rigid glass fiber insulation.
   c. Water diversion: Integral 4 inch high by full length cricket on upslope side.
   d. Exposed curb flanges pre-drilled for correct fastener locations.
   e. Upslope and down slope curb flanges with integral welded inside and outside cell closures compatible with the roof panel profile.
   f. Curb framing: Mounted on secondary structural members and installed from the top; compatible with the thermal expansion and contraction properties of the roof on which it is used.

I. Materials

1. Structural Steel Plate, Bar, Sheet, and Strip for Use in Bolted and Welded Constructions: ASTM A 572/A 572M, A 529/A 529M, A 1011 or A 36/A 36M Modified 50, with minimum yield strength of 50,000 psi (345 MPa).
2. Structural Steel Material for Use in Roll Formed or Press Broken Secondary

Structural Members: ASTM A 607, with minimum yield strength of 55,000 psi (380 MPa).

3. Galvanized Steel Sheet for Roll Formed or Press Broken Roof and Wall Coverings, Trim and Flashing: ASTM A 653/A 653M, with minimum yield strength of 50,000 psi (345 MPa).
4. Galvalume Steel Sheet Used in Roll Formed or Press Broken Roof Covering: Aluminum-zinc alloy-coated steel sheet, ASTM A 792/A 792M, with minimum yield strength of 50,000 psi (345 MPa); nominal coating weight of 0.5 oz per sq ft (152 kg/sq m) both sides, equivalent to an approximate coating thickness of 0.0018 inch (0.05 mm) both sides.
5. Hot Rolled Steel Shapes: W, M and S shapes, angles, rods, channels and other shapes; ASTM A 500, ASTM A 572/A 572M or ASTM A 36/A 36M as applicable; with minimum yield strengths required for the design.
6. Structural Bolts and Nuts Used with Primary Framing: High strength, ASTM A 325.
7. Bolts and Nuts Used with Secondary Framing Members: ASTM A 307.
8. Panel Fasteners:
    a. For Galvalume and KXL finished roof panels: Stainless steel-capped carbon steel fasteners with integral sealing washer.
    b. For SP finished roof panels: Coated carbon steel.
    c. For wall panels: Coated carbon steel.
    d. Color of exposed fastener heads to match the wall panel finish.
    e. Concealed Fasteners: Self-drilling type, of size as required.
    f. Provide fasteners in quantities and location as required by the manufacturer.
9. Flashing and Trim: Match material, finish, and color of adjacent components. Provide trim at rakes, including peak and corner assemblies, high and low eaves, corners, bases, framed openings and as required or specified to provide weathertightness and a finished appearance.
10. Sealants, Mastics and Closures: Manufacturer's standard type.
    a. Provide at roof panel end laps, side laps, rake, eave, transitions and accessories as required to provide a weather resistant roof system; tape mastic or gun grade sealant may be used at side laps and end laps.
    b. Provide at wall panel rakes, eaves, transitions and accessories.
    c. Closures: Formed to match panel profiles; closed cell elastic material, manufacturer's standard color.
    d. Tape mastic: Pre-formed butyl rubber-based, non-hardening, non-corrosive to metal; white or light gray.
    e. Gun grade sealant: Non-skinning synthetic Elastomeric based material; gray or bronze.

J. Fabrication
1. Require that fabrication occur according to manufacturer's standard practice.
    a. Fabricate structural members made of welded plate sections by jointing the flanges and webs by continuous automatic submerged arc welding process.
    b. Welding operators and processes: Qualified in accordance with AWS D1.1.
    c. Field connections: Members to be prepared for bolted field connection by

making punched, drilled, or reamed holes in the shop.

2. Component Identification: Require that all fabricated parts be marked, either individually or by lot or group, using identification marking corresponding to the marking shown on the shop drawings, using a method that remains visible after shop painting.

K. Finishing

1. Schedule of Finishes: Roof and Wall finish and color shall be selected specifically for each project.
2. Shop Coat: Manufacturer's standard rust inhibitive primer paint; manufacturer's standard color.
    a. All structural steel members shall be finished using one coat of manufacturer's standard shop coat, after cleaning of oil, dirt, loose scale and foreign matter.

END OF SECTION 133000

DIVISION 14: CONVEYING EQUIPMENT

SECTION 142000

ELEVATORS

I. GENERAL CRITERIA

A. This section includes: Electric Traction Elevators.

B. Car Performance:
1. Car Speed ±5% of contract speed under any loading condition or direction of travel.
2. Car Capacity: Safely lower, stop and hold (per code) up to 125% of rated load.

C. System Performance:
1. Vertical Vibration (maximum): 25mg
2. Horizontal Vibration (maximum): 25 mg
3. Jerk Rate (maximum): 1.3 ft/sec3
4. Acceleration (maximum): 1.3 ft/sec2
5. In Car Noise: =55dB(A)
6. Leveling Accuracy: ±0.2 inches
7. Starts per Hour (maximum): 120

D. Quality Assurance:
1. Manufacturer: Minimum of ten years' experience in the fabrication, installation and service of elevators of the type and performance of the specified. The manufacturer shall have a documented quality assurance program.
2. Installer: Equipment manufacturer shall install the elevator.
3. Inspection and Testing: In accordance with requirements of local jurisdiction.

E. Warranty: Require a manufacturer's warranty for one year to cover defects in materials and workmanship.

F. Maintenance Service: Require that the elevator manufacturer provide maintenance service consisting of regular examinations and adjustments of the elevator for twelve (12) months after Substantial Completion.

II. DESIGN STANDARDS

A. Elevators shall be AC gearless machine room-less elevator systems subject to compliance with the design and performance requirements of this specification. Elevator manufacturers may include but are not limited to one of the following:
1. Basis of Design: EcoSpace™ traction elevators by KONE, Inc. (www.kone.com).
2. Other acceptable machine room-less products:
   a. Otis Elevator Co. - Gen2™ Product
   b. Schindler Elevator Corp. -400A Product

B. Equipment: Controls, and Control Space
   1. Controller: Microcomputer based control system to perform all functions.
      a. All high voltage (110V or above) contact points inside the controller cabinet shall be protected from accidental contact in a situation where controller doors are open.
      b. Controller shall be separated into two distinct halves: motor drive side and control side. High voltage motor power conductors shall be routed and physically segregated from the rest of the controller.
      c. Provide a serial cardrack and main CPU board containing a non-erasable EPROM and operating system firmware.
      d. Variable field parameters and adjustments shall be contained in a non-volatile memory module.
   2. Drive: Variable Voltage Variable Frequency AC drive system to develop high starting torque with low starting current.
   3. Controller location: Located in a remote cabinet or room within 140’-0” wire feet of the elevator machine.

C. Equipment: Hoistway Components
   1. Machine: AC gearless machine with permanent magnet synchronous motor, direct current electro-mechanical disc brakes and integral traction drive sheave, mounted to car guide rail at the top of the hoistway.
   2. Governor: Friction type over-speed governor rated for duty of specified elevator.
   3. Buffers, Car and Counterweight: Polyurethane buffer.
   4. Hoistway Operating Devices: Emergency stop switch in the pit, Terminal stopping switches, Emergency stop switch on the machine.
   5. Positioning System: System consisting of magnets and proximity switches.
   6. Guide Rails and Attachments: Steel rails with brackets and fasteners.

D. Equipment: Hoistway Entrances
   1. Sills: extruded
   2. Doors: Hollow metal construction with vertical internal channel reinforcements.
   3. Fire Rating: Entrance and doors shall be 1 ½ hour UL fire rated.
   4. Entrance Finish: Brushed stainless steel.
   5. Entrance Markings/Jamb Plates: Standard entrance jamb tactile markings on both jambs, at all floors. Plate mounting per manufacturer.

E. Equipment: Car Components
   1. Car Frame: Provide car frame with adequate bracing to support the platform and car enclosure.
   2. Platform: Manufacturer’s standard.
   3. Car Guides: Provide guide shoes mounted to top and bottom of both car and counterweight frame. Each guide-shoe assembly shall be arranged to maintain constant contact on rail surfaces. Retainers shall be provided in areas with Seismic design requirements.
   4. Load weighing device shall be strain gauge type mounted to dead-end hitch attached atop the hoistway guide rail.

5. Steel Cab: Panels to be non-removable vertical plastic laminate panels, cab interior finish series: Vintage-Winger (basis of design). Car finish:
    a. Back Wall: Mercury Stria (416)
    b. Side Walls: Satin Stainless Steel
    c. Reveals: Brushed Aluminum
    d. Ceiling: LF-94 Satin finished stainless steel three panel suspended ceiling with (2) strip lights with T-5 fluorescent lights.
    e. Flooring: 3/8" Epoxy Terrazzo unless directed otherwise by the County
    f. Threshold: Aluminum
    g. Protective Pads: Hooks and quilted fire retardant protective pads to be hung from ceiling.
6. Emergency Car Signals
    a. Emergency Siren: Siren mounted on top of cab that is activated when the alarm button in the car operating panel is engaged. Siren shall have rated sound pressure level of 80 dB(A) at a distance of three feet from device. Siren shall respond with a delay of not more than one second after activation of alarm button.
    b. Emergency Car Lighting: Provide emergency power unit employing a 12-volt sealed rechargeable battery and totally static circuits shall illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
    c. Emergency Exit Contact: Electrical contact shall be provided on the car-top exit.
7. Ventilation: Exhaust Fan

F. Equipment: Signal Devices and Fixtures
1. Car Operating Panel: Include panel with all push buttons, key switches and message indicators for elevator operation.
    a. Full height car operating panel shall contain a bank of round, mechanical, illuminated buttons marked to correspond to landings served, emergency call button, door open button, door close button, and key switches for lights, inspection, and exhaust fan. Buttons have solid federal blue illumination (halo). All buttons to have raised text and Braille marking on left hand side. The car operating display panel shall be solid federal blue Dot Matrix. All texts, when illuminated, shall be solid federal blue. The full height car operating panel shall have a polycarbonate face plate that is shatterproof and impact resistant in a color and pattern per manufacturer's standard selection.
    b. Additional Features of Car Operating Panel
        i. Car Position Indicator within panel (Solid Federal Blue).
        ii. Elevator Data Plate marked with capacity and car number on car top.
        iii. Help buttons with raised markings.
        iv. In car stop switch per local code.
        v. Firefighter's hat.
        vi. Firefighter's Phase II Key-switch.
        vii. Call Cancel Button.
        viii. Pre-programmed integrated ADA phone (complete description

of KRMS features included as standard)

ix. Help Button/Communicator: Activation of help button will initiate two-way communication between car and a location inside the building, switching over to alternate location if call is unanswered, where personnel are available to take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.

x. Firefighter's Phase II emergency in-car operating instructions.

2. Hall Fixtures: Wall mounted hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Wall mounted hall fixtures shall have a polycarbonate face plate that is shatterproof and impact resistant in a color per manufacturer's standard selection.
   a. Hall fixtures shall feature round, mechanical, buttons in applied mount face frame. Hall fixtures shall correspond to options available from that landing. Buttons shall be in a vertically mounted fixture. Hall fixtures shall not be jamb-mounted. Hall lanterns shall feature solid federal blue illumination.
3. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound. The chime will sound once for up and twice for down.

G. Equipment: Elevator Operation and Controller
1. Elevator Operation:
   a. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in system have been answered, the car shall park at the last landing served.
   b. Zoned Car Parking.
   c. Relative System Response Dispatching.
2. Standard Operating Features to include full collective operation, fan and light control, load weighing bypass, ascending car uncontrolled movement protection, top of car inspection station.
3. Additional Operating Features to include independent service, hoistway access bottom landing, hoistway access top landing, automatic standby power operation with manual override.
   a. This operation shall return each car automatically to a designated landing when the system is initially switched to standby power. Preference is given to loaded cars.
   b. Manual Override of Standby Power Operation is achieved by a manual input for each car via a rotary selector, individual key switch for each car switch. A manually selected car may be run either in a return operation to a designated landing or in normal operation under standby power. If a manually selected car has not yet returned to the designated landing, it will perform this operation first then immediately go into normal operation.
4. Elevator Control System for Inspections and Emergency
   a. Provide devices within controller to run the elevator in inspection

operation.

b. Provide devices on car top to run the elevator in inspection operation.

c. Provide within controller an emergency stop switch to disconnect power from the brake and prevent motor from running.

d. Provide means from the controller to mechanically lift and control the elevator brake to safely bring car to nearest available landing when power is interrupted.

e. Provide means from the controller to reset the governor over speed switch and also trip the governor.

f. Provide means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.

g. Provide means from the controller to reset the elevator earthquake operation.

H. Equipment: Door Operator and Control

1. Door Operator: A closed loop permanent magnet VVVF high-performance door operator shall be provided to open and close the car and hoistway doors simultaneously. Door movement shall be cushioned at both limits of travel. Electro-mechanical interlock shall be provided at each hoistway entrance to prevent operation of the elevator unless all doors are closed and locked. An electric contact shall be provided on the car at each car entrance to prevent the operation of the elevator unless the car door is closed.

2. The door operator shall be arranged so that, in case of interruption or failure of electric power, the doors can be readily opened by hand from within the car, in accordance with applicable code. Emergency devices and keys for opening doors from the landing shall be provided as required by local code.

3. Doors shall open automatically when the car has arrived at or is leveling at the respective landings. Doors shall close after a predetermined time interval or immediately upon pressing of a car button. A door open button shall be provided in the car. Momentary pressing of this button shall reopen the doors and reset the time interval.

4. Door hangers and tracks shall be provided for each car and hoistway door. Tracks shall be contoured to match the hanger sheaves. The hangers shall be designed for power operation with provisions for vertical and lateral adjustment. Hanger sheaves shall have polyurethane tires and pre-lubricated sealed-for-life bearings.

5. Electronic Door Safety Device. The elevator car shall be equipped with an electronic protective device extending the full height of the car. When activated, this sensor shall prevent the doors from closing or cause them to stop and reopen if they are in the process of closing. The doors shall remain open as long as the flow of traffic continues and shall close shortly after the last person passes through the door opening.

END OF SECTION 142000

DIVISION 21: FIRE SUPPRESSION

SECTION 210000

FIRE SUPPRESSION-GENERAL

I. GENERAL CRITERIA

A. All aspects of fire protection design must meet or exceed all current and applicable building codes and amendments. It is expected that the mechanical design professional will apply solid engineering design practices for anything not covered in these guidelines.

B. Designers shall adhere to the following codes, latest version adopted by the State of Georgia (including any state amendments that may apply):

1. International Building Code, 2006 Edition, with Georgia Amendments.
2. International Fire Code, 2006 Edition, with Georgia Amendments.
3. NFPA 13 – 2002 Edition, Standard for the Installation of Sprinkler Systems.
4. NFPA 14 – 2003 Edition, Standard for the Installation of Standpipe and Hose Systems.
5. NFPA 20 – 2003 Edition, Standard for the Installation of Centrifugal Fire Pumps.
6. NFPA 24 – 2002 Edition, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
7. NFPA 750 – 2006 Edition, Standard on Water Mist Fire Protection Systems.
8. NFPA 1963 – 2003 Edition, Standard for Fire Hose Connections.
9. NFPA 2001 – 2004 Edition, Standard for Clean Agent Fire Extinguishing Systems.
10. All City, County, State, Regional, and other ordinances applicable to the work shall apply.
11. In addition, the fire suppression system shall be designed to meet the requirements of Factory Mutual, the County's underwriter. The final fire suppression drawings will be subject to Factory Mutual review and approval. Contractor should be directed to comply with this process.

END OF SECTION 210000

SECTION 210100

FIRE SUPPRESSION PIPE, FITTINGS AND ACCESSORIES

I. UNDERGROUND PIPE AND FITTINGS

A. Underground pipe: underground piping shall be ductile iron.

B. Ductile iron pipe: thickness class 50 with cement lining and bituminous coating, meeting ANSI A21.51. Joints shall be gasketed slip-on type, meeting ANSI A21.11.

C. Underground fittings: underground fittings shall be cement-lined cast iron with mechanical joint connections. Working pressure shall be 250 psig. Fittings shall meet ANSI A21.10 and A21.11.

D. Tie rods and clamps: carbon steel rods with bituminous coatings. Provide 3/4" tie rods, bolts, and washers.

E. Underground gate valves: valves shall be suitable for use with an indicator post valve (PIV) or roadway box. Valves shall be non-rising stem gate valves with cast iron body, bronze mountings, and mechanical joint connections. Valves with indicator post shall have an indicator post flange. Valves shall open counterclockwise.

F. Fire Hydrant: AWWA approved, 3-way, dry barrel, compression type hydrant with cast iron body and bronze mountings. Hydrant shall have a break-away flange and stem, 6" mechanical joint inlet, 5.25" main valve, one 4.5" hose connection, and two 2.5" hose connections set 180 degrees apart. Hose threads and operating nut shall match the local fire department standard. Caps and chains for all outlets shall be included. Hydrant working pressure shall be 150 psi.

G. Require a barrel extension be provided if needed to set the hydrant plumb with break-away flange exposed, and 2.5" outlets set 18" to 24" above finished grade. Mueller Fig. A-24015, Kennedy Fig. K-11, or Clow Fig. F- 2640.

II. ABOVEGROUND PIPE AND FITTINGS

A. All above ground pipe shall be black steel. The Engineer shall specify that pipe meet the following standards:

1. For wet pipe systems piping shall be black steel to meet ASTM A-120, ASTM A-135 or ASTM A-53. All pipe less than Schedule 40 shall meet ASTM A-135. All pipe 2" and smaller shall be Schedule 40. All pipe lighter than Schedule 30 shall be all be UL listed and FM approved and shall be joined by welding or Victaulic roll grooved couplings only (no threaded joints).
2. All normally-dry piping shall be Schedule 40 hot dipped galvanized type, including fittings, including preaction systems.

3. All grooved end galvanized steel piping systems for pre-action and dry pipe systems shall be cut grooved in accordance with Victaulic specifications in accordance with AWWA C606. Coupling gaskets for pre-action and dry pipe systems shall be Flush Seal type and shall be provided by the coupling manufacturer.

B. Cast iron fittings: Standard weight fittings shall be U.L. rated for 175 psig. Fittings shall meet ASTM A-126. Threaded fittings shall meet ANSI B16.4. Flanged fittings shall meet ANSI B16.1. Gaskets for flanged fittings shall be full-face type of red sheet rubber.

C. Welded fittings: Factory fabricated wrought steel buttweld fittings meeting ASTM A-234 and ANSI B16.9. U.L. listed and FM approved formed steel welding outlets may be used. Acceptable manufacturers for welded fittings are Wheeling Machine Products Company, Anvil, or Allied Piping Products Company.

D. Grooved joints and fittings:
1. Grooved mechanical fittings and couplings shall use an elastomeric gasket (EPDM or nitrile) enclosed by a split ductile iron housing. All wet pipe systems shall be roll-grooved type. All dry systems shall be cut groove type.
2. Ductile iron shall meet ASTM A-536.
3. Rigid type couplings: Housings shall be ductile iron ASTM A-536, cast with offsetting, angle-pattern bolt pads to provide system rigidity and support and hanging in accordance with NFPA 13. 1-1/4" through 8" shall be "Installation Ready" stab-on design, for direct 'stab' installation onto grooved end pipe without prior field disassembly and no loose parts. Victaulic FireLock® EZ Style 009H (1-1/4" – 4") and QuickVic™ Style 107H (2" – 8"). 10" and larger shall be Victaulic Style 07 standard rigid coupling.
4. Specify that flexible type couplings be used. Use in seismic areas and where required by NFPA 13. 2" through 8" shall be "Installation Ready" stab-on design, for direct 'stab' installation onto grooved end pipe without prior field disassembly and no loose parts. Victaulic QuickVic™ Style 177. 10" and larger shall be Victaulic Style 75 or 77 standard flexible couplings.
5. Do not allow the use of self-grooving couplings and fittings employing set screws or plain end pipe.
6. Allow reducing couplings shall be allowed only where one pipe size change occurs. Require reduction pipe fittings where change of more than one pipe size occurs.

E. Acceptable manufacturers of grooved joints and fittings shall be Victaulic, Guston-Bacon, Stockham, Grinnell, or Conac. The products of only one shall be used.

III. VALVES

A. Require all valves shall be by one manufacturer.

B. Require valve size, working pressure, and the manufacturer's name or trademark to be permanently affixed to the body of all valves. Drain, test and gauge valves are exempt from this requirement.

C. "Standard weight" valves for service up to 175 psig, are as follows:

1. Gate valves smaller than 2½" shall be U.L. listed OS & Y (rising stem) design with bronze body and mountings and screw connections.
2. Gate valves 2½" and larger for above ground service shall be U.L. listed OS & Y design with cast iron body, bronze mountings and flange connections, and shall open counterclockwise.
3. Grooved end gate valves 2½ " and larger for above ground service shall be U.L. listed and FM approved OS&Y design with ductile iron body, EPDM coated cast iron disc, bronze mountings and grooved end connections. Victaulic Series 771.
4. Check valves smaller than 2½" shall be Y pattern clapper type with renewable seat and disc, bronze body, and screw connections.
5. Check valves 2½" and larger shall be U.L. listed clapper type with cast iron body and bronze mountings, rubber faced disc, flanged connections and bolted bonnet.
6. Grooved end check valves 2½ " and larger shall be U.L. listed and FM approved, non-slam, silent type with ductile iron body, spring-loaded stainless steel or EPDM coated ductile iron disc, stainless steel spring, nickel-plated or welded-in nickel seat and grooved end connections. Victaulic Style 717H and 717.
7. Trim valves: gate, globe, angle, and check valves used for "trim" in the fire protection system shall have all bronze construction and screwed connections.
8. All system shut-off valves shall be electrically supervised.

D. Butterfly valves shall be U.L. listed and F.M. approved for fire protection service. Valves 3" and larger shall be slow closing ductile iron body, flanged or grooved to fit piping system, 175 psi working pressure rated, stainless stem and ductile disc, EDPM or Viton resilient seat. Valves shall be provided with gear operation with malleable iron wheel. All valves shall be provided with a built-in tamper resistant SPDT switch for supervision of the valve position. Valves shall be Kennedy, Central or approved equivalent.

E. Butterfly valves with grooved ends shall be U.L listed and F.M. approved for fire protection service. Valves shall be ductile iron body, nickel-plated ductile iron disc, and Nitrile seat, up to 365 psi working pressure rated, stainless steel stem. Valves shall be provided with weather-proof actuator with two built-in pre-wired supervisory switches for supervision of the valve position. Victaulic Series 765 (365 psi) and 705 (300 psi) shall be supervised in the open position. Victaulic Series 766 (365 psi) and 707 (300 psi) shall be supervised in the closed position only (for fire pump metering test lines per NFPA 20).

IV. FIRE DEPARTMENT SIAMESE CONNECTION

A. 2½"x2½"x4" rough brass, wall mount or free standing, double clapper siamese with matching caps and chains. Escutcheon shall be lettered AUTO SPRINKLER. (FIRE DEPARTMENT CONNECTION)

V. POST INDICATOR VALVE

A. Vertical, adjustable indicator post with cast iron casing, steel operating stem, operating wrench, and locking staple. Require an extension piece to set the indicator post plumb with top 36" to 40" above finished grade.

VI. FIRE HOSE VALVES

A. Fire department hose valve: 2½" polished brass, pressure restricting angle hose valve with adjustable pressure setting, breakable control line, 2½" x 1½" polished brass reducer, cap, and chain. Working pressure shall be 300 psig.

VII. VALVE CABINET

A. Specify provision of a twenty gauge recessed steel cabinet, 20-gauge aluminum door and frame with hinge and brass pin, 18" x 18" size for 2½" valve.

B. Cabinet to be furnished with break glass front, self-contained cylinder lock, and red lettering 1½" size noting "FIRE DEPARTMENT VALVE".

END OF SECTION 210100

SECTION 210200

WET AND DRY-PIPE SPRINKLER SYSTEMS

I. SPRINKLERS

A. Require sprinklers to be listed and to be the product of one manufacturer.

B. Pendent, upright and sidewall sprinklers shall be Victaulic Model V27, Viking Micromatic type or equal with half-inch (½") orifice and half-inch (½") threaded connections.

C. Semi-recessed sprinklers shall be Victaulic Model V27, Viking Micromatic pendent type or equal with ceiling escutcheon plate allowing a 1” projection. All sprinklers shall have half-inch (½") orifice and half-inch (½") threaded connections.

D. Concealed sprinklers shall be Victaulic Model V38, Viking Horizon Mirage Standard Concealed type or equivalent with white cover plate. Do not allow large drop sprinklers. All sprinklers shall have half-inch (½") orifice and half-inch (½") threaded connections.

E. All sprinklers shall be cast brass finish.

F. Dry pendent sprinklers shall be Victaulic Model V36 recessed or concealed type

G. Specify shallow chrome plated escutcheons at all pendent sprinklers under finished ceilings.

H. Temperature ratings shall be as recommended by NFPA 13 unless shown otherwise.

I. Require installation of a painted steel cabinet containing 12 extra sprinklers and one sprinkler wrench near the alarm valve.

J. Require sprinkler guards on all sprinklers located lower than 7'-0" above the floor.

K. In areas where sprinklers are subject to high velocity impacts (i.e. gymnasiums) sprinkler guards shall be heavy duty steel construction type, approximately 4” W x 2-5/16” H for 1/2” NPT sprinklers. Chrome finish.

L. Special coatings: sprinklers shall be Nickel-Teflon coated where installed in corrosive environments.

M. Require sprinkler escutcheons and guards to be listed, supplied, and approved for use with the sprinkler, by the sprinkler manufacturer.

II. FLEXIBLE SPRINKLER DROPS

A. Provide that in lieu of rigid pipe offsets or return bends for sprinkler drops, the Victaulic AquaFlex® multiple-use stainless steel sprinkler fitting system may be used to locate sprinklers as required by final finished ceiling tiles and walls.

B. The drop system shall consist of a braided or unbraided (corrugated) type 304 stainless steel flexible tube, a zinc plated steel 1" NPT male threaded nipple for connection to branch-line piping, and a zinc plated steel reducer with a 1/2" or 3/4" NPT female thread for connection to the sprinkler head.

C. The flexible drop must be listed for a minimum of three 90 degree bends to assure proper installation. Union joints shall be provided for ease of installation. Specify that the flexible drop shall attach to the ceiling grid using a one-piece open gate Indicate the braided drop system is FM Approved for sprinkler services to 200 psi and can be installed without the use of tools, and the corrugated system is UL Listed for sprinkler services to 175 psig. All hoses shall be factory-pressure tested to 400 psi.

III. ALARM CHECK VALVE

A. Cast iron, bronze trimmed alarm check valve with vertical, variable pressure trim and including an exterior water motor alarm.

B. Grooved end alarm check valve shall be ductile iron with aluminum bronze clapper, complete with Series 752 retard chamber, drains, gages, by-passes and all accessories required to prevent accidental alarms. Specify a series 760 exterior water motor alarm. Valve internal components shall be replaceable without removing the valve from the installed position. Victaulic FireLock® Series 751.

C. Valve shall be manufactured by Vitaulic, Viking Star, Grinnell, or equivalent.

IV. DRY PIPE VALVE

A. Ductile iron body, grooved ends, 300 psi rated in all sizes, low differential, latched clapper design, aluminum bronze replaceable clapper, EPDM diaphragm and seat with brass seat and Nitrile seat o-rings. Minimum required air pressure is 13 psi with Series 776 low pressure actuator. Valve internal parts shall be replaceable without removing the valve from the installed position and shall be externally resettable. Require valve to be installed in the vertical position only and to be provided pre-trimmed as a Vic-Quick Riser with all necessary piping, shutoff valve, pressure switches, and gages. Victaulic FireLock® NXT Series 768.

B. Pendent style sprinklers installed in dry pipe systems shall be dry pendent type – to minimize the volume of trapped water in the system.

V. AIR MAINTENANCE/COMPRESSOR ASSEMBLY

A. Consisting of a riser-mounted compressor, Series 757P air maintenance device and flexible hoses for installation. Design to ensure the valve system can achieve operational air pressure within 30 minutes of discharge in accordance with NFPA 13 requirements. [1/6][1/3][1/2] horsepower compressor depending on system requirements.

VI. STRAP ON AIR COMPRESSOR

A. Air compressor for auxiliary dry systems where required shall be air-cooled, single stage, oil-less strap-on type. The air compressor shall be U.L. approved, and rated for 1.4 SCFM at 50 psig. Specify complete assembly with thermal overload protected motor, check valve, pressure relief valve and pressure switch.

B. Valve shall be Viking Model E-1 or approved equivalent by Central or Star.

VII. FLOOR MOUNTED AIR COMPRESSOR

A. Compressor and air tank: duplex piston type sized to restore normal air pressure in 30 minutes with one compressor running. Functions of system to be complete with two compressors, factory mounted and wired starters and controls with manual lead-lag switch, automatic pressure switch, A.S.M.E. relief valve, reducing valve, hand valves, drip valves, intake filter, high pressure discharge filter with automatic trap, refrigerated drier and steel air tank with automatic trap. Specify three valve bypass with desiccant driers around refrigerated drier. Compressor shall be reciprocating type. Compressor discharge pressure shall not be less than 80 psi.

VIII. PRE-ACTION SYSTEM

A. U.L. listed double interlock action, iron body, flanged, deluge valve, rated for 175 psi.

B. Valve to be Grinnell Duomatic Action Model B or Viking E-1 with swing check valve, dry pipe actuator and complete trim.

C. Grooved end pre-action valve to be Victaulic FireLock® NXT Series 769 rated for 300 psi. Valve shall be U.L. listed and F.M. approved double interlock action, ductile iron body, aluminum bronze clapper, brass seat with Nitrile seat o-rings. Minimum required air pressure is 13 psi with Series 767 electric/pneumatic actuator. Valve internal components shall be replaceable without removing the valve from the installed position and shall be externally resettable. Valve shall be completely pre-trimmed with all necessary piping, shutoff valve, pressure switches, gages and alarm test valve allowing testing of the alarm system without reducing the system pressure. Separate check valve shall not be required.

D. Release control panel shall be:
   1. By the same manufacturer as the pre-action valve assembly, fully compatible with fire alarm system. Panel shall be System Sensor PDRP 2001, Viking Par III or approved equal.
   2. Detection Devices:
      a. Detection devices should be fixed temperature, rate-of-rise, or combination fixed temperature/rate of rise.
      b. Detection devices should be on only single-zone circuitry.
   3. System shall be installed per NFPA 750.

IX. TEST HEADER

A. Ductile iron body test header with rough brass plate lettered "PUMP TEST CONNECTION" with rough brass 2½" NRS hose valves with chains and caps.

B. Specify a Victaulic Style 735 fire pump test meter on the discharge side of the pump for accurate flow measurements. Grooved end calibrated venture flow meter shall be carbon steel, zinc electroplated, brass needle valve with attached GPM meter. Minimum straight pipe installation of five diameters upstream and two diameters downstream.

X. TEST AND DRAIN VALVE

A. Globe style bronze body and bonnet, bronze and copper alloy internals with stainless steel spring, dual polycarbonate sight glasses, ½" orifice for test purposes, and malleable iron hand-wheel. UL listed and FM approved for services up to 300 psi. Victaulic Series 720 TestMaster™ II.

XI. ZONE CONTROL RISER MODULE

A. In zoned wet sprinkler systems, specify installation of a compact design zone control riser module consisting of a ductile iron module body with grooved ends, shutoff valve, test and drain valve combination with different orifice sizes, and vane type waterflow detector with sealed retard, visual switch activation, and mechanical delay adjustment. Victaulic Series 747M, FM approved to 365 psi and UL listed to 300 psi.

XII. HANGERS AND SUPPORTS

A. Require installation and spacing of hangers for sprinklers to conform to NFPA 13.

B. Hangers and supports shall be U.L. listed and FM approved and suitable for the structural system as recommended by the manufacturer.

C. Do not allow strap hangers and U-hooks.

D. Require piping smaller than 4" be supported by galvanized steel, adjustable, flat band hangers.

E. Require piping 4" and larger to be supported by galvanized steel, adjustable, clevis hangers.

F. Victaulic Style 009H, 107H and 07 rigid couplings may be used with IPS steel piping systems, which meet the support and hanging requirements of NFPA 13. Victaulic Style 177, 75 and 77 flexible couplings also may be used to compensate for thermal expansion/contraction of the pipe.

G. Require sprinkler piping below ductwork to be supported by trapeze hangers or angles conforming to NFPA 13, and not by the ductwork.

XIII. ALARM AND SUPERVISORY DEVICES

A. Alarm switch for wet pipe systems: Vane-type flow switch with flexible vane, SPDT contacts, cast aluminum housing with red enamel finish, and a steel U-bolt. The switch shall have an instantly recycling pneumatic retard mechanism field adjustable from 0-60 seconds. Minimum water working pressure shall be 175 psig.

B. Valve tamper switch: Suitable for PIV alarm, or zone valves. A signal shall be initiated before the valve stem moves more than 1/5 of its total travel or if the housing cover is removed.

END OF SECTION 210200

SECTION 210300

FIRE PUMPS

I. FIRE PUMP, CONTROLLER AND METER

A. Required the fire pump and jockey pump, drivers, controllers and accessory fittings to be purchased from a single supplier who shall be responsible for the satisfactory performance of the entire unit and its component.

B. Fire Pump: U.L. listed horizontal split case, double suction, cast iron, bronze fitted centrifugal pump. Maximum allowable shut-off pressure at now flow shall be 120% of rated pressure.

C. The pump shall deliver at least 65% of rated pressure when pumping 150% of rated flow.

D. Driver: The pump shall be directly connected through a flexible coupling, with guard, to a 480 volt, 3 phase, 60 cycle, horizontal, open, drip proof induction motor meeting the requirements of NFPA 20. Pump and motor shall be mounted on a one-piece drip-rim base of cast iron or fabricated steel.

E. Pump shall be Aurora, Peerless, Fairbanks-Morris, or Patterson.

F. Specify the following trim and fittings required to meet NFPA 20:
1. Concentric discharge increaser.
2. Automatic air release valve.
3. Suction and discharge pressure gauges with gauge cocks.
4. Pressure relief valve.
5. Discharge cone.
6. Test header
7. 2½" straight-way hose valves.

G. ELECTRIC FIRE PUMP CONTROLLER

1. The fire pump controller shall conform to all of the requirements of NFPA 20, and shall be listed and approved for fire pump service by UL, ULC, FM, and CSA.
2. If emergency power is included on the project, the pump assembly shall include an automatic transfer switch as part of the assembly.
3. The controller shall be of the combined manual and automatic type designed for solid state reduced voltage starting.
4. The enclosure shall be NEMA Type 2 for indoor use.
5. The controller shall be suitable for use as service equipment.
6. The controller shall have a motor minimum running period timer set for ten minutes and shall be specified for easy conversion from automatic to manual shutdown.

7. The controller shall include a motor rated combination isolating disconnect switch/circuit breaker, mechanically interlocked and operated with a single, externally mounted handle. When moving the handle from “OFF” to “ON” the interlocking mechanism shall sequence the isolating disconnect switch “ON” first and then the circuit breaker. When the handle is moved from “ON” to “OFF”, the mechanism shall sequence the circuit breaker open first, and then the isolating disconnect switch. The isolating disconnect switch and circuit breaker shall be mechanically interlocked so that the enclosure door cannot be opened with the handle in the “ON” position except by a hidden, tool operated defeater mechanism.
8. The controller shall include visible indication of Power Available and Phase Reversal. The controller shall also include both normally open and normally closed contacts wired to terminals for remote alarm of: Pumps Run, Phase Failure; Phase Reversal. The controller shall include circuits and terminals for Remote Start, Deluge Valve Start, and Interlock.
9. If required, controller shall have emergency generator controls including adjustable time delays for normal to emergency, emergency to normal and engine cool down.
10. No pushbuttons or pilot lights shall be mounted on the enclosure door.
11. Acceptable manufacturers are Firetrol, Metron or Clark.

H. Jockey Pump: cast iron, bronze mounted, single stage regenerative turbine pump. Maximum net pressure at churn conditions shall not exceed 60 psig. The pump shall be driven by a ½ HP, 480 volt, 3 phase, 60 cycle open drip proof induction motor. Acceptable manufacturers: Grundfos, Aurora Series 930, Paco Series C, or Burks Series CS. Specify an adjustable relief valve with discharge piped to floor drain.

I. Jockey Pump Controller: Combined manual and automatic start-stop controller of same manufacturer as the fire pump controller. Provide for "MANUAL-OFF-AUTOMATIC" starter; Boudron-tube type pressure switch with adjustable high and low set points; control transformer; adjustable period timer; and fusible disconnect switch with externally operable handle. Require installation in a wall-mounted drip-proof cabinet.

END OF SECTION 210300

SECTION 212200

CLEAN AGENT FIRE EXTINGUISHING SYSTEMS

I. GENERAL APPLICATION

A. This section outlines the requirements for the design of an engineered total flooding fire suppression system with automatic controls that meets the minimum requirements of NFPA 2001 - 2004 Edition, Standard for Clean Agent Fire Extinguishing Systems and this guideline section. The County's preference is HFC-227a (Heptafluropropane), hereafter referred to by the trade name FM-200. The FM-200 clean agent fire suppression system is intended for use in areas such as computer equipment rooms, emergency call center equipment rooms, in records and data storage areas, and in other spaces where either the cost of equipment downtime or the potential loss of records or data due to fire or damage from a water based sprinkler system are unacceptable. The County typically will designate whether it wishes for a clean agent system to be installed, but in some instances may request that a licensed fire protection engineer assess the benefits and practicality of a clean agent system versus a water based sprinkler system.

II. QUALITY ASSURANCE

A. Installer's Qualifications: The qualifications and experience of the installing contractor are critical to insuring proper engineering, installation and testing of the FM-200 system. As such, the architect shall insure the specifications require that the installing contractor be trained by the system manufacturer and have a minimum of five years' experience in engineering, installation and testing of FM-200 fire suppression systems. It also shall be required that the installer's personnel responsible for the work be NICET certified Special Hazard Design, Level 2 and Fire Alarm System Level 2 or above. The installing contractor shall have an FM-200 re-charging station on its premises and be capable of providing emergency services within 24 hours of notification.

B. Warranty Services: The system warranty shall require the installing contractor to provide two (2) system inspections during the first year of service, the first at a six month interval and the second at the end of the one year period. The system inspections shall be conducted in accordance with the manufacturer's guidelines and comply with the recommendations of NFPA 2001. The contract specifications shall call for a one year warranty on all materials and workmanship associated with the system.

III. PRODUCT/SYSTEM CHARACTERISTIC AND REQUIREMENTS

A. As noted, the preferred clean agent system is HFC-227a (Heptafluropropane), hereafter referred to by the trade name FM-200. The FM-200 system shall be designed as a stand-alone, turnkey system and shall include all piping and piping specialties, extinguishing agent containers, extinguishing agent, detection and alarm devices, listed control and alarm panels, and all wiring between system components.

B. Design the FM-200 system for Class A, B, or C fires as appropriate for the areas being protected per the requirements of NFPA 2001. In this design utilize the safety factor specified in NFPA for the concentrations of the FM-200 agent suitable for normally occupied areas in Class A, B, and C fires.

C. Design the FM-200 system to be actuated by a combination of ionization and /or photoelectric detectors installed in a cross-zoned arrangement that will require two separate detectors to be in alarm before the agent is released. High Sensitivity Smoke Detectors (HSSD) may be used to activate the FM-200 fire suppression system control panel.

D. The engineer-of-record shall coordinate with the architect to insure that the design for the protected space is properly detailed for sealing and securing the protected space against agent loss and/or leakage during the required "hold" period. Careful consideration also must be given to compartment over/under pressurization during the FM-200 discharge period. Pressure relieving vents located in the finished ceiling may be necessary to regulate rapid pressure changes during discharge. Comply with the manufacturer's recommended procedure relative to enclosure venting.

E. Design the system to include a manually activated exhaust system to facilitate the extraction of any remaining FM-200 after the required hold time is met. This exhaust system may be integrated into the HVAC system.

F. The design preference is that to the extent possible the FM-200 agent cylinders be located in the spaces they serve. The engineer-of-record will coordinate this space requirement with the architect.

G. Specify that all system equipment and the extinguisher agent be provided through a single source.

END OF SECTION 212200

DIVISION 22: PLUMBING

SECTION 220010

PLUMBING-GENERAL

I. GENERAL CRITERIA

A. All aspects of plumbing design must meet or exceed all current and applicable building codes and amendments. It is expected that the mechanical design professional will apply solid engineering design practices for anything not covered in these guidelines.

B. The mechanical design professional shall attempt to minimize building water use where possible. They should aim to achieve LEED 2009 WEp1: Water Use Reduction prerequisite, calling for a 20% reduction for all projects.

C. Designers shall adhere to the following codes, latest version adopted by the State of Georgia (including any state amendments that may apply):

1. International Building Code 2006 Edition, 2012 Edition effective 1/1/2014, with Georgia Amendments.
2. International Residential Code 2006 Edition, 2012 Edition effective 1/1/2014 with Georgia Amendments.
3. International Fire Code 2006 Edition, 2012 Edition effective 1/1/2014 with Georgia Amendments.
4. International Plumbing Code 2006 Edition, 2012 Edition effective 1/1/2014 with Georgia Amendments.
5. International Mechanical Code 2006 Edition, 2012 Edition effective 1/1/2014 with Georgia Amendments.
6. International Fuel Gas Code 2006 Edition, 2012 Edition effective 1/1/2014 with Georgia Amendments.
7. International Energy Conservation Code, 2009 Edition, with Georgia Supplements and Amendments.
8. All City, County, State, Regional, and other ordinances applicable to the work shall apply.

D. Indicate on plumbing drawings the locations for all concealed air plenum systems. State on drawings that materials exposed within plenums are required to be noncombustible or shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 as determined in accordance with ASTM E 84 except for tested and labeled wiring, fire sprinkler piping, pneumatic tubing, and electrical equipment. (IBC sections 603.1 exception 22, 717.5 exception 2, 1017.4.1; IMC section 602.2.1)

E. Indicate on plans the locations of all backflow prevention devices for the potable water supply. Provide an accessible backflow prevention device at each water outlet not protected by the "minimum required air gap". (IPC section 608)

F. Provide local shut off valves for each restroom and plumbing fixture group. All valves shall be located in accessible location. When provided above gypsum ceilings or in walls, provide access panel for valve access.

G. All pipes and fixtures shall have immediate and sufficient access through walls and obstructions to facilitate maintenance and repair.

H. All pipes shall have sufficient cleanouts to expedite maintenance. Back to back cross-tee assemblies shall have cleanouts above or below cross-tee

I. Hot water circulation system shall be provided when hot water source is away from plumbing fixtures requiring hot water. Waiting period for hot water at any plumbing fixture shall not exceed 10 seconds. Provide balancing valve at each branch of hot water recirculation line.

END OF SECTION 220010

SECTION 220523

PLUMBING VALVES AND STRAINERS

I. GATE VALVES

A. Valves 2" and under shall be class 125 all bronze construction valve with solder ends, rising stem, block pattern, union bonnet, solid wedge, 200 psi non shock cold working pressure conforming to MSS SP-80 downstream of pressure reducing valve and class 150 valve rated for 250 psi non shock cold working pressure upstream of PRV.

B. Valves 2½" and over shall be class 125 iron body, flanged, non-rising stem, solid wedge, bronze trimmed, bolted bonnet, and 200 psi non shock cold working pressure conforming to MSS SP-70 downstream of pressure reducing valve and class 150 valve rated for 250 psi non shock cold working pressure upstream of PRV.

C. Valves shall be Hammond, American, Milwaukee, Nibco, Powell or Stockham/Crane.

II. GLOBE VALVES

A. Valves 2" and smaller shall be class 125 all bronze valve with solder ends, union bonnet, composition or Teflon disc for selected service, 200 psi non shock cold working pressure conforming to MSS SP-80 downstream of pressure reducing valve and class 150 valve rated for 250 psi non shock cold working pressure upstream of PRV.

B. Valves 2½" and larger shall be class 125 iron body, flanged, bronze trimmed, bolted bonnet, solid disc, and 200 psi non shock cold working pressure conforming to MSS SP-85 downstream of pressure reducing valve and class 150 valve rated for 250 psi non shock cold working pressure upstream of PRV.

C. Valves shall be Hammond, American, Milwaukee, Nibco, Powell or Stockham/Crane.

III. BALL VALVES

A. Valves 2" and under shall be full port rated for 150 psi saturated steam and 600 psi non shock cold working pressure conforming to MSS SP-110 with cast bronze body, chrome plated ball, reinforced PTFE seal (15% glass filled), brass stem, and zinc coated extended steel handle with vinyl handle hand grip, and soldered connections. Ball valves shall be American, Apollo, Hammond, Milwaukee, Nibco or Stockham/Crane.

IV. BUTTERFLY VALVES

A. Valves 2½" and larger shall be wafer-type, iron body with aluminum bronze disc and EPDM seal. Valves shall be rated for no less than 200 psig, complying with MSS-SP-67 and API-609, and shall be equipped with 10-position handle in sizes from 2" through 6" and with manual worm gear operator in sizes 8" and above. Butterfly valves shall be Centerline, Hammond, Keystone, Milwaukee, or Nibco.

V. PRESSURE REDUCING VALVES

A. Pressure regulating valves shall be self contained direct operating type with bronze body, stainless steel seat, stainless steel spring, sealed spring cage, and bronze body strainer with 20 mesh stainless steel spring. Regulator shall be constructed in accordance with ASSE standard 1003 and shall bear the seal of approval. Capacities shall be based on a maximum pressure fall off of 10 psig.

B. Valves ½" to 2" shall be Watts Series 223S, valves 2-1/2" and 3" shall be Watts Series N223BS or equal by Spence Engineering or A.W. Cash Company.

VI. WATER TEMPERING VALVES

A. Single Hi-Lo thermostatic mixing valve shall be ASSE 1017 listed. Valve shall have thermal actuator and expandable restrictor, dirt and lime resistant poppet, seat, heavy duty strainer check stops, self aligning bronze trim and seats and temper-resistant temperature adjustment control. Mixing valve shall be capable of providing minimum of 0.5 gpm tempered water and valve shall be rated for 125 psig service. Valves shall have a mixed temperature adjustment range of 40°F. to 160°F. and setpoint shall be field adjustable. Valves shall be Powers HydroGuard XP Series SH1430 or comparable by Symmons, Leonard, Bradley or Lawler.

B. Thermostatic mixing valve shall be ASSE 1070 listed. Valve must control each performance standard down to 0.5gpm. Valve shall be constructed of solid brass and temperature must be adjustable between 80°F and 120°F with locking nut to prevent unauthorized adjustment. Valve shall be set to deliver 90°F tempered water. Valve shall be Powers e480 for single lavatory use or Powers LM 49# series where installed above the ceiling. Comparable products by Leonard, Symmons or Wilkins.

C. Emergency mixing valves shall be ASSE 1017 listed and shall include thermostat to control intake of hot and cold water and compensate for supply temperature and pressure fluctuations. Valve shall close upon failure of cold water and continue providing cold water upon failure of hot water. Valve shall include high temperature limit stop, rough bronze finish, dial thermometer and checkstops on inlets. Valves shall have a mixed temperature adjustment range of 60°F to 95°F and valve shall be set to deliver 80°F (field adjustable) water to emergency fixture. Valves shall meet requirements of ANSI Z358.1-2004. Emergency mixing Valves shall be Powers ES and ETV series or comparable by Bradley, Lawler, Leonard, Haws, or Speakman.

VII. BACKFLOW PREVENTERS

A. Reduce Pressure Backflow Preventer:

1. Backflow preventers 2" and under shall be of bronze construction and stainless steel working parts, consisting of integral check valves, relief valve, strainer, inlet and outlet shut-off valves and bronze body test cocks. Unit shall meet ASSE standard 1013 be equipped with an air gap drain device. Preventers shall be line size. Design basis is Watts Series 909QT-S

2. Backflow preventers 2-1/2" and larger shall be iron body with flanged connections, strainer, replaceable bronze seats, stainless steel internal parts, inlet and outlet shut-off valves. Unit shall meet ASSE standard 1013 and be equipped with an air gap drain device. Preventers shall be line size. Design basis is Watts Series 909-S.

B. Anti-Siphon Vacuum Breaker: Watts No. 288A breaker with angle bronze body and internal trim and brass external trim.

C. Backflow preventers shall be manufactured by Ames, Febco, Hersey, Watts or Zurn Wilkins.

END OF SECTION 220523

SECTION 220553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

I. PLUMBING IDENTIFICATION

A. This section provides direction on specifications for identification of plumbing piping and equipment. The construction documents shall provide for all of the markers and tags described below. The manufacturer's standard products may be used for each application referenced.

II. PIPE MARKERS

A. Pressure-Sensitive Type: Specify manufacturer's standard preprinted, permanent adhesive, color-coded pressure sensitive vinyl labels complying with ANSI A13.1. Color-coded plastic adhesive flow directional arrow tape, full circle at both ends of the pipe marker, tape overlapped 1-1/2". Specify 1" tape for piping less than 2-1/2", 2" tape for 2-1/2" thru 8" piping; and 4" tape for larger piping.

B. Lettering: Require compliance with ANSI A 13.1 for piping system nomenclature. Allow abbreviation only as necessary to accommodate marker length.

III. UNDERGROUND TYPE PLASTIC LINE MARKERS

A. Metallic Piping: Specify use of manufacturer's standard non-detectable permanent, continuous printed plastic tape, intended for direct burial service, not less than 3" wide by 4 mils thick. Specify use of tape with printing most accurately indicating type of service of buried pipe.

B. Non-Metallic Piping: Specify use of manufacturer's standard detectable, multi-ply tape consisting of solid aluminum foil core between 2 layers of plastic tape, not less than 3" wide by 5 mils thick. Specify use of tape with printing most accurately indicating type of service of buried pipe.

IV. VALVE TAGS

A. Plastic Tags: Specify use of manufacturer's standard 1/16" plastic engraved tags, 1½" square, black with white lettering, with ¼" high service indicator on top line and ½" numbers below.

B. Valve Tag Fasteners: Require solid brass "S" hooks for installation of valve tags.

C. Chart Frames: Require provision of two (2) of aluminum 8 ½" x 11" valve chart frame with glass lens for each valve schedule provided.

D. Access Panel Markers: Specify use of manufacturer's standard 1/16" thick engraved plastic access panel markers with abbreviations and numbers corresponding to the concealed valve.

V. ENGRAVED PLASTIC EQUIPMENT MARKERS

A. Specify use of manufacture's standard 1/16" engraved equipment tags matching the terminology on schedules as closely as possible. Specify black with white letters, 1" x 3" or 1 ½" x 4" for control devices, and valves and 4" x 6" for equipment. Specify green with white letters, 3" long x the ceiling grid width for equipment above lay-in ceilings.

VI. MARKER LOCATION

A. Require pipe markers on each system indicated below. Require markings include arrows showing normal direction of flow.

B. Schedule of Piping Identification:

Piping Systems and Contents	Tape Background Color	Stenciled Legends
<u>Water Supply</u>		
Domestic Cold Water	Green	Cold Water Domestic
Domestic Hot Water	Yellow	Hot Water Domestic
Recirculating	Yellow	Hot Water Recirculating
<u>Gas Systems</u>		
Gas	Yellow	Natural Gas
<u>Drainage</u>		
Sewerage	Green	Sanitary Sewer
Waste	Green	Waste
Roof Drainage	Green	Rainwater
Vent	Green	Vent

C. Specify provision of pipe markers and/or color bands (if required) wherever piping is exposed to view, and at least one marking per room above suspended ceilings. Per the following:

1. Near each valve and control device.
2. Near each branch, excluding short take-offs for fixtures and terminal units mark each branch where there might be a question of flow direction.
3. Near locations where pipes pass through walls, floors, or ceilings or where they enter non-accessible locations.
4. Behind removable panels and other access points permitting view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. On piping above removable acoustical ceilings.
7. At maximum intervals of 40' along each straight pipe run, except to 25' in congested areas.

VII. UNDERGROUND PIPE IDENTIFICATION

A. Require that backfilling of each exterior underground piping system, contractor to provide continuous underground plastic line markers directly over buried line at 6” to 8” below finished grade. Where multiple small lines are buried in a common trench and do not exceed and overall with of 16” require a single line marker.

VIII. VALVE IDENTIFICATION

A. Specify provision of a valve tag on every, cock, and control device in each piping system. Exclude check valves, valves within factory fabricated equipment units, plumbing fixture faucets, convenience and lawn watering hose bibs, shut-off valves at plumbing fixtures. Contractor to list each tagged valve in a valve schedule for each piping system.

IX. EQUIPMENT IDENTIFICATION

A. Require installation of engraved plastic signs or equipment markers on or near each major item of mechanical equipment and each operational device. Require attachment of tag to the ceiling grid directly under equipment installed above lay-in ceilings. Require markers for the following general categories of equipment and operational devices.

1. Main control and operating valves including safety devices and hazardous units.
2. Meters, gauges, thermometers, and similar units.
3. Fuel burning units including boilers and heaters.
4. Pumps and similar motor driven units.
5. Tank and pressure vessels.
6. Strainers, filters, water treatment systems, and similar equipment.

END OF SECTION 220553

SECTION 220700

PLUMBING SYSTEMS INSULATION

I. QUALITY ASSURANCE

A. This section establishes the standards and acceptable products for plumbing system insulation. Products of the manufacturers listed should be acceptable for use for the specific functions noted. Engineer will confirm that all materials shall be compatible with the materials to which they are applied, and shall not corrode, soften or otherwise attack such material in either the wet or dry state.

B. Include that materials shall be applied subject to their temperature limits. Specify that any methods of application of insulating materials or finishes not specified in detail herein shall be in accordance with the particular manufacturer's published recommendations.

C. Require that insulation shall be applied by experienced workers regularly employed for this type work.

II. RATING

A. Specify that all insulation and accessories shall have a composite flame-spread rating of not more than 25 and a smoke developed rating of not more than 50. Materials that are factory applied shall be tested as assembled. Materials that are field applied may be tested individually. Do not permit fugitive or corrosive treatments be employed to impart flame resistance.

B. Flame Spread and Smoke Developed Ratings shall be determined by Method of Test of Surface Burning Characteristics of Building Materials, ASTM E-84 1997 or U.L. 723.

C. Specify that products or their shipping cartons shall bear a label indicating flame spread and smoke developed ratings.

D. Require that treatment of pipe jackets and duct facings to impart flame and smoke safety shall be permanent.

III. ASBESTOS

A. Require that all materials used in this work be asbestos free.

IV. INSULATION APPLICATIONS

A. Pipe Insulation:
   1. Interior concealed Domestic Cold water:
      a. Glass fiber, 1/2” thick.
   2. Interior exposed Domestic Cold water:
      a. Glass fiber, 1” thick.
   3. Domestic Hot water and Circulating Hot water, interior installations:

a. Glass fiber, 1” thick for piping up to 2” diameter and 1-1/2” for piping larger than 2”

4. Rainwater piping, horizontal, interior installations (emergency overflow piping is exempt):
   a. Glass fiber, 1” thick.
5. Interior, horizontal waste piping receiving condensate from HVAC equipment:
   a. Glass fiber, 1” thick.

V. ACCESSORY MATERIALS

A. Require that low VOC adhesives, sealants and mastics shall be selected as recommended by the insulation manufacturers. Adhesives shall be water based, and must comply with the current VOC content limits of the South Coast Air Quality Management District (SCAQMD) Rule #1168, with a maximum VOC emission of 70 grams per liter. Low VOC water based sealants and mastics shall be manufactured to comply with NFPA 90A, U.L. listed and complying with ASTM E84 and comply with the current VOC limits of the SCAQMD Rule #1168, with a maximum VOC emission of 250 grams per liter. They shall be manufactured by the insulation manufacturer or by Foster, Flintkote, Hardcast, Insul-Coustic, Lion Oil or 3M.

B. Adhesives, sealants and mastics which secure a vapor barrier material shall be of the vapor barrier type.

C. Adhesives, sealants and finishes for surfaces above 70°F shall be of the "breather" type.

D. Insulation jackets shall have a vapor barrier when applied to surfaces subject to sweating in an ambient environment up to 90°FD.B. and 80°FW.B.; including chilled water, domestic cold water, rainwater, condensate drain, refrigerant suction and ice water.

E. Finish jackets, if required, shall be not less than 8 oz./sq. yd. white, pre-sized glass cloth kraft paper reinforced by Carolina or Twinsburg-Miller.

F. All finish mastics and sealants shall be white in color.

G. Pre-formed fitting jackets shall be one piece molded PVC with a 25/50 flame spread smoke developed rating.

H. Staples shall be "outward clinch" or "flare" type.

I. Galvanized steel wire shall be 20 gauge.

J. Stainless steel wire shall be 20 gauge.

VI. INSULATION PIPE SHIELDS

A. Shields shall be galvanized rolled to form a 180° arc. Length of shields shall conform to the following:

Insulation O.D.	Shield Length	Shield Gauge
0-4 inch	12 inch	14 gauge

5-9 inch	18 inch	14 gauge
10-19 inch	24 inch	12 gauge
Over 20 inch	30 inch	12 gauge

VII. INSULATION DESIGNATION

A. Glass Fiber Insulation, suitable for interior application.

1. Insulation shall be composed of high-density glass fibers bonded with a thermosetting resin. Operating temperature range shall be 0°F to 850°F. Mean thermal conductivity shall not exceed 0.23 at 75°F. Manufacturers shall be Certainteed, Knauf, Owens Corning, or Schuller (Manville).
2. Insulation finish shall be factory applied all service jacket with pressure sensitive adhesive closures for the longitudinal and butt joints. Jacket permeance shall not exceed 0.02 perms.
3. Specify all valves, thermometer wells, gauge cocks, hose bibbs, air vent piping, and any other components shall be insulated with molded insulation fittings or same thickness elastomeric insulating tape finished with flexible glass cloth and mastic.
4. Specify provision of PVC jacket on insulation where piping is exposed to building occupants. Protective jacket shall be paintable white PVC, high impact type, UV resistant, flame spread and smoke developed 25/50 rated per ASTM E 84 and shall have minimum 0.020" thickness.

END OF SECTION 220700

SECTION 221005

PLUMBING PIPING AND DRAINAGE ACCESSORIES

I. DOMESTIC WATER SERVICE

A. Pipe shall be ductile iron, Class 51, cement lined, bituminous outer coating.

B. Fittings shall be ductile iron, cement lined, bituminous coated, 250 psi rated, mechanical joint.

C. Provide thrust blocks and rodding.

II. INTERIOR DOMESTIC WATER SYSTEM TO 5FT OUTSIDE BUILDING

A. Indicate main shutoff valve and pressure reducing valve on plans on water riser diagram.

B. Pipe:
   1. Type "L" hard copper above ground.
   2. Type "K" hard copper buried.

C. Fittings: Wrought copper solder type pressure fittings.

D. Joints: Solder joints 95/5 above ground. Silver alloy solder for buried piping. Lead free, weighted average lead content of less than 0.25%.

E. Flux: Meets requirements of ANSI/NSF Standard 61. Lead free.

III. SOIL, WASTE, VENT AND RAINWATER SYSTEM

A. Provide complete schematic or isometric riser diagrams for each drain waste-vent system which indicates the type, size and material of each pipe. (Continuous waste/vent risers shall be shown on single sheet for clarification.)

B. Pipe and Fittings inside the building to 5'-0" beyond building wall:
   1. Cast iron service weight (schedule 80) piping. Underground piping shall be hub and spigot with gasketed push-on type joints. Above ground piping shall be no-hub with stainless steel and neoprene couplings.
   2. All pipe, fittings, gaskets and couplings shall be of one manufacturer and shall conform to the ASTM requirements listed by the Cast Iron Soil Pipe Institute. Pipe and fittings shall be manufactured by Charlotte Pipe and Foundry, Tyler Pipe or AB&I Foundry.
   3. PVC as directed by the County. Underground piping shall be Schedule 40 PVC and ABS conforming to ASTM D2665 and D2661 respectively. Fittings: Drainage, waste, and vent PVC and ABS fittings shall conform to ASTM D2665 and ASTM D2661 respectively.
   4. Protective Coating - Cast Iron Inside Soil, Waste and Vent Piping: Piping shall be coated with coal tar enamel or other material that will not burn through when painted.

C. Soil piping outside the building: Cast iron service weight hub and spigot pipe, except where in fill or in paved areas with less than three (3) feet of cover, pipe shall be ductile iron service weight hub and spigot. Ductile iron shall continue for 10 feet from paved area.

D. Each facility in which food is prepared or processed shall collect all floor drains, hub drains, and open site drains into a safe waste system (master trap with fresh-air relief vent). Provide drain waste-vent riser diagram which incorporates the requirements of each safe waste system which shall be limited to one floor.

E. For facilities with food service, the location and specifications for each required grease interceptor shall be established and approved by Gwinnett County Department of Water Resources (GCDWR) prior to issuance of the building permit. GCDWR shall signify acceptance of submitted plans by applying stamp of approval for grease interceptor directly on the pertinent plumbing drawings.

F. Prepare plans for both primary and secondary (emergency) roof drainage systems which include required sizes, locations, and materials for the applicable piping and scuppers. Piping for the secondary roof drain system shall be independent of the primary system with a separate point of discharge at a readily visible location above grade for compliance with IPC section 1107.2. Overflow scuppers shall be sized in accordance with IPC section 1107.3 and located such that the bottom of each scupper is not less than 2 inches nor more than 4 inches above the top of finished roof unless the specific rain design load for the corresponding scupper location is indicated on the structural construction documents. (IPC sections 1105, 1106, and 1107; IBC sections 1603.1.7 and 1611)

G. Rainwater piping outside the building: Cast iron service weight hub and spigot type, except where less than three feet (3') of cover is available pipe shall be ductile iron service weight hub and spigot. Ductile iron shall continue for 10 feet from paved area.

H. Waste Piping from Fixtures:
   1. Connect floor outlet water closets with cast iron closet connectors. Make joint between closet traps and floor flanges with gaskets.
   2. Caulk cast iron closet connectors to the cast iron closet bend or straight closet connection.
   3. Connect fixture traps from lavatories, drinking fountains, service sinks, kitchen equipment, etc. to cast iron pipe with Schedule 40 PVC pipe.
   4. Connect fixture traps from urinals to cast iron pipe with Schedule 40 PVC pipe.

I. Each open vent for a drainage system shall not terminate directly below any door, operable window, or other air intake opening of any building and shall also not terminate within 10 feet horizontally of any air intake opening for any building unless it is located at least 2 feet above the top of such opening. Document compliance on plans. (IPC section 904.5)

J. Flashing: Vents at roof shall be flashed with 3 lb./sq. ft. sheet lead, counter flashed into vent cap collar. Roof drains shall be flashed with 3 lb./sq. ft sheet lead, counter flashed into the roof drain flashing clamp. Flashings shall extend a minimum of 18" in all directions from the outside perimeter of vent piping and roof drain.

IV. GAS PIPING SYSTEM

A. Indicate on either mechanical or plumbing drawings the layout of gas piping on each floor plan with a corresponding riser diagram which specifies the type, pressure, size, location and total equivalent length of each pipe, the type and location of shutoff valves and flow control devices, and a schedule of equipment (with BTUH demand) served by each pipe. Also, provide details which clearly address the requirements of installation of piping to resist the applicable seismic design forces. (IFGC sections 301.12, 401, 402, 403, 404, 407, 409, 410, and 411).

V. GAS PIPING ABOVE GRADE

A. Gas piping shall be schedule 40 black steel pipe.

B. Fittings shall be threaded malleable iron in sizes 3" and under and welding type in sizes 3" and over.

C. All gas piping in return air plenum shall be welded.

VI. GAS PIPING BELOW GRADE

A. Piping shall be medium density polyethylene meeting ASTM D-2513.

B. The piping shall be continuous tubing in sizes 3/4” thru 2” and shall be pipe sections in sizes 3” thru 6” I.P.S. Piping shall be jointed with socket fusion fittings.

C. The piping and tubing shall be specifically designed for underground natural gas piping systems with standard dimension ratios and specified wall thickness to meet design pressures of 80 psig at 73°F.

D. The system shall be complete with non-corrosive mechanical non-pull out type couplings, steel to polyethylene non-pull out “O” ring protected transition fittings, and single seal anodeless gas risers.

E. Piping system shall be Performance Pipe DRISCOPLEX 6500 PE2406 polyethylene piping.

VII. GAS PIPING BELOW SLAB

A. When gas piping runs below slab, specify polyethylene sleeved, flexible steel corrugated gas piping.

B. Stainless steel tubing shall be made from 300 series stainless steel strip conforming to ASTM A240. Tubing shall be suitable for operation with Natural Gas and LP Gas (Propane). Tubing shall be rated for 5 psig pressure.

C. Protective sleeve shall be fire retarded polyethylene and shall have ASTM E-84 flame spread rating not to exceed 25 and smoke density rating not to exceed 50. Polyethylene shall be resistant to UV. Protective sleeve shall be designed to withstand the superimposed loads. The sleeve shall have internal vent channels lengthwise to direct any leakage along the pipe to the end fittings. End fitting shall consist of AutoFlare fittings with a plastic containment coupling and ¼” NPT vent port to provide venting. ¼” diameter type K copper piping shall be connected to vent port on fitting, extend and terminate to outdoors.

D. No fittings shall be permitted under the slab of a building.

E. Piping system shall be TracPipe PS-II by Omega Flex or equal.

VIII. CLEANOUTS

A. Cleanouts outside the building shall extend up to grade (in 12” x 12” x 6” concrete pad) with countersunk cleanout caps set flush with finished grade. They shall consist of a cast iron trap screw ferrule, and heavy brass or bronze plug with countersunk head; Smith 4400.

B. Cleanouts for concealed piping in floor or ceiling construction shall extend through the finished floor above. Do not locate cleanouts in hallways, lobbies, entrance ways and other high traffic areas.

C. Medium duty cleanouts shall be cast iron body, adjustable housing, round top, inside caulk, bronze plug, solid satin nikaloy secured top; Smith 4026. Cleanouts in carpeted areas shall have carpet markers.

D. Heavy duty cleanouts subject to vehicular traffic shall be cast iron adjustable body, round solid satin nikaloy top, secured top, bronze plug, inside caulk outlet; Smith 4246-M-U. Where waterproofing membranes are provided, cleanouts shall have a flashing clamping device.

E. Cleanout installed on PVC piping shall have PVC body, adjustable housing, medium duty 7-1/16” square nickel bronze top with vandal resistant screws and polypropylene plug; Sioux Chief 834 series.

F. Equal products by Josam or Zurn are acceptable.

IX. FLOOR DRAINS AND DECK DRAINS

A. FD1 (Restrooms). Provide a floor drain in all restrooms regardless of the size. Quantity shall be determined by the size of the restroom. Cast iron body, flashing collar, bottom outlet, inside caulk, adjustable height strainer, trap primmer connection, 6" square secured polished nikaloy strainer, J.R. Smith 2010(B)06-P050. Provide flashing collar where installed in waterproof membranes.

B. FD2 (Mechanical Rooms). Provide at least one floor drain in each mechanical room. Cast iron, flashing collar, adjustable top, bottom outlet, medium duty, sediment bucket, inside caulk, weep holes, 8" strainer, with trap primer connection; J.R. Smith 2350-P050. Provide flashing collar where installed in waterproof membranes.

C. FD3 (Large Mechanical Rooms). Provide at least one floor drain in each mechanical room. Cast iron, flashing collar, adjustable top, bottom outlet, medium duty, sediment bucket, inside caulk, weep holes, trap primer connection, 12" strainer; J.R. Smith 2360-P050. Provide flashing collar where installed in waterproof membranes.

D. FD4 (Floor Sink): Cast iron flanged receptor with acid resistant coated interior, nickel bronze rim, secured grate, sediment bucket, 12-1/2” square top, 6” deep; J.R. Smith 3141. Provide flashing collar where installed in waterproof membranes.

E. FD5 (Pool Deck). PVC body, bottom outlet, light duty, flashing collar with schedule 40 hub connection, 7" square nickel-bronze strainer with vandal resistant screws; Sioux Chief 863 series.

F. FD6 (Pool Mechanical Room): PVC body, flashing collar, bottom outlet, medium duty, sediment bucket, 8" nickel bronze strainer; Sioux Chief 860 series. Provide flashing collar where installed in waterproof membranes. Provide trap guard in drain

G. Apparatus Bay Trench Drain: 6" wide Precast Polyester Concrete Channel of Interlocking Design with a Built-in Slope of .6% trench drain with heavy duty slotted perforated stainless steel grate. JR Smith 9818 series trench drain with 9870-490-SSHD grate. Provide trap guard in p-traps associated with trench drain.

H. Equal drains by Josam or Zurn are acceptable.

X. ROOF DRAINS

A. RD (Primary Roof Drain): Cast iron type, large aluminum dome, bottom outlet, adjustable extension sleeve, cast iron flashing clamp, under deck clamp; J.R. Smith 1015-AD.

B. ERD (Emergency or Secondary Roof Drain): Cast iron type, large aluminum dome, bottom outlet, adjustable extension sleeve, cast iron flashing clamp, under deck clamp, gravel stop, cast iron water dam; J.R. Smith 1045-AD

C. DOWNSPOUT NOZZLE: Cast bronze body with bolting flange, threaded inlet and bird screen; J.R. Smith 1770-BS

D. Equal drains by Josam or Zurn are acceptable.

XI. STACK SLEEVES

A. Smith 1720 galvanized cast iron sleeve with caulking recess, flashing flange, flashing clamp ring with pressure ring and bronze bolts.

XII. WATER HAMMER ARRESTERS

A. Specify water arrester that shall be permanently charged and sealed. Manufacturers shall be American Tube and Controls "Hammertrol", Zurn "Shok-Trol", Wade "Shock-Stop", Josam "Absorbotron", or Jay R. Smith "Hydrotrol". Size of arresters is determined by the Plumbing and Drainage Institute's symbols set forth in Standard PDI-WH-201.

XIII. FIXTURE CARRIERS

A. For water closets, Smith Series 200.

B. For urinals, Smith Series 0636, bolt type floor mounted.

C. For lavatories, Smith Series 0700, bolt type floor mounted

D. For drinking fountains, Smith Series 0830, bolt type floor mounted.

E. Equal carriers by Zurn or Josam are acceptable.

XIV. HYDRANTS

A. HB: Provide hose bibb in each mechanical room. Hose Bibbs shall be furnished with integral vacuum breaker, 3/4" hose thread, removable handle, polished chrome finish; Chicago 952 or equal by Prier, Watts, Woodford or Zurn.

B. WH: Provide wall hydrant within 50 feet of any outdoor HVAC unit and locate a wall hydrant every 50 feet around the perimeter of building. Non-Freeze wall hydrant shall be cast bronze non-freeze wall hydrant with polished face, integral vacuum breaker, backflow preventer, hinged and latched cover. Smith 5509 Series or equal by Josam, Prier, Watts, Woodford or Zurn.

C. WH1: Provide a can wash in large kitchen when required. Can Wash wall hydrant shall be hot and cold water wall hydrant, non-freeze, bronze, quarter turn operation, vacuum breaker, hose connection, "T" handle key, and bronze box with chrome plated face: J.R. Smith 5560QT-H or equal by Josam, Prier, Zurn, or Woodford.

D. RH: Provide roof hydrant within 50 feet of any HVAC unit on roof. Non-freeze roof hydrant shall include type 304 stainless steel shroud w/ welded stainless steel flange and R-8 rated / thermo-cell insulation, black powder coated cast aluminum weather-guard dome handle, 125 lb.-1" bronze globe angle valve with vacuum breaker, stainless steel reservoir, under-deck support flange w/ hardware. Unit shall be self contained for freeze protection and shall not require a drain connection for freeze protection; Mapa Products model MPH-24FP or equal by Prier or Woodford.

XV. TRAP PRIMERS

A. Indicate on plans a trap seal primer or other approved method at each location in which a trap seal is subject to loss by evaporation. (IPC section 1002.4 with 2007 Georgia State Amendments)

B. Pressure Drop Activated Trap Primer: Trap primers shall be pressure drop activated with all brass body, vacuum breaker port, backflow preventer seal, and meet A.S.S.E. Standard 1018. Trap primers for single through three (3) floor drain installations shall be Precision Plumbing Products PR-500 or Mifab MR-500. Trap primers for installations greater than three drains shall be Precision Plumbing Products model PI-500 or Mifab MI-500. Multiple drain installations shall include a trap primer distribution unit. Distribution units shall be Precision Plumbing Products DU series or Mifab MI-DU series.

C. Trap Guard: An elostomeric normally closed membrane, trap guard device to utilize a normally closed p-trap seal; Proflo Trap Guard.

END OF SECTION 221005

SECTION 221125

PUMPS-PLUMBING

I. HOT WATER CIRCULATING PUMP

A. Engineer shall design and specify hot water recirculating pumps and return lines with systems having hot water lines over 75 feet in length, Pump shall be a centrifugal in-line pump; horizontal, permanently lubricated, designed for quiet operation, and rated for 125 psi working pressure. Pump shall have a ground and polished steel shaft supported by two horizontal sleeve bearings of the grease lubricated ball bearing design. Pump to include a mechanical seal with carbon seal face rotating against a ceramic seat. Motor shall be non-overloading at any point on pump curve. Motor shall be drip-proof, ball bearing, quiet operating, and rubber mounted construction. Motors shall have built-in thermal overload protectors. Pump shall have flow switches that shut the system down when there is pump failure. The starter shall be equipment with manual reset buttons. Pump shall include all bronze construction, designed for supporting from piping.

B. Pump shall be Armstrong, Bell & Gossett, or Grundfos.

II. ELEVATOR SUMP PUMP

A. If required, engineer shall design and specify a sump pump with elevator pump control system with oil / water detection. The pump control shall activate the pump for removal of water in accordance with ASME17.1. The control shall shut-down the pump prior to discharging oil.

B. Pump shall be a close coupled submersible type simplex pump with cast iron motor housing and volute, bronze impeller, stainless steel shaft, armored power cord and operating switch of waterproof construction.

C. Sensor to include ABS housing, stainless steel probe and PVC float.

D. Control panel shall include NEMA type 1 enclosure, 6 foot power cord and receptacle.

E. Alarm panel shall include NEMA type 1 enclosure, plug-in transformer, battery back-up power, LED alarm indicators and audible alarm with buzzer, auto test and reset.

F. Pump shall be Myers EPP series or equal by Stancor Oil-Minder, Liberty OilTector or Zoeller Oil Smart System.

END OF SECTION 221125

SECTION 223400

WATER HEATERS

I. WATER HEATER

A. Indicate size and location of water heaters on drawings. Water heaters larger than 10 gallons shall be floor mounted.

B. Water heaters exceeding 200,000 Btu/hr, 210 degrees Fahrenheit, or 120 gallons capacity shall be established by O.C.G.A. Title 34, Chapter 11 and the Rules and Regulations of the Georgia Department of Labor. Georgia Amendments to IPC section 501.9.

II. ELECTRIC WATER HEATER

A. Electric type U.L. listed, vertical storage tank type, meeting UL Standard 1453. Non-simultaneous element operation.

B. The tank shall be of glass-lined steel and rated for 125 psi. The heater shall be complete with automatic thermostat, magnesium rod, dip tube, fiberglass insulation and steel jacket with baked enamel finish and cold water connection in lower part of tank. Controls shall include low water cutoff and high temperature protection. Heater element density shall not exceed 80 watts per square inch.

C. Water heater shall meet or exceed ASHRAE 90.1-2004 Performance Requirements:

D. $\leq$12 KW, Min Energy Factor = 0.93-0.00132V where V = Rated Vol. (gals)

E. $>$12 KW, Max Stand-by Loss (BTUH) = 20 + 35$\sqrt{V}$ where V = Measured Vol. (gals)

F. Provide CSA/ASME rated temperature and pressure relief with water heater. Relief valve shall be set to relieve at 210°F or 125 psig.

G. Water heaters shall be State, Rheem/Ruud, A.O. Smith, or Bradford White.

III. GAS WATER HEATERS

A. Natural gas, vertical storage tank type, CSA certified hot water heater with minimum thermal efficiency of 92%.

B. Water heater shall be high efficiency type with power burner with direct vent sealed combustion. Combustion venting to be PVC. Heater shall be vented with factory recommended screen and weatherproof enclosure over vents at exterior.

C. The tank shall be of glass-lined steel and rated for 150 psi. The heater shall be complete with automatic thermostat, foam insulation and steel jacket with baked enamel finish and cold water connection in lower part of tank. Controls shall include low water cutoff and high temperature protection. Controls shall be provided to meet ASME Safety Code CSD-1, latest version, as a minimum.

D. Water heater shall exceed ASHRAE 90.1-2004 Performance Requirements:

E. ≤75,000 BTUH and ≥20 gal, Min Energy Factor = 0.62-0.0019V where

F. V = Rated Vol. (gals)

G. >75,000 BTUH and <4,000 BTUH/Gal

H. Storage tank shall be warranted for three (3) years against corrosion failure.

I. Heater shall be provided with CSA/ASME rated temperature and pressure relief valve. Relief valve shall be set to relieve at 210°F or 125 psig.

J. Water heaters shall be A.O. Smith BTH series or equal by Bradford White, Rheem Ruud or Lochinvar.

IV. TANKLESS ELECTRIC WATER HEATER

A. Tankless heaters shall be electric, thermostatic type with digital microprocessing temperature control capable of maintaining outlet temperature of ±1°F accuracy. Maximum operating pressure shall be 150 psi.

B. Heaters shall have ABS-UL 94Vo rated cover. Element shall be field serviceable, replaceable cartridge insert. Element shall be iron free, nickel chrome material with minimum 1 year warranty.

C. Unit shall have replaceable filter in the inlet connector. Heaters shall have compression type inlet and outlet fittings to eliminate the need for soldering.

D. Heaters shall be set to deliver 105°F maximum with 0.3 GPM turn-on flow rate to meet ASSE 1070TR.

E. Heaters shall be guaranteed against leaks of heater body/element assembly for a period of 5 years.

F. Tankless electric water heaters shall be Eemax or equal by Chronomite or Stiebel Eltron.

V. TANKLESS GAS WATER HEATER

A. Tankless Heater(s) shall be internally mounted, instantaneous, multiple point-of-use, gas fired, direct vent, water heater(s) design certified to the ANSI Z21.10.3 standard for gas fired water heaters.

B. Each Tankless Heater shall produce no more than 55 ppm NOx emissions when tested in accordance with the Rules and Regulations of the South Coast Air Quality Management District (SCAQMD).

C. Tankless Heater(s) shall be configured to operate with natural gas and a 120 volt/60 Hz AC power source.

D. Tankless Heater(s) shall have a a minimum thermal efficiency rating of 84%.

E. Tankless Heater(s) shall be microprocessor controlled and utilize a direct electronic ignition system (with no standing pilot), fully modulating gas control valve, turbine flow meter, automatic electro-mechanical water flow control valve, and water temperature thermistors to maintain outlet water temperature between ± 2 °F of set point temperature.

F. Tankless Heater(s) shall incorporate the following internal safety devices: flame failure lockout, boiling protection lockout, thermal overheat protection, internal freeze protection for ambient temperatures as low as –30 °F, and lockout protection in the event of a blocked flue.

G. Tankless Heater(s) shall be provided with a temperature thermostat with an adjustable set point range of 98°F to 140°F.

H. Tankless Heater(s) shall also be capable of storing and displaying a history of up to 9 diagnostic maintenance codes, via the display on the temperature thermostat controller.

I. Heaters shall activate on minimum flow of 0.5 gallons per minute.

J. Tankless Heater(s) shall have stainless steel burners, solid brass water flow control valve, and solid brass inlet and outlet water connections.

K. Tankless Heater(s) shall have a copper heat exchanger warranted against material defects or workmanship for a period of 5 years from date of purchase. All other parts shall be warranted against material defects or workmanship for a period of 5 years from the date of purchase.

L. Tankless gas water heaters shall be Rinnai or equal by Bosh, Noritz or Aerco.

VI. THERMAL EXPANSION TANKS

A. Expansion tanks shall be pre-charged to 40 psi (adjustable), FDA and NSF approved for use in domestic water systems. Tank shall have working pressure of 150 psig and maximum temperature of 200°F.

B. Tank shall be steel with an epoxy finish and include a FDA approved double butyl rubber diaphragm.

C. The tank shall have a NPT connection of brass or stainless steel and incorporate an air charging valve.

D. Expansion tank shall be Flexcon Industries WH/WHV series or equal by Amtrol, Bell & Gossett, or Sparco.

END OF SECTION 223400

SECTION 224000

PLUMBING FIXTURES, FOUNTAINS & COOLERS

I. FIXTURES

A. Provide complete fixture and equipment schedule and identify each item on floor plans and riser diagrams.

B. Indicate on plumbing drawings the total number of occupants that has been considered in determining the required number of plumbing fixtures.

C. Required public restroom facilities shall be directly accessible to the public through direct openings or corridors from the area(s) they are intended to serve and shall not pass thru kitchens, storage rooms, closets and other spaces which are restricted from public access.

D. Provide separated male and female toilet facilities in compliance with the requirements of IPC 403.1 with following exception;

1. Structures with a calculated occupant load (including employees and customers) of 15 or less.

E. The calculated occupant load shall be established either in accordance with 2006 international builsing code section 1004.1.1 or by verification of the occupant load as determined by Gwinnett County Fire Marshal's Office per IBC 2007 Georgia State Amendments. Clearly document compliance with the fixture requirements on both architectural and plumbing drawings.

F. The installation of high efficiency plumbing fixtures shall be required in all new construction and major renovations affecting restroom spaces. Georgia Amendments to IPC section 301.1.1, 419, 420, 424, and Table 604.4.

G. Indicate on plans each required permanent emergency eye wash and/or shower station with floor drain based on the information contained in the MSDS (Material Safety Data Sheets) submitted in response to code compliance item AG18. (IPC sections 403.1 and 411)

H. Fixtures shall be complete with all equipment, fittings, and trim. Fittings and trim shall be chrome plated brass, including P-traps, supplies and stops.

II. FIXTURE SCHEDULE:

A. Fixtures shall be as follows:

1. Water closets are based on American Standard, comparable Toto or Kohler fixtures will be acceptable.
2. Seats are based on Church, comparable Bemis seats are acceptable.
3. Urinals are based on American Standard, comparable Toto or Kohler fixtures will be acceptable.
4. Flush valves are based on Sloan, comparable Zurn flush valves will be acceptable
5. Lavatories are based on American Standard, comparable Kohler fixtures will be acceptable.

6. Sensor operated faucets are based on Moen, comparable Sloan faucets will be acceptable.
7. Stainless Steel Sinks are based on Just manufacturer, comparable Elkay or Advance Tabco fixtures will be acceptable.
8. Sinks faucets are based on Chicago, comparable Zurn or T&S Brass faucets will be acceptable.
9. Drinking Fountains shall be Oasis manufacturer; comparable fixtures by Acorn Aqua or Elkay will be acceptable.
10. Stops, traps and tailpieces shall be by one manufacturer by McGuire or Engineered Brass.
11. Drain, trap, and supply insulation under ADA fixtures shall comply with ASTM E84 and 25 Flame/450 Smoke rating may be provided by Plumberex- Handy Shield or by comparable others.

B. Fixtures for new construction:
1. Water Closet: High efficiency wall hung toilet with exposed sensor operated, battery powered, 1.28 gpf flush valve. Toilet shall be wall hung, vitreous china, elongated siphon jet bowl, top spud, open front seat with check hinge and bolt caps with clips, water closet shall be designed for 1.28gpf. American Standard 3351.001 bowl, Sloan Optima G2 Plus 8111-1.28 flush valve, Church #9500-C seat.
2. Fire Station Water Closet: High efficiency wall hung toilet system complete with exposed manual 1.28 gpf manual flush valve. Toilet shall be wall hung, vitreous china, elongated siphon jet bowl, top spud, open front seat with check hinge and bolt caps with clips, water closet shall be designed for 1.28gpf. American Standard 3351.001 bowl, Sloan Royal 111-1.28 flush valve, Church #9500-C seat.
3. Urinal: High efficiency wall hung urinal with exposed sensor operated, battery powered, 0.5 gpf flush valve. American Standard 6590.001 urinal, Sloan Optima 8186.05 flush valve.
4. Countertop Lavatory: 20" x 17" oval, counter type, self-rimming, vitreous china lavatory with 4” faucet centers; American Standard 0476.028. Faucet: ADA compliant, battery operated, no-touch infrared faucet with chrome plated spout and 0.5 gpm aerator; Moen 8305 faucet with 104428 deck plate. Drain: Chicago 327 grid drain with 1¼" tailpiece and chrome plated 17 gauge cast brass P-trap with cleanout. Provide chrome plated supplies to wall with removable handle angle stops. Insulate drain, trap, and hot water supply under lavatory.
5. Wall Hung Lavatory: 20" x 18" wall hung, vitreous china lavatory, 4" faucet centers; American Standard 0355.012. Faucet: ADA compliant, battery operated, no-touch infrared faucet with chrome plated spout and 0.5 gpm aerator; Moen 8305 faucet with 104428 deck plate. Drain: Chicago 327 grid drain with 1¼” offset tailpiece and chrome plated 17 gauge cast brass P-trap with cleanout. Provide chrome plated supplies to wall with wheel handle angle stops. Insulate drain, trap and hot water supply under lavatory.

6. Two Compartment Counter Sink: ADA compliant, double compartment, 18 gauge, self rimming, type 304 stainless steel sink, 19”x33”x6½” deep; Just DL-ADA-1933-A-GR with J-ADA-35 basket strainers. Faucet: deck mounted, chrome plated, 8” centers, 8” spout, aerator, wrist blade handles; Chicago 1100-317CP. Provide supplies to wall with wheel handle angle stops, ADA offset chromed brass tailpiece, and 17 gauge cast brass P-trap with cleanout. Provide rigid PVC, vandal resistant, ADA insulation kit on piping under lavatory.
7. One Compartment Sink: Single compartment, 18 gauge, self rimming, type 304 stainless steel sink, 20” x 17” x 6½” deep; Just SL-ADA-2017-A-GR with J-35 basket strainer. Faucet: 4” centers, gooseneck spout, wrist blade handles; Chicago 895-317CP. Provide supplies to wall with wheel handle stops, chromed brass tailpiece, and 17 gauge cast brass P-trap with cleanout. Insulate drain, trap, and hot water supply under sink.
8. Dual Drinking Fountain: Provide drinking fountains to comply with IPC sections 403 and 410 with Georgia State Amendments. Wall mounted electric drinking fountain, ADA compliant for adult and child, single cooling unit, bi-level dual fountain, all stainless steel housing, lead free tank and piping, stainless steel bubbler head, R-134a refrigerant; Oasis P8ACSL. Provide 17 gauge, chrome plated cast brass P-trap with cleanout and flexible ½” supply with wheel handle angle valve.
9. Drinking Fountain& Bottle Filler: ADA compliant Halsey Taylor Hydroboost in wall bottle filling station and oval drinking fountain combination HTHBWF-OVLERGRN.
10. Shower: Pressure balancing mixing valve with lever handle, integral service stops and adjustable stop screw to limit handle turn, adjustable ball joint type polished chrome shower head with 1.5 gpm flow. Symmons C-96-1-4-228-1.5 equal by Bradley, Acorn or Willoughby Industries. All mounting fasteners for valve and head are to be vandal resistant construction.
11. ADA Shower: ADA compliant, pressure balancing mixing valve with screw driver service stops, adjustable stop screw to limit handle turn, adjustable ball joint type polished chrome shower head with 1.5 gpm flow, lever diverter with volume control, 1.5 gpm wall/hand shower with flexible metal hose and vacuum breaker, 30” slide bar, recessed soap dish, stainless steel covering to be 18 gauge; Symmons model 1-912RS-FSB-4-228-1.5 or equal by Bradley, Acorn or Willoughby Industries. All mounting fasteners for valve and head are to be vandal resistant construction.

Fixture	Design Base	Acceptable Fixture Manufacturers	Acceptable Flush Valve/Trim Manufacturers
Water Closet	American Standard 3351.001 bowl, Sloan Optima G2 Plus 8111-1.28 flush valve, Church #9500-C seat.	Kohler, Toto	Zurn
Fire Station Water Closet	American Standard 3351.001 bowl, Sloan Royal 111-1.28 flush valve, Church #9500-C seat.	Kohler, Toto	Zurn
Urinal	American Standard 6590.001 urinal, Sloan Optima 8186.05 flush valve.	Kohler, Toto	Zurn
Counter Lavatory	American Standard 0476.028, Moen 8305 faucet with 104428 deck plate.	Kohler, Toto	Sloan
Wall Hung Lavatory	American Standard 0355.012, Moen 8305 faucet with 104428 deck plate.	Kohler, Toto	Sloan
Two Compartment Sink	Just DL-ADA-1933-A-GR, Chicago 1100-317CP.	Elkay or Advance Tabco	Zurn, T&S Brass
One Compartment Sink	Just SL-ADA-2017-A-GR, Chicago 895-317CP.	Elkay or Advance Tabco	Zurn, T&S Brass
Dual Drinking Fountain	Oasis P8ACSL.	Acorn, Elkay or Halsey Taylor	
Drinking Fountain & Bottle Filler	Halsey Taylor Hydroboost HTHBWF-OVLERGRN.	Oasis or Elkay	
Shower	Symmons C-96-1-4-228-1.5.	Zurn or Bradley	
ADA Shower	Symmons model 1-912RS-FSB-4-228-1.5	Zurn or Bradley	

END OF SECTION 224000

DIVISION 23: HEATING VENTILATION AND AIR CONDITIONING (FACILITIES UNDER 50,000 SF)

SECTION 230010

HVAC-GENERAL

I. GENERAL CRITERIA

A. All aspects of mechanical design must meet or exceed all current and applicable building codes and amendments. It is expected that the mechanical design professional will apply solid engineering design practices for anything not covered in these guidelines.

B. Designers shall adhere to the following codes, latest version adopted by the State of Georgia (including any state amendments that may apply):
   1. International Building Code
   2. International Mechanical Code
   3. International Energy Conservation Code
   4. NFPA 90A
   5. NFPA 96
   6. NFPA 101
   7. ASHRAE 90.1
   8. ASHRAE 62.1
   9. All City, County, State, Regional and other ordinances applicable to the work shall apply.

C. Unless directed otherwise by the County, specify cooling conditions at 75°F, 50% RH indoor at 93°F DB/75°F WB outdoor, and heating design conditions at 68°F, 50% RH indoor at 18°F outdoor.

D. Unless directed otherwise by the County, all equipment shall meet the Minimum Efficiency Requirements stated in ASHRAE 90.1, latest edition.

E. Unless directed otherwise by the County, building ventilation design shall comply with ASHRAE 62.1, latest edition. Provide outside air and exhaust calculations on Construction Documents.

F. Passing COMCheck Mechanical Compliance Certificate shall be provided on M-Series mechanical sheets.

G. In most cases, air-cooled chillers will not be utilized for buildings under 50,000 SF. However, if it is determined and directed by the County that a chiller be specified and designed for a smaller facility, refer to the building standards document for buildings 50,000 SF and up for detailed information regarding air-cooled chillers.

H. All equipment shall take into consideration serviceability and ability of removal. Where located above a ceiling, equipment shall be installed two (2) feet or less above ceiling level for ease of access. Where above inaccessible ceilings, a minimum 24” x 24” access panel shall be installed to service equipment. Access panel shall be large enough for equipment to fit through if no other means of removal is provided. In rare instances and with the approval of County, catwalks may be used. Where catwalks are used, they shall be designed and sized to allow adequate access to equipment for maintenance in accordance with manufacturer’s cut sheets. Catwalks shall be no less than 3’-0” wide. Always comply

with manufacturer's recommended clearances. Designer shall complete equipment layouts so that removal of any piece of equipment is possible without removing other unrelated pieces of equipment.

I. Air Conditioning Condensers: Locate condensing units so that there is free air circulation and room for maintenance. Confirm the manufacturer's minimum recommended clearances between units and walls prior to design. In no cases shall units be placed closer than two (2) feet from an adjacent wall or with less than three (3) feet between units. Provide additional clear area for servicing as recommended by manufacturer, but not less than five (5) feet of service area.

J. Air Handling Units: Locate air handling units so that there is adequate room for maintenance. Confirm the manufacturer's minimum requirements. In no cases of new construction shall an air handling unit have less than two (2) feet of clearance around the entire unit, plus not less than five (5) feet clear at the service sides of the unit.

K. In preparing the design, ensure that there is coordination between trades to ensure adequate spacing and access for all HVAC equipment.

END OF SECTION 230010

SECTION 230700

HVAC INSULATION

I. GENERAL CRITERIA

A. Insulation and accessories, unless specifically exempted, shall have a composite flame-spread rating of not more than 25 and a smoke developed rating of not more than 50.

B. Flame Spread and Smoke Developed Ratings shall be determined by Method of Test of Surface Burning Characteristics of Building Materials, ASTM E-84 1997 or U.L. 723.

C. All materials used in this work shall be asbestos free.

II. DESIGN STANDARDS: INSULATION PRODUCTS

A. INSULATION APPLICATIONS (Where multiple options are listed, any are acceptable. Insulation thicknesses listed are minimums.):

1. Duct Insulation – Denoted by Type D:
   a. Interior concealed Supply ductwork:
      i. 2" thick flexible fiberglass blanket, 1 lb. per cubic foot minimum density with foil/scrim kraft jacket finish.
      ii. 2" thick flexible fiberglass blanket, low VOC type, 1 lb. per cubic foot minimum density with foil/scrim kraft jacket finish.
   b. Interior concealed Return ductwork (insulation not required for ducts located in unventilated attics with roof insulation or crawlspaces):
      i. 2" thick flexible fiberglass blanket, 1 lb. per cubic foot minimum density with foil/scrim kraft jacket finish.
      ii. 2" thick flexible fiberglass blanket, low VOC type, 1 lb. per cubic foot minimum density with foil/scrim kraft jacket finish.
   c. Interior concealed Outside air (tempered) and Exhaust ductwork connected to energy recovery units:
      i. 2" thick flexible fiberglass blanket, 1 lb. per cubic foot minimum density with foil/scrim kraft jacket finish.
      ii. 2" thick flexible fiberglass blanket, low VOC type, 1 lb. per cubic foot minimum density with foil/scrim kraft jacket finish.
   d. Interior exposed Supply ductwork in mechanical rooms:
      i. 1-1/2" thick rigid fiberglass insulation, 3 lbs. per cubic foot minimum density with foil/scrim reinforced kraft jacket finish.
      ii. 1-1/2" thick rigid fiberglass insulation, low VOC type, 3 lbs. per cubic foot minimum density with foil/scrim reinforced kraft jacket finish.
      iii. 1-1/2" thick rigid fiberglass insulation, 3 lbs. per cubic foot minimum density with all service jacket (white) finish.
   e. Interior exposed Supply ductwork, unlined, and within 25' of an exterior door.
      i. 1" thick closed cell elastomeric, 3 lbs. per cubic foot minimum density.
      ii. 1-1/2" thick rigid fiberglass insulation, 3 lbs. per cubic foot minimum density with all service jacket (white) finish.

f. Interior exposed Outside air (tempered) and Exhaust ductwork in mechanical rooms connected to energy recovery units:
    i. 1-1/2" thick rigid fiberglass insulation, 3 lbs. per cubic foot minimum density with foil/scrim reinforced kraft jacket finish.
    ii. 1-1/2" thick rigid fiberglass insulation, 3 lbs. per cubic foot minimum density with all service jacket (white) finish.
g. Interior exposed Outside air ductwork in heated only mechanical rooms:
    i. 1-1/2" thick rigid fiberglass insulation, 3 lbs. per cubic foot minimum density with foil/scrim reinforced kraft jacket finish.
    ii. 1-1/2" thick rigid fiberglass insulation, 3 lbs. per cubic foot minimum density with all service jacket (white) finish.
h. Exterior Supply and Return ductwork and exterior outside air (tempered) and exhaust ductwork connected to energy recovery units:
    i. 2" thick closed cell elastomeric, 3 lbs. per cubic foot minimum density. Insulation shall be finished with self-adhering rubberized bitumen single ply membrane jacket in the largest sheet possible. Membrane shall conform to the minimum physical properties of ASTM D882, D1000 & E154.
i. Interior concealed Kitchen range hood or oven hood ductwork:
    i. 1-1/2" thick fire resistant duct wrap . Duct wrap shall be a UL listed foil encapsulated, non-combustible, flexible fire-resistant wrap with a thermal resistance R-valve of 4.15 per inch. Duct wrap must comply with NFPA 96, latest edition, and shall be tested in accordance with UL 1978 (Sections 12 & 13).
    ii. 4" thick mineral fiber wire mesh reinforced blanket, 6 lbs. per cubic foot minimum density.
j. Exterior Kitchen range hood or oven hood ductwork accessible to foot traffic:
    i. Provide expanded metal screen around duct to shield against accidental skin contact with hot duct surface. Screen shall be 0.081" thick aluminum with .3" x 1" openings and secured to duct with 1" standoff.

2. Mechanical Equipment: Insulation - Denoted by Type E:
    a. Interior Cold Equipment (Any equipment subject to sweating):
        i. 1" thick closed cell elastomeric, 3 lbs. per cubic foot minimum density.
        ii. 1" thick rigid fiberglass insulation, 3 lbs. per cubic foot minimum density with all service jacket (white) finish.
    b. Interior Hot Equipment (Any equipment with surface temperatures above 130°F, except pumps and expansion tanks):
        i. 2" thick rigid fiberglass insulation, 3 lbs. per cubic foot minimum density.
3. Pipe Insulation – Denoted by Type P:
    a. Interior concealed Chilled water piping:
        i. For piping 2" and less, 1-1/2" thick cellular glass, 7 lbs. per cubic foot minimum density. For pipe diameters over 2", insulation shall be 2" thick. Insulation shall be finished with glass fabric and mastic jacket.
        ii. For piping 4" and less, 1-1/2" thick continuously molded rigid foam polyisocyanurate cellular plastic, 2 lbs. per cubic foot minimum density. For pipe diameters over 4", insulation shall be 2" thick. Finish insulation with industrial film, by insulation manufacturer. Where exposed, insulation shall be covered with paintable PVC protective jacket. Straight pieces and fittings shall be secured by solvent welding.
    b. Interior exposed Chilled water piping:

i. For piping 2” and less, 1-1/2” thick cellular glass, 7 lbs. per cubic foot minimum density. For pipe diameters over 2”, insulation shall be 2” thick. Insulation shall be finished with glass fabric and mastic jacket.
ii. For piping 4” and less, 1-1/2” thick continuously molded rigid foam polyisocyanurate cellular plastic, 2 lbs. per cubic foot minimum density. For pipe diameters over 4”, insulation shall be 2” thick. Insulation shall be finished with industrial film, by insulation manufacturer. Where exposed, insulation shall be covered with paintable PVC protective jacket. Straight pieces and fittings shall be secured by solvent welding.

c. Exterior above grade Chilled water piping:
i. For piping 2” and less, 1-1/2” thick cellular glass, 7 lbs. per cubic foot minimum density. For pipe diameters over 2”, insulation shall be 2” thick. Insulation shall be finished with glass fabric and mastic jacket. All exterior piping and insulation shall be protected with aluminum corrugated jackets. Provide pre-formed aluminum jackets at fittings.
ii. For piping 4” and less, 1-1/2” thick continuously molded rigid foam polyisocyanurate cellular plastic, 2 lbs. per cubic foot minimum density. For pipe diameters over 4”, insulation shall be 2” thick. Finish insulation with industrial film, by insulation manufacturer. Where exposed, insulation shall be covered with paintable PVC protective jacket. Straight pieces and fittings shall be secured by solvent welding. All exterior piping and insulation shall be protected with aluminum corrugated jackets. Provide pre-formed aluminum jackets at fittings.

d. Exterior below grade Chilled water piping (field applied):
i. For piping 2” and less, 1-1/2” thick cellular glass, 7 lbs. per cubic foot minimum density. For pipe diameters over 2”, insulation shall be 2” thick. Insulation shall be finished with glass fabric and mastic jacket. Insulation shall be finished with bituminous resin reinforced woven glass fabric covered with aluminum mylar film and release paper. Pipe fittings shall be covered with five (5) layers of open mesh synthetic fabric. Alternate layers of fabric and mastic cut to match fittings and build up a minimum we file thickness of 1/4".

e. Interior Condenser (cooling tower) water piping:
i. For piping 4” and less, 1-1/2” thick cellular glass, 7 lbs. per cubic foot minimum density. For pipe diameters over 4”, insulation shall be 2” thick. Insulation shall be finished with glass fabric and mastic jacket.
ii. For piping 2” and less, 1” thick continuously molded rigid foam polyisocyanurate cellular plastic, 2 lbs. per cubic foot minimum density. For pipe diameters over 2”, insulation shall be 1-1/2” thick. Insulation shall be finished with industrial film, by insulation manufacturer. Where exposed, insulation shall be covered with paintable PVC protective jacket. Straight pieces and fittings shall be secured by solvent welding.
iii. 1” thick high-density rigid fiberglass insulation with all service jacket (white) finish. Protective jackets shall be paintable PVC. Straight pieces and fittings shall be secured by solvent welding.

f. Exterior above grade Condenser (cooling tower) water piping:
i. 1-1/2” thick cellular glass, 7 lbs. per cubic foot minimum density with glass fabric and mastic jacket finish. All exterior piping and insulation shall be protected with aluminum corrugated jackets. Provide pre-formed aluminum jackets at fittings.

ii. 2” thick continuously molded rigid foam polyisocyanurate cellular plastic, 2 lbs. per cubic foot minimum density with industrial film finish, by insulation manufacturer. Where exposed, insulation shall be covered with paintable PVC protective jacket. Straight pieces and fittings shall be secured by solvent welding. All exterior piping and insulation shall be protected with aluminum corrugated jackets. Provide pre-formed aluminum jackets at fittings.

g. Interior concealed Hydronic heating water piping:
   i. For piping 4” and less, 1-1/2” thick cellular glass, 7 lbs. per cubic foot minimum density. For pipe diameters over 4”, insulation shall be 2” thick. Insulation shall be finished with glass fabric and mastic jacket.
   ii. For piping 2” and less, 1” thick continuously molded rigid foam polyisocyanurate cellular plastic, 2 lbs. per cubic foot minimum density. For pipe diameters over 2”, insulation shall be 1-1/2” thick. Insulation shall be finished with industrial film, by insulation manufacturer. Where exposed, insulation shall be covered with paintable PVC protective jacket. Straight pieces and fittings shall be secured by solvent welding.
   iii. For piping 2” and less, 1” thick high-density rigid fiberglass insulation. For pipe diameters over 2”, insulation shall be 1-1/2” thick. Insulation shall be finished with all service jacket (white). Protective jackets shall be paintable PVC. Straight pieces and fittings shall be secured by solvent welding.
h. Interior exposed Hydronic heating water piping:
   i. For piping 4” and less, 1-1/2” thick cellular glass, 7 lbs. per cubic foot minimum density. For pipe diameters over 4”, insulation shall be 2” thick. Insulation shall be finished with glass fabric and mastic jacket.
   ii. For piping 2” and less, 1” thick continuously molded rigid foam polyisocyanurate cellular plastic, 2 lbs. per cubic foot minimum density. For pipe diameters over 2”, insulation shall be 1-1/2” thick. Insulation shall be finished with industrial film, by insulation manufacturer. Where exposed, insulation shall be covered with paintable PVC protective jacket. Straight pieces and fittings shall be secured by solvent welding.
   iii. For piping 2” and less, 1” thick high-density rigid fiberglass insulation. For pipe diameters over 2”, insulation shall be 1-1/2” thick. Insulation shall be finished with all service jacket (white). Protective jackets shall be paintable PVC. Straight pieces and fittings shall be secured by solvent welding.
i. Exterior above grade Hydronic heating water piping:
   i. For piping 4” and less, 1-1/2” thick cellular glass, 7 lbs. per cubic foot minimum density. For pipe diameters over 4”, insulation shall be 2” thick. Insulation shall be finished with glass fabric and mastic jacket. All exterior piping and insulation shall be protected with aluminum corrugated jackets. Provide pre-formed aluminum jackets at fittings.
   ii. For piping 2” and less, 1” thick continuously molded rigid foam polyisocyanurate cellular plastic, 2 lbs. per cubic foot minimum density. For pipe diameters over 2”, insulation shall be 1-1/2” thick. Insulation shall be finished with industrial film, by insulation manufacturer. Where exposed, insulation shall be covered with paintable PVC protective jacket. Straight pieces and fittings shall be secured by solvent welding. All exterior piping and insulation shall be protected with aluminum corrugated jackets. Provide pre-formed aluminum jackets at fittings.
j. Exterior below grade Hydronic heating water piping (field applied):
   i. For piping 4” and less, 1-1/2” thick cellular glass, 7 lbs. per cubic foot minimum density. For pipe diameters over 4”, insulation shall be 2” thick. Insulation shall be finished with glass fabric and mastic jacket.

k. Interior Condensate piping from coils and heat exchangers:
   i. 3/4" thick closed cell elastomeric tube and tape, 3 lbs. per cubic foot minimum density.
l. Interior Refrigerant piping systems:
   i. For suction and hot gas up to 1”, 3/4" thick closed cell elastomeric tube and tape, 3 lbs. per cubic foot minimum density. For suction and hot gas pipe diameters over 1”, insulation shall be 1” thick. For exterior above grade refrigerant piping systems, protect piping and insulation with aluminum corrugated jackets with preformed aluminum jackets at fittings.
m. Interior Generator exhaust silencer and piping:
   i. 2 layers of 2” thick (for a total of 4 inches) hydrous, calcium silicate molded in sections or blocks.
   ii. Pre-fabricated custom fit fiberglass mat blankets. Blanket shall be silicone-impregnated cloth with stainless steel hooks for lacing blankets together. Blanket thickness shall limit surface temperature to 130˚F with a pipe temperature of 1,200˚F.
n. Valves, thermometer wells, gauge cocks, hose bibbs, air vent piping and other components shall be insulated with molded insulation fittings or elastomeric insulating tape finished with flexible glass cloth and mastic. Insulation thickness shall be same as piping insulation.

4. Insulation Pipe Shields:
   a. Shields shall be galvanized rolled to form a 180° arc. Length of shields shall conform to the following:

Insulation O.D.	Shield Length	Shield Gauge
0-4 inch	12 inch	14 gauge
5-9 inch	18 inch	14 gauge
10-19 inch	24 inch	12 gauge
Over 20 inch	30 inch	12 gauge

   b. For all piping, insulation shall be continuous on pipe at pipe hangers with protection shields bearing on the outside of the insulation.
   c. For pipes 2" and larger, where insulation would be crushed by hangers, provide 180 degree foamglass inserts between pipe and hanger protector and finish with jacket same as adjacent pipe.

END OF SECTION 230700

SECTION 230900

CONTROLS

I. GENERAL CRITERIA

A. Wall-mounted thermostats shall be 7-day programmable. Thermostats in common areas shall not be installed with lockable covers, but shall have security lock-out (e.g., key code). Thermostat wiring shall be 18 gauge minimum. Where thermostat wiring is installed outdoors between building and outdoor units, wiring shall be installed in 1/2" plastic conduit.

B. In garage areas – particularly with Fire Stations – specify a minimum of two (2) carbon monoxide sensors. Sensors shall be mounted on opposite sides of garage area. Include a carbon dioxide sensor at each location where a carbon monoxide sensor is shown. Garage exhaust fans shall be energized manually with switch, or based on carbon monoxide or carbon dioxide setpoints. Garage exhaust fans shall also be energized upon vehicles leaving or entering garage area, as sensed by a photoelectric eye system.

C. Demand control ventilation shall be specified for all Library projects. Specify carbon dioxide (CO_2) sensors in space to modulate outside and return air dampers.

D. Specify carbon monoxide (CO) sensors in all buildings where gas heat is used.

E. Where renovations, additions, equipment replacements, etc. are occurring on an existing building, all new equipment and controls shall be compatible with the existing equipment and controls system.

END OF SECTION 230900

SECTION 232000

PIPING, VALVES & ACCESSORIES

I. GENERAL CRITERIA – HYDRONIC PIPING, VALVES & ACCESSORIES

A. All hydronic piping 2½" and over shall be butt welded Schedule 40 black steel. Piping 2" and smaller shall be brazed copper or threaded Schedule 40 black steel. Victaulic piping may be used in lieu of welded or threaded piping on Chilled Water, Condenser Water and Tempered Water systems. Piping shall be installed to slope upward in the direction of flow, 1 inch every 40 feet. Where reducers are installed, they shall be done so as to eliminate unvented high points. Eccentric reducers shall be used on horizontal pipe with flat side on top.

B. HVAC system drain piping, other than condensate, shall be threaded Schedule 40 galvanized steel. For sizes 2" and smaller, brazed copper piping may be used. Copper shall be used for all condensate drains. All drain piping shall be pitched a minimum of 1/8" per foot toward termination point.

C. Chilled water valves shall be:
   1. Butterfly type for 2½" and larger.
   2. Plug type for balancing.
   3. Gate, globe, plug or ball type for smaller than 2½".

D. Condenser water valves shall be:
   1. Butterfly type for 2½" and larger.
   2. Gate, globe or angle type for smaller than 2½".

E. Tempered water valves shall be:
   1. Butterfly type for 2½" and larger.
   2. Plug type for balancing.
   3. Gate, globe or angle type for smaller than 2½".

F. Hot water heating valves shall typically be gate, globe or angle types.

G. Automatic air vents shall be specified at the high points of each circulating piping system. Automatic air vents may be omitted in open systems where the air is vented to an open cooling tower. Automatic air vent discharge piping shall be extended to floor drains, air conditioning unit drain pans, out through building wall or other suitable drainage location.

H. Air separators, make-up water connections, expansion tanks and other air elimination fittings, shall be shown on the suction side of hydronic pumps. Air separators shall be centrifugal type, no strainer, carbon steel body, 125 psi. Manufacturers: B&G, Taco or Thrush. Expansion tanks should be pressurized, removable bladder, captive air type, carbon steel body, 100 psi. Specify with applicable gauges, fittings and valves. Manufacturers: B&G, Taco or Thrush.

I. Typical pipe hangers to be clevis type (Grinnell 1260). Hot water pipe hangers to be steel yoke pipe roll type (Grinnell 181).

J. Specify that contractor hydrostatically test each pipe system when complete including valves, fittings and control devices at 1.5 times the operating pressure for four (4) hours without any loss of pressure.

II. REFRIGERANT PIPING

A. All components of the piping system shall be products intended for refrigeration systems.

B. Design shall comply with ASHRAE 15, “Safety Code for Refrigeration Systems.”

C. The system shall be designed to withstand the following conditions:

Design Working Pressure Rating	500 psig.
Maximum Operating Temperature	275°F.

D. Refrigerant pipe shall be copper tube: ASTM B 280, ACR Type "L" hard drawn copper.

E. Fittings to be sweat-type wrought copper, long radius pattern.

F. All joints in copper piping shall be brazed. Solder joints shall not be permitted.

III. UNDERGROUND HYDRONIC PIPING

A. All underground hydronic piping shall be carrier pipe pre-insulated with foamglass insulation and HDPE jacket. Piping system shall be PermaPipe, Thermacor, Rovanco or equal.

END OF SECTION 232000

SECTION 232100

PUMPS

I. GENERAL CRITERIA

A. In specifying pumps, examine several performance charts to see if one impeller/motor combination satisfies the requirements more efficiently than another. Require that pump submittals include product data showing pump curve with system operating point, motor horsepower, electrical requirements and RPM. Shop drawings shall be required to show pump dimensions and pipe connection size and accessories.

B. Typically, specify end suction pumps for chilled and hot water circulation. Where 25 HP or greater pump motors are required, horizontal split case pumps may be used. Base-mounted and horizontal split case pumps shall be specified to be bolted to concrete bases and grouted in place.

C. Where 5 HP or less, inline pumps may be used instead of end suction. Inline pumps shall be supported with threaded rods and hangers, one from each side, suspended from structure.

D. Select pumps for quiet operation and system conditions. Impeller diameter shall not be larger than 85% of the casing inside diameter measured from the water cut-off point.

E. NPSH for pumps shall not exceed 12 feet, unless specific design constraints exist.

F. Pumps shall be rated for operation at 215˚F and 175 psi working pressure. Where pumps are under a greater pressure, engineer shall schedule and specify them to be rated as such.

G. Pumps shall be selected so that motor will not overload to 125% (150% for horizontal split case and vertical turbine) of rated gpm.

H. Specify that contractor shall provide one spare set of seals for each pump.

I. Specify that contractor shall inspect shaft alignment prior to starting pumps.

J. Where vertical turbine pumps are specified, pumps shall be supplied with a cast iron baseplate of adequate size and thickness to support the pump head, column, bowls and motor. Vertical turbine pumps shall include a non-reverse ratchet to prevent pumps from turning in the reverse direction.

K. To reduce wear and noise, specify that rotation equipment 5 horsepower and larger must be dynamically balanced, tested and measured by the contractor for displacement in all directions.

L. Pressure gauges installed around pumps shall use copper tubing.

M. Specify variable frequency drives on all pumps five (5) HP and larger.

N. RPM for heating hot water pumps shall be 1150 or 1750. 3500 RPM pumps shall not be used in heating hot water applications.

O. Specify that isolation valves shall be provided on both suction and discharge sides of all pumps.

P. Where pumps are used for building heat and cooling applications, specify a minimum of two pumps for installation, typically in a lead-standby configuration. Pumps may run in parallel, where each pump is sized sufficiently to operate the system on its own should a pump failure occur to the second pump.

Q. Preferred manufacturers are: Aurora, Armstrong and Paco.

END OF SECTION 232100

SECTION 232913

STARTERS AND VARIABLE FREQUENCY DRIVES

I. GENERAL CRITERIA

A. Specify ABB Type PST Motor Starters for use in installations of single motors, or equal by Danfoss or Yaskawa.

B. Manual motor starters should specify overload protection as required by Article 430-150 of the National Electrical Code. Control should be specified by manual operation of the contacts. Starters should be combination type with non-fused disconnect, UL rated contactor, 120-volt control transformer, 120-volt holding coil, HOA switch, adjustable overloads, (1) NO auxillary contact and (1) NC auxillary contact, NEMA 1 enclosure with padlock and pilot light.

C. Specify ABB solid-state variable frequency drives, model ACH550 UL listed in NEMA 1 enclosure, for use in installations of variable speed pumps or fans, or equal by Danfoss or Yaskawa.

D. Include bypass package, door disconnect, 3-contactor bypass system (input, load and bypass), electrical interlock, motor overload relay, test-off-normal switch, drive-off-bypass switch and lights, and control transformer, two programmable analog inputs.

END OF SECTION 232913

SECTION 233100

DUCTWORK

I. GENERAL CRITERIA

A. All ductwork typically shall be hot dipped galvanized steel of lock forming quality with minimum zinc coating of 1.25 ounces per square foot each side (ASTM A525, Class G90). Specify that ductwork shall be fabricated and installed in accordance with SMACNA "HVAC Duct Construction Standards, Metal and Flexible," latest edition. All ductwork which requires painting (eg. exposed ductwork) shall be specified as "paint-grip" type or shall be noted to be treated to accept paint. Exceptions to above are noted in B, C, D and E below.

B. Shower and kitchen dishwasher exhaust ducts shall be aluminum. Aluminum exhaust ductwork shall be watertight using silicon sealed joints. This ductwork should be sloped back to grilles 1/32" per foot. No traps shall be allowed in aluminum exhaust systems.

C. Commercial dryer vents shall be 20 gauge (minimum) stainless steel factory fabricated low-pressure spiral lock seam type ductwork. Elbows and fittings shall be die-stamped type of the same material with fully welded seams. Nothing shall protrude (eg. sheetmetal screws) into the dryer exhaust ductwork air path. Installation shall be with the male slip-in joint facing downstream and without rivets or screws. All joints shall be continuously welded using the TIG process. Specify tee with removable clean-out cover at the bottom of all vertical rises. Residential dryer exhaust ducts may be galvanized, same as typical exhaust ducts; specify backdraft damper at wall termination.

D. Lab hood exhaust ductwork shall be 316 stainless steel, all welded, including longitudinal joints. Ductwork shall be minimum 16 gauge.

E. Commercial range hood exhaust ductwork shall be 16 gauge steel or 18 gauge stainless steel (Type 3C4) with all joints continuously welded and ground smooth (No. 4 finish). Provide for grease duct access as required by applicable codes. Access doors shall be gasketed or sealed with 1500˚F rated material, bolted to the ductwork with carbon steel studs welded to the surface of the duct. Access panels shall be grease tight. Duct clearances to combustibles shall be maintained per NFPA 96. Where required or utilized, exhaust ductwork from domestic range hoods shall be constructed of Type B vent or smooth-wall duct constructed of galvanized steel, thickness as required by code. (See Georgia Amendments to International Mechanical Code.)

F. Round and flat oval ductwork shall be minimum 20 gauge. Round snap-lock type ductwork is prohibited.

G. Low pressure ductwork shall be specified for 2,000 fpm air velocity and two (2) inches static positive pressure. This shall apply to ductwork downstream of terminal units, return ductwork, exhaust ductwork, and low pressure supply ductwork. Low pressure positively pressurized ductwork shall be sized at airflow velocity to develop approximately 0.1 in w.g. pressure drop per 100 feet of duct. Low pressure negatively pressurized ductwork shall be sized at airflow velocity to develop approximately 0.08 in. w.g. per 100 feet of duct.

H. Medium pressure ductwork shall be specified for 4,000 fpm air velocity and three (3) inches static pressure. This shall apply to medium pressure supply air ductwork between fan outlet and terminal units. Medium pressure supply ductwork shall be sized at a maximum of 2500 fpm. Elbows shall be mitered or stamped type with center line radius of 1.5 times duct diameter. 45˚ "Y" fittings shall be used at takeoffs from round ducts. Straight taps and spin-ins shall not be used in medium pressure duct. Splitter dampers shall not be used in medium pressure ductwork.

I. Duct liner is only allowable in return and exhaust air ducts (only when routed back to an energy recovery unit for exhaust ducts). Duct liner is strictly prohibited in supply ductwork. Where duct liner is used, liner shall be flexible closed-cell non-wicking elastomeric type. Lined ductwork is not required to be insulated externally. Where lined and insulated duct meet, ductliner shall overlap a minimum of four (4) inches. Where sound is a concern in supply air ductwork, solutions shall be discussed with the County.

J. Dampers shall be provided at all duct and branches above accessible ceilings for balancing purposes. Single blade dampers shall not be used in ducts over 30 inches. Where multi-blade manual volume or control dampers are used, maximum individual damper width shall not exceed 48 inches, or 42 inches for backdraft dampers. Control dampers shall be multi-blade opposed action type. Where dampers open to the outdoors, they shall be provided with jamb seals and blade seals.

K. Fire dampers shall conform to the requirements of UL555. Fire dampers shall be static curtain type for all low pressure ductwork. Fire dampers in supply air ducts shall be Type B style. Fire dampers in return and exhaust air ducts shall be Type A style. Low profile fire dampers may be used where ceiling space is tight. Fire dampers in medium pressure duct systems shall be dynamic type. Preferred manufacturer: Ruskin or equal.

L. Smoke and Combination Fire/Smoke dampers shall conform to the requirements of UL555S, Class 2.

M. Require that damper submittals include data on damper performance including, but not limited to, total static pressure drop verses airflow shown for all types. Shop drawings shall be required to show damper dimensions, construction, duct connections and electrical requirements, if required.

N. Flexible ductwork shall not be used in negative-pressure systems. Flex duct runouts to supply diffusers shall be a maximum of 6 feet in length, or 2 feet at terminal unit inlets. Where length of runout to diffusers exceeds 6 feet, specify low pressure sheetmetal duct for extension. Flexible ductwork shall not be used in exhaust or return air systems. Insulate flexible ductwork with a minimum of R-4.2 insulation, except in unconditioned attics where insulation value shall be R-6. Flexible ductwork in low pressure duct systems shall be rated for 4" positive or 3/4" negative static pressure. For medium pressure systems, flexible ductwork shall be rated for 10" positive or 1" negative static pressure. Preferred manufacturer: Flexmaster or equal.

O. Specify and locate access doors in all ductwork for access to all fire dampers, smoke dampers, controls, coils, duct smoke detectors, etc.

P. Specify that where visible behind grilles or registers, ductwork shall be painted flat black.

Q. Require ductwork leakage testing on all medium pressure ductwork.

R. All ductwork specified outside shall have provisions to shed water. Any horizontal duct runs of rectangular/square duct shall have a sloped top to allow rainwater runoff. The sloped top surface can be provided by either a sheetmetal cap or sloped insulation.

S. Where intake louvers are installed with motorized dampers and serve exhaust fans in garage areas, motorized dampers shall be powered closed and spring open. When exhaust fan in garage area is energized, power for motorized damper behind intake louver shall be lost and damper shall fail to the open position.

END OF SECTION 233100

SECTION 233400

FANS

I. GENERAL CRITERIA

A. Restroom and general exhaust fans shall be inline type, and shall be located in mechanical rooms for convenient access. Restroom and general exhaust fans shall consolidate, as much as possible, exhaust from multiple grilles and multiple restrooms. Where no mechanical room exists with sufficient space for installation of inline fan, inline exhaust fan shall be installed above an accessible ceiling, or a roof-mounted exhaust fan shall be used.

B. Ceiling exhaust fans shall not be used for any exhaust applications. Exception: Where only a single restroom exists within a building, and that restroom contains three (3) or less plumbing fixtures (including sink), a ceiling exhaust fan may be used.

C. Specify that submittals for Fans shall include data on fan performance including, but not limited to, airflow, total static pressure and fan motor horsepower. Shop drawings shall be required to show unit dimensions, weight, electrical requirements, service access requirements and duct connection sizes and locations.

D. Exhaust fans shall be Greenheck or approved equal.

END OF SECTION 233400

SECTION 233700

DIFFUSERS, REGISTERS AND GRILLES

I. GENERAL CRITERIA

A. Specify that submittals shall include product data on air distribution performance including, but not limited to, total static pressure drop and sound generation (NC) verses airflow shown for each supply and return grille, size and quantity of grilles required. Require shop drawings to show catalog illustrations, duct connection sizes and accessories.

B. Indicate that performance of all diffusers, registers and grilles shall be tested in accordance with ANSI/ASHRAE Standard 70 – 1991.

C. Air distribution devices typically shall be steel construction, except in areas with substantial humidity or moisture (i.e. restrooms, locker rooms, etc.), where the construction shall be aluminum.

D. All grilles and registers with borders shall be specified with gasketed seals around the perimeter.

E. Register dampers shall be gang operated, opposed blade type. Dampers shall be operable through face of air distribution device. Specify opposed blade dampers, for balancing, in all devices installed in walls or inaccessible ceilings.

F. NC level for any air distribution device shall not exceed 25. Designer shall take into consideration the space being served when selecting air distribution devices and associated NC levels.

G. Bottom of supply air diffusers shall extend no lower than 1/2" below the ceiling line.

H. Perforated supply air diffusers are prohibited.

END OF SECTION 233700

SECTION 237100

AIR HANDLING UNITS

I. GENERAL CRITERIA

A. Air handling units shall have double wall casings. Casing shall be constructed of removable, insulated double wall panels, gasketed where in contact with the unit frame. Module-to-module connections shall have gasketing between metal-to-metal surfaces. Panels shall be insulated with a minimum of R-8 insulation, conforming to the requirements of NFPA 90A.

B. Include access sections for maintenance on cooling and heating coils. Access doors shall be hinged, double wall type with full perimeter gasketing. Doors shall have quick operating latching handles on interior and exterior of unit. Access doors should be located upstream and downstream of coils.

C. Magnahelic pressure gauges shall be installed across air handling unit fllter.

D. Condensate drain pans shall be insulated, double-wall stainless steel, sloped to the drain outlet. Provide only one drain outlet per pan. Drain pan shall allow no standing water.

E. Require that air handling units be installed at a sufficient height to install a condensate drain trap, and to accommodate drain pipe slope to plumbing drain. Required height shall be obtained with concrete housekeeping pad and galvanized steel base rails, when required.

F. Require that submittals include product data on unit performance including, but not limited to, entering and leaving air temperatures, fan airflow and associated total and external static pressure, fan motor horsepower, fan curves and coil capacity. Shop drawings shall be required to show unit dimensions, weight and electrical requirements, service access requirements and duct and piping connection sizes and locations.

G. Supply and return fans and motors shall be belt driven, all mounted on a spring-isolated base with a maximum deflection of two inches. Specify flexible duct connectors at each air handling unit ductwork connection, unless air handling units are internally isolated. Provide flexible duct connection at unit discharge opening. Fans shall provide stable operation down to 20% of rated CFM. Fan and drives shall be statically and dynamically balanced and run tested in the unit casing. Specify a man-sized access door into the fan section. All fan motors shall be open drip proof high efficiency type.

H. Cooling coils shall consist of copper tubes, aluminum fins and stainless steel casings with same end connections. Cooling coils shall be selected to eliminate any moisture carryover at design face velocity. Maximum coil velocity shall not exceed 500 fpm. Where refrigerant coils are used, specify that they be shipped with a nitrogen holding charge. Cooling coils shall be provided with a drain pan. Where multiple cooling coils are stacked, an intermediate drain pan shall be provided with drop tubes down to the main drain pan. Coils should be removable with an additional 12 inches of clearance.

I. Air handling units over 3,000 cfm shall be provided with economizer control installed, unless not feasible due to design constraints. The controls shall modulate the return, outside air and mixing damper to maintain a constant supply temperature during economizer mode.

J. Provide for motorized outside air, return air and exhaust air dampers on all air handling units. Motorized dampers on outside air intakes shall close completely during building unoccupied hours. Provide for a return air fan on systems where the return air system pressure drop exceeds 0.1 in. w.g.

K. Require all outdoor equipment located at grade level to be secured to a concrete pad. Concrete pads shall be four (4) inches thick and extend a minimum of two (2) feet beyond perimeter of unit on all sides. Plastic pads for HVAC units are prohibited. Outdoor units mounted on roofs or elsewhere shall be provided with a support system capable of withstanding the weight of the unit, and shall be secured to the support system.

L. Where air handling units are installed on roofs in a downflow configuration, units shall be provided with a fully-insulated full perimeter roof curb, twelve (12) inches high (minimum) with raised cant.

M. Where gas-fired heat is used, the heat exchanger shall be warranted for a minimum of 10 years, and shall be a minimum of 90% efficient.

N. Electric heat may be used in lieu of gas. Where electric resistance heat is 10 kW or larger, SCR control shall be provided.

O. Float switches shall be provided in primary or auxiliary drain pans, where installed. Float switches shall be installed in pan to shut down unit upon excess water detection. Styrofoam arm type float switches are not acceptable. Piping of auxiliary drain pans or secondary drain lines is prohibited.

P. At secondary condensate drain lines at cooling coils, specify piping with elbow up and screw on cap for application of chemical treatment.

Q. Hailguards shall be specified for all equipment installed outdoors at grade level. Where hailguards are not an option, equipment shall be surrounded by chain link fencing.

R. Indoor units shall be mounted on concrete housekeeping pads.

S. Alarm contacts shall be provided at all access panels on outdoor equipment to trigger alarm upon removal during unoccupied hours.

T. Air handling units shall be Trane, Carrier or approved equal.

U. See Section 232000 for Refrigerant Piping Requirements.

V. Terminal units shall be used in VAV systems:
   1. Variable volume boxes (VAVs) for rooms at the interior of the building with no exterior exposure. Heaters shall only be allowed to be installed in VAV boxes when in compliance with the applicable energy codes.
   2. Powered induction units (PIUs), parallel type at perimeter zones of the building and at areas with exterior exposures. Heaters on PIUs shall be located at the fan inlet so that only air from the ceiling plenum is being heated.
   3. Series type PIUs shall only be used when a constant volume of air is required from the unit at all times.
   4. Reheat in all terminal units shall be electric resistance type. Use of hot water coils for reheat in terminal units is prohibited.
   5. VAV terminals shall be insulated, double wall, pressure independent type with access door opposite the control panel.

END OF SECTION 237100

SECTION 237200

ENERGY RECOVERY VENTILATORS

I. GENERAL CRITERIA

A. Require that submittals for Energy Recovery Ventilators (ERVs) include data on unit performance including, but not limited to, entering and leaving air temperatures, airflow, total static pressure, fan motor horsepower, and total and sensible heat recovery. Shop drawings shall be required to show unit dimensions, weight, electrical requirements, service access requirements and duct connection sizes and locations.

B. ERVs shall be provided with a minimum one-year warranty on all parts. Enthalpy wheels shall be provided with a minimum 5-year warranty.

C. Heat wheels shall be enthalpy type air-to-air heat exchangers, providing both sensible and latent heat recovery. Wheel effectiveness, for both sensible and latent heat recovery, shall be no less than 70%. In situations where air is bypassed to mix downstream of wheel, this shall be taken into account in wheel effectiveness calculations. Reuire sufficient clearance for slide-out and removal of wheel or wheel media.

D. Air handling units shall have double wall casings. Casing shall be constructed of removable, insulated double wall panels, gasketed where in contact with the unit frame. Module-to-module connections shall have gasketing between metal-to-metal surfaces. Panels shall be insulated with a minimum of R-8 insulation, conforming to the requirements of NFPA 90A.

E. Include access sections for maintenance on cooling and heating coils. Access doors shall be hinged, double wall type with full perimeter gasketing. Doors shall have quick operating latching handles on interior and exterior of unit.

F. Magnahelic pressure gauges shall be installed across unit fllters.

G. Condensate drain pans shall be insulated, double-wall stainless steel, sloped to the drain outlet. Provide only one drain outlet per pan. Drain pan shall allow no standing water.

H. Float switches shall be provided in primary or auxiliary drain pans. Float switches shall be installed in pan to shut down unit upon excess water detection. Styrofoam arm type float switches are not acceptable. Piping of auxiliary drain pans or secondary drain lines is prohibited.

I. At secondary condensate drain lines at cooling coils, specify piping with elbow up and screw on cap for application of chemical treatment.

J. Motorized dampers shall be provided at unit's outside air intake and unit's exhaust air discharge, and shall be interlocked to open when fans energize.

K. Air filters shall be provided upstream of the heat wheel for both the supply and exhaust airstreams. Filters shall be 2-inch thick UL listed Class 2 type with a minimum MERV 6 rating with no more than a 0.25 in. w.g. initial pressure drop at 500 fpm face velocity.

L. Downflow roof-mounted units shall be provided with a fully-insulated full perimeter roof curb, twelve (12) inches high (minimum) with raised cant.

M. Supply and return fans and motors shall be belt driven, all mounted on a spring-isolated base with a maximum deflection of two inches. Specify flexible duct connectors at each ERV ductwork connection, unless ERV is internally isolated. Fans shall provide stable operation down to 20% of rated CFM. Fan and drives shall be statically and dynamically balanced and run tested in the unit casing. Require a man-sized access door into the fan section. All fan motors shall be open drip proof high efficiency type.

N. For units providing tempered airflow:
   1. Heating/cooling coils shall consist of copper tubes, aluminum fins and stainless steel casings with same end connections. Cooling coils shall be selected to eliminate any moisture carryover at design face velocity. Maximum coil velocity shall not exceed 500 fpm. Where refrigerant coils are used, require that they shall be shipped with a nitrogen holding charge. Cooling coils shall be provided with a drain pan. Where multiple cooling coils are stacked, an intermediate drain pan shall be provided with drop tubes down to the main drain pan.
   2. In direct expansion systems, provide hot gas reheat for dehumidification mode to reheat air to neutral temperature.
   3. Where chilled water is used, both preheat and reheat coils shall be used. Preheat coils shall provide freeze protection for chilled water coils. Reheat coils shall be used for heating and dehumidification mode.
   4. Install unit at sufficient height to install condensate drain trap, and to accommodate drain pipe slope to plumbing drain. Required height shall be obtained with concrete housekeeping pad and galvanized steel base rails, when required.

O. Require all outdoor equipment located at grade level shall be secured to a concrete pad. Concrete pad shall be four (4) inches thick and extend a minimum of two (2) feet beyond perimeter of unit on all sides. Plastic pads for HVAC units are prohibited. Outdoor units mounted on roofs or elsewhere shall be provided with a support system capable of withstanding the weight of the unit, and shall be secured to the support system.

P. Where ERVs are installed on roofs in a downflow configuration, units to be provided with a fully-insulated full perimeter roof curb, twelve (12) inches high (minimum) with raised cant.

Q. Where ERVs are used, but are not tempered air type (with coils), a method of heating the air to a minimum of 55˚F shall still be provided.

R. Where gas-fired heat is used, the heat exchanger shall be warranted for a minimum of 10 years, and shall be a minimum of 90% efficient.

S. Electric heat may be used in lieu of gas. Where electric resistance heat is 10 kW or larger, SCR control shall be provided.

T. Hailguards shall be specified for all equipment installed outdoors at grade level. Where hailguards are not an option, equipment shall be surrounded by chain link fencing.

U. Indoor units shall be mounted on concrete housekeeping pads.

V. Alarm contacts shall be provided at all access panels on outdoor equipment to trigger alarm upon removal during unoccupied hours.

W. See Section 232000 for Refrigerant Piping Requirements.

END OF SECTION 237200

SECTION 238100

UNITARY HEAT PUMPS AND AIR CONDITIONERS

I. GENERAL CRITERIA

A. Unitary Equipment shall include:
   1. Packaged Terminal Air Conditioners and Heat Pumps
   2. Split System Air Conditioners and Heat Pumps
   3. Mini Split System Air Conditioners and Heat Pumps
   4. Packaged Rooftop Air Conditioners and Heat Pumps

B. Require that submittals for Unitary Equipment include product data on unit performance including, but not limited to, entering air temperatures, airflow and total static pressure, supply fan motor horsepower, total and sensible capacity, and applicable ARI SEER or EER values. Shop drawings shall be required to show unit dimensions, weight, electrical requirements, service access requirements and duct connection sizes and locations.

C. Furnaces may be either horizontal or vertical type. Furnaces shall be natural gas fired with aluminized heat exchanger, draft diverter and burner.

D. Gas furnaces shall have a minimum efficiency of 90%, and shall have a minimum 10-year warranty on the heat exchanger.

E. Electric heat may be used in lieu of gas. Where electric resistance heat is 10 kW or larger, SCR control shall be provided.

F. Outdoor packaged units, air-cooled condensing units or heat pumps shall utilize R-410A, or other HCFC-free refrigerant. Condenser and evaporator coils shall be copper tubing with aluminum fins. System compressors shall be hermetic type, and shall be protected by a minimum five (5) year warranty. Outdoor units shall be selected at 95˚F ambient outdoor temperature, and a 45˚F suction temperature for cooling design.

G. Where systems are used in spaces that require 24/7 cooling (i.e. electrical rooms, data closets, etc.), the outdoor unit shall be provided with accessories (low ambient kit, wind baffle, etc.) to provide cooling down to 0˚F. Rooms in which heat-generating equipment is located that require 24/7 cooling shall be conditioned with a system capable of providing cooling 100% of the time. Typically, mini-splits shall be used to provide year-around cooling to these spaces. Where part of a VAV/VRV system, these areas shall be designed as separate zones. Mini-splits shall be DaikinAC, Mitsubishi or approved equal.

H. Alarm contacts shall be provided at all access panels on outdoor equipment to trigger alarm upon removal during unoccupied hours.

I. Split system heat pumps and air conditioners shall have a minimum SEER rating of 14.0.

J. Where part of split systems, indoor fan coil units and gas furnaces shall have ECM motors.

K. Filter racks shall not be utilized within gas furnaces and fan coil units (5 tons or less). Specify filter bank in return air ductwork in accessible location. Exception: Filter banks are not required where the return air is fully ducted and all return air grilles are filter type.

L. Specify adequate vibration isolation for all indoor units. Rubber-in-shear isolators shall be used, at a minimum for all units hung from building structure.

M. Outdoor HVAC units installed at grade level shall be mounted on concrete pad, four (4) inches thick and extending a minimum of twelve (12) inches beyond perimeter of unit on all sides. Plastic pads for HVAC units are prohibited.

N. Downflow roof-mounted packaged units shall be specified with a fully-insulated full perimeter roof curb, twelve (12) inches high (minimum) with raised cant.

O. Packaged rooftop units shall be Trane, Carrier or approved equal.

P. Float switches shall be provided in primary or auxiliary drain pans, where installed. Float switches shall be installed in pan to shut down unit upon excess water detection. Styrofoam arm type float switches are not acceptable. Piping of auxiliary drain pans or secondary drain lines is prohibited.

Q. At secondary condensate drain lines at cooling coils, specify piping with elbow up and screw on cap for application of chemical treatment.

R. Hailguards shall be specified for all equipment installed outdoors at grade level. Where hailguards are not an option, equipment shall be surrounded by chain link fencing.

S. For packaged units, require flexible duct connectors at each unit ductwork connection, unless unit is internally isolated.

T. For split systems, see Section 232000 for Refrigerant Piping Requirements.

END OF SECTION 238100

SECTION 238200

COMPUTER ROOM AIR CONDITIONING UNITS (CRACs)

I. GENERAL CRITERIA

A. Where buildings contain data rooms over 1,000 square feet, CRAC units shall be used for those rooms.

B. Require that submittals for Chilled Water CRAC units shall include data on unit performance including, but not limited to, entering and leaving air and water temperatures, fan airflow, total and external static pressure, fan motor horsepower, cooling coil water pressure drop and unit capacity. Shop drawings shall be required to show unit dimensions, weight, electrical requirements, service access requirements and duct and piping connection sizes and locations. Submittals and shop drawings for air-cooled CRAC units shall be the same, except shall exclude data related to chilled water coils.

C. Require that adequate access shall be provided for removal of filters and routine maintenance. Adhere to manufacturer's published required clearances.

D. Specified units shall be capable for producing a minimum air capacity of 600 cfm per nominal ton rating of equipment.

E. Cooling coils, whether chilled water or direct expansion, shall be an A-frame design with seamless copper tubes with aluminum fins and stainless steel supports. Each chilled water coil shall have two independent circuits, and refrigerant coils shall also be dual circuit.

F. Condensate drain pans shall be insulated, double-wall stainless steel, sloped to the drain outlet. Provide only one drain outlet per pan. Drain pan shall allow no standing water.

G. Float switches shall be provided in primary drain. Float switches shall be installed in pan to shut down unit upon excess water detection. Styrofoam arm type float switches are not acceptable. Piping of secondary drain lines is prohibited.

H. Air filters shall be 4" thick UL listed Class 2 type with a minimum MERV 6 Rating and not more than a 0.25 in. w.g. initial pressure drop at 500 fpm face velocity. Specifiy that units shall be provided with one set of spare filters.

I. Provide for electric resistance type reheat coils in all CRACs. For heaters 10 kW and over, provide SCR control. Where buildings are designed with an emergency generator, provide a relay to the Building Automation System to lock-out operation of reheat coil when it is operating.

J. CRACs shall be specified with infrared type humidifiers. Humidifier shall consist of high-intensity quartz lamps mounted above and out of the water supply. Humidifier shall be designed to use ordinary tap water without requiring pretreatment or chemical additives. The infrared humidification system shall use bypass air to prevent over humidification. Where buildings are designed with an emergency generator, provide a relay to the Building Automation System to lock-out operation of reheat coil when it is operating.

K. Specify accessories and options required for CRAC units as follows:
   1. CRAC units shall be provided with chilled water flow switch, which shall activate the alarm system and/or stop the system should the chilled water supply be interrupted.

2. Provide 35 foot water detection cable for chilled water units.
3. Provide factory-mounted firestat in the electrical panel with the sensing element in the return air flow. Upon activation, the firestat shall immediately shut down the entire unit.
4. Provide a factory-mounted smoke detector with the sensing element in the return air flow. Upon activation, the smoke detector shall shut down the unit and send an alarm signal to the fire alarm system.
5. Provide condensate pump mounted in the bottom of the system complete with sump motor, pump and automatic control. Pump shall be capable of 20 feet of head.
6. Provide disconnect switch meeting NEC codes, protruding through front panel.

L. Computer Room Air Conditioning Units shall be by Liebert or approved equal.

M. See Section 232000 for Refrigerant Piping Requirements.

END OF SECTION 238200

SECTION 238300

HEATERS

I. GENERAL CRITERIA

A. Heaters shall include:
   1. Duct Heaters (hot water and electric)
   2. Unit Heaters (hot water, gas and electric)
   3. Electric Wall Heaters
   4. Electric Baseboard Heaters
   5. Electric Cabinet Heaters
   6. Electric Heat Tape
   7. Hot Water Convectors

B. Require that submittals for Heaters shall include entering and leaving air and water temperatures, capacity, and airflow. Shop drawings shall be required to show heater dimensions, weight, service access requirements and electrical requirements.

C. All areas containing sprinkler piping shall be heated, at a minimum, to 55˚F during winter design conditions.

D. Electric heat tape shall be specified on all water piping located outside the building or subject to exposure to freezing temperatures. Heat tape shall be installed prior to insulating water piping. Heat tape shall be supplied in a sufficient wattage density to protect the insulated pipe from freezing at ambient temperatures down to -10˚F. Heat tape shall not energize at ambient temperatures above 40˚F.

E. Gas-fired duct furnaces are prohibited. Where required, duct heaters shall be electric or hot water.

F. Where gas-fired heat is used, the heat exchanger shall be warranted for a minimum of 10 years, and shall be a minimum of 90% efficient.

G. Electric heaters 10 kW or greater shall have SCR control, where possible.

H. In garage areas (fire and police stations) and warehouses, gas-fired infrared tubular type radiant heaters shall be used. Heaters shall not be located directly above vehicles or other materials to which damage may occur. Adhere to all required clearances during design and installation. Heaters shall be Schwank or approved equal.

END OF SECTION 238300

SECTION 239100

VARIABLE REFRIGERANT VOLUME SYSTEMS

I. GENERAL CRITERIA

A. Variable Refrigerant Volume (VRV) Heat Recovery systems may be considered on projects were a portion of the building requires cooling at all times so that the heat recovery feature of the system can be taken advantage of. On projects where all building zones have an exterior exposure, or skin load, VRV Heat Recovery systems shall not be considered since the heat recovery feature would be used minimally. VRV Heat Recovery systems shall be 3-pipe type, with liquid, suction and hot gas lines. 2-pipe type VRV Heat Recovery systems are not acceptable. VRV Heat Recovery systems shall have a minimum cooling IEER of 15.0.

B. VRV Heat Pump systems may be considered on all projects. However, designer shall note that VRV Heat Pumps systems are not capable of simultaneous heating and cooling. Only one mode of operation is available at a time. Therefore, the potential exists for multiple systems being required to condition a building, which is unlike the VRV Heat Recovery systems. VRV Heat Pump systems shall have a minimum cooling IEER of 16.0.

C. VRV Heat Pump and Heat Recovery systems shall be designed and installed in accordance with manufacturer's recommendations.

D. Require that submittals for Variable Refrigerant Volume systems shall include data on fan performance including, but not limited to, airflow, total static pressure and fan motor horsepower. Shop drawings shall be required to show unit dimensions, weight, electrical requirements, service access requirements and duct connection sizes and locations.

E. Require contractor to submit a scaled drawing to the VRV manufacturer indicating line lengths, elevations, vertical elements, etc. VRV manufacturer shall provide to the contractor a submittal indicating refrigerant pipe sizes for system installation.

F. Require that VRV Systems be installed to comply with ASHRAE 15, latest edition. Failure or rupture of refrigerant piping, coils, etc. shall result in a discharge of refrigerant, into any room, no greater than 25 lbs. per 1,000 cubic feet of space volume.

G. VRV systems shall utilize R-410A as the working refrigerant.

END OF SECTION 239100

DIVISION 26: ELECTRICAL

SECTION 260000

ELECTRICAL SYSTEMS AND CONTROLS

I. GENERAL CRITERIA

A. This document does not address all aspects of electrical construction. It addresses only those items for which Gwinnett County Facilities has a specific standard, preference, or methodology.

B. Provide complete construction drawings. Drawings must show the locations of all equipment and devices and must include branch circuit wiring and home runs including circuit numbers except for renovation projects in which circuit numbers cannot be reasonably determined after thorough field investigation. Schedules must be provided on the drawings for panelboards, switchboards, switchgear, motor control centers, dimming systems and lighting fixtures. All schedules shall be printed on the drawings. No schedules for electrical equipment or materials are to be printed in the specifications.

C. Specifications shall include furnishing O&M manuals and training for systems requiring any programming or other user interface. Specify electrical testing in compliance with International Electrical Testing Association standards (iNETA). Require a third-party electrical specialty firm for projects with over 800 amp services; otherwise, require electrical contractor to self-test and provide documentation. Testing shall be performed for cabling (larger than #2), circuit breakers (100 amps and larger), grounding, and distribution equipment.

D. All wiring will be in conduit. Specify conduit-and-wire type wiring methods; do not use type MC cable, except for renovation projects where wiring must be “fished” through existing walls, or for fixture whips. For renovation projects, consider replacing existing MC cable type circuiting if within the scope of the project. See design notes below.

E. All conductors shall 600 volt insulated THHN/THWN, minimum #12 AWG copper (#10 minimum for outdoor applications). XHHW for underfloor or outdoor applications.

F. For new projects, consider the use of aluminum conductors only for incoming service conductors and panel-to-panel feeders, and only then with the specific permission of the County, based on the engineer’s review of the cost-benefit analysis associated with accepting aluminum conductors.

G. In general, conduits within buildings shall be metallic; specify non-metallic where environmental conditions warrant or where otherwise required by the National Electrical Code. For physical protection during construction, include rigid galvanized steel elbows at conduit turn-ups at slab or grade. Otherwise, underground conduits may be Schedule 40 PVC.

H. Receptacles - 20 amp rated.

I. Device plates – stainless steel for general applications, in work areas, or other areas of hard usage; specify plastic or phenolic device plates only in high-profile public areas where architectural compatibility is a concern; detention type plates with torx-head screws for inmate or suspect intake areas.

J. Device plates – jumbo type to ensure drywall knockout coverage, color selected based on architectural compatibility.

K. Floor boxes – specify large-capacity floor boxes, recessed/flush, ensure adequate space for low-voltage elements in combination power/data boxes, specify fire-rated poke through type devices for renovations on upper floors.

L. Switches – match receptacles in color and device plate type; otherwise, see Interior and Exterior Lighting for where to apply manual light switches versus other types of controls.

M. Require provisions of as built" drawings detailing all electrical installations as actually constructed and furnished.

II. DESIGN STANDARDS

A. Conduit and Boxes
   1) Conduits located in areas of public access shall be rigid steel.
   2) All conduits will be concealed except in Electrical, Mechanical and Communications Rooms, or in intentionally unfinished spaces.
   3) For exposed conduits, use cast boxes; otherwise, use sheet metal 4"x4" boxes.
   4) For boxes over 4" in any dimension, size box on drawings, don't rely on contractor to "size per NEC".
   5) Conduit for multi-circuit homeruns shall be ¾" minimum conduit. Increase size as needed per NEC conductor size/fill requirements, specify sizes on drawings.
   6) Review the raceway physical protection and separation requirements of the National Electrical Code's "Critical Operations Facilities" articles, normally for just Fire and Police facilities (selected areas) and incorporate if applicable.
   7) Carefully review the environment into which all raceways or devices will be installed; specify non-metallic or other conduit types if appropriate.
   8) Provide phone conduit and backboards to concessions or other building-to-building facilities.
   9) Provide (2) 3" spare conduit from a building's comm. room and (2) 3" spare conduit from a building's electrical room past any concrete apron to the any anticipated expansion location for future growth. Terminate spare conduit in a hand hole located past any sidewalk or where most practical based on review of site plan. Make all annotations of location of hand hole and conduit routes on the as built drawings.
   10) Provide (2) 4" conduits for voice/data line from the telephone backboard location to the property line utility demark location.
   11) Provide voice/data conduit to the security alarm control system, irrigation system controller, and chemical control system for pools.
   12) For underground applications, encasement shall be 3" over all conduits. Power and communications conduits shall be separated by at least 6" of concrete. Conduits of the same system shall be separated by at least 2". Support conduits on spacers. Anchor and tie conduits to prevent displacement when concrete is poured. Pour against undisturbed fill and trimmed trench walls or forms as needed. Vibrate concrete to eliminate voids. Do not allow excess concrete to be disposed of in trenches.

B. Circuiting
   1) Do not load branch circuits up to maximum wiring device quantity allowed by the National Electrical Code.
   2) 120V receptacle circuits shall include individual neutrals. Do not install 120V receptacles on multi-wire branch circuits.
   3) Specify dedicated circuits:
      a. Water coolers, copiers, vacuum cleaner circuits, telecomm equipment, vending or breakroom equipment, maintenance shops, apparatus bays, outdoor mechanical equipment
      b. Install (2) 20A receptacles at the telephone backboards and LAN connections, Security Control Panels, service personnel and expansion capability in our hi-tech systems where many things are to be automated.
      c. For other equipment as identified.

4) Circuiting with a maximum of 4 devices per circuit:
   a. Workstations with computers
   b. Private offices
5) Circuiting with a maximum of 6 devices per circuit:
   a. All other applications
6) Other
   a. Provide "shoreline" power connections at Fire apparatus bays; confirm exact connection locations, sizes, with vehicles. 2 per bay.
   b. Provide battery charging stations throughout Fire stations – confirm exact locations.
   c. Ground fault devices shall be specified where required by Code or for outdoor locations. For outdoor locations, specify "bubble" type in-use device plates.
   d. All receptacles located outdoors shall have weatherproof cover less devices that will be supporting vending machines, or icemakers.
   e. Each picnic pavilion shall have a minimum of (6) 20A GFCI type duplex receptacle mounted at pavilion columns, and at least 2 at each exterior panelboard. Receptacles shall be controlled by a timer and have manual override via switch for staff.
   f. Each corporate size picnic pavilions shall have a minimum of (2) public access R.V. boxes on pedestals. R.V. boxes shall consist of 60A single phase with GFIC outlets
   g. Provide electrical connections to basketball goals, scoreboards, center curtains, vending.
7) Mechanical Equipment Connections – specify dedicated circuits for each item of mechanical equipment, dedicated disconnect switches (heavy-duty HP rated type). Refer to mechanical design for starter and controls requirements. Provide a maintenance outlet accessible to each item of mechanical equipment.

END OF SECTION 260000

SECTION 262000

SWITCHBOARDS AND PANELBOARDS

I. GENERAL CRITERIA

A. Develop design and specify equipment to allow for future expansion, spare capacity, and easy maintainability.

B. Select building voltage based on economic analysis of "best blend" of economical use of feeders versus step-down transformers as well as the HVAC system selected. Minimize different quantities of voltage types used for HVAC units to the extent possible. Refer to specific criteria below in "Design Standards".

II. DESIGN STANDARDS

A. Facilities will be best served at the following voltages based on the following criteria:
- 480Y/277V, 3PH, 4W services: buildings of over 20,000 square feet, or buildings with chillers, electric boilers, or other large single-point loads, or buildings with subfeeds to remote loads over 200 feet away such as Parks and Recreation facilities.
- 208Y/120V, 3PH, 4W services: buildings of less than 20,000 square feet, or buildings of less than 300 kVA total load.
- Regardless of voltage, minimum service size for any building shall be 400 amps.

B. Incorporate at least 20% spare capacity in all electrical distribution equipment, including not only ampacity, but bussed spaces.

C. Specify distribution equipment with copper bussing.

D. Specify panelboards with door-in-door type enclosures, for ease of maintenance, troubleshooting, and future wiring additions.

E. Labeling – address existing labeling schemes for renovation projects. (A building shouldn't have multiple "Panel HA"s, for example.) Otherwise, use the following:
- First digit – "M" for main service equipment, such as Main Distribution Panel (for 1200 amp services and below) or Main Switchboard (for larger services). "H" for 480Y/277V panels. No prefix for 208Y/120V panels.
- Second digit – alphabet sequencing for multiple panels: "HA", "HB", "HC", etc., or "A", "B", "C".
- Third digit – numeric sequencing for subpanels or multiple section panels: "A1", "A2", etc.
- Reserve "E" for emergency panels, insert before first digit.

F. The Main Electrical service equipment will typically be either in a dedicated closet or co-located in a room with selected mechanical equipment. Additional electrical closets will be required to house branch panels and step-down transformers. These are expected to be approximately 70 square feet each, minimum. Design engineer must coordinate with project Architect to ensure that these minimally sized spaces are provided.

G. Branch circuit panelboards shall be surface mounted and located in electrical closets except as permitted below. Closets shall be stacked where possible and shall have doors opening directly to public corridors. Panelboards in finished spaces shall be flush mounted and shall be limited to cases such as dedicated equipment panels and similar applications. Panelboards may also be installed in finished areas in renovation projects where electrical closet space cannot be obtained. Maintain proper clearances and working spaces. Where panelboards are flush mounted, provide at least three spare 3/4" or larger conduits stubbed with junction boxes in accessible concealed or unfinished spaces for future use.

H. Distribution panelboards shall be located only in electrical closets, electrical rooms or dedicated space in mechanical rooms.

I. Step down transformers will be provided to derive 208Y/120V for service to receptacles and smaller loads, and will be K-13 type, mounted on neoprene isolation pads. Transformers shall be Energy Star rated.

J. Low voltage 208Y/120V panels with copper bussing will be provided on each floor to address general purpose outlet needs.

K. Switchgear and transformers shall be Suare D, Seimens, or Cutler Hammer.

L. Include Uninterruptible Power Supply equipment for data closets in standard Administration, Library, Parks and Recreation, and other general purpose buildings. Select rack-mounted, single phase equipment, typically no more than 5 kW per unit.

M. Include Uninterruptible Power Supply equipment for data closets, command centers, monitoring centers, dispatch, control rooms, and security systems for Fire and Police Department facilities.

END OF SECTION 262000

SECTION 264000

LIGHTNING AND SURGE PROTECTION

I. GENERAL CRITERIA

A. Lightning Protection – For Administrative Facilities, Parks and Recreation Facilities, Libraries, and general purpose buildings, perform a Risk Assessment study per NFPA-780, and specify a lightning protection system where recommended by the Risk Assessment. All Police Department facilities, all Fire and Emergency Services facilities, and other critical service facilities will always be required to include a Lightning Protection system. The Lightning Protection system specification should reference UL and NFPA standards. Specify a standard "cage" type system, not streamer emission. Require a complete set of shop drawings with detailed interconnection wiring and details shown, require UL certification upon completion.

B. Surge Suppression – specify for all incoming service equipment, 200,000 amp, 7-mode type. Augment with "downstream" protection for other critical areas internal to buildings such as computer rooms, network closets, etc., 100,000 amp, 7-mode type. Include branch-circuit level protection for all power and lighting circuits extending outside the building. Include on all circuits of all sizes interconnecting multiple buildings in a multi-building facility such as Parks and Recreation facilities.

END OF SECTION 264000

SECTION 265000

INTERIOR AND EXTERIOR LIGHTING

I. GENERAL CRITERIA

A. Lighting fixture selections: fixtures will be specified based on their application, see Design Standards below for fixture types per occupancy.

B. Lamps: lamps will be specified based on their application, see Design Standards below. Incorporate standard lamp types for all compact fluorescent, linear fluorescent, and HID fixtures to minimize future maintenance issues with stocking of multiple types of lamps. Do not specify incandescent lamps for new construction and major renovations. LED sources are currently under review by County and are not approved as a standard at this time.

C. For Maintained Illumination Levels, design in accordance with IESNA design guidelines. Final illumination levels will also depend on aesthetic preferences where accent lighting is applied and will be limited by wattage densities prescribed by the Energy Code, or less if driven by sustainability goals. Designer should provide a lighting calculation per typical room type and size for review, and run Comcheck to confirm Energy Code compliance. Include Comcheck forms on the permit drawing package.

D. Emergency lighting: where a generator is provided, connect fixtures in paths of egress, exit fixtures, and fixtures illuminating the exit discharge on dedicated emergency circuiting. Where a generator is not provided, provide battery ballast modules for those same fixtures, connect trickle charge input to unswitched conductor of the same circuit serving the normal lighting in the area. All exit fixtures will be battery backup LED type, red lettered, with brushed aluminum faces, Acceptable Manufacturer, Lithonia Lighting.

II. DESIGN STANDARDS

A. LIGHTING FIXTURE SELECTIONS – INTERIOR

1) Private Offices – volumetric direct/indirect troffer type fixtures, similar to Lithonia RT series, with T8 lamps and electric ballasts.
2) Open Plan Offices or Multi-person Work Spaces - volumetric direct/indirect troffer type fixtures, similar to Lithonia RT series, with T8 lamps and electric ballasts.
3) Other Administrative Support Areas – volumetric direct/indirect troffer type fixtures, similar to Lithonia RT series, with T8 lamps and electric ballasts.
4) Restrooms in Administrative or General Purpose spaces – volumetric direct/indirect troffer type fixtures, similar to Lithonia SP series, with T8 lamps and electric ballasts.
5) Utility Spaces with Finished Ceilings – acrylic lensed troffer type fixtures, similar to Lithonia SP series, with T8 lamps.
6) Utility Spaces with Exposed Ceilings – fluorescent strip fixtures, 2-lamp cross section, with wire guard and reflectors, Lithonia S series, with T8 lamps, chain mounting detailed on drawings.

7) Lamps –T8 as indicated above for linear fluorescent lamps; 4100K color temperature for linear fluorescent lamps; match this color temperature for compact fluorescent lamps. Self-ballasted compact fluorescent lamps are not acceptable.

B. LIGHTING CONTROLS

1) Private Offices – wall mounted vacancy sensor with dual-level switching to accommodate presentation technology or audio visual equipment.
2) Open Plan Offices or Multi-person Work Spaces – ceiling mounted occupancy sensors (provide full coverage) with dual-level manual switching to accommodate presentation technology or audio visual equipment.
3) Classrooms or Training Rooms - ceiling mounted occupancy sensors (provide full coverage) with dual-level manual switching to accommodate presentation technology or audio visual equipment. Also include:
   a. Ambient light blocking system (blackout shades).
   b. Zone lighting to minimize screen glare (front row separate zone), with classroom participants still able to see well enough to open chairs and take notes.
   c. Lighting controls near entrances and at presentation station.
   d. Lighting coordinated with LCD projector.
4) Other Administrative Support Areas – wall mounted vacancy sensors for small rectangular areas of 150 square feet or less; otherwise, ceiling mounted occupancy sensors.
5) Restrooms in Administrative or General Purpose spaces – wall mounted vacancy sensors for small rectangular areas of 150 square feet or less; otherwise, ceiling mounted occupancy sensors, located to cover entry vestibule and main toilet area.
6) Utility Spaces with Finished Ceilings – wall mounted vacancy sensors for small rectangular areas of 150 square feet or less; otherwise, ceiling mounted occupancy sensors.
7) Utility Spaces with Exposed Ceilings – wall mounted vacancy sensors for small rectangular areas of 150 square feet or less; otherwise, ceiling mounted occupancy sensors, with location coordinated such that structural members do not affect coverage distribution.

END OF SECTION 265000

DIVISION 27: COMMUNICATIONS

	GWINNETT COUNTY GOVERNMENT INFORMATION TECHNOLOGY SERVICES	
Title:	**Network Wiring Standards**	
Effective Date:	3/10/2008	
POC for Changes:	IT Technical Architecture Community of Interest	
Synopsis:	This document outlines the wiring and cabling standards for the entire Gwinnett County Government data network infrastructure.	

Revision History

Version	Reviser	Description
v.2012040901	Rob Hutton	Add Rack Layout
v.2012100801	Rob Hutton	Remove separate voice cabling
v.2012101001	Rob Hutton	Moved requirements that were not product related out of product section.
v.2012101101	Rob Hutton	Combined duplicate sections and moved requirements into like sections.

PURPOSE

This document outlines the wiring and cabling policy for the entire Gwinnett County Government data network infrastructure.

STANDARDS

The cable wiring standards defined below provide the standard for the network wiring of buildings within the Gwinnett County Government computing environment. These standards define a communications wiring system for buildings that support many different vendors' products and equipment. It also provides direction for the design of telecommunications products and specifies a standard of performance for those products. Employing these standards when building and deploying network equipment will maintain the integrity of the Gwinnett County Government computing system, as well as, keep operating costs to a minimum. While these standards are meant to apply particularly to new construction and major renovation projects, they should also be followed when wiring or rewiring existing buildings whenever it is practical and economically feasible. Gwinnett County's Network and Telecommunications Teams will act as telecommunications consultants and review the plans for all Gwinnett County construction and renovation projects.

It is recognized that the design process and the allocation of space in all construction and renovation projects is actually a negotiation between all interested parties. These standards provide information for the initial project design. Once the initial phase is complete, Gwinnett County's Network and Telecommunications Teams and the other consultants will work with the Project Manager to perform the detailed work and ensure that a modern network infrastructure can be installed. Gwinnett County's Network and Telecommunications Teams and other reviewers will always be flexible and make sure that the needs of the building occupants are met at the minimum possible cost. We realize each project is unique and negotiations are expected. It is the responsibility of both parties to agree on any changes.

Individual requirements may vary by project, please contact Gwinnett County Telecom and/or Network Teams with any questions.
Gwinnett County Network Team email address :
GC-NetworkTeam@gwinnettcounty.com

Building Entrance Termination Space/MDF/IDF

1. **Building Entrance**
   The building entrance room houses the facilities necessary to terminate the inter-building cable plant and to transition to the intra-building communications backbone cabling. Along with cable splice facilities, this room will also hold the lightening surge suppressors needed for the telephone system cable plant. The intra-building backbone cables run from this room to the MDF. In some cases this room may also serve as the MDF.

2. **Main Distribution Frame (MDF)**
   The Main Distribution Frame houses the core network/telecommunications equipment that services the building. The intra-building backbone cables run from this room via the vertical riser and horizontal pathways to the communications wiring closets (IDFs) throughout the building. In some cases this room may also serve as the IDF for this level/area of the building.

3. **Intermediate Distribution Frame (IDF)**
   The Intermediate Distribution Frame houses the equipment that services a specific area of a building such as a floor, wing, office group, etc. Whenever possible, the IDF closets should be vertically stacked in a multi-story building and each floor should have a minimum of one IDF.

4. **Number of closets per building**
   General rule of thumb is one communications closet per 10,000 square feet of office space. The distance from a communications closet to the device termination must not exceed 270 horizontal feet (82 meters).

5. **Dimensions**
   All Building Entrances, MDFs, and IDF Closets serving up to 100 outlet locations shall be 12X12 ft. minimum. In areas where greater than 100 outlet locations are anticipated the closet shall be sized on a case-by-case basis. Ceilings shall be 9 ft. minimum in height. A drop ceiling is preferred over a hard ceiling. The door shall be a minimum of 36” wide and 80” high, open outward. If the door must open inward, additional space must be added to the room to account for the door swing.

6. **Lighting**
   Lighting shall be a minimum of 50-foot candles measured 3 feet above the finished floor, mounted 8.5 ft. above the finished floor. No wall-mounted lighting will be allowed.

7. **AC Power**
   Two dedicated 20 amp 120 volt circuits shall be provided. A minimum of one quad outlet per wall shall be provided. Outlets should be marked with associated breaker number and location of panel. Access shall be provided to main building ground electrode

   Additional power requirements, such as dedicated circuits with L5 or L6 devices, will be determined by project.

   Backup power requirements will be determined on a per project basis.

8. **Entrance pathway**
   The entry pathway conduit between the building entrance point and the Building Entrance room shall be a minimum of two 4” conduits per entry path.

   Diverse entry is required unless otherwise specified, meaning entering from different points of the building. If the entry pathways must run parallel to each other to the street, an eight-

foot separation between the conduit routes is required.

9. **Closet Linkage**
   A backbone/riser cable pathway having the capacity of two (2) 4" conduits minimum shall be established between the Building Entrance Facility and *one of the* N vertically stacked closets (IDFs). If wiring closets are not stacked and positioned at random throughout a building, a 12" wide by 4" deep ladder rack shall be provided from the entrance facility to each closet.

   When multiple closets exist on a single floor, these closets must be interconnected via horizontal cable pathways. If drop ceilings are used, the closets should be interconnected using cable ladder that is 12 inches wide and 4 inches deep. In locations without drop ceilings a minimum of two four (4) inch conduits should be provided to implement the closet interconnection. A conduit system must include pull boxes at 100 foot intervals and after every pair of 90° bends. Conduits entering the closet through a 90 degree bend, whether from floor or ceiling, shall do so with a bend radius of 18 inches for 2' Inner Diameter (ID) or less. Conduits with greater than a 2" ID shall have a radius ten times conduit ID. Pull cords shall be provided in all conduits.

   Unless otherwise specified, all closets should be linked with FDDI-grade 50 micron multi-mode fiber cable terminated with LC connections in rack mounted LIU's.

10. **Wall Treatment**
    Fire treated ¾" plywood must be mounted on end, edge-to-edge, on all walls. Plywood should start 6" off finished floor height and extend to a minimum of 8' above finished floor height or to ceiling, and should be painted light gray.

11. **Flooring**
    All closets must have non-conductive/non-static floor covering such as VCT

12. **Environment**
    Temperature and humidity control shall be continuous over the range 50 to 85 degrees F with 30% to 75% relative humidity non-condensing. The cooling system should maintain the ambient room temperature of below 70 degrees F. A positive pressure shall be maintained with an air exchange sufficient to dissipate the heat generated by electronic/electrical equipment. Dissipated power will typically be less than 6,000 watts. The cooling system for the wiring closet must operate on a 24x7 basis, 365 days per year. Wiring closet cooling cannot be controlled by energy management systems that cut off cooling when the building is not occupied. The cooling system shall be an independent stand-alone system. Control for the system shall reside in the communications room.

13. **Closet Penetrations**
    Floor penetrations for vertically stacked closets shall be a minimum of two 4" penetrations per closet. Each penetration will include a bushed sleeve extending 1" above the finished floor. It is recommended that all penetrations be in clusters at a location in the closet stack specified by Gwinnett County Government. Penetrations for horizontal conduit or cable tray runs which use ceiling pathways should be near the 8 ft. level. Additional penetrations may be needed depending on the density of network devices needed in a particular area.

14. **Fire Suppression**
    Wiring closets should not include fire sprinkler heads. If sprinkler heads are required, a dry-pipe system is preferred.

15. **Racks and Wire Management**
    Where floor mount racks are installed vertical cable management is required on both sides and a minimum clearance of three feet is required on all four sides. In cases where more

than one rack is installed cable management is required between the racks as well as on the ends.

All floor mount racks shall be bolted to the floor and all racks should be grounded per building codes.

16. **Grounding**
    All closets must have a properly grounded ground bus bar installed in compliance with applicable NEC and/or local code.

    Minimum of #6 copper wire should be used to ground all equipment

17. **Security**
    All closets must be dedicated for Network/Telecom use or all equipment and wiring must be placed in a lockable enclosure.

18. **Access Control**
    Access should be controlled by standard centralized access control unless otherwise specified. If not available, the lock should use county key ABA2.

Horizontal Wiring

1. **General**
   Horizontal wiring is that portion of the building telecommunications infrastructure which supports signal transmission from the telecommunications closet to the user workstation. Included in this section are the closet-to-workstation cable, telecommunications closet termination hardware, and workstation wall outlet hardware.

2. **Closet-to-Wall Outlet Distance**
   The closet-to-wall outlet distance shall be a maximum of 290 cable-feet. Multiple closets shall be provided where necessary to meet this requirement. Remember to include the vertical components of a cable path when calculating distances. The 290 foot limit is cable length and not simply floor path length.

3. **Ceiling Cable Pathways**
   Ceilings used as distribution pathways for horizontal cabling shall meet the following conditions:

   a. If a fixed ceiling has to be used as a cable route, properly sized conduit must be installed as a pass through:

      i. Conduit Capacity:
         1. 4 inch conduit = 100 Category 6 cables
         2. 3 inch conduit = 50 Category 6 cables
         3. 2 inch conduit = 24 Category 6 cables
         4. 1 inch conduit = 8 Category 6 cables

   b. Ceilings of lay-in tiles which allow easy access to a suitable space above are recommended. Suitable space is defined as that which supports the installation and ready use of a 12” open-frame center spine cable ladder. These cable ladders should be installed in all hallways. Solid bottom cable trays are not to be used.
   c. Height of the cable ladder/raceway above the finished floor shall be no more than 11’.
   d. Metal cable ladders/raceways shall be bonded to the building ground per applicable code.
   e. Plenum ceilings add to the cost of wiring a building since special type of cable must be used to meet fire codes.

Raceway-to-Outlet Cable Path

1. A 1” conduit shall be provided from the cable raceway area above the ceiling to a quad wall box, or quad boxes if specifically requested, for each workstation location. The quad box should be fitted with a mud ring to size it down to use a duplex outlet faceplate. The conduit should be installed from the outlet box to the cable ladder in main corridor.
2. When no cable ladder exists, a simple stub termination of the in-wall outlet conduit extending several inches into the ceiling space is preferred.
3. A cable ladder should be installed for all addition and renovation projects.
4. Enclosed raceways should not be installed as this restricts access.
5. Pull ropes shall be installed in all conduits as part of the conduit installation work.
6. Daisy-chained systems that originate in the wiring closet and serve multiple outlets via a single conduit are **not** allowed.

Device Termination

1. **Installed cable**
   Standard practice shall be to install two Category 6 twisted-pair cables from the telecommunications closet to each outlet location. Blue cable will be used for the first drop, yellow cable will be used for the second.

   Installed cable must meet all NEC and local code requirements.

   Additional or requirements will be determined on a case by case basis.

2. **Twisted-pair Wall Outlet Terminations**
   Twisted-pair wiring wall outlet terminations shall be Category 6. The outlet wall plate shall be part of a modular system that supports twisted-pair, coax, and fiber. Some locations may require specialized terminations.

   Cables will be terminated into one blue and one yellow jack

   Each drop will be labeled with the room number of the telecommunications closet, patch panel identifier (A-Z), and port number.

   e.g. 2W1823-A-4

3. **Closet-to-Wall Outlet Distance**
   The closet-to-wall outlet distance shall be a maximum of 290 cable-feet. Multiple closets shall be provided where necessary to meet this requirement. Remember to include the vertical components of a cable path when calculating distances. The 290 foot limit is cable length and not simply floor path length.

4. **Communications outlet density**
   Standard practice shall be to install two (2) communications outlets per 100 sq. ft. of assignable office space. In offices In all other areas, communications outlets to be provided as required. Interaction with the department that will occupy the space is essential when determining the number and location of telecommunications outlets.

5. **Performance Requirements**
   All cables must meet or exceed Category performance standards after terminated. Every drop must be certified using an appropriate testing meter capable of testing all Category specifications.

CABLE Certification for ALL cables is required before project completion.

6. **System Furniture Installation**
   All jacks must be mounted in the system furniture. All wiring must be routed in the system furniture out of sight.

Building Backbone Cabling

1. **General**
   Building backbone cabling refers to the intra-building communication trunk system. This will consist of optical cable unless otherwise specified.
2. **Fiber Specifications**
   All fiber shall be Corning multimode graded index fiber with a 50 micron core/cladding diameter, buffered to 900 microns, and housed in a UL, OFNR rated jacket or standard Corning SMF-28e single-mode 8 micron cable.

   Minimum Performance Specifications for Multi-mode cable

Wavelength (nm)	Attenuation (dB/Km)	Capacity (MHz-Km)
850	3.75	160
1300	1.5	500

3. **Topology**
   Building backbone cabling shall have a star topology unless otherwise specified.

4. **Intra-building Data Backbone**
   Wherever maximum lengths are not exceeded by any single run within a specific building or site, 50 micron multi-mode optical cabled will be used. Whenever a single run within a specific building or site exceeds maximum lengths, 8 micron single-mode optical cable will be used. All cable will be terminated to accept LC connections.

Miscellaneous Topics

1. **Documentation**
   Documentation shall be computer based and include both schematic and table forms. Elements of the building infrastructure to be documented shall be chosen based on local requirements and with reference to the TIA/EIA-606 infrastructure administration standard. A documentation maintenance program shall be developed and put into effect. A building floor plan showing details of the cabling system shall be provided. The document shall show end points of cables installed.

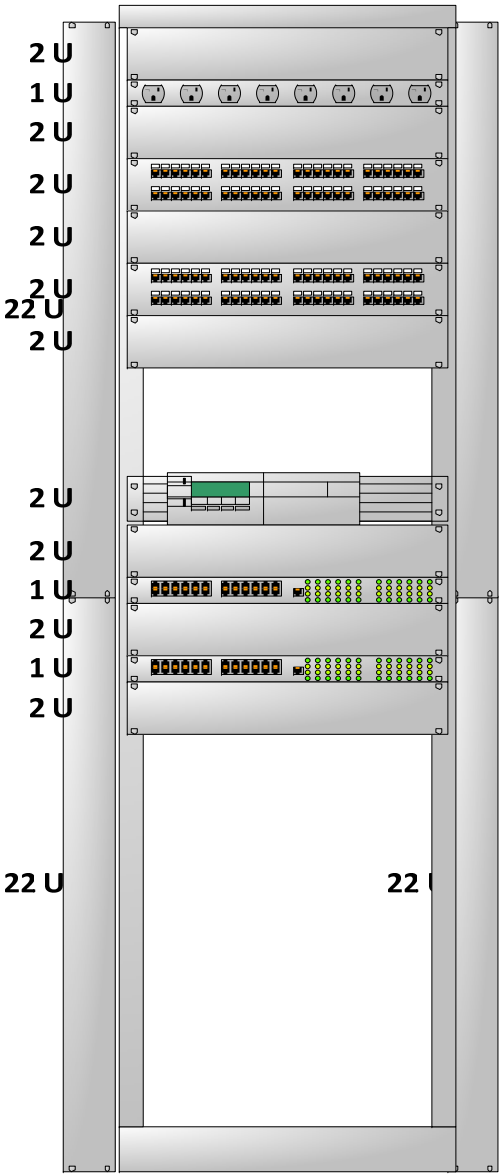
2. **Proximity to EMI sources**
   Telecommunications closets and wiring pathways shall not be located in close proximity to sources of electromagnetic interference. Special attention shall be given to potential EMI sources such as large electric motors, welding equipment, transformers, breaker panels, high current lines, etc. Wiring pathways shall be at least 12” from unshielded power lines of <480 volts and at least 5” from fluorescent lighting fixtures.

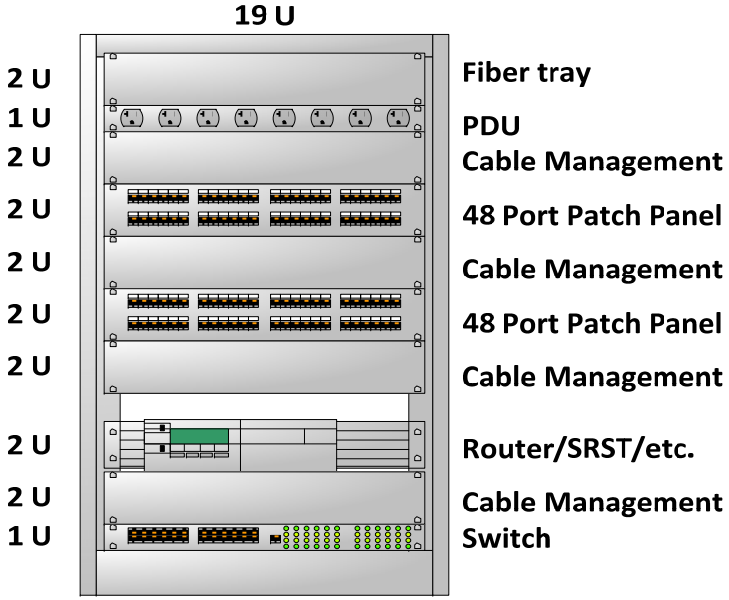
3. **Wire Management**
   Velcro cable ties are preferred

   Plastic tie wraps are permissible where Velcro will not be strong enough.

Rack Layout Standard

Gwinnett County Standard Rack Layout





Preferred Products
Following are details and part numbers:

Wiring

Product	**Preferred Manufacturer Model/Type/Part Number**	Comments	**Proposed Manufacturer Model/Type/Part Number**
Cable 	No preferred mfr. but must meet the specified TIA/EIA industry standards Cat6 or better • Primary color **Blue** • Secondary color **Yellow**	• A Cat 6 or better end-to-end solution is required. • Panduit patch cables are available in various lengths. • Total end-to-end certified Cat6 solution	
Mini Com Jacks for Data  	Panduit CJ688TGBU-24 Blue for primary CJ688TGYL-24 Yellow for Secondary	• Designed to meet TIA/EIA-568-B-2-1 Category 6 standard • ETL tested and approved for Category 6 component compliance • 100% tested to ensure NEXT performance • Forward motion termination speeds installation and places no impact on critical internal components for maximum reliability • No punch down tool required, optional termination tool (CGJT) ensures conductors are fully terminated • Utilizes patented Giga-TX™ Technology to optimize performance by reducing conductor untwist to less than 3mm • Terminates 4-pair 24 and 22 AWG 100 ohm solid unshielded twisted pair cable • Can be re-terminated a minimum of 10 times • Termination cap provides excellent strain relief, helps control cable bend radius and securely retains wires • Termination cap includes universal label for T568A and T568B wiring schemes • Accepts 6 and 8 position modular plugs without damage • Ivory colored termination cap designates Category 6 performance with Giga-TX™ Technology • Can be clearly identified with optional labels and icons • Compatible with Mini-Com® modular patch panels, faceplates and surface mount boxes	

Product	Preferred Manufacturer Model/Type/Part Number	Comments	Proposed Manufacturer Model/Type/Part Number
Faceplates 	Panduit CFPE4IWY	• Accept Mini-Com® Modules for STP and UTP, Fiber Optic and Audio/Video, which snap in and out for easy moves, adds and changes • Includes label/label covers for easy port identification • Raised rail design for aesthetic appeal	
Mini-com Surface Mount Boxes 	Panduit CBX4IW-AY	• Accept Mini-Com® Modules for STP and UTP, Fiber Optic and Audio/Video, which snap in and out for easy moves, adds and changes • Mount easily with supplied mounting screws, adhesive tape or optional magnet (CBM-X) • Cable entry from side and rear knockouts and from opening in center of base • CBXJ2 and CBX2 include built-in removable blank to add a second module • Optional adhesive labels available	
Mini-com Double Gang Boxes 	Panduit CFPE10IW-2GY	• Accept Mini-Com® Modules for STP and UTP, fiber optic and audio/video, which snap in and out for easy moves, adds, and changes • Include label/label covers for easy port identification • Raised rail design for aesthetic appeal	
Patch Panels – 48-port installations 	Panduit CPPL48M6BLY	• Arrange modules in groups of six (M6) • Allow front access to installed modules • Accept *Mini-Com*® Modules for UTP, Fiber Optic and Audio/Video, which snap in and out for easy moves, adds and changes • Include pre-printed numbered labels with writable surface on back when pre-numbered labels are not applicable • Mount to standard EIA 19" racks or 23" racks with optional extender brackets	
Horizontal Cable	Panduit	• Lightweight plastic construction provides	

Product	Preferred Manufacturer Model/Type/Part Number	Comments	Proposed Manufacturer Model/Type/Part Number
Management (Patch Panel) 	WMPH2E 2 Per Patch Panel (1 above and 1 below)	durability and easy installation • Patented dual hinged cover allows cable access without removing cover • Rounded edges on fingers protect cables from snags and damage to cable • Flexible fingers allows easy installation and removal of cables • Increased finger spacing provides larger area for high performance Category 6 cables • Pass-through holes allow front to rear cabling • Mount to standard 19" EIA racks and cabinets • Covers, #12-24 and M6 mounting screws included	
Vertical Cable Management 	Panduit WMPV22E (see note) 1 on each side of floor rack. NOTE: If cabling from patch panel to switch will extend further than halfway down the rack use part: WMPV45	• Large finger openings accommodate up to 24 Category 6 cables • Integral cable retainers on the end of each finger to help contain cables within each rack unit • Bend radius fingers align with rack spaces to support cables as they transition to the vertical pathway • Dual hinged covers can be opened 110° to the left or right to provide complete access to the cables inside the vertical pathway • Snap-on cable retainers can be placed on to fingers to help retain cables in channel during installation and maintenance • Vertical managers include hinged covers, cable retainers, mounting brackets and #12-24 screws	
Patch Panels – 12-port installations 	Panduit CPP12WBL	• Release snap feature on faceplate allows front access to installed modules • Accept *Mini-Com*® Modules for UTP, Fiber Optic and Audio/Video, which snap in and out for easy moves, adds and changes • Mount directly onto wall • Modular design for easy cabling revisions	
Standard Black 19" Floor Racks	Chatsworth (or equivalent) 55053-X03 - 7 feet	• Underwriters Laboratory listed 22Y9 communications circuit accessory designed specifically for use in telecommunications equipment installations where codes require UL	

Product	Preferred Manufacturer Model/Type/Part Number	Comments	Proposed Manufacturer Model/Type/Part Number
		Listed equipment racks • Mount 3' from the wall to provide working clearance	
Standard Black 19" Wall Racks 	Hoffman EWMR24T	• Front Door (window) scratch-resistant 1/4-in. tinted safety glass • 140-degree opening door • Field-reversible (left or right) hinge • Quarter-turn key lock, two keys included • Center Section • Solid top of center sections provides protection against falling debris • Ventilated sides (to which fans can be added) • Self-latching closure connects center section to wall section • Self-alignment ramp supports center section to wall section • Heavy duty center-to-rear section hinge with quick-release self-retained hinge pin eases wall installation • EIA universal spaced 19-in. rack-mounting holes • RU marked from bottom to top • Tapped 10-32 holes, 20 mounting screws included • Rear Wall Section • Radius corners; no sharp edges • Gland plates • Cable tie-down points for cable management • Three cable-entry grommets	

Fiber Cable

Fiber Optic Cable shall be used between buildings, wiring closets, or building additions.

Product	Preferred Manufacturer Model/Type/Part Number	Comments	Proposed Manufacturer and Part Type/Model Number
Multimode Fiber (6 or 12 strand)	No preferred mfr. but must meet the specified TIA/EIA	• The fiber size will be dependent upon project requirements. • All fiber distribution wiring must be in	

	industry standards Between MDF and IDF's terminated with LC ends in LIU trays	conduit or armored cable must be used i.e. MDF to IDF, and floor to floor. • Fiber inner-duct or armored cable required in all spaces where fiber will not be placed in conduit • Additional inner-duct requirements may be required as needed per project.	

Wire Labeling

Type	Labeling
Data Labeling	Each drop will be labeled with the room number of the telecommunications closet, patch panel identifier (A-Z), and port number. e.g. 2W1823-A-4

Cable Tray Requirements

Product	**Preferred Manufacturer Model/Type/Part Number**	**Comments**	**Proposed Manufacturer and Part Type/Model Number**
Cable tray system 	CABLOFIL CF-54/150 2"Hx6"W	• For all new construction and remodeled spaces where applicable • Size (capacity) dependant on quantity of wires to be run**:** o 50 or less - 6" cable tray o Over 50 wires – 12+" • Cable tray should run down the center of hallways and no farther than 20' from any wall stub	
Wall mounted cable tray 	CABLOFIL CF-54/300 2"Hx12"W	• Installed <u>inside the telephone room</u> (MDF) • A minimum of 12" below the ceiling on all four walls • "As required" in all IDF's • Installed <u>outside the MDF/IDF rooms</u> • Must be anchored on both sides • No center anchoring is permitted • All cable tray assemblies must be grounded • All low voltage wiring may utilize the cable tray but must be separated (tie wrapped) and bundled	

Fire Wall Penetrations

Product	Preferred Manufacturer Model/Type/Part	Comments	Proposed Manufacturer and Part Type/Model Number

	Number		
Fire Stop Devices	EZ-Path	Pathway firestop devices on all firewall penetration points are required All penetrations must be sealed to code	

DIVISION 28: FIRE ALARM AND SECURITY

SECTION 281000

ACCESS CONTROL SYSTEM

I. GENERAL CRITERIA

A. The County will provide direction to the design team on whether an access control system is required on the project and will establish the program requirements and locations for controlled access doors.

B. The County's sole access control system is the GE Facility Commander (compatible with the former Casi-Rusco system) system. System is proximity card based.

C. For all construction or major retrofits, electric door locks controlled by card readers shall be concealed and have a mechanical release when in exit path. All access controlled doors shall have exit buttons, fire alarm releases and motion sensors, and should meet the fire existing requirements of the local authority having jurisdiction.

D. The design professional shall specify that all door switches be heavy duty type and that all associated power and control cabling be incorporated in EMT conduit or MC cable.

E. The design team shall carefully coordinate the design, specification and scheduling of all doors, door frames, and door hardware to insure that where applicable, it is compatible with and prepared for installation of access control system components.

END OF SECTION 281000

SUPPLEMENTAL REQUIREMENTS

FIRE AND EMERGENCY SERVICES
SUPPLEMENTAL REQUIREMENTS

While most of the construction requirements and specifications for Fire and Emergency Services facilities are contained in the General Standards document, the County has long pursued a largely prototypical design for Fire Stations that has resulted in some unique requirements for those facilities. Those provisions and standards that are different from the General Standards or which supplement them are described in the following text.

Division 06 Wood, Plastics and Composites

1. Specify that all kitchen cabinetry shall have three (3) hinges rather than two (2). Preference is for European style hinges manufactured by Blum. Equivalents are acceptable.

Division 08 Openings

1. Specify that overhead doors at apparatus bays be operable by a remote device from 100 ft.
2. Specify that overhead doors control system will have a sensing edge and photo-cell device as safety features.
3. Specified overhead door shall be only 110v units.

Division 10 Specialties

1. Do not include wall mounted waste paper containers in staff restroom/shower areas.

Division 11 Equipment

1. Information on specific equipment needs will be provided by the County at the start of design.

Division 22 Plumbing

1. In staff restroom/shower areas, do not specify automatic flush valves. Flush valves are to be manual.
2. Size water heater so it does not qualify as a boiler under state regulations.

Division 23 Heating, Ventilation and Air Conditioning

1. Specify apparatus bay exhaust fan systems with quick opening intake louvers and with 15 minute run times. Exhaust fans are to be activated in three ways. Use CO and CO2 monitors to activate the exhaust fans when gas readings reach a designated level. Use the bay door photo electric eye system to automatically start the exhaust fan system when apparatus enter or exit the bay area. Also, incorporate a manual override switch that will allow personnel to run the exhaust fan when working in the bay area with the doors closed.
2. Locate and specify CO and CO2 monitors for both sides of the apparatus bay. Monitors shall be Vulcain products or equal.

Division 26 Electrical

1. Specify high bay T8 fluorescent light fixtures for apparatus bays. Place lighting on conventional switching with each bay controlled individually.
2. Locate and specify shore electrical plugs and connections for servicing apparatus in bay area. Shorelines are to have a minimum of two plugs per drop.
3. Place most of exterior building lighting on time clocks that enable full control of operating hours. Place exterior lights required for security and access on photo cells for dusk to dawn operation.

PARKS AND RECREATION DIVISION/DEPT OF COMMUNITY SERVICES

SUPPLEMENTAL REQUIREMENTS

In the past 15-20 years, the Parks and Recreation Division of the Department of Community Services has implemented a large scale development program for new and expanded parks and recreational facilities. This expansion program has involved the design and construction of numerous vertical facilities ranging from small Comfort Stations to large scale Aquatic Centers. During this period of intense development, the division has standardized the programs and designs of many of its facilities, particularly those that are repeated frequently across the various parks. The General Standards provide for most of the guidance and the vast majority of the specifications needed to continue designing in accordance with the division's expectations. Nevertheless, there are many unique requirements that still need to be stated to provide clarity and comprehensiveness in these design instructions. This section provides this supplemental information.

The section is broken down into eight areas of focus. These are as follows:

1. General Building Design (Largely universal requirements)
2. Community/Activity Center Design
3. Gymnasium Design
4. Aquatic Center Design
5. Major Facility Public Restroom Design
6. Concession Building Design
7. Concession Building Restroom/Comfort Station Design
8. Maintenance Building Design

For each of these focus areas, the design instructions and specifications are grouped by the applicable CSI Divisions.

1. General Building Design

Division 04 Masonry

1. Construction in the County's parks is typically clad with split face concrete masonry units. To insure conformance with this look, specify split face CMU to match "Shellstone" or "Taupe" with corresponding matching mortar. (If exterior finishes within a park vary from this finish scheme, match the existing finish within that park.) Supplier of the specified masonry is Georgia Masonry Supply. Equivalents are acceptable.

Division 07 Thermal and Moisture Protection

1. Roofs for Aquatic Centers, Community/Activity Centers, and Gymnasiums are to be determined by design and are to meet the requirements for the applicable roof type in the General Standards. The roofs of all smaller park facilities shall be standing seam metal roofs that also meet the requirements and specifications of the General Standards. These latter roofs, however, shall be of a color that matches the "Patina Green" by Berridge, which has been used throughout the County's parks.
2. Gutters on the latter roofs shall be 6" x 6" and have downspouts 4" x 6". Specify that all gutters be industrial quality with baked on color finish to match that of the roof. Specify splash guards for gutters at roof valleys, and require solid metal leaf guard systems. Color of the downspouts shall match that of the split face block.
3. On the Parks facilities, fascia shall be a cementitious composite board such as that manufactured by Hardie Products; and soffits shall be the same cementitious product or perforated vinyl or metal.

Division 08 Openings

1. All exterior doors are to have lock guards.
2. Specify all locksets, latches, deadbolts, cylinders and cores to be manufactured by Best Access Systems. This requirement also shall apply to locks for equipment such as electrical switchgear and panels. All door locksets are to be cylindrical locks; there should be no mortise locks. Specify that during construction, all keyed cylinders shall be provided with Best temporary construction cores. The County shall be responsible for installing the permanent cores (provided by and paid for by the Contractor) and returning the construction cores to Best. All construction cores and keys will remain the property of Best Access Systems. Finish on the permanent core faces shall match the lockset finish.
3. Specify flush pulls (not push plates) where doors must be pulled and held shut to be locked.
4. If transfer grilles are necessary at doorways, it is preferred that the grilles be placed over the doors. If door louvers must be used, specify correctional grade louvers, particularly on all exterior and secured doors.
5. Specify correctional grade metal louvers on all exterior walls.

Division 22 Plumbing

Items related to Restrooms are covered in other sections herein directly addressing Restroom design and fixtures.

1. Plumbing pipe chases shall be 36" wide with plumbing against one wall to allow for maintenance access. Pipe chases are to be heated spaces with ceilings and lighting. Doors to pipe chases shall be standard lockable metal doors.
2. Backflow preventers and pressure reducers should be located in the pipe chases.

3. Do not locate water heaters in pipe chases. Show water heaters to be located in mechanical rooms or other service rooms.
4. Do not show any water piping in any building type running through unheated spaces.

Division 23 Heating, Ventilation, and Air Conditioning

1. For Community/Activity Centers and Gymnasiums, use only programmable thermostats. Place remote sensors in public areas and place all thermostats in staff occupied areas only.
2. Except for though-wall units approved by the County for smaller buildings, do not specify heat pumps for environmentally controlled spaces.
3. Do not locate cooling condensers near cook-out pavilions or the doors of Concession Buildings.
4. Enclose all exterior HVAC condensers behind block walls or similar enclosures with locking gates to control access and reduce the possibility of vandalism.
5. Ventilation fans activated at 85° shall be specified for all mechanical and electrical rooms.

Division 26 Electrical

These requirements are in addition to the directions and specifications in the General Standards for electrical systems. Where these requirements are more stringent, adhere to them. Where there are apparent conflicts with the General Standards or a chance that a lower quality standard will be applied, obtain direction from County prior to proceeding.

1. Specify that all electrical conduit publicly exposed be rigid steel.
2. Specify that all above ground interior conduit be thru wall EMT pipe, except that flexible metallic tubing may be used for connections to exhaust fans, ventilator motors, and lighting fixtures. The maximum allowable length for metal tubing shall be 6'.
3. All below ground conduit and all conduit used in chemical rooms associated with Aquatic Centers shall be 40 PVC tubing.
4. Specify only conductor wire above 10 gauge for underground runs. All underground cables are to be stranded copper.
5. Specify that any spare conduits, rigid steel elbows turning up at the panelboards, be bonded into the electrical bonding system.
6. In panel boxes, provide copper (not aluminum) bus bars.
7. Use bolt-in, commercial grade panels and breakers.
8. Provide dedicated power circuits for each vending machine, copier, laser printer, electrical water fountain, etc.
9. Provide that two 20 amp spec grade receptacles (commercial application NEC code) be installed at telecommunications backboards to support Lan connections, security systems, service personnel, and future expansion of computer based systems.
10. Specify that all exterior mounted receptacles that could be exposed to rain have rain shield covers installed.
11. All interior lighting to be 120V/277V.
12. Unless directed otherwise by the County, all interior lighting shall be furnished from T-8 fluorescent tube fixtures or compact fluorescent fixtures.
13. All emergency exit lights are to be LED fixtures. In pool areas and other areas with exposure to chlorine, specify plastic exit light fixtures.
14. Each light fixture in pool areas and gymnasiums shall have a twist lock disconnect.
15. Exterior fixtures around building perimeters (on fascia or walls) shall be globe fixtures with compact fluorescent bulbs, 28 watt medium base with electronic ballast; XOV13 by Luminaire. Recessed can lighting soffits shall be LF8 Series by Lithonia Lighting. All lights shall be on timers.

16. An exterior security light shall be provided over each exterior door. Security lights shall be photo-cell activated for dusk to dawn operation.
17. Design and specify connections for emergency generators on the exterior of all Community/Activity Centers and Gymnasiums. More detail to be provided at the start of design.

Division 28 Fire Alarm and Security Systems

1. Fire alarm systems shall be products of Ademco Vista to promote consistency in systems and equipment throughout the Park facilities.

2. Community/Activity Center Design

Division 06 Wood, Plastics and Composites

1. All cabinets in community rooms, classroom/meeting rooms and kitchens are to be lockable.

Division 09 Finishes

1. Acoustical characteristics of larger community rooms are considered very important. Architect shall address this requirement in design and shall provide acoustical treatments as considered necessary and cost effective within the project budget.

Division 10 Specialties

1. Larger community rooms shall have retractable dividers to separate the space into two equally sized rooms. The dividers shall be manually operated with recessed handles and be concealed in wall pockets when not in use. No preferred manufacturer or model.

Division 11 Equipment

1. Equipment to be provided for the facility includes, but is not necessarily limited to the following:

   Kitchens:

   a. Refrigerator (20 cu ft.); Energy Star rated.
   b. Ice Machine (500 lbs); Energy Star rated if available; provide with remote condenser if possible.
   c. Microwave Oven (1.5 cu ft.) 900 W.
   d. Warming Oven (No Stovetops); Energy Star rated.
   e. Garbage Disposal; 1 HP commercial grade.

   Large Activity Rooms:

   a. Public Address and Audio Enhancement System (Integrated into room and usable by either side when room is divided).

Division 12 Furnishings

1. Specify blinds and/or other window treatments for community room and other activity/meeting rooms to allow for video presentations in daylight hours.

Division 27 Communications

1. Design and specify a public address system tied to the facility's phone system. Include zoned volume controls.

3. Gymnasium Design

The Parks and Recreation Division has largely standardized its approach to Gymnasium design but much of that is programmatic and not particularly applicable to the technical intent and content of this General Standards document. A few critical design items relevant to Gymnasium construction are provided below. Also provided is a list of key specialties and equipment items that are integral to equipping Gymnasiums.

Division 09 Finishes

1. The County's preference for Gymnasium basketball courts is for a maple wood flooring system.
2. No gypsum board walls are to be used near basketball courts and other play areas. These walls should always be painted concrete block. If necessary to protect recreation participants, the Architect should specify placement of padded wall panels.

Division 10 Specialties and Division 11 Equipment

1. Provide for two scoreboards, one for each full court. Scoreboards are to have LED displays, be operable independently or together and be controlled wirelessly.
2. Provide for required number of basketball goals. Basketball goals are to be adjustable from 8' to 10' and be electronically operated. Preference for basketball goals is equipment from Porter Athletic Equipment, inclusive of goals, backstops, backboard padding, backboards, winches and switches. Equivalent products and manufacturers are acceptable.
3. Bleachers are to be provided for in needed quantity. Bleachers are to have rubber feet and wheels. Preference is for "Tip n' Roll" product manufactured by E & D Specialty Stands. Equivalent products and manufacturers are acceptable.
4. Other specialties and equipment include:
   a. Lockers – See General Standards Section 10500.
   b. Defibrillators
   c. Volleyball Posts/Nets – Collegiate 3000 by Schelde.
   d. Protective Gym Flooring – Carpetdeck by Signature Flooring.
   e. Table Tennis Tables – Spacesaver 22 Rollaway by Butterfly.

   Equivalents of the above are acceptable.

Division 23 Heating, Ventilation and Air Conditioning

1. Do not locate any HVAC equipment on the roof of the gymnasium facility. Units should be placed on ground level or in interior mechanical rooms.
2. Specify fabric ducts (duct socks) for HVAC system in gymnasium space. Specify anti-vibration soft start motor controllers for portion of system utilizing fabric ducts.

Division 26 Electrical

1. Interior lighting for gymnasiums shall be T-8 fluorescent tub fixtures. Specify sleeves over fluorescent tubes and cage protectors over the fixtures in areas exposed to ball throwing. Also specify cages over exit light fixtures in same areas.

4. Aquatic Center Design

Division 03 Concrete

1. In the pump room, provide for a medium broom finish concrete floor to provide a non-skid surface.
2. Evaluate other wet areas or potential wet areas to determine if other finished concrete floors should be broom finish to accomplish same purpose.

Division 08 Openings

1. Design and specify one set of special access doors that will enable transport of large equipment such as bleachers and portable lifts into the pool area.

Division 09 Finishes

1. Specify that pump room walls be painted white before installation of equipment, piping and electrical connections.
2. Specify that aggregate used for pool floors should be either white or light blue in color.
3. The facility's lobby, concession area, and "wet areas" should be designed with non-skid floor surfaces.

Division 10 Specialties

1. Dressing room lockers should be solid, high-density HDPE with integral color. Preference is "Lenox" by Bradley Corporation but equivalents by American Locker Security Systems and Scranton Products (Comtec) are acceptable.

Division 11 Equipment

1. Equipment to be specified for the facility includes, but is not necessarily limited to the following:
   a. Refrigerator (20 cu. ft.); Energy Star rated.
   b. Ice Machines (size not specified); Energy Star rated.
   c. Clothes Dryer (7 cu. ft.); Energy Star rated.
   d. Microwave Oven (1.5 cu. ft.) 900W
   e. Swimsuit Water Extractors – "Suitmate" by Extractor Corporation.
   f. Defibrillators.

Division 22 Plumbing (Specific Pump Room Requirements)

1. All pool pump motors are to have motor protection devices that shut down motor in the event of low voltage and phase monitor loss. Also include indicator lights for each phase that are visible to pool staff.
2. Locate control for pump switch in reasonable proximity to pump and in open view.
3. Floor drains in pump room shall be in quantity and sizes that will quickly drain water from floor. Provide floor slopes to promote drainage.
4. Provide for an overhead hoist system above pump motor pits. Hoist shall be capable of lifting motors in and out for service.
5. Locate and specify a hand sink and an eyewash station for the pump room
6. In locker room areas, provide a floor drain for each swimsuit water extractor.
7. Design and specify an automatic fill line system for the pool. Insure adequate backflow prevention.

8. Design and specify an ultra-violet water purification system for the pool.
9. Provide wall hydrants (hose bibs) on all exterior walls of facility.
10. Provide for a ventilated chemical wash-down area with sanitary sewer connection. Locate wash-down area outside between pump room and dumpster area.

Division 23 Heating, Ventilation and Air Conditioning

1. Engineer and specify an indoor pool dehumidification system. Basis of design shall be products or on-site construction provided by PoolPak International.
2. Specify fabric ducts (duct socks) for HVAC system in pool space. Duct socks should be hung with heavy duty aluminum connections. Specify anti-vibration soft start motor controllers for portion of system utilizing fabric ducts.

Division 26 Electrical

1. Specify that plastic enclosed emergency exit lights be used in rooms affected by pool chlorine.
2. Specify that chemical feed systems for pool have separate power switches.

Division 27 Communications

1. Design and specify a Public Address system tied to the facility's phone system for indoor pools and operating remotely for outdoor pool areas. Public Address system shall be designed as a means of providing emergency communications within the pool areas and to facility staff. Include zoned volume controls for each system.
2. Provide for data line communications to chemical feed system(s) and to dehumidification system.

5. Major Facility Public Restroom Design

For public restrooms in Community/Activity Centers and Gymnasiums, the following standards and specifications shall apply to provision of restroom fixtures, specialties and accessories. Where additional information is needed, refer to the applicable sections of the General Standards.

1. Toilet fixtures (water closets) shall be wall hung units with sensor operated battery powered flush valves with manual overrides.
2. Urinals shall be floor mounted units with sensor operated battery powered flush valves.
3. Sinks shall be wall hung or mounted within countertops, depending on size and configuration of restroom. Sink faucets shall be one piece units with battery operated sensors. Faucets shall be adjustable to provide preset flow intervals.
4. Soap dispensers shall be battery powered "no touch" dispensers.
5. For hand drying, provide no towels electric powered (120V hard wired) hand dryers, wall mounted. Preferred model/manufacturer is #NR126 by World Dryer. Equivalents are acceptable.
6. Toilet paper dispensers shall be double side-by-side rolls with no box/cover.
7. Child protection seat shall be provided in the HC stall of all public restrooms.
8. A diaper changing station is to be specified for installation in both men's and women's public restrooms.
9. A sanitary napkin disposal unit shall be provided in each stall in women's restrooms. Do not call for sanitary napkin dispensers.
10. Stall partitions and doors shall be compliant with requirements and specifications in Section 102000 Toilet Compartments and Accessories in the General Standards.
11. Vanity countertops shall be solid monolithic surfaces.
12. Flooring shall be ceramic tile.

6. Concession Building Design

Division 06 Wood, Plastic Composites

1. Cabinets and countertops shall be plastic laminate. Provide for only floor mounted cabinets. Cabinets should not be lockable.

Division 08 Openings

1. Exterior doors shall be hollow metal with corrections facility grade louvers and special security screw fasteners.
2. The serving ledge at the concession windows shall be stainless steel.
3. The concession serving window shall be a three frame window with sash balances; outer two slide open. Provide for an aluminum frame and ¼" tempered glass. Window shall have double spring system to keep it from falling inadvertently.
4. The concession window shall have a coiling metal door on the outside of the unit to secure the space. This door shall be of 22 gauge metal construction with an internal keyless lock mounted on the bottom bar accessible from inside the concession building. Door shall have a vandal resistant latching system. Door shall be mounted so as to prevent contact with glass and aluminum serving window. The typical door is provided by The Overhead Door Company, 511 Stephens Street, Atlanta, GA 30310. Equivalents are acceptable.

Division 09 Finishes

1. Flooring for main concession area shall be seamless epoxy flooring system with quartz aggregate. Basis of design is "Ceramic Carpet" by General Polymers; equivalents are acceptable. Flooring in ancillary spaces will be determined during design.

Division 10 Specialties

1. Provide for a mirror over hand sink in the concession room. Mirror is Bobrick B-165 or equivalent.

Division 22 Plumbing

1. In main concession room, provide water lines and floor drains for ice machines. Properly position floor drains.
2. In main concession room, provide hand sink with metered faucet with one preset time interval. The sink may be wall hung or installed in cabinet top dependent on design preference.
3. Provide for two freeze proof wall hydrants on exterior of concession building. Preference Woodford Fixtures #B67; equivalents acceptable.

Division 23 Heating, Ventilation and Air Conditioning

1. Do not locate thermostats in occupied portion of concession building; place remote sensor in public area with thermostat control located in mechanical room.
2. Include attic ventilation fan with unit mounted thermostat to reduce cooling demand on concession buildings.

Division 26 Electrical

1. Provide for the following electrical conduit runs in addition to those required for the building interior and systems:

a. Locate one 3” conduit from electrical room to outdoor grilling pavilion located at all large concession buildings.
b. Locate two spare 3” conduits from mechanical room and three spare 3” conduits from electrical room, to extend past concrete apron/plaza. Capable for future use.
c. For large concession buildings, locate three spare 3” conduits under slab from the mechanical/electrical room to the storage room on the opposite side of breezeway.

2. All concession buildings to have a minimum of a 400 amp service. Provide for no more than one duplex receptacle per circuit (20 amp spec. grade receptacle)
3. Provide for athletic field lighting controls to be located in the Youth Athletic Association storage rooms that accompany large concession buildings. Timers are to be located in electrical rooms.

Concession Building Breezeway Design

Standard requirements for breezeway construction include the following:

1. Design roof structure with heavy timber scissor trusses 4” x 8”. The last two sets of trusses at each end of breezeway are to be cedar; all others may be painted a light color.
2. Exposed roof deck/ceiling should be tongue and groove and painted a light color.
3. Metal connection plates on beams shall be primed and painted same light color.
4. Roof should overhang trusses by 1’. Provide for a drip edge on the metal roof.
5. Lighting: Specify 150 Watt metal halide lamps, each with a metal casing in a dark bronze finish and mounted with a heavy duty swivel. Fixtures shall be placed to up-light from the sides. Lights shall be placed on same timer as park perimeter lighting.

7. Concession Building Restroom/Comfort Station Design

In addition to the directions and guidance provided for all restrooms, the following items apply specifically to Concession Building restroom facilities, stand-alone Comfort Stations and other unattended restroom facilities.

Division 08 Openings

1. Exterior doors shall be hollow metal with corrections facility grade louvers and special security screw fasteners.
2. For more remote unattended facilities, or as directed by County, provide for electronic door locking system with panic device to allow for emergency exiting. Basis of design is Von Duprin #22NL Panic Bar and #1100 Series Electric Strike. Equivalents are allowed but must be compatible with Best lock hardware and locks.

Division 09 Finishes

1. Flooring shall be seamless epoxy flooring system with quartz aggregate. Basis of design is "Ceramic Carpet" by General Polymers; equivalents are acceptable.
2. Ceiling shall be gypsum board over ¾" painted plywood. Do not allow for ceiling access panels in the public areas of unattended facilities.

Division 10 Specialties

1. Specify all toilet partitions to be braced from floor to ceiling with connections to overhead bracing.
2. Do not provide for mirrors or soap dispensers in unattended restrooms. Soap dispensers will be provided and installed by the County.
3. Specify 12" steel jumbo roll tissue dispensers. Basis of design is Georgia Pacific, 12" Jumbo Sr.", #59493. Equivalents are acceptable.

Division 22 Plumbing

1. For more remote unattended facilities, or as directed by County, specify stainless steel correctional grade fixtures. Basis of design for toilet, urinal and sink is penal-Ware by Acorn Engineering. Equivalents are acceptable.

Division 23 Heating, Ventilation and Air Conditioning

1. Do not locate thermostats in occupied portions of unattended restrooms; place remote sensor with thermostat control in area not accessible to public.

Division 26 Electrical

1. Locate and specify security light fixture for exterior of remote restroom facilities. Fixture shall function on a timer.
2. Locate and specify occupancy lights for the exteriors of remote restrooms. Light shall be a separate fixture mounted to wall or soffit and shall be activated by interior motion sensor.
3. Provide for interior lights and exhaust fans in remote facilities to be activated by motion sensors. Locate sensor so that lights and fan will remain on while facility is occupied.

8. Maintenance Building Design

Maintenance Buildings are standard pre-engineered steel buildings, 30' x 60' enclosed with a 30' x 20' overhang for covered storage. In the enclosed area, 450 sq. ft. is designated as office/restroom space and 1,350 sq. ft. as workshop space. The metal building is to be designed and constructed to the standards in Division 13, Special Construction/Section 133000 Metal Building System. Special requirements for the building include the following:

Division 06 Wood, Plastics and Composites

1. Provide for the facility's workshop area walls to be lined with painted plywood, 8' in height, throughout space.
2. Design and specify construction of a workbench a minimum of 36' in length and 2'6" wide with a 2'6" shelf below and a 12" wide shelf above.

Division 08 Openings

1. Exterior doors shall be hollow metal with corrections grade louvers with special security screw fasteners. Include latch guards on all doors.
2. Workshop area to have exterior entry from roll-up overhead door 10' tall and 12' wide.

Division 09 Finishes

1. Workshop floor shall be sealed concrete with smooth finish. Office floor shall be VCT. Restroom floor shall be seamless epoxy flooring system with quartz aggregate.

Division 11 Equipment

1. Equipment to be provided for the facility includes:
    a. Refrigerator (20 cu. ft.); Energy Star rated.
    b. Microwave Oven (1.5 cu. ft.) 900W
    c. Ice Machine (50 lbs/day) Manitowc Q-130 or equal.

Division 22 Plumbing

1. Specify 120 gal water heater and provide location in mechanical room or similar service area.
2. Specify ADA compliant unisex shower and restroom combination. Shower to be pre-fab unit. Toilet to be floor mounted with manual flush valve.
3. Provide for electric powered water cooler in workshop space.
4. Provide for emergency eye wash/shower station with floor drain in workshop area.
5. Provide for freeze proof wall hydrant on exterior wall at covered storage area.

Division 23 Heating, Ventilation and Air Conditioning

1. Provide for through-wall heating and cooling unit to service office and restroom area.
2. Provide for a ventilation system in the workshop space.

Division 26 Electrical

1. All interior lighting is to be T-8 fluorescent fixtures. In addition to basic lighting, provide for one row of fluorescent fixtures located over the full length of the workbench. Specify vandal resistant covers for all lighting in workshop.
2. Provide for exterior security lights at each end of the building. These fixtures shall have vandal resistant protective covers and shall be operated by photocells and timers.

Division 28 Fire Alarm and Security

1. Provide for a security alarm system tied into buildings telecommunications system.
2. Provide conduit and cabling to support future security camera installation in which camera will provide view of entrance gate and front of maintenance building.