

Department of Aviation
Bureau of Planning and Development

Design and Construction Guidelines Manual for Concessions New Construction and Modification

A vision for Airport Development

Architecture

Civil

Structural

Mechanical

Electrical

Construction

A Vision for Airport Development

Concessions Project Submittal & Review
Guidelines

Concessions New
Construction/Modifications Design
Guidelines-Architectural

Concessions New
Construction/Modifications Design
Guidelines - Civil

Concessions/New
Construction/Modifications Design
Guidelines-Structural

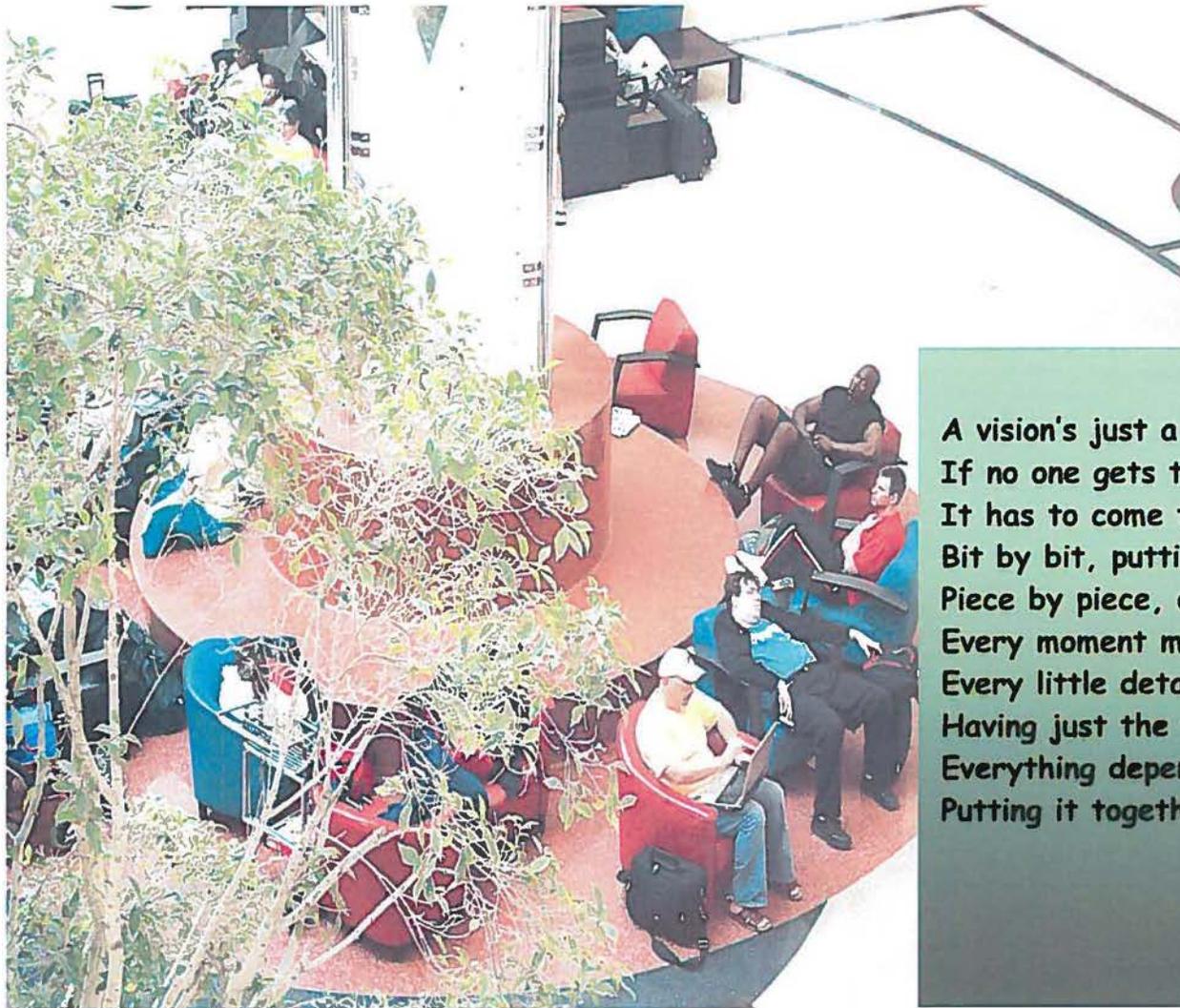
Concessions New
Construction/Modifications Design
Guidelines-Electrical

Concessions New
Construction/Modifications Design
Guidelines-Mechanical

Concession Kiosks - Permanent & Temporary
Design Guidelines

Concessions New
Construction/Modifications Design
Guidelines-Grease Interceptors

Tenant Construction Guidelines



A vision's just a vision if it's only in your head
If no one gets to hear it, it's as good as dead.
It has to come to life.
Bit by bit, putting it together . . .
Piece by piece, only way to make a work of art.
Every moment makes a contribution,
Every little detail plays a part.
Having just the vision's no solution
Everything depends on execution,
Putting it together, that's what counts.

Stephen Sondheim Lyrics

Prologue:

This document is a part of the trilogy of documents that describe the requirements and guidelines for the design and development of any space within the Hartsfield-Jackson Atlanta International Airport (H-JAIA). The parts of the trilogy include:

1. A Vision for Airport Development – This document outlines the philosophical approach to design with a general look at design requirements.
2. Tenant/Concessions Project Submittal & Review Requirements – A document that provides guidelines for submitting a project to the DOA for technical review and approval for all new construction and modification.
Access at <http://apps.atlanta-airport.com/engineeringguidelines//index.asp>
3. DOA Design Guidelines – This information provides specific guidelines for Design Intent, Technical Requirements, Specifications and Standard Details that are specific to H-JAIA and are above and beyond the code requirements.
Access at <http://apps.atlanta-airport.com/engineeringguidelines//index.asp>



1.0 Introduction

Hartsfield-Jackson Atlanta International Airport (“ATL” or “HJAIA”) is recognized as the busiest airport in the world and the most efficient in terms of number of passengers and number of airplanes. ATL has a staggering history for passenger efficiency. As a key hub airport geographically, ATL is vital to the passenger aviation system in the United States.

As a key partner, each Tenant is expected to apply standards of excellence in design and construction for the development of space within the airport. Each space must meet the expectations of efficiency and compelling design. The DOA will work with each Tenant and its designers to provide exciting new spaces that appeal to the passengers at the airport.

The Department of Aviation encourages each tenant at the airport to apply creativity in the development of each space. The DOA will work with each tenant towards an exciting solution. However, the DOA will retain approval rights to each scheme.

The purpose of this document is to identify guideline criteria for designing spaces at the airport and identify design principles that are quintessential to future development. The various space development efforts must engage the core visionary values of a coordinated and efficient transportation facility.

This document will promote customer satisfaction by creating world-class environments for our passengers to shop, dine, and enjoy, and simultaneously leave them with a lasting impression of their distinctive experience at ATL. The goal is to foster creativity while ensuring a consistent and high quality experience.

These guidelines are intended to serve as a framework from which all projects – including DOA projects, Capital Improvement Program designers, airlines and Concessionaires and their designers to evolve their spatial planning and design. Each space should be unique to the airport, providing identity for the Stakeholders and interest for prospective customers. At the same time as being unique, unifying elements and materials must provide a sense of belonging to the airport as a whole.

F - Focal Point: Provide an aesthetic treatment that provides for focal points, foregrounds and backgrounds.

R - Range of Colors: Select colors that have a range of contemporary, modern colors including accents against progressive modern colored backgrounds.

E - Efficient and Elegant: Designs must maintain or improve the efficiency of the airport while providing world class elegance.

S - Sustainability: All designs must employ sustainable designs reflecting the airport's role as a public steward of our resources.

H - Each design must support a Sense of Place for Atlanta as the Capitol of the South so a passenger will remember they were Here.

2.0 Vision for the Airport

2.1 General

No two snowflakes, people or airports are alike. ATL airport is a reflection of the area's cities, its environment, industry, tourism, history and its people which should be evident in its public spaces.

At Hartsfield-Jackson Atlanta International Airport, we are compelled to provide a facility that is "Opening Day Fresh". The design of all components of the airport must be securely grounded in "Fresh Design".

A key ingredient of the Vision of the airport is to provide a **Sense of Place** for Atlanta and the New South. A **Sense of Place** is an expression of the characteristics of the region through the architecture, art, retail and food offerings, and its hospitality. The **Sense of Place** becomes the aesthetic approach for the base building infrastructure, the design guidelines for tenant and concessionaire build-outs, the type and variety of retail and food offerings, the service and products, and, above all else, it can be described as the sense that you are somewhere that matters. The user becomes aware that they are experiencing a space that is unique and tactile.

The intent of this effort is to ensure that each party providing a service or product to the passengers at ATL contributes towards this **Sense of Place**, encouraged to promote the unique locale and to do so while still maintaining a world-class quality of design, materials and offerings.

Hartsfield-Jackson Atlanta International Airport

2.2 The City of Atlanta, Georgia

The City of Atlanta has long been known as the "gateway" to the south based on its heritage as a backbone for the country in transportation and its central location in the southeast United States. Atlanta has become the Capitol of the South – an emerging international City of this millennium. Atlanta is a city that is the essence of the future by being high tech and business and technology friendly as well as culturally exciting.

The facilities that comprise the City of Atlanta must inspire a **Sense of Place** for visitors and residents alike. This **Sense of Place** will provide a source of identity for Atlanta, defining the characteristics of the fabric of this place. The **Sense of Place** is

experienced and not an item or an icon. Each facility that embodies the place that is Atlanta shall establish a **Sense of Place** for the specific facility, the place that is Atlanta and the region known as the South.

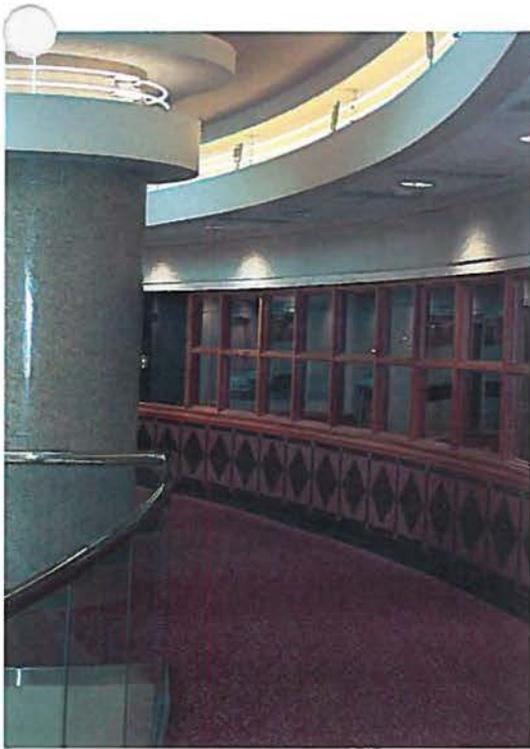
Atlanta's proud tradition of accepting and accentuating the diverse background of its residents has earned the City national accolades and the title of Capitol of Diversity.

Each facility shall reflect the beauty, energy and culture of our City and the region, providing a strong Sense of Place and civic pride and enabling visitor's awareness of all our City has to offer.

2.3 Hartsfield-JacksonAtlanta International Airport

It is imperative to the success of the airport that there is a common framework for all projects – inside and out. The airport needs to have common core visionary values. Based on the complexity of the airport neighborhood, this vision has become a hybrid of multiple visions.





Hartsfield-Jackson Atlanta International Airport (HJAIA) has a history for being the most efficient airport. The future of the airport success depends upon maintaining this efficiency. However, the increasing expectations of the passengers utilizing HJAIA require that this efficiency be combined with a comfortable passenger experience resulting in a general ambiance of “*elegant efficiency*”.

HJAIA makes a commitment and promise to reinvest its attention to consistency and quality. In partnership with the each Tenant, all products and services at the airport will be of the highest quality environment and product or service to enhance the passenger experience. HJAIA will leave a lasting impression on the memories of each passenger's distinctive experience at ATL.

Hartsfield-Jackson Atlanta International Airport

Each space within the airport shall work towards a new identity for ATL providing passengers a reinvented airport through:

- ❑ Enhance the passenger spatial experience
- ❑ Reflecting an image and vision for Atlanta and the South
- ❑ Providing unifying elements for the entire airport experience
- ❑ Providing distinctive southern character, hospitality, charm and personality
- ❑ Providing innovative designs and spatial experiences
- ❑ Provide flexibility to the ever-changing airport environment
- ❑ Play a key role in the creating and reinforcement of the image
- ❑ Serve all passengers through the provision of services for safety, accessibility, cleanliness, for all age groups and at appropriate times.
- ❑ Focus on communications to all passengers including multi-lingual where appropriate.
- ❑ Accentuate the mystique of the flying experience.

2.4 HJAIA Facility Design Approach

The design for each space within the airport, from new terminal buildings to minor tenant or concessions spaces, shall consider Atlanta's rich history and the vision of the South in its design decisions. A *Sense of Place* shall be employed to allow the passenger to know they are in Atlanta, the South, the area of the airport and the service or product location without total reliance on signage.

The design of spaces at the airport shall utilize a dynamic, progressive modern architecture.

The design of new spaces and the renovation of existing spaces shall use the human element in each progressive design, bringing human scale to the place – a spectrum of scales from intimate to grand. Based on the compartmentalized nature of the spaces at the airport, designers must utilize the expanding spatial relationships to expand their usefulness of adjoining spaces. Designs must be flexible and nimble with the ability to adjust to change.

The designs shall always consider accessibility to all persons desiring to utilize the airport. This includes compliance with the requirements of the Americans with Disabilities Act. Standards are set to meet ADA and Building Code requirements as a minimum and not the maximum.

Designs shall develop formal and informal spaces providing a variety of opportunities to meet the needs of the traveling public.



Designs will provide excitement and shall be intuitive. Spaces shall be innovative, trans-cultural, interactive, vibrant and cohesive. Passenger flow shall be seamless, convenient, instinctive and intuitive. Spaces shall be designed with critical massing of activities to help reduce anxiety levels and provide for simplistic decision making. The ordered arrangements, not loose and informal, will be filled with effective initiatives to engage the passenger in airport activities.

2.5 Design Decisions

Facility or area designs shall provide solutions within existing constraints to provide dynamic volume. The designs shall provide "iconographic" architecture – structure that is inspirational and iconic. The designers shall utilize the qualities discussed above to inspire the design process and solutions. Each design expression shall absorb or quantify the patterns of the place with a measured cadence or rhythm. All design decisions shall incorporate ease of maintenance and accessibility.

Designers shall incorporate good design practices within airport design projects including:

- ❑ Sustainable design
- ❑ LEED design
- ❑ Adaptability
- ❑ Healthy design (Air Quality)
- ❑ Tactile synergy
- ❑ Utilize all senses (5 senses plus the 6th sense: emotion).
- ❑ Utilize materials native to the region when possible
- ❑ Utilize materials that are permanent and durable

Hartsfield-Jackson Atlanta International Airport

- ❑ Utilize geometry of common patterns in ceilings, walls, masonry, etc.
- ❑ Promote natural lighting making spaces seem lightweight if open to the outdoors
- ❑ Carefully defined artificial lighting to add sparkle and definition
- ❑ Design to human scale
- ❑ Promote innovation for design and operation.
- ❑ Design for energy efficiency.
- ❑ Provide for passenger comfort.
- ❑ Utilize technology to ease movement for passenger and employees



Natural Light Provides Life to a Space



Interior design shall follow the architectural basis. All furnishings, interior plants, wall surfaces shall be carefully selected and designed to provide the color and texture to complement the building architectural theme.

Utilization of common shapes and patterns shall be incorporated in each project to provide a sense of continuity between elements of the airport. Spaces shall be designed to "borrow" space from other areas to expand the visual limits of each space.

Concession areas shall be grouped with visual elements that intertwine. The Shops at Hartsfield shall become the Shops of Southern Hospitality. While the Department of Aviation will be open to creativity by concession and project designers, the DOA must approve all concepts in accordance with the design's appropriateness to meet the airport's vision and Sense of Place for the Airport.

2.6 Wayfinding

The busiest airport in the world must efficiently move passengers through a complex often confusing environment. To accomplish this task signage must be simple and consistent throughout the airport campus.

HJAIA's wayfinding signage provides essential directional information designed to expedite passenger travels from point to point.

2.7 Art in Public Places

HJAIA enjoys the benefit of an extensive art program managed by DOA. The program includes permanent and rotating exhibits which include a variety of applications, media and subject matter.

HJAIA encourages tenants to incorporate art into each individual environment. Art can be in the form of objects or applied to wall surfaces, but preferably, it shall be integrated in the design of the facilities. Art can be used to enforce wayfinding opportunities and as unifying elements for spaces with a common function. Careful planning of locations for art is important to ensure that it does not impede circulation or create an obstruction for life safety.

The Art Program must provide art that is appropriate to the area and the activities to occur in the space. Art must involve the viewer and be integrated into the structure of the space. The Art itself must reflect the unique character and environment of the South and provide support to the Sense of Place for the airport.



Artwork can contribute significantly to enhancing the quality of the traveler's experience by providing engaging things to Hartsfield-Jackson Atlanta International Airport

look at or interact with, and by enriching the overall design environment.

2.8 Color Palette

The color palette shall employ contemporary, elegant mix of colors utilizing mid-tone and deeper saturated neutrals to bring new depth and drama to the spaces. The mix of color values, of warm and cool tones harmonizing together as they do in natural stone, represent a subtle rainbow compared with the safe off-white palette of yesteryear. The feeling must be one of luxury, utilizing whole new dimensions of the neutral palette, adding light and inner luster with textures and finishes selections.

2.9 Material Selection

The selection of materials for construction and finishes shall primarily consider materials that are native to the area. The materials shall be selected based on their durability and low maintenance requirements. Materials are preferred to be hazard free, have a recycled content and are energy efficient.

3.0 Current Sense of Place Efforts

Currently, HJAIA in close coordination and cooperation of the Concessionaires at the Airport, are reaching new levels of aesthetic value through concentrated efforts of design to support the sense of place at the airport. Two current examples include the Burger King on Concourse T that proudly displays the Atlanta skyline as a backdrop in lieu of ceramic tile. This approach emphasizes the sense of being in Atlanta. Alternatively, the new Phillips Seafood restaurant on Concourse D has been carefully designed to promote a sense that this is a seafood restaurant. The sense is amplified through colors, accents of fish and crab, and a general look of dining on a wharf. Both are excellent examples of the Sense of Place at the Atlanta Airport.



4.0 Design and Submission Requirements

4.1 General Requirements

There are specific requirements that each tenant must follow during the development of the design for each space at the airport.

- ❑ Tenants are required to retain the services of a licensed professional to design their spaces and prepare the required drawings.
- ❑ Each design application will be considered on its individual merit and no design will be approved until all required documents have been received.
- ❑ Tenants have total responsibility for compliance with all codes and standards including Federal, State and local regulations and all HJAIA Design Guidelines as found on the website,
- ❑ Tenant has total responsibility to verify all conditions and dimensions in the field. The DOA has limited existing information but do not guarantee their accuracy or completeness.

4.2 Designs Reviews

Each Tenant shall be required to submit the construction documents for review and approval by the DOA. These reviews shall provide a comprehensive review, but shall not relieve the Tenant or their designers from compliance with all DOA design guidelines and code requirements. Approval from the DOA shall be required prior to the initiation of construction.

4.3 Review Procedures

The Department of Aviation has a Design Review Committee, that serves as principal reviewers of design and construction submittals. Representatives of relevant City agencies such as Department of Aviation, City of Atlanta Fire Department and City of Atlanta Department of Watershed Management are included. The purpose of the Design Review Committee is to assess the Tenant's design and construction submittals with regard to consistency with Design Criteria and compliance with DOA Design Guidelines.

The Landlord (The Department of Aviation) shall have absolute right of review and approval over all aspects of the Tenant Improvements prior to construction of any alterations completed by the Tenant. The Landlord also may waive any of the Design Criteria so long as the concept, quality and character of the project are not significantly affected.

4.4 DOA Design Procedures and Technical Guidelines

Tenants shall comply with the requirements and conditions set forth in the DOA Project Submittal & Review Guidelines and DOA Design Guidelines. Access these guidelines at <http://apps.atlanta-airport.com/engineeringguidelines/index.asp>

Hartsfield-Jackson Atlanta International Airport
City of Atlanta
Department of Aviation
Bureau of Planning & Development

Concessions Project Submittal & Review Guidelines

03/28/14	New Revised Guidelines for Concessions Work Only			
Last Revised Date	Description			
Revisions				

Concessions Project Submittal & Review Guidelines

Table of Contents

1.0	Purpose	3
2.0	Scope	3
3.0	Responsibilities	3
3.1	DOA Concessions.....	3
3.2	DOA Planning & Development (P&D).....	3
3.3	Concessionaire/Designers of Record	4
4.0	Procedure	4
4.1	Project Submittals	4
	4.1.1 Delivery of Submittals	4
	4.1.2 DOA Concessions Submittals to P&D	4
5.0	Review Process & Timing	6
6.0	DOA Project Requirements	7
6.1	Grease Interceptors	7
6.2	Permanent & Temporary Kiosks	7
6.3	Aircraft Ramp Work.....	8
6.4	Building Permit.....	8
6.5	Construction	8
6.6	As-Builts.....	8
7.0	References	9
8.0	Appendices	10

1.0 PURPOSE

The purpose of these guidelines is to provide DOA Concessions and airport Concessionaires & their Designers of Record with procedures for submitting a project to the Department of Aviation's Planning & Development (P&D) for technical review and approval. All new construction and modifications to any airport's Concessions space including the addition/remodeling of new & temporary kiosks at Hartsfield-Jackson Atlanta International Airport (ATL) shall follow these guidelines.

2.0 SCOPE

These guidelines apply to DOA Concessions and airport Concessionaires & their Designers of Record.

3.0 RESPONSIBILITIES

3.1 DOA Concessions

- 3.1.1 DOA Concessions shall be responsible for accepting and processing all Concessions' new construction, modifications & new/temporary kiosk project submittals issued for review and approval by the Concessionaire or their Designer of Record.
- 3.1.2 DOA Concessions shall be responsible for submitting to P&D all project submittals requiring technical review.
- 3.1.3 DOA Concessions shall be responsible for ensuring that all project submittals meet DOA's design intent and that each project submittal is complete (Per Section 4.0 of these guidelines) before submitting to P&D for technical review.
- 3.1.4 DOA Concessions shall be responsible for submitting P&D's review comments and final stamped accepted construction documents to the Concessionaire and Designers of Record.
- 3.1.5 DOA Concessions shall be responsible for submitting the Concessionaire's Designer of Record review comment responses to P&D and for ensuring that all comments are closed and incorporated in order for P&D to provide final acceptance of the submittal.
- 3.1.6 DOA Concessions shall be responsible for all communication (s) and scheduling of required meetings with the Concessionaire and Designers of Record to resolve design issues, unless requested otherwise by DOA Concessions.
- 3.1.7 DOA Concessions shall be responsible for coordinating and assisting in the resolution of all design issues.

3.2 DOA Planning & Development (P&D)

- 3.2.1 P&D shall be responsible for the Architectural/Engineering technical review of all project submittals submitted to P&D by DOA Concessions. Fire Code and Grease Interceptor Requirements reviews shall be the responsibility of the City of Atlanta's Fire Department (AFD) and Department of Watershed Management (DWM) respectively.

- 3.2.2 P&D shall be responsible for ensuring that all project submittals comply with DOA Concessions Architectural/Engineering Design and Construction Standards.
- 3.2.3 P&D shall be responsible for issuing the technical review comments to DOA Concessions for their review and distribution to the Concessionaire and their Designers of Record.
- 3.2.4 P&D shall be responsible for issuing the final P&D stamped approved project submittals to DOA Concessions for distribution to the Concessionaire and their Designers of Record.
- 3.3 Concessionaire/Designers of Record
 - 3.3.1 Concessionaire/Designers of Record shall be responsible for submitting all project submittals to DOA Concessions for review and approval.
 - 3.3.2 Concessionaire/Designers of Record shall be responsible for complying with all DOA Concessions Architectural/Engineering Design and Construction Standards. Access at <http://apps.atlanta-airport.com/engineeringguidelines//index.asp>
 - 3.3.3 Concessionaire/Designers of Record shall be responsible for submitting to DOA Concessions, all revisions or modifications to the DOA stamped/approved documents for DOA review and approval.
 - 3.3.4 Concessionaire shall be responsible for obtaining all required building permits from appropriate agencies before start of any construction work.

4.0 PROCEDURE

- 4.1 Project Submittals
 - 4.1.1 Delivery of Submittals
 - 4.1.1.1 Concessionaire/Designers of Record shall be responsible for submitting all project submittals to the DOA Concessions Office located in the Domestic Terminal at Hartsfield-Jackson Atlanta International Airport.
 - 4.1.2 DOA Concessions Submittals to P&D

DOA Concessions shall be responsible for submitting/delivering to P&D's Document Control the following documentation with each project submittal:

 - 4.1.2.1 One (1) hard copy of the Transmittal Form.
 - 4.1.2.2 One (1) hard copy of the DOA Concessions concept Sign Off Sheet
 - 4.1.2.3 Concept Design Submittal (30%)
 - 4.1.2.3.1 Three (3) 11" x 17" hard copy sets of plans/sketches to include all necessary floor plans, elevations, sections, details, renderings, etc., that shows/provide a clear project/concept proposal.

4.1.2.4 100% Design Submittal (Initial Review Submittal)

Drawings for this submittal are not required to be sealed by the Professional Engineer or Registered Architect

4.1.2.4.1 Five (5) hard copies of full-sized set of plans and one (1) hard copy set of specifications.

4.1.2.4.2 Two (2) compact discs (CD) containing the PDF version of the plans and specifications.

4.1.2.5 100% Design Re-Submittal (Revised Drawings incorporating all comments for Review and Final Acceptance)

4.1.2.5.1 Five (5) hard copies of full sized set of plans of the **revised drawing sheets only** (showing the incorporation of P&D's comments as required)

4.1.2.5.2 One (1) hard copy of the **revised Specifications sheets only**

4.1.2.5.3 One (1) CD containing the following:

4.1.2.5.3.1 The DOA Review Spreadsheets (Highlighted Tabs) with **the Concessionaire/Designer of Record responses to all DOA Comments**

4.1.2.5.3.2 PDF of the **revised drawings and Specification sheets only**

4.1.2.5.4 Once P&D receive the above information from DOA Concessions, P&D shall review/confirm that all comments/revisions have been answered, are closed and have been incorporated. DOA Concessions will then be notified via E-Mail that the submittal is ready for approval and can advise the Designer of Record to submit the Final Conformed set of Issue for Construction documents for P&D's stamp approval.

4.1.2.6 Issue for Construction Documents Submittal (IFC) (Final Conformed set of Documents)

Drawings shall be signed and sealed by a Professional Engineer or Registered Architect with a State of Georgia Seal.

4.1.2.6.1 Seven (7) hard copies of full-sized set of plans and seven (7) hard copy sets of specifications

4.1.2.6.2 Two (2) CDs containing the PDF version of the plans and specifications.

4.1.2.6.3 One (1) CD containing the Auto CADD version of plans and Word document of specifications. This CADD version is of the FINAL & CONFORMED DOA Approved set of documents only (Documents with all comments addressed, closed and incorporated).

5.0 REVIEW PROCESS & TIMING

- 5.1 Review process shall be per the Concessions Review Process Flow Chart (Appendix A).
- 5.2 Concept Design (30%) review (One (1) day)
 - 5.2.1 This review shall be conducted by DOA Concessions as a design review meeting (within one (1) day) with the Concessionaire/Designer of Record and P&D and/or as determined by DOA Concessions.
 - 5.2.2 DOA Concessions shall provide P&D with copies of these documents per Section 4.1.2.3.1 of these guidelines.
 - 5.2.3 This review is to determine if any constraints exist based on DOA Design Standards and requirements before proceeding with full project/design execution.
 - 5.2.4 P&D shall provide written confirmation of comments/design decisions made at this meeting within five (5) days.
- 5.3 DOA Concessions Pre-100% Design Submittal Review Meeting (One (1) day)
 - 5.3.1 DOA Concessions schedules, coordinates and conducts a pre-100% Design Submittal meeting with the Concessionaire/Designer of Record and P&D to ensure completeness and accuracy of the submittal before is submitted for review.
- 5.4 DOA Concessions submits to P&D's Document Control the 100% Design submittal for P&D, AFD and DWM technical review.
 - 5.4.1 P&D's Document Control Date stamps and distributes documents
 - 5.4.2 P&D's Facility Construction Management (FCM) receives submittal package and logs in
 - 5.4.3 P&D's FCM determines Engineering discipline review, establishes review due date and notifies reviewers
 - 5.4.4 100% Design Submittal (Initial Review Submittal). P&D begins technical review

AFD & DWM review times and their resolution of issues are not controlled by P&D. These conditions may be subject to additional review time and full acceptance of the documents.
 - 5.4.5 P&D's FCM transmits review comments via e-mail to DOA Concessions
 - 5.4.5.1 If there are no comments, DOA Concessions shall then be notified via E-Mail that the submittal is ready for approval and can advise the Designer of Record to submit the Final Conformed set of Issue for Construction Documents (with Architect/Engineer seals) for P&D, AFD and DWM stamp approval.
 - 5.4.5.1.1 Once P&D receives the IFC Documents from DOA Concessions, P&D and AFD/DWM (if required) shall stamp the documents and FCM shall prepare the Release Notification Letter.

- 5.4.5.1.2 DOA Concessions shall then be notified via e-mail that the stamped- accepted documents are ready for pick up from P&D's Document Control.
- 5.4.5.2 If Comments are provided, FCM shall transmit to DOA Concessions the review comments via E-Mail and DOA Concessions shall be responsible for advising the Concessionaire/Designer of Record to address/incorporate all comments and to submit the 100% Design Re-Submittal (Revised Drawings incorporating all comments for Review and Final Acceptance).
- 5.4.5.3 DOA Concessions shall be responsible for providing P&D with the Concessionaire's Designer of Record review comment responses and once P&D reviews and confirms that all comments are incorporated, DOA Concessions shall then be notified via E-Mail that the submittal is ready for approval and can advise the Designer of Record to submit the Final Conformed IFC Documents for P&D, AFD/DWM (if required) stamp acceptance.
 - 5.4.5.3.1 Once P&D receives the IFC Documents from DOA Concessions, P&D and AFD/DWM (if required) shall stamp the documents and FCM shall prepare the Release Notification Letter.
 - 5.4.5.3.2 DOA Concessions shall then be notified via e-mail that the stamped- accepted documents are ready for pick up from P&D's Document Control.
- 5.5 P&D's and AFD/DWM (if required) stamped accepted documents with a copy of P&D's Release letter (Per BOB request) shall be used by the Concessionaire/Designer of Record for submitting to the Bureau of Buildings for permitting.**
- 5.6 Overall review/approval time depends on the Concessionaire/Designer of Record turn-around time of their Re-Submittals incorporating all of the agreed upon comments.
- 5.7 P&D's technical review and stamped acceptance of documents is solely for compliance with the DOA Concessions approved Concept Design and DOA/P&D Architectural & Engineering Design Standards.
- 5.8 Compliance with City, State and Federal Codes, Regulations, and Ordinances is the responsibility of the Concessionaire/Designer-of-Record and are reviewed and approved by the City of Atlanta Bureau of Building, Atlanta Fire Department and Department of Watershed Management. Concessionaire/Designer of Record shall also be responsible for any liability resulting from the design and installation of the improvements and for any errors, omissions or conditions from the submitted construction documents.

6.0 DOA PROJECT REQUIREMENTS

- 6.1 Grease Interceptors
 - 6.1.1 Refer to DOA/P&D's Concessions New Construction/Modifications Design Guidelines - Grease Interceptors for the responsibilities and process of all work associated with the design and construction of Grease Interceptors.

- 6.2 Permanent & Temporary Concession Kiosks
 - 6.2.1 Refer to DOA/P&D's Concession Kiosks – Permanent & Temporary Design Guidelines for modification of existing Kiosks, relocations and new construction.
- 6.3 Aircraft Ramp Work
 - 6.3.1 Refer to DOA/P&D Concessions New Construction/Modifications Design Guidelines – Civil when Concessions project construction requires work on the aircraft ramps.
 - 6.3.2 Construction of any project on the aircraft ramps shall also require an FAA 7460 application form to be submitted to the DOA for review and approval, regardless of whether cranes are required or not.
- 6.4 Building Permit
 - 6.4.1 **P&D's and AFD/DWM (if required) stamped accepted documents with a copy of P&D's Release letter (Per BOB request) shall be used by the Concessionaire/Designer of Record for submitting to the Bureau of Buildings for permitting.**
 - 6.4.2 BOB will not review any submittal or issue a permit without the DOA and AFD/DWM (If required) stamped acceptance and copy of P&D's Release Letter.
 - 6.4.3 The BOB permit does not authorize the Concessionaire's Contractor to proceed with construction. A DOA Pre-Construction meeting is required and shall be conducted with the concessionaire's Contractor in order to receive a "Notice to Proceed" to begin construction.
- 6.5 Construction
 - 6.5.1 Refer to DOA/P&D's Tenant Construction Guidelines for all interior/exterior Concessions construction work. All construction work shall comply with these guidelines.
 - 6.5.2 All Tenant projects shall be constructed in accordance with the DOA/P&D stamped/approved documents.
 - 6.5.3 Any revisions or modifications to the DOA/P&D stamped accepted documents during construction shall be submitted to DOA Concessions and P&D for review and acceptance. BOB inspectors will not approve any work without P&D's and AFD/DWM (If required) stamped acceptance of changed documents.
 - 6.5.4 Any changes made after completion of construction and final inspection by DOA and BOB shall be submitted to DOA Concessions for review and approval.
- 6.6 As-Builts
 - 6.6.1 At project completion, Concessionaire shall be responsible for submitting to DOA Concessions the following:
 - 6.6.1.1 Two (2) hard copies of full sized as-built drawings and specifications

- 6.6.1.2 Three (3) CDs containing the Auto CAD version of plans and Word document of the specifications
- 6.6.1.3 Three (3) CDs of the electronic version of PDF's of the plans and specifications.

7.0 REFERENCES

Access at <http://apps.atlanta-airport.com/engineeringguidelines//index.asp>
for the following DOA/P&D Concessions Design Guidelines:

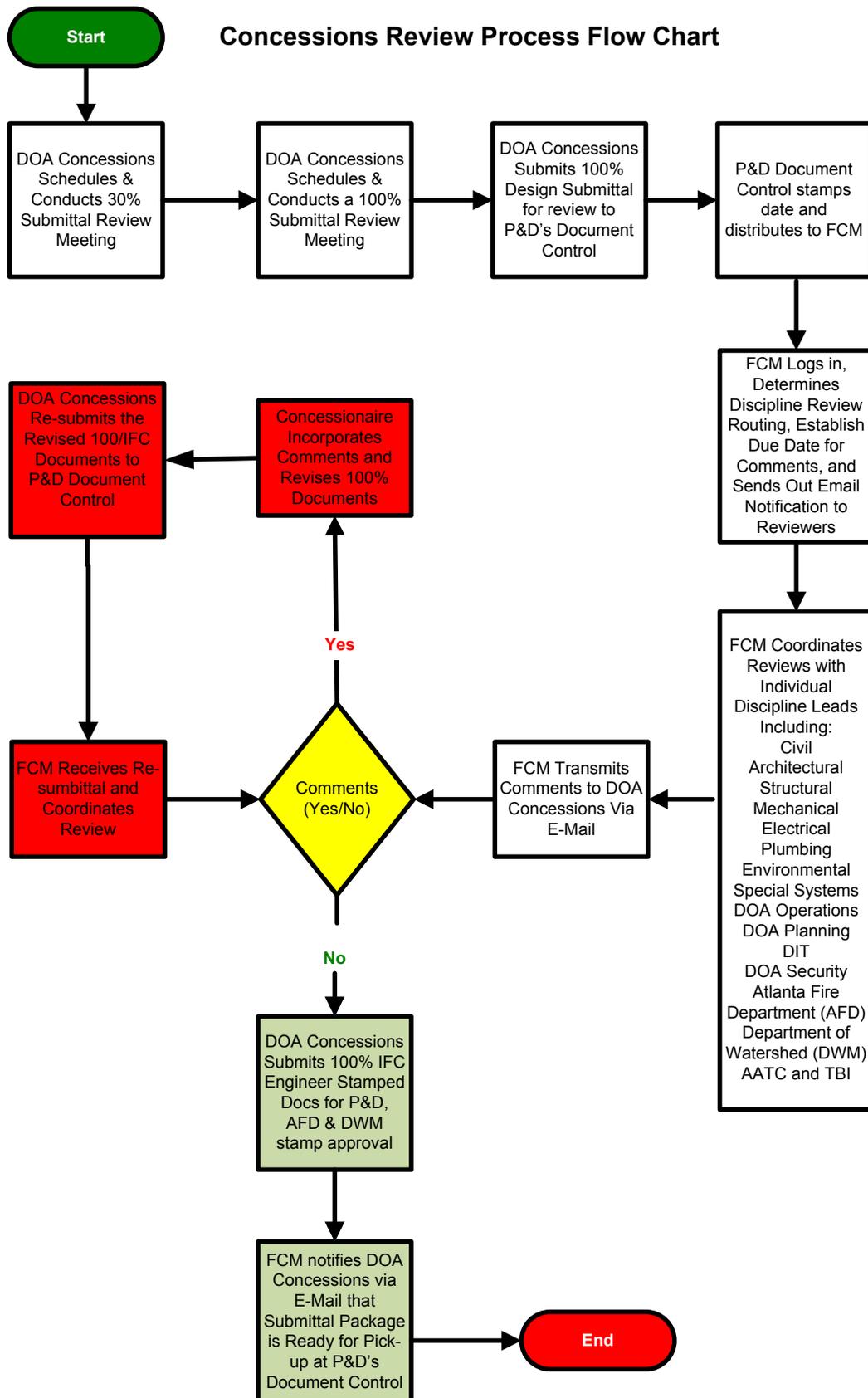
- 7.0.1 Concessions New Construction/Modifications Design Guidelines – Architectural
- 7.0.2 Concessions New Construction/Modifications Design Guidelines – Structural
- 7.0.3 Concessions New Construction/Modifications Design Guidelines – Electrical
- 7.0.4 Concessions New Construction/Modifications Design Guidelines – Mechanical
- 7.0.5 Concessions New Construction/Modifications Design Guidelines – Civil
- 7.0.6 Concessions New Construction/Modifications Design Guidelines – Grease Interceptors
- 7.0.7 Concession Kiosks – Permanent & Temporary Design Guidelines
- 7.0.8 Tenant Construction Guidelines

8.0 APPENDICES

Appendix A Concessions Review Process Flow Chart

APPENDIX A

Concessions Review Process Flow Chart



Hartsfield-Jackson Atlanta International Airport
City of Atlanta
Department of Aviation
Bureau of Planning & Development

Concessions New Construction/Modifications Design Guidelines – Architectural

03/28/2014	Revised for Concessions Work only
Last Revised Date	Description of Changes
Revisions	

Design Guidelines Architectural

Table of Contents

Section		Page
1.0	Purpose	3
2.0	General	3
2.0.1	Applicable Codes	3
2.0.2	Existing Space Requirements	3
2.0.2.1	Modifying Existing Structures	3
2.0.2.2	New Floor, Wall & Roof Penetrations	3
2.0.2.3	Repair of Existing Floor & Roof Penetrations.....	4
2.0.2.4	Demising Walls.....	4
2.0.2.5	Temporary Construction Walls.....	4
3.0	Design	4
3.0.1	General.....	4
3.0.2	Storefront Design	4
3.0.3	Storefront Design Control Zone	5
3.0.4	Storefront Signage.....	6
4.0	Attachments	6

Design Guidelines Architectural

1.0 Purpose

The purpose of this document is to outline the minimum Architectural requirements for New Construction and/or Modifications related to Concessions submitted projects at the City of Atlanta's Hartsfield-Jackson Atlanta International Airport (H-JAIA).

2.0 General

All design work shall be performed in accordance with generally accepted professional principles and practices for Architectural Design and in compliance with all applicable Department of Aviation (DOA) Design Guidelines, Federal, State and City of Atlanta Design Codes, Standards and Regulations.

2.0.1 Applicable Codes

The requirements of the following codes shall form the minimum criteria for architectural design projects at Hartsfield-Jackson Atlanta International Airport. Where there may be conflicting requirements in the cited codes, the most stringent provision, as determined by the airport's Planning and Development Division shall be applied.

- International Building Code, 2012 Edition, with Georgia Amendments (2013)
- International Fire Code, 2012 Edition, with Georgia Amendments (2013)
- International Plumbing Code, 2012 Edition, with Georgia Amendments (2013)
- International Mechanical Code, 2012 Edition, with Georgia Amendments (2012)
- International Fuel Gas Code, 2012 Edition, with Georgia Amendments (2013)
- National Electrical Code, 2011 Edition, with no Georgia Amendments
- 2012 NFPA 101 – Life Safety Code with state Amendments (2013)
- International Energy Conservation Code, 2009 Edition, with Georgia Supplements and Amendments (2011) (2012)

2.0.2 Existing Space Requirements

2.0.2.1 Modifying Existing Structures

- 2.0.2.1.1 Proposed space modifications shall comply with the DOA Architectural, Structural, Electrical and Mechanical Design Guidelines.

2.0.2.2 New Floor, Wall and Roof Penetrations

- 2.0.2.2.1 Proposed penetrations and/or openings for existing floors, walls and roofs shall comply with the DOA Structural Design Guidelines, Section 1.1.3.

2.0.2.3 Repair of Existing Floor and Roof Penetrations

2.0.2.3.1 Repair/filling of existing cores and/or openings for Concrete Floors, Concrete Floors on Steel Deck, Steel Deck Roof, Concrete on Steel Deck Roof and Concrete Deck Roof shall comply with Details No.1 through No. 5 (Attached as part of these guidelines)

2.0.2.4 Demising Walls

2.0.2.4.1 New demising walls between Concessions spaces shall be one (1) hour fire rated construction and shall extend to the underside of building structure.

2.0.2.5 Temporary Construction Walls

2.0.2.5.1 Temporary construction walls shall be full height (to underside of finished ceiling)

2.0.2.5.2 Walls shall be constructed of metal studs with gypsum wall board, on the public side, and be attached to the existing floor. The gypsum board shall be painted and shall include finished baseboard (Colors to be selected by Owner)

2.0.2.5.3 Any damage to existing base building finishes shall be repair by Concessionaire at no cost to the Owner.

2.0.2.6 Floor Waterproofing

2.0.2.6.1 At all Food Service Spaces, a waterproof membrane shall be installed prior to the finished floor. The waterproofing membrane shall be continued to six inches (6") high at all perimeter walls and sealed.

3.0 Design

3.0.1 General

3.0.1.1 The design of Concession spaces shall utilize a dynamic, progressive modern architecture

3.0.1.2 The use of materials at the Storefronts shall provide continuity between the Concession design elements and the existing base building architectural elements

3.0.1.3 Designers shall incorporate good design practices including, but not limited to:

- Sustainable design
- Adaptability
- Healthy design (Air Quality)
- Utilize materials native to the region when possible
- Utilize materials that are permanent, high quality and durable
- Design for energy efficiency

3.0.1.4 Concept Design shall be review and approve by DOA before proceeding with Design Development.

3.0.2 Storefront Design

- 3.0.2.1 The existing base building soffit band height at the Domestic Terminal, Concourses and International Terminal shall be maintained.
- 3.0.2.2 Existing base building columns inside, adjacent to and/or in front of a concession space shall be maintained.
- 3.0.2.3 Existing base building finishes outside a concessions lease line (Horizontal and Vertical) shall be maintained.
- 3.0.2.4 No element of a proposed storefront design shall extend beyond the approved lease line (Except for blade signs which must comply with DOA Signage Guidelines).
- 3.0.2.5 Concession design affecting adjacent Airline Hold Room spaces shall be reviewed and approved by DOA Concessions, DOA Properties and the Airline Tenant.
- 3.0.2.6 Security storefront closures shall be open mesh rolling side-mounted or overhead-mounted grilles. Grill housings and rails shall be recessed and concealed from public view.

3.0.3 Storefront Design Control Zone

- 3.0.3.1 The Design Control Zone elements include floor, wall & ceiling finishes, displays, fixtures, lighting, menu boards, counter casework and identity graphics.
- 3.0.3.2 The Design Control elements shall not obstruct visibility into the Retail/Food Service space.
- 3.0.3.3 The design control zone for Retail Spaces shall be the area from the front lease line to a point five feet (5 ft.) inside the Retail space.
- 3.0.3.4 The design control zone for Food Service Spaces shall be the area from the front lease line to a point ten feet (10 ft.) inside the food Service space.
- 3.0.3.5 All materials and finishes used within the Design Control Zone shall be of high quality and shall be review and approved by DOA.
- 3.0.3.6 Use of the following materials within the Design Control Zone shall not be permitted:
 - Simulated brick, stone wood or replication of other natural materials
 - Plastic Laminates (never as a countertop)
 - Multi-colored wall coverings
 - Textured paint and/or stucco
 - Carpet or fabric
 - Rough Cut Lumber
 - Mirrored finishes
 - Fabric covered panels as display backdrops
- 3.0.3.7 Ceilings within the Design Control Zone shall be painted gypsum board.

- 3.0.3.8 No wall partitions shall cross the Design Control Zone.
- 3.0.3.9 Concession's floor finishes shall be level with the existing abutting base building public area floor. Floor finishes shall be of high quality materials and shall be reviewed and approved by DOA
- 3.0.3.10 Lighting within the Design Control Zone shall not be less than 90-foot candles.

3.0.4 Storefront Signage

- 3.0.4.1 Concessions Signage shall be of the best quality and shall be compatible with adjacent storefronts.
- 3.0.4.2 One horizontal sign and one blade sign per storefront as a primary business identity shall be allowed. These signs shall be limited to trade name and logo/symbol only.
- 3.0.4.3 The total horizontal sign area shall not exceed a square foot area equaling 10% of the total storefront square footage. Trade name and Logo/Symbol shall fit within the total square footage of the allowable sign area.
- 3.0.4.4 The blade sign shall not project more than 36" from the soffit and shall not exceed 20" H x 26" W. Circular blade signs shall not exceed 24" in diameter. Blade signs shall maintain a minimum 8 ft. from AFF to bottom of sign.
- 3.0.4.5 Signage shall be Underwriter Laboratory approved.
- 3.0.4.6 Signage raceways, ballasts and transformers shall not be exposed to public view.
- 3.0.4.7 Signage shall be installed on the soffit band and shall maintain a minimum 8 ft. from AFF to bottom of sign.
- 3.0.4.8 Pin mounted, rear-lit channel or halo-reversed lit channel letters illuminated with neon two inches (2") away from background plane of the soffit band shall be used.
- 3.0.4.9 Neon-formed letter tubing and/or logos shall not be permitted.
- 3.0.4.10 Signage shall not have and/or use the following:
 - Moving or flashing lights
 - Surface mounted light boxes or cabinets
 - Hand lettered signs of any type
 - Freestanding floor signs either within the Design Control Zone or outside the Concessions lease Line
- 3.0.4.11 Menu Boards shall not be allowed within the Design Control Zone.

4.0 Attachments

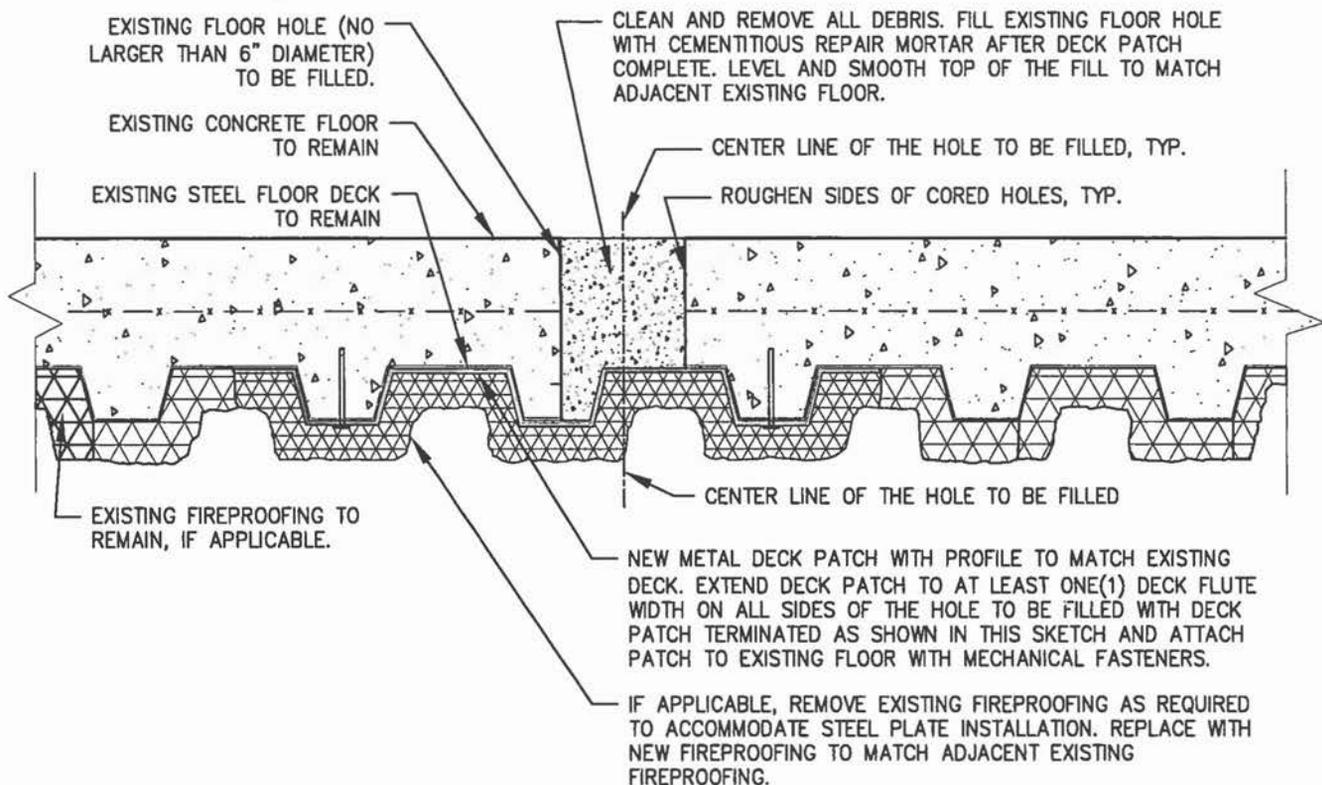
- | | | |
|-------|-------------|-------------------------------------|
| 4.0.1 | Detail No.1 | Concrete on Steel Deck Floor Repair |
| 4.0.2 | Detail No.2 | Concrete Floor Repair |
| 4.0.3 | Detail No.3 | Steel Deck Roof Repair |
| 4.0.4 | Detail No.4 | Concrete on Steel Deck Roof Repair |
| 4.0.5 | Detail No.5 | Concrete Deck Roof Repair |

Requirements for Filling Penetrations in Existing Elevated Concrete Slabs

Proposed filling of cores or openings in existing elevated concrete slabs shall be evaluated by a Georgia registered structural design professional, who shall provide stamped requirements in the construction documents whenever either:

1. The clear spacing of adjacent cores or openings will be less than 3 inches; or
2. The core or opening is proposed for a concrete floor reinforced with prestressed reinforcement; or
3. The greatest dimension for the opening or core proposed exceeds 6 inches.

Cores or openings in concrete slabs, for which none of the above restrictions are applicable, shall be reinstated with a cementitious repair mortar in accordance with the manufacturer's written instructions for preparation, mixing, placement, finishing and curing. Also, see detail below for more information.



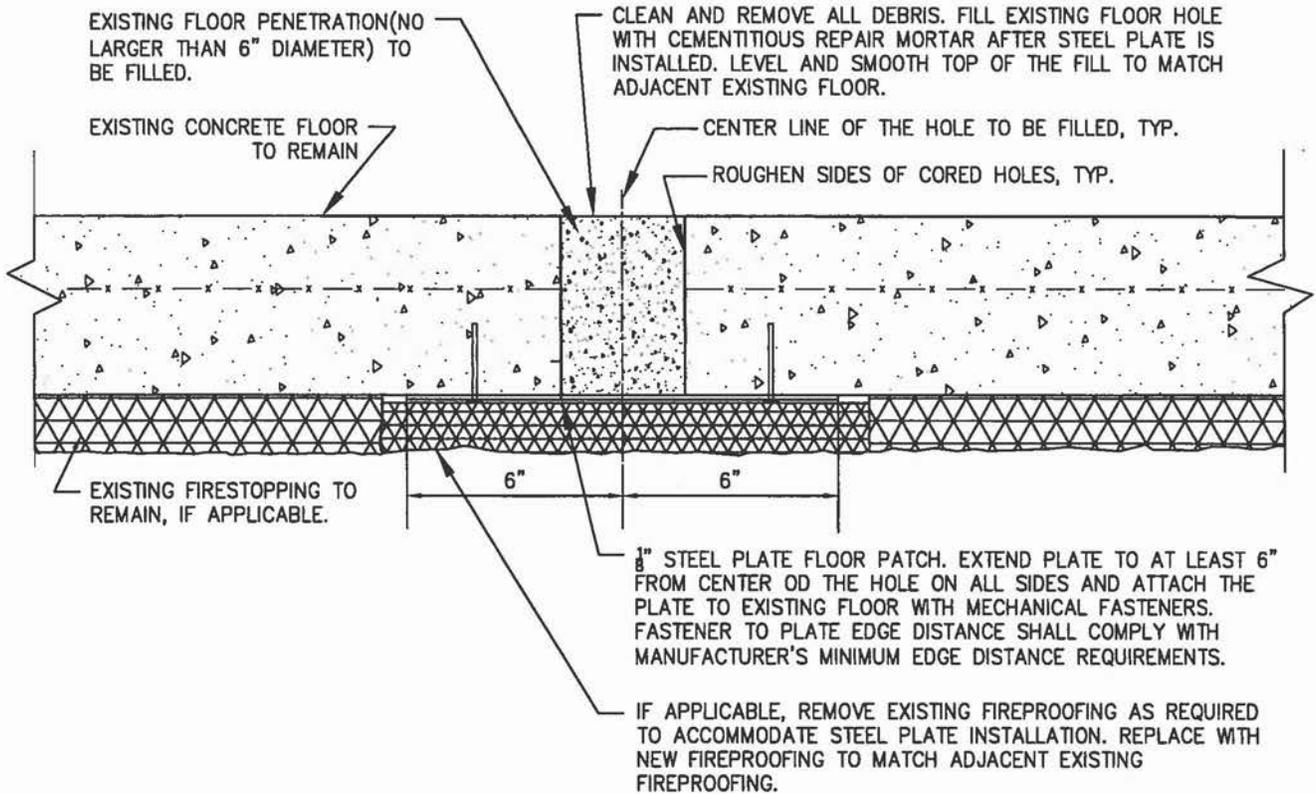
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DRAWING NAME: CONCRETE ON STEEL DECK FLOOR REPAIR			1
REVISIONS	DESCRIPTION OF REVISION	DRAWN BY: CM DESIGNED BY: CM CHECKED BY: CHECK CONTRACT: NONE WBS: NONE SCALE: NTS DATE: 08/20/2013	REFERENCE DWG. NO.
No.			NONE
No.			
No.			
No.			

Requirements for Filling Penetrations in Existing Elevated Concrete Slabs

Proposed filling of cores or openings in existing elevated concrete slabs shall be evaluated by a Georgia registered structural design professional, who shall provide stamped requirements in the construction documents whenever either:

1. The clear spacing of adjacent cores or openings will be less than 3 inches; or
2. The core or opening is proposed for a concrete floor reinforced with prestressed reinforcement; or
3. The greatest dimension for the opening or core proposed exceeds 6 inches.

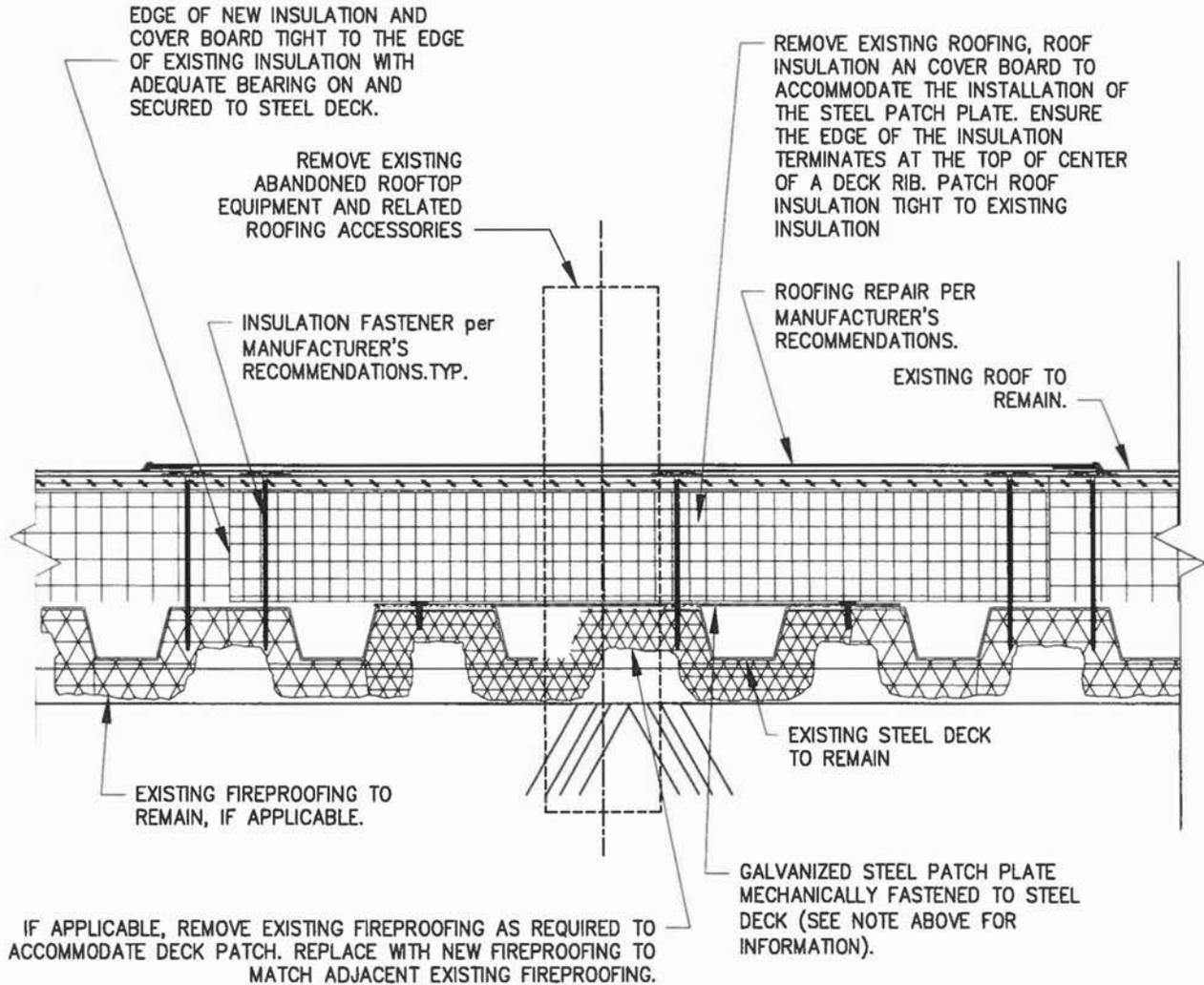
Cores or openings in concrete slabs, for which none of the above restrictions are applicable, shall be reinstated with a cementitious repair mortar in accordance with the manufacturer's written instructions for preparation, mixing, placement, finishing and curing. Also, see detail below for more information.



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DRAWING NAME: CONCRETE FLOOR REPAIR			2
REVISIONS	DESCRIPTION OF REVISION	DRAWN BY: CM	REFERENCE DWG. NO.
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No.		CHECKED BY: CHECK	
No.		CONTRACT: NONE	
No.		WBS: NONE	
No.		SCALE: NTS	
		DATE: 08/20/2013	

Requirements for Patching Steel Roof Decks

Repairing a steel deck hole or dent, no larger than 13", with a 0.057" galvanized steel plate and extending the plate to at least one (1) adjacent rib (see sketch below). For holes or dents greater than 13" or holes closer than 3", a structural frame Designed by a Georgia Registered Structural Design Professional is required.



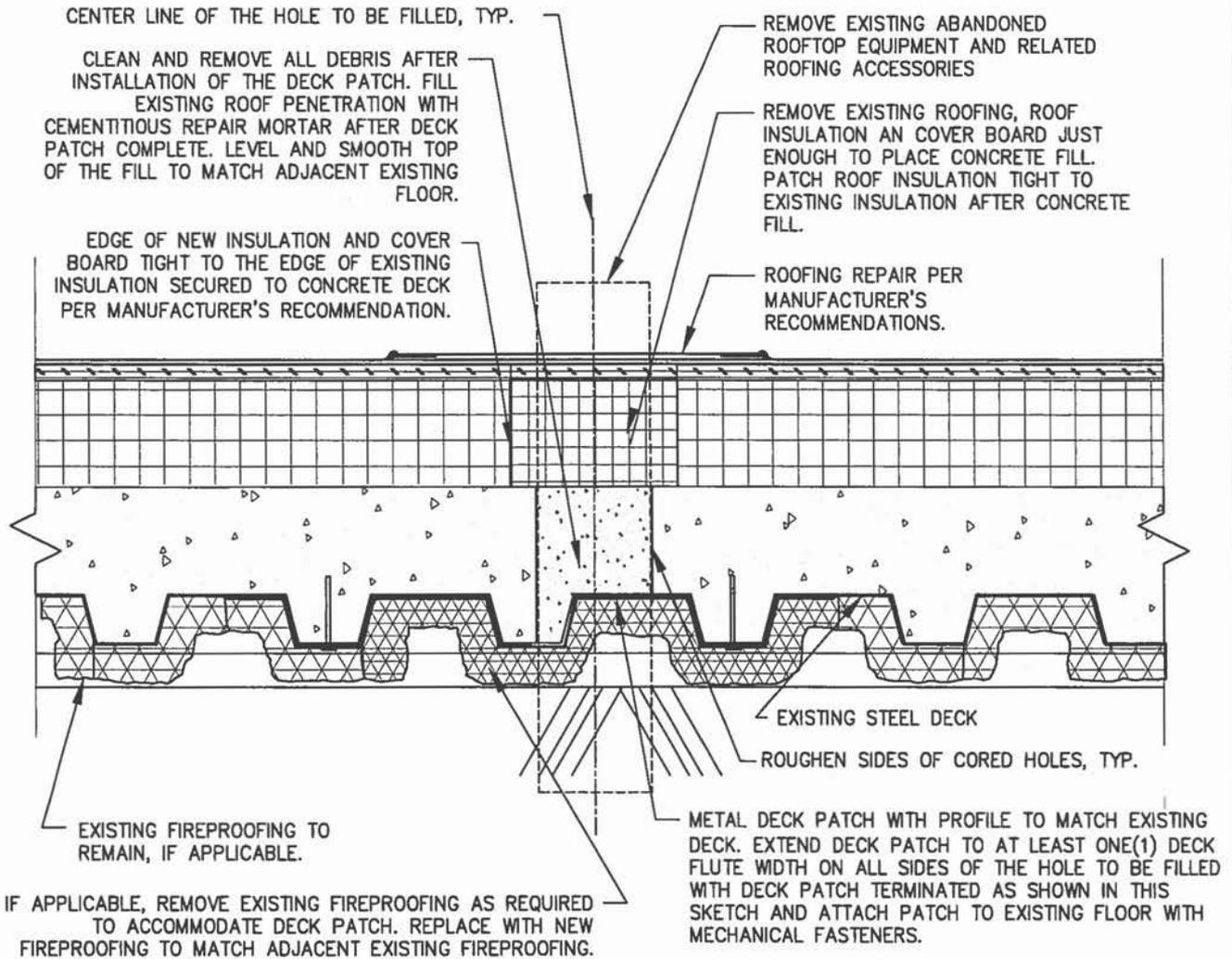
PROJECT: EXISTING ROOF PENETRATION REPAIR FOR OPENING 13" OR LESS			SKETCH NO.
DRAWING NAME: STEEL DECK ROOF REPAIR			3
REVISIONS	DESCRIPTION OF REVISION	DRAWN BY: CM DESIGNED BY: CM CHECKED BY: CHECK CONTRACT: NONE WBS: NONE SCALE: NTS DATE: 08/20/2013	REFERENCE DWG. NO.
No.			NONE
No.			
No.			
No.			

Requirements for Filling Penetrations in Existing Concrete Roof Deck

Proposed filling of openings in existing concrete roof deck shall be evaluated by a Georgia registered structural design professional, who shall provide stamped requirements in the construction documents whenever either:

1. The clear spacing of adjacent openings is less than 3 inches; or
2. The greatest dimension for the opening exceeds 6 inches.

Openings in concrete roof deck for which none of the above restrictions are applicable shall be reinstated with a cementitious repair mortar in accordance with the manufacturer's written instructions for preparation, mixing, placement, finishing and curing. Also, see detail below for more information.



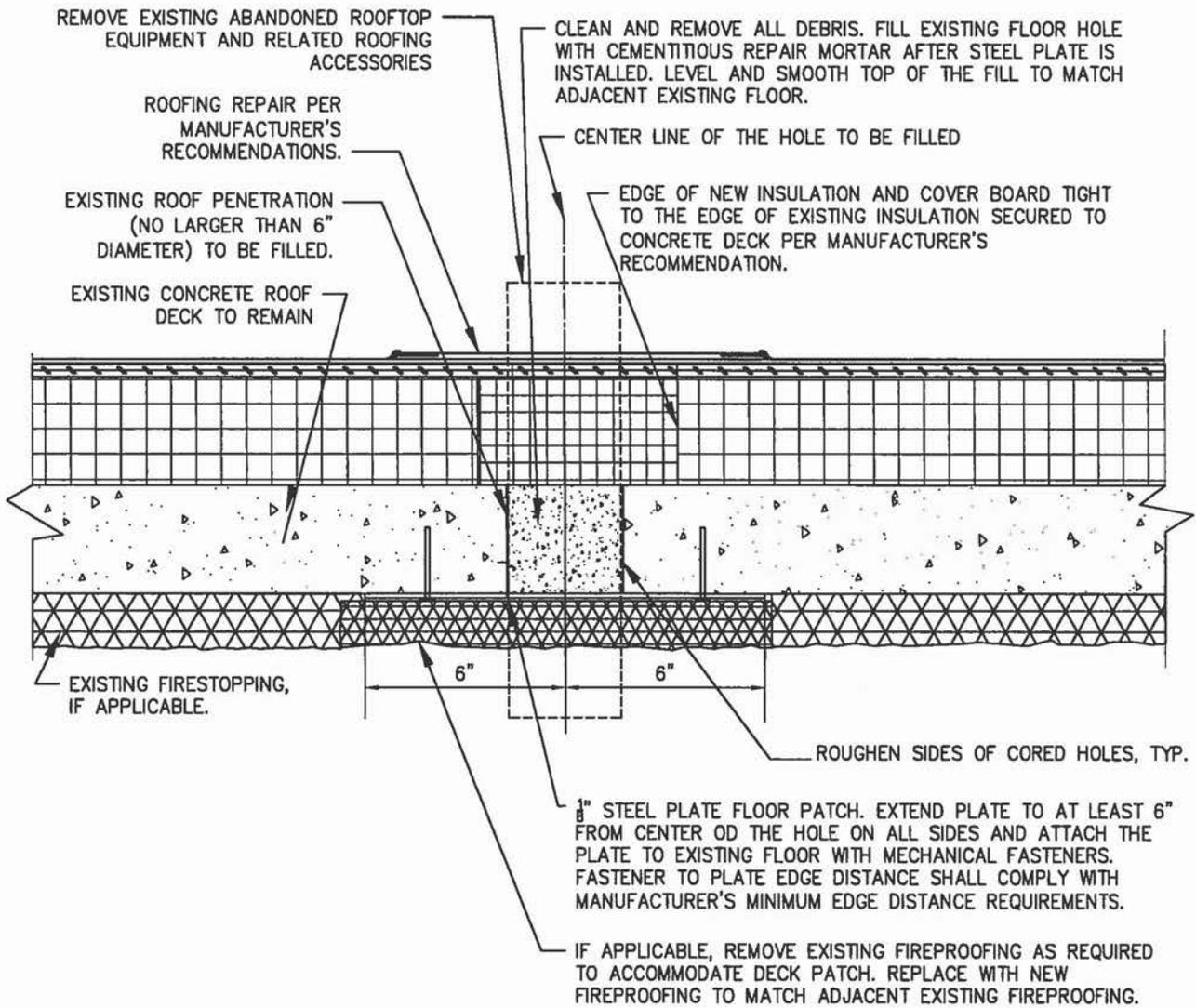
PROJECT: EXISTING ROOF PENETRATION REPAIR FOR OPENING 6" OR LESS			SKETCH NO.
DRAWING NAME: CONCRETE ON STEEL DECK ROOF REPAIR			4
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No.			NONE
No.			

Requirements for Filling Penetrations in Existing Concrete Roof Deck

Proposed filling of openings in existing concrete roof deck shall be evaluated by a Georgia registered structural design professional, who shall provide stamped requirements in the construction documents whenever either:

1. The clear spacing of adjacent openings is less than 3 inches; or
2. The greatest dimension for the opening exceeds 6 inches.

Openings in concrete roof deck for which none of the above restrictions are applicable shall be reinstated with a cementitious repair mortar in accordance with the manufacturer's written instructions for preparation, mixing, placement, finishing and curing. Also, see detail below for more information.



PROJECT: EXISTING ROOF PENETRATION REPAIR FOR OPENING 6" OR LESS			SKETCH NO.
DRAWING NAME: CONCRETE DECK ROOF REPAIR			5
REVISIONS	DESCRIPTION OF REVISION	DRAWN BY: CM	REFERENCE DWG. NO.
No.		DESIGNED BY: CM	
No.		CHECKED BY: CHECK	NONE
No.		CONTRACT: NONE	
No.		WBS: NONE	
No.		SCALE: NTS	
No.		DATE: 08/20/2013	

Hartsfield-Jackson Atlanta International Airport
City of Atlanta
Department of Aviation
Bureau of Planning & Development

Concessions New Construction/Modifications Design Guidelines – Civil

03/28/2014	Revised for Concessions Work only
Last Revised Date	Description of Changes
Revisions	

Design Guidelines Civil

Table of Contents

Section	Page
1.0 Purpose	Error! Bookmark not defined.
1.1 General	Error! Bookmark not defined.
1.1.1 DOA/P&D Civil Design Standards.....	1
1.1.2 DOA/P&D Civil Design Specifications.....	1

Design Guidelines Civil

1.0 Purpose

The purpose of this document is to provide the Concessionaire/Designer of Record with the Civil design detail standards and specifications that shall be used for any new construction and/or modification concessions project on the airport's aircraft ramps.

1.1 General

All design work shall be performed in accordance with generally accepted professional principles and practices for civil engineering and in compliance with all applicable Federal, State and City of Atlanta Design Codes, Standards and Regulations and the following DOA/P&D Civil Design Standards and Specifications:

1.1.1 DOA/P&D Civil Design Standards (Attached)

- 1.1.1.1 Sheet No. CON-01-100 Bollard Detail
- 1.1.1.2 Sheet No. CON-01-200 Full Depth Pavement Replacement Details-1
- 1.1.1.3 Sheet No. CON-01-201 Full Depth Pavement Replacement Details-2
- 1.1.1.4 Sheet No. CON-01-300 Full Depth Pavement Replacement Details
- 1.1.1.5 Sheet No. CON-01-400 Pavement Detail at Utility Slab (For Manholes in Apron Pavement)
- 1.1.1.6 Sheet No. CON-01-500 Typical Grease Interceptor Installation (Top of Interceptor Flush with Pavement Surface Designed for Tug Loading) – Case 1
- 1.1.1.7 Sheet No. CON-01-501 Below Pavement Grease Interceptor Details (Interceptor Not Designed for Tug Loading) Case 2
- 1.1.1.8 Sheet No. CON-01-502 Below Pavement Grease Interceptor Details (Interceptor Not Designed for Tug Loading) Case 3
- 1.1.1.9 Sheet No. CON-01-600 Utility Slab Detail for Interceptor Below Pavement
- 1.1.1.10 Sheet No. CON-01-700 Pipe Details
- 1.1.1.11 Sheet No. CON-01-800 Underdrain Details for Repairs

1.1.2 DOA/P&D Civil Design Specifications (Attached)

- 1.1.2.1 Section 02085 Interceptors
- 1.1.2.2 Section D-705 Pipe for Underdrains
- 1.1.2.3 Section D-750 Sanitary Sewers
- 1.1.2.4 Section P-501 Portland Cement Concrete Pavement
- 1.1.2.5 Section P-504 High Early Strength Cement Concrete Pavement
- 1.1.2.6 Section P-605 Joint Sealing Filler
- 1.1.2.7 Section P-615 Site Concrete
- 1.1.2.8 Section P-621 Pavement Markings and Marking Removal
- 1.1.2.9 Section P-660 Concrete Filled Steel Guard Post



CITY OF ATLANTA, GEORGIA



DEPARTMENT OF AVIATION
PLANNING & DEVELOPMENT

FULL DEPTH PAVEMENT
REPLACEMENT DETAILS - 1

ISSUE FOR STANDARD

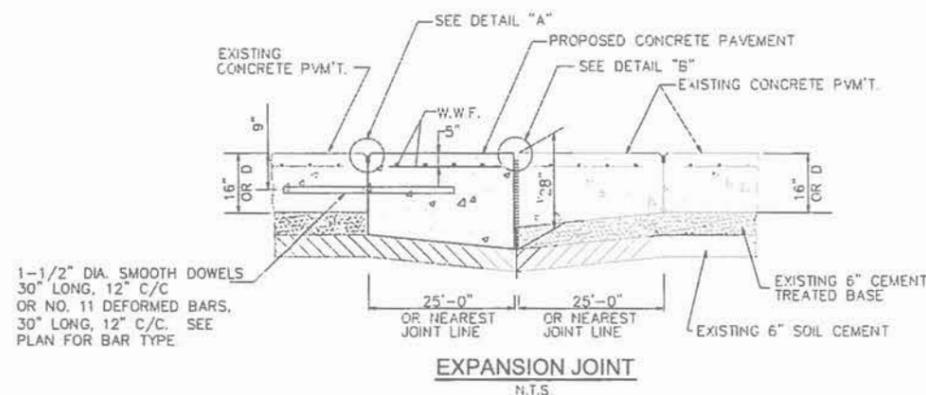
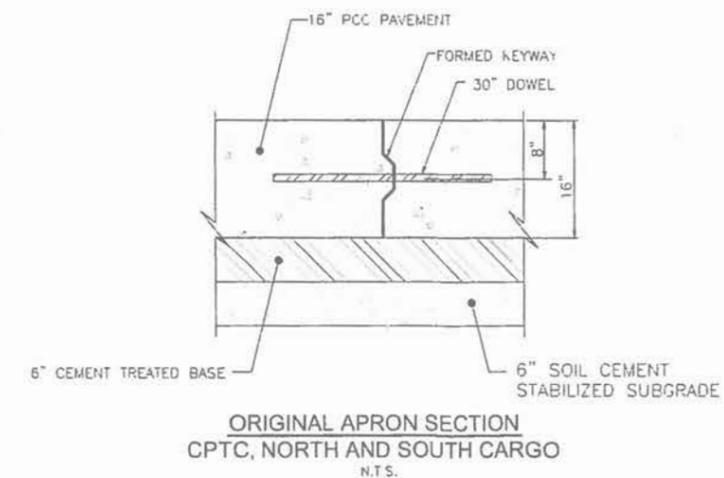
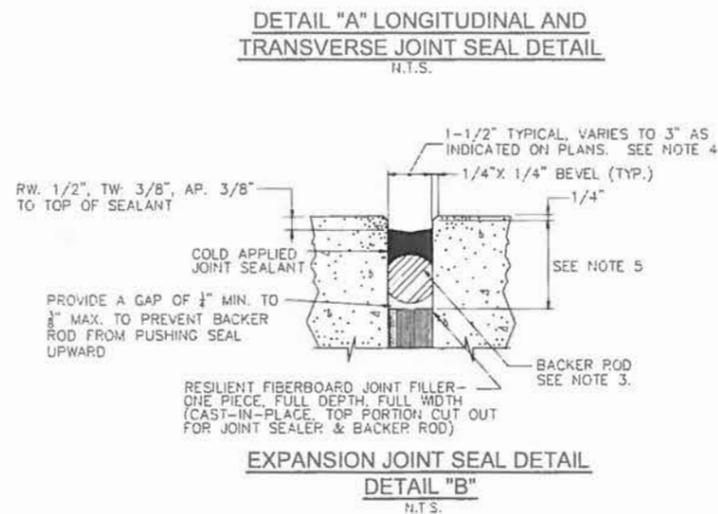
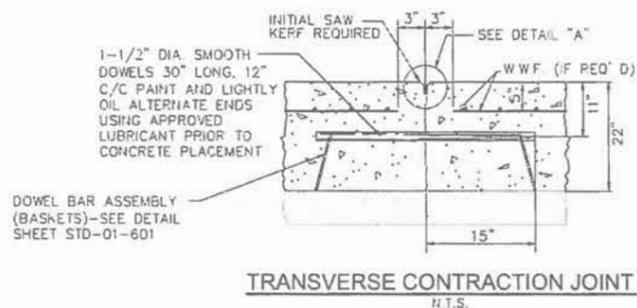
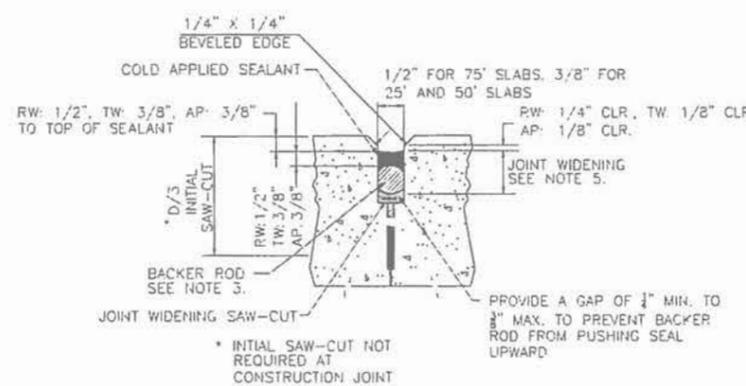
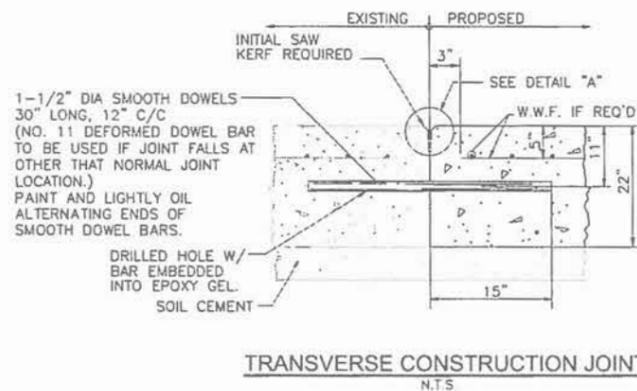
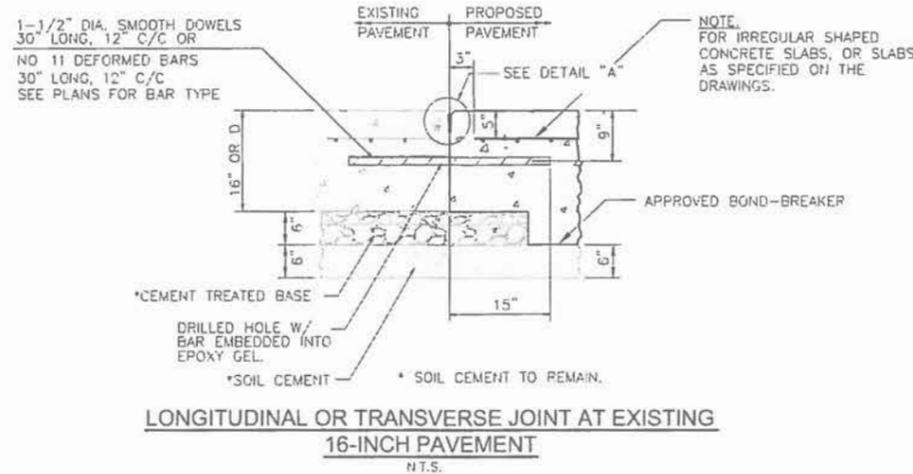
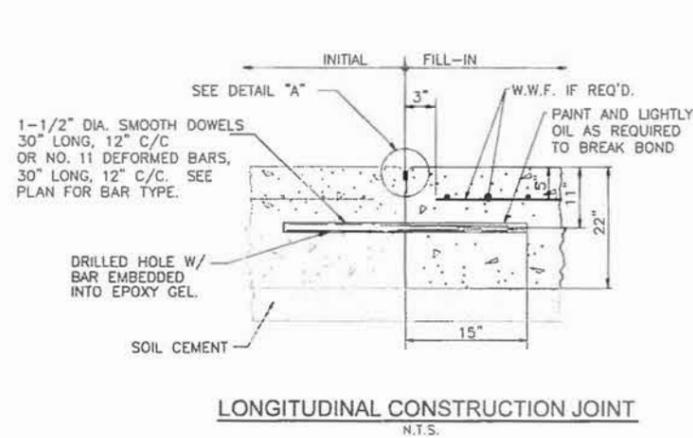
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FC NUMBER:	DESIGNED BY: STAFF
CONSULTANT PROJECT NUMBER N/A	CHECKED BY: STAFF
STANDARD SHEET NUMBER CON-01-200	APPROVED BY: STAFF
DATE: FEBRUARY 2014	
SCALE:	
SHEET NO.:	

NOTES FOR DOWEL AND TIE BAR HOLE DRILLING
AND INSTALLATION:

- DRILLING AND INSTALLATION METHOD SHALL BE CAPABLE OF MAINTAINING DRILL HOLES AND EMBEDDED BARS: (A) PARALLEL TO THE CONCRETE SURFACE, AND (B) NORMAL TO THE JOINT LINE, WITHIN 1/4" AT THE END OF THE DOWEL OR TIE BAR EXCEPT WHERE SPECIFIED OTHERWISE. DRILL HOLES SHALL BE ACCURATELY LAID OUT SO THAT THE MAXIMUM DEVIATION DOES NOT EXCEED 1". DRILL HOLE DIAMETER TO BE APPROXIMATELY 1/8" CLEAR OF BAR ALL AROUND.
- AFTER THE DRILLING IS COMPLETE AND PRIOR TO INSTALLATION OF THE DOWEL OR TIE BARS, THE HOLES SHALL BE THOROUGHLY CLEANED TO REMOVE DRILLING DUST, CONCRETE CHIPS, AND ANY MATERIAL DETRIMENTAL TO BONDING.
- EPOXY GEL SHALL BE APPLIED TO THE DOWEL AND SUFFICIENT GEL INJECTED IN THE BACK OF THE TIE BAR HOLE BY A MECHANICAL MIXING/PUMP DEVICE, SO THAT A SLIGHT AMOUNT OF GEL WILL BE FORCED OUT WHEN THE DOWEL OR TIE BAR IS INSERTED AND TAPPED TO THE CORRECT POSITION IT WILL BE NECESSARY TO TWIST THE BAR BACK AND FORTH SEVERAL TIMES TO ELIMINATE THE AIR ENTRAPPED IN THE HOLE. SMALL WEDGES MAY BE USED TO SUPPORT THE DOWEL OR TIE BAR IN CORRECT ALIGNMENT UNTIL THE GEL HARDENS.
- EPOXY SHALL MEET THE GEORGIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATION, SECTION 886 FOR TYPE VIII EPOXY GEL.

NOTES:

- LONGITUDINAL AND TRANSVERSE JOINTS SHALL BE SAWED AS INDICATED
- TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED ONLY WHEN APPROVED BY THE ENGINEER.
- FOR ALL JOINTS THE BACKER ROD MATERIAL SHALL BE COMPATIBLE WITH THE COLD POURED SEALANT AND SLIGHTLY OVERSIZED TO PREVENT MOVEMENT DURING THE JOINT SEALANT OPERATION.
- THE WIDTH OF THE JOINTS SHALL BE CORRECTED FOR 68° F.
- JOINT CONFIGURATION SHALL MEET JOINT SEAL MANUFACTURER'S SPECIFICATIONS, EXCEPT AS NOTED ON PLANS AND IN SPECIFICATIONS.
- WELDED WIRE REINFORCING SHALL BE 6X6 D6/D6 ALL REINFORCING STEEL SHALL BE DELIVERED IN FLAT SHEETS. NO ROLL STOCK WILL BE ACCEPTABLE.



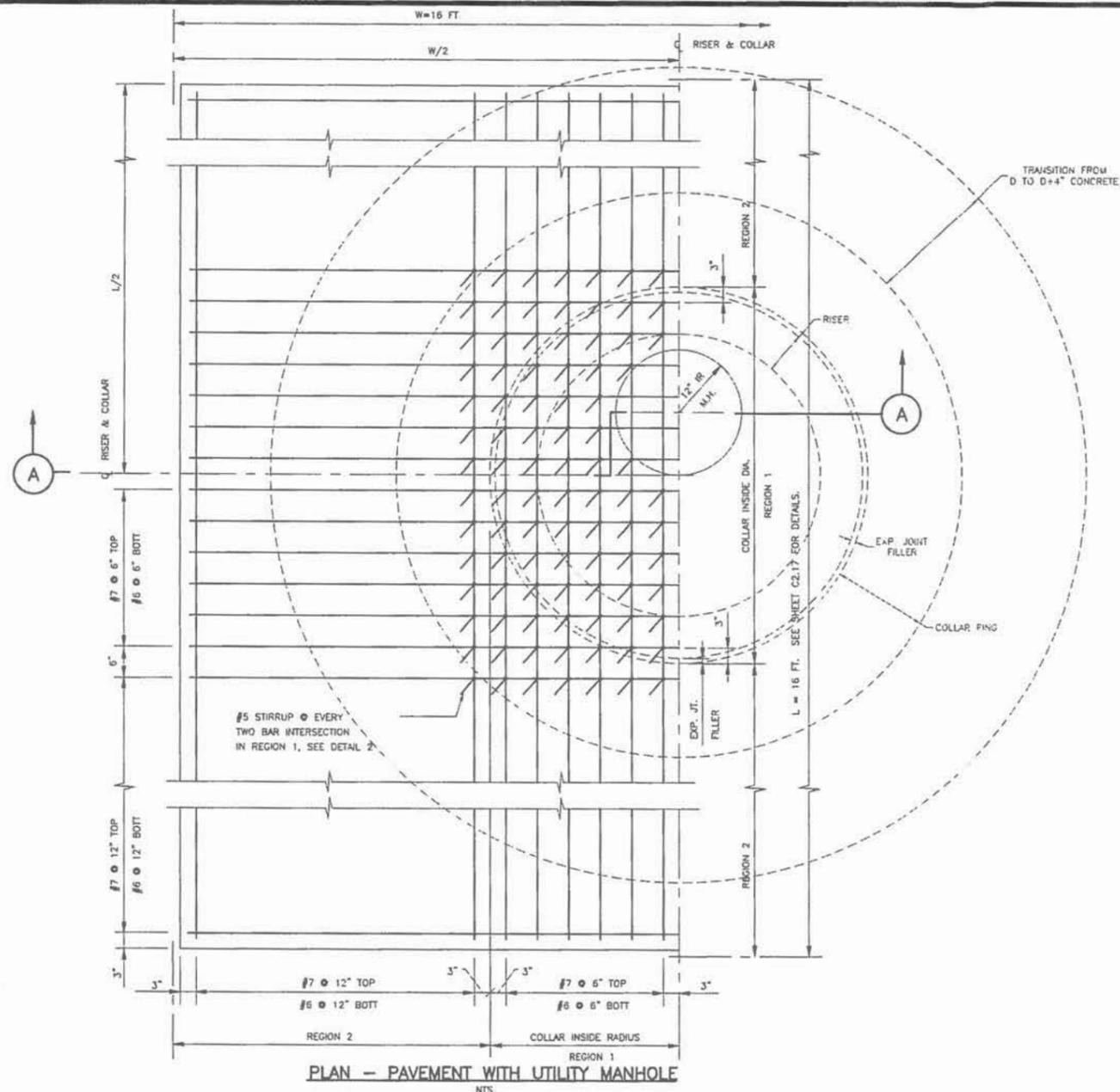


CITY OF ATLANTA, GEORGIA

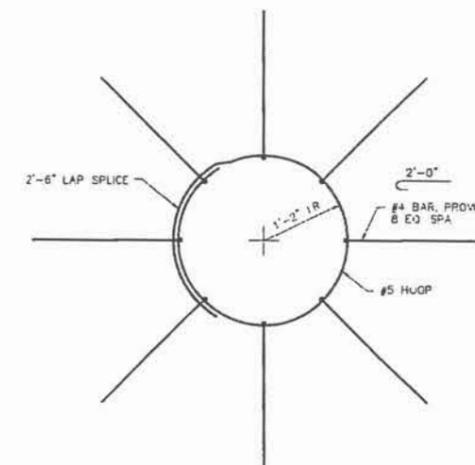


DEPARTMENT OF AVIATION
PLANNING & DEVELOPMENT

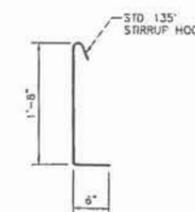
CONCESSIONS DETAILS, ISSUE FOR STANDARD, FEBRUARY 2014



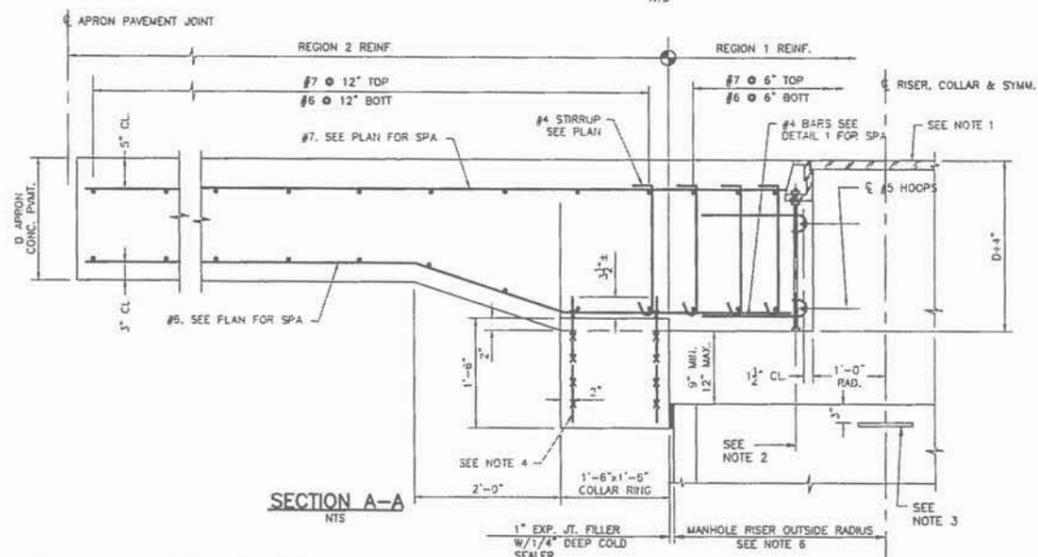
PLAN - PAVEMENT WITH UTILITY MANHOLE
N.T.S.



DETAIL 1
N.T.S.



DETAIL 2
N.T.S.



SECTION A-A
N.T.S.

NOTES FOR APRON PAVEMENT WITH M.H.

1. NEENAH MANHOLE FRAME AND LID (R-3492), OR EQUAL LID TO BE CAPABLE OF WITHSTANDING REPEATED LOADING OF 240 PSI OVER ENTIRE AREA, BOLTED AND GASKET SEALED, 1.0 VENT HOLES, WITH 2 PICK HOLES.
2. OPTIONAL LEVELING BOLTS (3/4"Ø) TO BE PLACED ON FORMS FOR BOTTOM OF PAVEMENT (8 PER FRAME.)
3. STANDARD STEPS SPACED 16" O.C. SHALL BE CAST IRON NEENAH PATTERN NO. R-1980-C, OR EQUAL.
4. COLLAR RING WELDED WIRE REINFORCING SHALL BE W6Ø6 x W2.9 IN EACH FACE.
5. REINFORCING STEEL SHOWN IN PLAN IS SYMMETRICAL IN BOTH DIRECTIONS ABOUT CENTERLINE RISER AND COLLAR FIELD CUT REINFORCING AT MANHOLE SUCH THAT TOP REINFORCING CLEARS FRAME BY 1" AND BOTTOM REINFORCING CLEARS THE 2'-0" OPENING BY 2" INSTALL ADDITIONAL REINFORCING AT MANHOLE IN ACCORDANCE WITH DETAIL 1.
6. STANDARD PRECAST MANHOLE IN ACCORDANCE WITH ASTM C-47B.

PAVEMENT DETAIL AT UTILITY SLAB
(FOR MANHOLES IN APRON PAVEMENT)

ISSUE FOR STANDARD

WBS NUMBER	DRAWN BY: STAFF
FC NUMBER	DESIGNED BY: STAFF
CONSULTANT PROJECT NUMBER N/A	CHECKED BY: STAFF
STANDARD SHEET NUMBER CON-01-400	APPROVED BY: STAFF

DATE
FEBRUARY 2014

SCALE

SHEET NO.

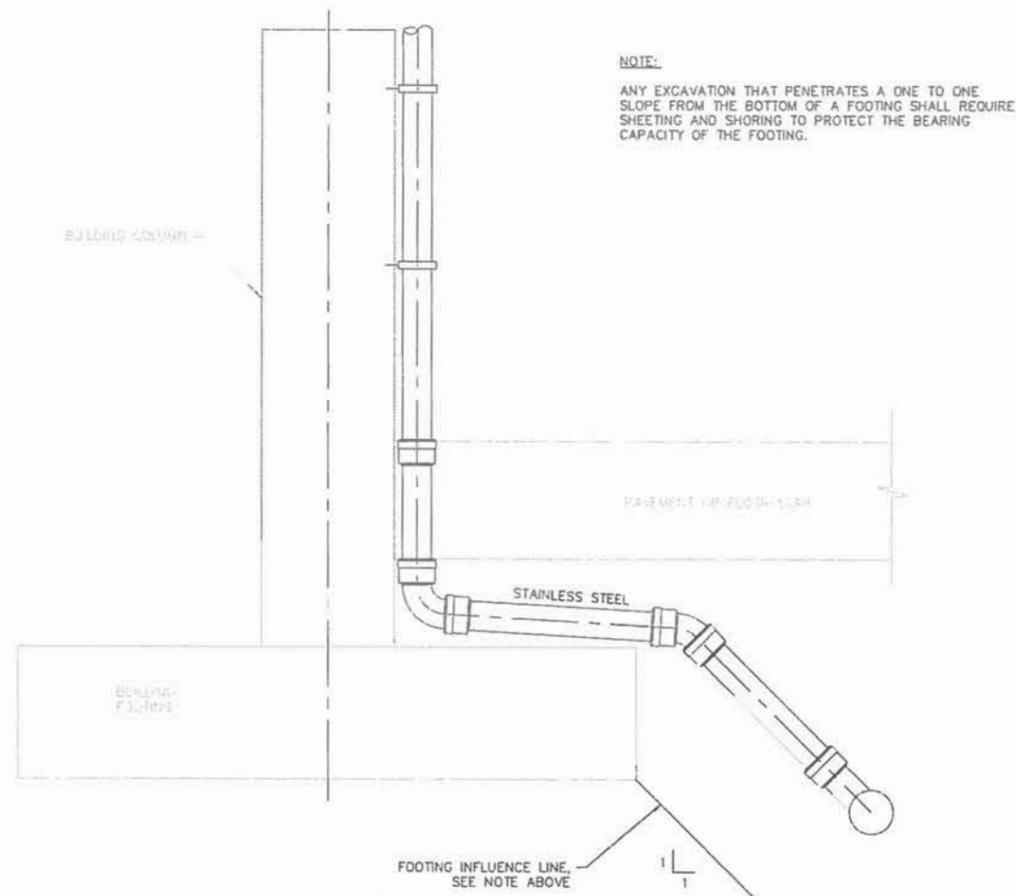


CITY OF ATLANTA, GEORGIA

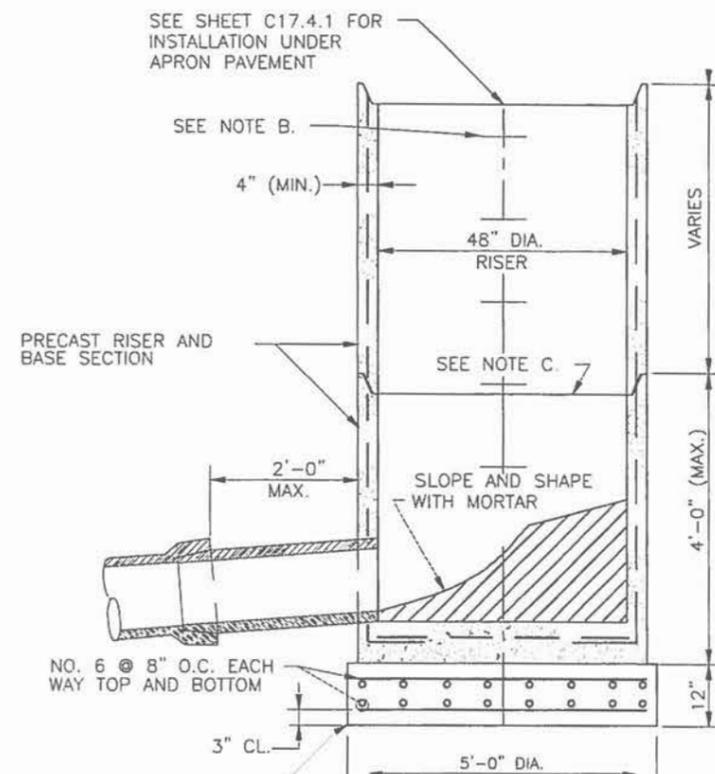


DEPARTMENT OF AVIATION
PLANNING & DEVELOPMENT

CONCESSIONS DETAILS, ISSUE FOR STANDARD, FEBRUARY 2014



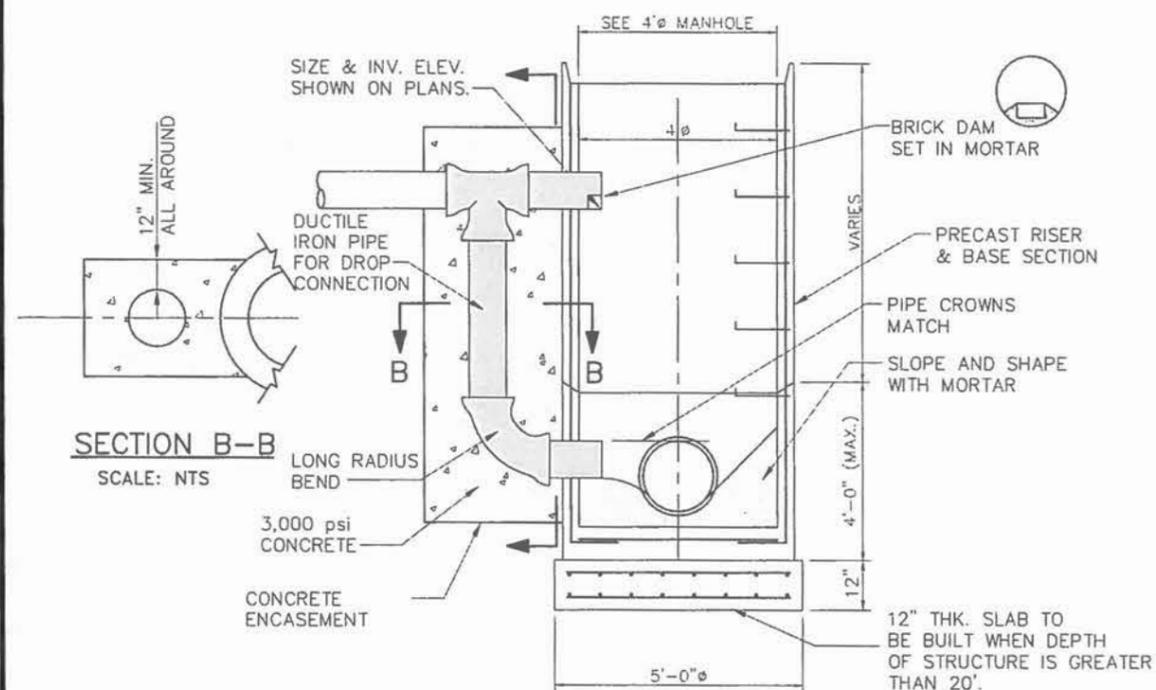
**TYPICAL SECTION
PIPE INSTALLATION AT FOOTINGS**
N.T.S.



**4' DIAMETER MANHOLE
FOR SANITARY SEWER
IN APRON PAVEMENT**
SCALE: NTS

NOTES

- A. 4" PRECAST CONCRETE ADJUSTMENT RINGS AS REQUIRED, WITH A MAXIMUM OF TWO RINGS PER MANHOLE. RINGS TO BE FURNISHED WITH 1" DIAMETER HOLES AT 180° FOR FRAME DOWELS.
- B. STANDARD STEPS SPACED AT 16" O.C. SHALL BE CAST IRON.
- C. JOINTS BETWEEN ALL PRECAST MANHOLE COMPONENTS SHALL BE FUEL RESISTANT O-RING.
- D. HEAVY DUTY MANHOLE FRAME AND COVER WITH NO. 4 STEEL DOWELS BEDDED IN STIFF MORTAR.
- E. ALL PRECAST BASE SECTIONS MUST BE FOUNDED ON A COMPACTED LAYER OF NO. 89 COARSE AGGREGATE AT LEAST 18" THICK.
- F. PRECAST MANHOLE RISERS AND BASE SHALL CONFORM TO THE PROVISIONS OF ASTM C-478.



**4' DIAMETER DROP CONNECTION MANHOLE
FOR SANITARY SEWER**
SCALE: NTS

NO.	DATE	BY	REVISION

PIPE DETAILS

ISSUE FOR STANDARD	
WBS NUMBER	DRAWN BY: STAFF
FC NUMBER	DESIGNED BY: STAFF
CONSULTANT PROJECT NUMBER N/A	CHECKED BY: STAFF
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SECTION 02085 INTERCEPTORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections 01400 and 01600, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following types of interceptors outside the building:
 - 1. Grease interceptors.
 - 2. Oil interceptors.
 - 3. Sand interceptors.

1.03 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.
- B. HDPE: High-density polyethylene plastic.
- C. PE: Polyethylene plastic.
- D. PP: Polypropylene plastic.

1.04 SUBMITTALS

- A. Product Data: For each type of metal and plastic interceptor indicated. Include materials of fabrication, dimensions, rated capacities, retention capacities, operating characteristics, size and location of each pipe connection, furnished specialties, and accessories.
- B. Shop Drawings: For each type and size of cast-in-place-concrete interceptor indicated.
 - 1. Include materials of construction, dimensions, rated capacities, retention capacities, location and size of each pipe connection, furnished specialties, and accessories.
 - 2. Include reports and calculations for design mixes of concrete.
- C. Shop Drawings: For each type and size of precast concrete interceptor indicated.
 - 1. Include materials of construction, dimensions, rated capacities, retention capacities, location and size of each pipe connection, furnished specialties, and accessories.
- D. Coordination Drawings: Interceptors, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Interceptors.
 - 2. Piping connections. Include size, location, and elevation of each.
 - 3. Interface with underground structures and utility services.

1.05 PROJECT CONDITIONS

- A. Interruption of Existing Sewer Services: Do not interrupt services to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sewer services according to requirements indicated:
1. Notify ENGINEER no fewer than five (5) days in advance of proposed interruption of service.
 2. Do not proceed with interruption of sewer services without ENGINEER'S written permission.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 GREASE INTERCEPTORS

- A. Grease Interceptors: Cast-in-place-concrete or pre-cast concrete structure complying with requirements of City of Atlanta. Size should be 1500 gallon or as specified on the Site Plans.
- B. Grease Interceptors: Construct bottom, sidewalls, and top of reinforced, cast-in-place concrete. Wall thickness and thickness of bottom slab to be designed according to Site Plan, C 7.1. Include manholes, compartments or baffles, and piping or openings to retain grease and to permit wastewater flow.
1. Concrete: Comply with ACI 318/318R, ACI 350R.
 - a. Design Mix: 4000 psig (27.6 MPa) minimum, with 0.45 maximum water-to-cementitious materials ratio.
 - b. Portland Cement: ASTM C 150, Type II.
 - c. Fine Aggregate: ASTM C 33, sand.
 - d. Coarse Aggregate: ASTM C 33, crushed gravel.
 - e. Water: Potable.
 - f. Reinforcing Fabric: ASTM A 185, steel, welded wire fabric, plain.
 - g. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.
- C. Grease Interceptors: Pre-cast concrete complying with ASTM C 913. Include rubber-gasketed joints, manholes, compartments or baffles, and piping or openings to retain grease and to permit wastewater flow.
1. Protective Coating: Plant-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all interior concrete surfaces.
 2. Structural Design Loads:

- a. Light-Traffic Load: Comply with ASTM C 890, A-8 (ASSHTO HS10-44).
 - b. Medium-Traffic Load: Comply with ASTM C 890, A-12 (ASSHTO HS15-44).
 - c. Heavy-Traffic Load: Comply with ASTM C 890, A-16 (ASSHTO HS20-44).
 - d. Walkway Load: Comply with ASTM C 890, A-03.
3. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into interceptor walls, for each pipe connection.
 4. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of interceptor to finished grade is less than 60 inches.
 5. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.
 6. Manhole Frames and Covers: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (100-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover.
 - a. Ductile Iron: ASTM A 536, Grade 60-40-18, unless otherwise indicated.
 - b. Gray Iron: ASTM A 48, Class 35, unless otherwise indicated.
 - c. Include indented top design with lettering cast into cover, using wording equivalent to SANITARY SEWER.
 - d. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all ferrous surfaces.

2.03 OIL INTERCEPTORS

- A. Oil Interceptors: Cast-in-place-concrete or pre-cast concrete structure complying with requirements of City of Atlanta.
- B. Oil Interceptors: Construct bottom, sidewalls, and top of reinforced, cast- in-place concrete. Include waste oil and vent connections, manholes, compartments or baffles, and piping or openings to draw off oil and to permit wastewater flow.
 1. Concrete: Comply with ACI 318/318R, ACI 350R.
 - a. Design Mix: 4000 psig (27.6 MPa) minimum, with 0.45 maximum water-to-cementitious materials ratio.
 - b. Portland Cement: ASTM C 150, Type II.
 - c. Fine Aggregate: ASTM C 33, sand.
 - d. Coarse Aggregate: ASTM C 33, crushed gravel.
 - e. Water: Potable.
 - f. Reinforcing Fabric: ASTM A 185, steel, welded wire fabric, plain.
 - g. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.
- C. Oil Interceptors: Pre-cast concrete comply with ASTM C 913. Include rubber-gasketed joints, vent connections, manholes, compartments or baffles, and piping or openings to retain grease and to permit wastewater flow.

1. Protective Coating: Plant-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all interior concrete surfaces.
 2. Structural Design Loads:
 - a. Light-Traffic Load: Comply with ASTM C 890, A-8 (ASSHTO HS10-44).
 - b. Medium-Traffic Load: Comply with ASTM C 890, A-12 (ASSHTO HS15-44).
 - c. Heavy-Traffic Load: Comply with ASTM C 890, A-16 (ASSHTO HS20-44).
 - d. Walkway Load: Comply with ASTM C 890, A-03.
 3. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into interceptor walls, for each pipe connection.
 4. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of interceptor to finished grade is less than 60 inches.
 5. Grade Rings: Reinforced-concrete rings, 6 to 9-inch (150 to 225-mm) total thickness, to match diameter of manhole frame and cover.
 6. Manhole Frames and Covers: Ferrous; 24-inch (610-mm) ID by 7 to 9-inch (175- to 225-mm) riser with 4-inch- (100-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover.
 - a. Ductile Iron: ASTM A 536, Grade 60-40-18, unless otherwise indicated.
 - b. Gray Iron: ASTM A 48, Class 35, unless otherwise indicated.
 - c. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER".
 - d. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all ferrous surfaces.
 7. Waste-oil storage tank and piping are specified in Division 2 Section "Fuel Oil Distribution."
- D. Oil Interceptors: Factory-fabricated, cast-iron or steel body; with removable sediment bucket or strainer, baffles, vents, and flow-control fitting on inlet.
1. Inlet, Outlet, Vent, and Waste-Oil Outlet Piping Connections: Hub, hubless, or threaded, unless otherwise indicated.
 2. Extension: Cast-iron or steel shroud, full size of interceptor, extending from top of interceptor to grade.
 3. Cover: Cast iron or steel, with steel reinforcement to provide ASTM C 890, load.
 4. Protective Coating: Factory-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all ferrous surfaces, except bucket or strainer, unless otherwise indicated.

2.04 SAND INTERCEPTORS

- A. Description: Factory-fabricated, cast-iron or steel body and inlet grate; with settlement chamber and removable basket or strainer.
- B. Outlet Piping Connection: Hub, hubless, or threaded, unless otherwise indicated.
- C. Grate: Cast iron or steel with reinforcement to provide ASTM C 890, load.
- D. Protective Coating: Factory-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all exterior and interior ferrous surfaces except basket or screens.

2.05 PRECAST CONCRETE MANHOLE RISERS

- A. Pre-cast Concrete Manhole Risers: Per City of Atlanta standards.
- B. Pre-cast Concrete Manhole Risers: ASTM C 913, 40 inches ID. Include rubber-gasketed joints.
 - 1. Structural Design Loads:
 - a. Light-Traffic Load: Comply with ASTM C 890, A-8 (ASSHTO HS10-44).
 - b. Medium-Traffic Load: Comply with ASTM C 890, A-12 (ASSHTO HS15-44).
 - c. Heavy-Traffic Load: Comply with ASTM C 890, A-16 (ASSHTO HS20-44).
 - d. Walkway Load: Comply with ASTM C 890, A-03.
 - 2. Length: From top of underground concrete structure to grade.
 - 3. Riser Sections: 3-inch (75-mm) minimum thickness and 48-inch diameter.
 - 4. Top Section: Eccentric cone, unless otherwise indicated. Include top of cone to match grade ring size.
 - 5. Gaskets: ASTM C 443 (ASTM C 443M), rubber.
 - 6. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals.
- C. Grade Rings: Reinforced-concrete rings, 6 to 9-inch (150 to 225-mm) total thickness, to match diameter of manhole frame and cover.
- D. Protective Coating: Plant-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all interior concrete surfaces.
- E. Manhole Frames and Covers: Ferrous; 24-inch (610-mm) ID by 7 to 9-inch (175 to 225-mm) riser with 4-inch- (100-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover.
 - 1. Ductile Iron: ASTM A 536, Grade 60-40-18, unless otherwise indicated.
 - 2. Gray Iron: ASTM A 48, Class 35, unless otherwise indicated.
 - 3. Include indented top design with lettering cast into cover, using wording equivalent to the following:

- a. Grease Interceptors in Sanitary Sewerage System: "SANITARY SEWER."
 - b. Oil Interceptors in Sanitary Sewerage System: "SANITARY SEWER."
4. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all ferrous surfaces.

2.06 MISCELLANEOUS MATERIALS

- A. Concrete Paint: SSPC-Paint 16, coal-tar, epoxy polyamide.
- B. Metal Paint: SSPC-Paint 16, coal-tar, epoxy polyamide.
- C. PE Film: ASTM D 4397, 0.10-inch (0.25-mm) thickness sheet.

PART 3 EXECUTION

3.01 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 02200-"Earthwork."

3.02 INSTALLATION

- A. Install interceptor inlets and outlets at elevations indicated.
- B. Place concrete for cast-in-place interceptors according to ACI 318/318R and ACI 350R.
 1. Refer to Section 03300-"Cast-in-Place Concrete" for formwork, reinforcement, and concrete.
- C. Install pre-cast concrete interceptors according to ASTM C 891. Set level and plumb.
- D. Install manhole risers from top of underground concrete interceptors to manholes and gratings at finished grade.
- E. Set tops of manhole frames and covers flush with finished surface in pavements. Set tops six inches (6") above finish surface elsewhere, unless otherwise indicated.
- F. Set tops of grating frames and grates flush with finished surface.
- G. Clean and prepare concrete surfaces to be field painted. Remove loose efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen surface as required to remove glaze. Paint the following concrete surfaces as recommended by paint manufacturer:
 1. Cast-in-Place-Concrete Interceptors: All exterior, except bottom and all interior.
 2. Precast Concrete Interceptors: All interior.
- H. Install sheet PE film on earth where cast-in-place-concrete interceptors are to be built.

- I. Clean and prepare metal surfaces to be field painted according to SSPC- PA 1. Paint the following metal surfaces according to SSPC-PA 1 and SSPC-Paint 16:
 - 1. Metal Interceptors: All surfaces except baskets, screens, and strainers.
 - 2. Plastic Interceptors: All metal surfaces except baskets, screens, and strainers.
 - 3. Metal Manhole Frames and Covers: All surfaces.
 - 4. Do not paint metal surfaces with factory-applied, corrosion-resistant coating.
- J. Set interceptors level and plumb.
- K. Set tops of metal interceptor covers flush with finished surface in pavements. Set tops six inches (6") above finish surface elsewhere, unless otherwise indicated.
- L. Prepare and paint metal components, to be field painted, according to SSPC-Paint 16.
- M. Repair and restore protective coatings to original condition.

3.03 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Make piping connections between interceptors and piping systems.

3.04 IDENTIFICATION

- A. Identification materials and installation are specified in Section 02200-"Earthwork." Arrange for installation of green warning tapes directly over piping and at outside edges of underground interceptors.
 - 1. Use warning tapes or detectable warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

END OF SECTION

SECTION D-705 PIPE FOR UNDERDRAINS

01) DESCRIPTION

- (a) This item shall consist of pipe for underdrains of the type, classes, sizes, and dimensions required on the plans, furnished and installed at the places designated on the plans, or by the Engineer, in accordance with these specifications and with the lines and grades given.
- (b) This item shall include the furnishing and installation of underdrain pipe in place, the cost of underdrain pipes, common excavation, pavement removal, furnishing and installing all trench bracings, all fittings required to complete the underdrains as shown on the plans, and the material for the making of all joints including all connections to existing drainage pipes and structures.
- (c) The bid price per linear foot of pipe shall include all backfill made with earth excavated from the immediate trench. Granular backfill, conforming to the requirements of Section 806, Aggregate for Drainage, of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, shall meet the following specifications.

02) MATERIALS

- (a) Underdrain Backfill. Underdrain backfill shall meet the quality requirements of Section 800, Coarse Aggregate, with the gradation meeting the requirements of size 89.

The above material shall be used to replace material from the trench for perforated pipe and shall be paid for separately as specified herein. Gradations shall be obtained on samples of underdrain backfill prior to delivery to the job site. Additional gradations shall be obtained at the rate of one (1) per week for size No. 89 during the stockpiling and placement operations. The quality requirement tests described under section 800 shall be performed prior to the start of delivery to the job site.

- (b) General. Materials shall meet the requirements shown on the plans and as specified below.
 - 1) Smooth-wall Perforated PVC Pipe, ASTM F758, Poly (vinyl chloride) Ribbed Drain Pipe & Fittings, based on controlled inside diameter, ASTM F794, Poly (vinyl chloride) (PVC) corrugated sewer pipe with a smooth interior and fittings, ASTM F949, Poly (vinyl chloride) (PVC) Profile Drain Pipe and fittings based on controlled inside diameter AASHTO M30. All PVC pipe for under drains shall be Schedule 40
 - 2) Fittings are not required to be leak-proof but must be tight enough to prevent intrusion of fine material. Fittings may snap or screw on. All fittings shall be of the composition and have the same physical properties as the tubing and shall not restrict flow. Fittings as a continuous part of the line shall be capable of passing the stretch resistance test in accordance with ASTM F-405, latest revision.

Schedule 40 PVC pipe supplied as meeting this specification shall be marked with the manufacturer's identification symbol regularly at not more than 10 ft. intervals and in addition may be required to carry an approved symbol designating the manufacturer's assurance of compliance also at regular

intervals along the pipe. Fittings shall bear the identification symbol of the manufacturer. Each bundle shall bear the date, month and year of manufacture.

- 3) All underdrain pipe backfill shall be AASHTO or ASTM No. 89 stone.

03) CONSTRUCTION METHODS

- (a) Equipment. All equipment necessary and required for the proper construction of pipe underdrains shall be on the project, in first class working condition, and approved by the Engineer before construction is permitted to start. The equipment shall be able to be set up to maintain line and grade control accurately without damaging the existing soil cement base. A standard backhoe will not be approved for this work

- 1) The Contractor shall provide hand tampers and pneumatic tampers to obtain the required compaction of the pipe bed and backfill, as specified.

- (b) Excavation. The Contractor shall do all necessary excavation to the depth shown on the plans.

- 1) Excavated material not required or acceptable for backfill shall be disposed of by the Contractor as directed by the Engineer. The excavation shall not be carried below the required depth; when this is done, the trench shall be backfilled at the Contractor's expense with material approved by the Engineer and compacted to the density of the surrounding earth material as determined by the AASHTO Compaction Control Tests AASHTO T-180. The laboratory compaction and field density shall be determined by methods described in Section P-152, "Excavation and Embankment".

- 2) In case the depth of cut is changed from that shown on the plans, the change shall not exceed 6" without a revision in the contract unit price per linear foot of pipe. However, if the depth of cut is changed more than 6", compensation or deduction of work involved, whether increased or decreased, shall be provided for in a supplemental agreement.

- 3) The minimum width of the trench at the top of the pipe, when placed, shall be a width which will permit the proper construction of joints and compaction of backfill around the pipe.

- 4) The Contractor shall do such trench bracing, sheathing, or shoring necessary to perform and protect the excavation as required for safety and conformance to governing laws. Unless otherwise provided, the bracing, sheathing, or shoring shall be removed by the Contractor after the completion of the backfill to at least 12" over the top of the pipe. The sheathing or shoring shall be pulled as the granular backfill is placed and compacted to avoid any unfilled spaces between the trench wall and the backfill material. The cost of bracing, sheathing, or shoring, and the removal of same, shall be included in the unit price bid per foot for the pipe.

- 5) The Contractor is cautioned to exercise extreme care, particularly in the areas immediately and adjacent to taxiway and runway edges, where lighting conduit runs continuously and under which the piping must pass. The Contractor is further cautioned to exercise care in the vicinity of FAA communication, power, and electronic circuits. Damages to these and any other underground utilities shall be repaired in accordance with "General

Conditions, Section 22.11". All cost associated with these repairs shall be paid for by the Contractor.

- (c) Laying and Installing Pipe.
- 1) The Contractor's facilities for lowering the pipe into the trench shall be such that neither the pipe nor the trench will be damaged or disturbed.
 - 2) The Engineer shall inspect all pipe before it is laid, and reject any section that is damaged by handling or is defective to a degree which will materially affect the function and service of the pipe.
 - 3) The laying of the pipe in the finished trench shall be started at the lowest point and laid upgrade. The pipe shall be firmly and accurately set to line and grade so that the invert will be smooth and uniform. Pipe shall not be laid on frozen ground or in a wet trench.
 - 4) PVC pipe shall be installed in accordance with the requirements of ASTM D2321 or AASHTO standard specifications for Highway Bridges Section 30. Perforations shall meet the requirements of AASHTO M252 or M294 class 2, unless otherwise indicated on the plans.
- (d) Mortar. The mortar shall be of the desired consistency for making connections to other pipes or to structures. Mortar that is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted.
- (e) Backfilling.
- 1) Earth. All trenches and excavations shall be backfilled within a reasonable time after the pipes are installed, unless other protection of the pipe is provided. Backfill material shall be approved by the Engineer. Special care shall be taken in placing the backfill. Great care shall be used to obtain thorough compaction under the haunches and along the sides to the top of the pipe.
 - i) The backfill shall be placed in loose layers not exceeding 6" in depth under and around the pipe, and not exceeding 8" over the pipe. Successive layers shall be added and thoroughly compacted by hand and pneumatic tampers, approved by the Engineer, until the trench is completely filled and brought to the proper elevation. Backfilling shall be done in a manner to avoid injurious top or side pressures on the pipe.
 - ii) In embankments and for other areas, the backfill shall be compacted to 90% of the maximum density as determined by AASHTO T-180. The laboratory compaction and field density shall be determined by methods described in SECTION P-152, EXCAVATION AND EMBANKMENT. Density tests shall be taken at a frequency of one (1) per every other lift per 100 linear feet of trench for earth backfill.

2) Granular Material. When granular backfill is required, its placement in the trench and about the pipe shall be as shown on the plans. Special care shall be taken in placing the backfill. The granular backfill shall not contain a damaging amount of foreign matter, nor shall earth from the sides of the trench or from the windrow be allowed to filter into the backfill. The backfill shall be placed in loose layers not exceeding 6" in depth and compacted by hand and vibratory tampers to the requirements as given above. Backfilling shall be done in a manner to avoid injurious top or side pressure on the pipe. The granular backfill shall be made to the elevation of the trench, as shown on the plans.

i) When perforated pipe is specified, granular backfill material shall be placed along the full length of the pipe. The position of the granular material shall be as shown on the plans.

ii) Whenever a granular subbase blanket course is to be used under pavements or which extends several feet beyond the edge of paving to the outside edge of the underdrain trench, the granular backfill material over the underdrains shall be placed in the trench up to an elevation of 2" above the bottom surface of the granular subbase blanket course. Immediately prior to the placing of the granular subbase blanket course, the Contractor shall blade this excess trench backfill from the top of the trench onto the adjacent subgrade where it can be incorporated into the granular subbase blanket course. Any unsuitable material which remains over the underdrain trench shall be removed and replaced.

The subbase material shall be placed to provide clean contact between the subbase material and the underdrain granular backfill material for the full width of the underdrain trench. The backfill shall be compacted in accordance with the applicable portions of Section D-701 Pipe for Storm Drains.

(f) Connections. When the plans call for connections to existing or proposed structures, these connections shall be watertight and made so that a smooth uniform flow line will be obtained throughout the drainage system.

(g) Flushing and/or Rodding. The flushing and/or rodding of underdrain pipe shall be accomplished in such a manner to reasonably assure that the underdrain longitudinal pipes and outlet pipes are not obstructed or blocked or discontinuous.

Sufficient water is to be injected into the system, overcoming the amount absorbed into the backfill aggregate, to reasonably indicate free flow. This can be observed by monitoring the time it takes to reach a monitoring point and the magnitude of flow. The reverse also will be monitored; i.e. the time it takes for the flow to abate.

If the lines appear to be blocked, obstructed, or discontinuous, based on the above monitoring, the Contractor is to rod the lines to determine the point of the problem.

An exploratory pit would then be dug at the perceived problem point and corrections made to the underdrains.

(h) Cleaning and Restoration of Site. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as ordered by the Engineer. Except for paved areas of the Airport, the Contractor shall restore all disturbed areas to their

original condition.

- 1) After all work is completed, the Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.
- 2) Performance of the work described in this section is not payable directly but shall be considered as a subsidiary obligation of the Contractor, covered under the contract unit price for the underdrain.

TESTING AND MATERIAL REQUIREMENTS

Test and short title

AASHTO T-180 -- Density
AASHTO T-27 -- Gradation

Material and short title

AASHTO M-85--Portland Cement
AASHTO M-45--Sand
ASTM C-6--Hydrated Lime
ASTM D-1248--Joints
ASTM D-3034--PVC Pipe & Fittings
ASTM F-758--PVC Pipe
ASTM F-949--PVC Pipe

END OF SECTION D-705

SECTION D-750 - SANITARY SEWERS

01) DESCRIPTION

- (a) This work shall include the construction of sanitary sewer pipes, downstream of grease interceptors, of the types, classes and sizes required on the contract documents, furnished and installed as designated on the contract documents, or as directed by the Engineer.

02) SUBMITTALS

- (a) Shop Drawings: For the following:
 - 1. Manholes: include plan, elevations, sections, details, frames and covers.
 - 2. Sewer Pipe: include manufacturer's cut sheet and certification.
- (b) Coordination Drawings: Show pipe size, locations, and elevations. Show other piping in same trench and clearance from sewage system piping. Indicate interface and spatial relationship between manholes, piping and proximate structures.
- (c) Field-Quality Control test reports. Infiltration test results.

03) MATERIALS

- (a) Ductile iron pipe shall meet the requirements of AWWA C-151. The pipe shall be cement-enamel lined in accordance with AWWA C-104, and coated outside in accordance with Section 51-8.1 of AWWA C-151. Push-on type rubber gaskets shall be used for gravity pipe and restrained joints will be used for force mains. All pipe shall be strength Class 51 pipe, unless otherwise noted on the Contract Drawings.
- (b) Reinforced concrete pipe shall be furnished in eight-foot maximum laying sections and shall have the strength or Class as indicated on the plans. The pipe shall be lined with two coats of epoxy coating. Dry fill coating thickness will be seven to eight mils per coat. Two coats will be required; preferably one red and the second in gray. No additional payment will be made for epoxy coating; all cost thereof will be considered incidental to the type of pipe.
- (c) All pipe and pipe joints on reinforced concrete pipe 48" diameter and smaller shall be certified as having been tested in accordance with ASTM Designation C-76 and C-443, respectively, for absorption and joint leakage. At least 1% of the pipe lengths and joints of each diameter from a given pipe run by a given manufacturer and not less than two pipe lengths or two joints of each diameter and run shall be so tested and certified. No runs of pipe failing to meet the absorption and leakage test requirements will be accepted. Lift holes will be permitted on all concrete pipe. Lift holes shall be sealed with 5 Star Non-Shrink Grout conforming to ASTM C-827 for shrinkage; have reached its initial set time within 45 minutes of mixing and initial set conforming to ASTM C-191; and with minimum compressive strength of 2,000 psi in one day and 7,000 psi at 28 days conforming to ASTM C-109.
- (d) PVC pipe furnished for force main and pressure gravity sewer shall be smooth-wall solid pipe, ASTM F758 Schedule 40.

- (e) Gaskets for both ductile iron pipe and reinforced concrete pipe shall be "O" ring type and approved, fuel resistant Neoprene "N". All gaskets proposed as fuel resistant equals shall conform to the requirements of ASTM C-443 and shall be tested for swelling in the presence of petroleum products in accordance with Federal Standard 601, Method 6001 and 6211. When the latter method is used No. 3 oil for 70 hours at 212°F, the swelling shall not exceed 100% by volume.
- (f) Manholes shall be as specified in Section D-751, Manholes, Catch Basins and Inlets.

04) CONSTRUCTION

- (a) Sanitary sewer pipe shall be constructed in accordance with Section D-701, "Pipe for Storm Sewers and Culverts", of these specifications. Sanitary facilities shall be tested in accordance with Section 660.3.06 "Quality Acceptance" of the Georgia Department of Transportation (DOT) specifications.
- (b) The Contractor will be required to maintain flow in existing sanitary sewers during construction. Blockage of any line or discharge of any line into adjacent drainage facilities will not be permitted. There will be no additional compensation for the maintenance of flow and all costs thereof will be considered incidental to the pipe.
- (c) Where noted on the plans, the Contractor shall plug existing sanitary sewer pipe with concrete. Concrete plugs shall extend into the pipe a distance equal to the pipe diameter.
- (d) All trench excavation through rock shall be extended at least one foot below the outside of the pipe in all directions, and then backfilled with approved granular material to form the pipe bedding.
- (g) Where noted on the contract plans, the Contractor shall remove or abandon existing manholes by demolishing or removing the top of the structure to five feet below finished grade and backfilling with approved material, once the floor of the structure has been made pervious by drilled holes, as directed by the Engineer. No additional compensation will be made for this work and all costs will be considered incidental to the pipe.

05) METHOD OF MEASUREMENT

- (a) The length of pipe to be paid for shall be the number of linear feet of pipe in place completed and approved. It shall be measured along the centerline of the pipe from end to inside face of structure to the end or inside face of structure, whichever is applicable. The several types and sizes shall be measured under the appropriate item without distinction as to pipe strength class. All fittings shall be included in the footage as typical pipe sections in the pipeline being measured.
- (b) The length of Type "B" and "C" Pipe Bedding to be paid for shall be the number of linear feet of pipe bedding, without regard to the pipe diameter, actually shaped, compacted and backfilled in accordance with these specification and approved by the City.
- (c) Trench and Excavation Protection shall be included in the contract lump sum price bid for contract Item Trench and Excavation Protection D-701-17. Trench rock excavation, if required, will be paid under Section P-152.

05) BASIS OF PAYMENT

- (a) Payment for sanitary sewer pipe, complete and installed as planned and/or directed, will be made at the contract unit price per linear foot for pipe, without distinction as to pipe strength class. These prices shall be full compensation for furnishing all materials and for all preparation, excavation, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.
- 1) No separate payment will be made for connection of new pipe as indicated on the drawings to existing sanitary sewer system (pipe, manhole, etc.). This work shall be considered incidental to the sanitary sewer construction.
 - 2) Hauling and placement of excess material removed in the pipe trench excavation process and not used as backfill will not be measured for payment under this item. Payment for this work will be made under the appropriate embankment item as specified in Section P-152.
 - 3) No separate payment will be made for common trench excavation, or trench backfill, including select backfill. The cost of this work will be considered incidental to the construction of the sanitary sewer pipe.
 - 4) No separate payment will be made for any sheeting, shoring, bracing, pumping and counter-floatation measures which are required during construction, whether or not such work is indicated on the plans, other than as specified under the term "Trench and Excavation Protection" in Section D-701.
 - 5) Payment will be made for the cost of removing and abandoning existing sanitary sewers, existing manholes, as specified by Section P-150, "Removal of Pavements and Miscellaneous Items".
 - 6) Separate payment will be made for constructing concrete pipe collars for the purpose of joining two pipes. This will be paid under the item for "Miscellaneous Concrete" in Item D-751-3.
 - 7) No separate payment will be made for the removal and replacement or support of existing utilities necessary during the construction of sanitary sewers. The cost of this work will be considered incidental to the construction of the sanitary sewer pipe.
 - 8) No separate payment will be made for exceptional costs incurred by the Contractor in conforming to construction schedules established in the plans or for duplicated work required by these schedules. The cost of this work will be considered incidental to the sanitary sewer item.
 - 9) No separate payment will be made for the removal and disposal of trash, rubble and garbage removed from the pipe trench, or for replacement backfill. All costs therefor, shall be included in the prices bid for the pipe item.
 - 10) No separate payment will be made for tees, reducers, or other fittings.
- (b) Payment for Pipe Bedding completed and accepted will be made at the contract

unit price per linear foot, which price shall be full compensation for furnishing and placing all material and for all labor, equipment, tools and incidentals necessary to complete the item.

(c) Payment will be made under:

- Item D-750-1--Sanitary Sewer, 42" RCP, Gravity -Per Linear Foot
- Item D-750-2 (Deleted)
- Item D-750-3-Sanitary Sewer 6" Diameter DIP, Gravity – Per Linear Foot
- Item D-750-4--Sanitary Sewer, 8" Diameter DIP, Gravity -Per Linear Foot
- Item D-750-5--Type "C" Bedding for Sanitary Sewers-Per Linear Foot
- Item D-750-6-Type "B" Bedding for Sanitary Sewers-Per Linear Foot
- Item D-750-7 (Deleted)
- Item D-750-8 (Deleted)
- Item D-750-9 (Deleted)
- Item D-750-10 (Deleted)
- Item D-750-11-Sanitary Sewer Cleanout – Per Each

TESTING AND MATERIAL REQUIREMENTS

Test and Short Title	Material and Short Title
ASTM C 6	Hydrated Lime
AASHTO M 45	Sand
ASTM C 76	RC Pipe
ASTM C 443	Rubber Gasket
AASHTO M 85	Portland Cement
AASHTO M 157	Reddy-Mix Concrete
AASHTO M 173	Joint Sealer
AASHTO M 198	Gaskets
AASHTO M 219	Aluminum Structural Plate
1/HH-P-117	Oakum
Fed. Std. 601	Gasket Swell
1/HH-G-156	Flexibility

Note: Others as required by referenced specifications.

1/ Federal Specifications

END OF SECTION D-750

SECTION P-501 PORTLAND CEMENT CONCRETE PAVEMENT

01) DESCRIPTION

- (a) This work shall consist of pavements composed of Portland Cement Concrete, with or without reinforcements as specified, constructed on a prepared subgrade or subbase course in accordance with these specifications and shall conform to the thickness and typical cross sections shown on the plans and with lines and grades established by the Contractor.
- (b) The Contractor will be required to construct a test section of approximately 300 linear feet in length at the proposed plan width. This test section is to be paved prior to proceeding with the production paving utilizing the equipment, methods, and materials the Contractor has submitted for the work to be constructed under this contract.

The test section shall be checked by the Contractor in the presence of the Engineer to verify acceptability and compliance with the tolerances and other contract requirements. Work not meeting the requirements will be removed and/or corrected by methods approved by the Engineer.

- (c) This section shall also include the replacement of damaged and/or deficient soil cement stabilized base course, capping of underdrain trenches, concrete fill in the trench above the longitudinal underdrain with low slump, low strength concrete. Mix design and placement methods shall be in general accordance with the requirements of this section.

02) MATERIALS

All aggregates shall be sourced from producers on the most recent Georgia Department of Transportation Office of Materials and Research Qualified Products List. Gradation will be performed at the frequency of one per day for each material for each day of the stockpiling or production.

All aggregates, including sand and stone, for use in concrete shall be tested for alkali-aggregate reaction in accordance with either ASTM C1260 or ASTM C1293. Expansions less than 0.08% at 14 days in the caustic soak solution in ASTM C1260 or less than 0.04% at one year in ASTM C1293 shall indicate that the aggregate is considered non-deleteriously reactive. Aggregates at or above these limits shall be considered potentially deleteriously reactive. Use of aggregates at or above these limits (i.e., aggregates that are potentially deleteriously reactive) shall require testing of the proposed concrete mix design to demonstrate control of deleterious expansion from ASR. The tests to demonstrate control of the mix shall be either a modified version of ASTM C1260 or ASTM C1293. The modification is that any mineral or lithium admixtures in the mix design shall be included in the cementitious portion of the batch of materials to be tested, and at the same weight percentages as designed for use in the concrete mixture being evaluated. Furthermore, in the case of ASTM C1260, the caustic soak storage solution shall be modified to incorporate the lithium admixture as described in the FHWA Publication No. FHWA-RD-03-047, pages 61 – 62, if lithium admixture is incorporated in the concrete mix design. Expansions less than 0.08% at 28 days in the caustic soak solution in the modified ASTM C1260 or less than 0.04% at two years in the modified ASTM C1293 shall be indicative of control of deleterious expansions from ASR. Aggregates shall also be tested for alkali-carbonate reaction in accordance with the criteria stated in ASTM C33. Aggregates shown to be alkali-carbonate reactive shall not be used.

- (a) Fine Aggregate. Fine aggregate for concrete shall be natural sand and shall conform to the requirements of ASTM C33 and AASHTO M-6 and shall meet the gradation requirements of Table I.

TABLE I

Gradation For Fine Aggregate

Sieve Designation (Square Openings)	Percentage by Weight Passing Sieve
3/8 Inch	100
No. 4	95-100
No. 16	45-80
No. 30	25-55
No. 50	10-30
No. 100	2-10

- (b) Coarse Aggregate. Coarse aggregate for concrete shall conform to the requirements of ASTM C33 and AASHTO M80. Coarse aggregate shall be furnished in the two separate sizes as shown in Table II. The coarse aggregate shall show no more than 47% wear when tested in accordance with ASTM C131 and/or ASTM C535.

TABLE II

Gradations from 1-1/2 Inch to No. 4

Sieve Designation (Square Openings)	Percentage By Weight Passing Sieves (AASHTO T-27)						
	<u>2"</u>	<u>1-1/2"</u>	<u>1"</u>	<u>3/4"</u>	<u>3/8"</u>	<u>No. 4</u>	<u>No. 8</u>
1-1/2" to 3/4"	100	90-100	20-55	0-15	0-5	-	-
3/4" to No. 4	-	-	100	90-100	10-55	0-10	0-5

- (c) Cement. The cement used shall be Portland cement conforming to one of the following specifications:

Portland Cement ASTM C150, Type I or Type II

Cement supplied for use in concrete shall be of the low alkali type, the total alkali content to be less than 0.40%.

If for any reason cement becomes partially set or contains lumps of caked cement, it shall be rejected. Cement salvaged from discarded or used bags shall not be used.

- (d) Premolded Joint Filler. Premolded joint filler for expansion joints shall conform to the requirements of AASHTO M 213 and shall be punched to admit the dowels where called for on the plans. The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint, unless otherwise specified by the Engineer. When the use of more than one piece is authorized for a joint, the abutting ends shall be fastened securely and held accurately to shape by stapling or other positive fastening means satisfactory to the

Engineer.

- (e) Joint Sealer. The joint sealer for the joints in the concrete pavement shall be as specified in Section P-605 Joint Sealing Filler.
- (f) Dowel and Tie Bars. Dowel and tie bars shall conform to the requirements of AASHTO M 31 or AASHTO M 42, except that rail steel shall not be used for tie bars that are to be bent or re-straightened during construction. Tie bars shall be deformed bars. Dowel bars shall be plain round bars of the size specified and shall be free from burring or other deformation restricting slippage in the concrete. Before delivery to the construction site, one-half of the length of each dowel bar shall be painted with one coat of paint.
- (g) Water. Water used in mixing or curing shall be as clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product as possible. Water will be tested in accordance with and shall meet the suggested requirements of AASHTO T-26. Water known to be of potable quality may be used without testing. Where the source of water is relatively shallow, the intake shall be so enclosed as to exclude silt, mud, grass, or other foreign materials.
- (h) Cover Materials For Curing. Curing materials shall be liquid membrane-forming compounds for curing concrete and shall conform to ASTM C 309, Type 2, Class B. Apply at the rate of no more than 125 square feet per 1 gallon.
- (i) Admixtures. The use of any material added to the concrete mix shall be approved by the Engineer. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below for the admixtures for which approvals are desired. In addition, the Engineer may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests will be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

Pozzolanic admixtures shall be fly ash meeting the requirements of ASTM C-350 or raw or calcined natural pozzolans meeting the requirements of ASTM C-402.

Air-entraining admixtures shall meet the requirements of AASHTO M 154 or ASTM C-260. Concrete to be tested for approval shall be made with the cement and aggregate to be used in the work and shall contain an air content of 4% to 6% by volume of the concrete mixture, as determined by ASTM C-231.

Water-reducing, set-controlling mixture shall meet the requirements of ASTM C-494, Type A, water-reducing or Type D, water-reducing and retarding and shall be added to all mixes. Type A shall be added when temperatures are below 65°F., and Type D when temperatures are above 65°F. Water-reducing admixtures shall be added at the mixer separately from air-entraining admixtures in accordance with the manufacturer's printed instructions. The water-reducing, set-controlling and retarding admixtures shall not contain calcium chloride or chloride containing compounds as a functional ingredient."

Lithium admixtures used for control of deleterious expansion from ASR shall meet the specifications described in the AASHTO Guide Specification for Highway Construction, Section 56X, Portland Cement Concrete Resistant to Excessive Expansion from Alkali Silica Reaction, section 713.04 (lithium nitrate aqueous admixture).

The quantity of lithium admixture required will be 0.6 gallons per cubic yard of concrete using low alkali cement (0.4% or less alkali), aggregates that have expansions less than 0.04% at

14 days in the caustic soak solution in ASTM C1260 and a low CaO Class F fly ash. There are aggregates in the Atlanta region that met the requirements. It is the contractor's responsibility to perform ASTM C1260 on the aggregates prior to stockpiling on site to determine that they meet the requirements if these locally available aggregates are not used. If the aggregates do not meet the requirements then it is the contractor's responsibility (at the contractor's cost) to put the proper amount of lithium admixture in the mix to account for the variation.

- (j) Fly Ash. Fly ash shall be used as an additive in concrete to promote workability and plasticity. Fly ash shall be used as a partial replacement for portland cement in concrete in accordance with the following:
- 1) The quantity of fly ash in the mix shall be 25% of the weight of total cementitious material (i.e., Portland cement plus fly ash).
 - 2) The fly ash shall conform to ASTM C-618, Type F, except that the loss on ignition shall not exceed 3%. The fly ash should have a maximum of 1.5% available alkali and a maximum 6% CaO.
 - 3) Separate facilities must be provided for the fly ash such that it will be stored in the same fashion as cement and batched and weighed to the same degree of accuracy as required for cement. The same scales may be used for weighing both cement and fly ash provided they are handled as a separate operation.
 - 4) The Contractor shall assume full responsibility for obtaining concrete having the minimum strength requirements set forth in the specifications.
 - 5) A minimum of five and one-half (5½) bags of Portland cement, at 94#/bag, per cubic yard of concrete shall be used in the mix.
- (k) Steel Reinforcement. Deformed welded wire fabric conforming to the requirements of AASHTO M-55 or M-221 shall be used where specified on the plans.

03) CONSTRUCTION METHODS

- (a) Equipment. Equipment and tools necessary for handling materials and performing all parts of the work shall be approved by the Engineer as to design, capacity, and mechanical condition. The equipment shall be at the job site sufficiently before the start of construction operation for examination and approval.
- 1) Batching Plant and Equipment.
 - i) General. The batching plant shall include bins, weighing hoppers, and scales for the fine aggregate and for each size of coarse aggregate. If bulk cement is used, a bin, hopper, and separate scale for cement shall be included. The weighing hoppers shall be properly sealed and vented to preclude dusting during operation.
 - ii) Bins and Hoppers. Bins with adequate separate compartments for fine aggregate and for each required size of coarse aggregate shall be provided in the batching plant. Each compartment shall discharge efficiently and freely into the weighing hopper. Means of control shall be provided so that, as the quantity desired in the weighing hopper is approached, the material may be added slowly and shut off with precision. A port or other opening for removing an overload of any one of the several materials from the hopper

shall be provided. Weighing hoppers shall be constructed to eliminate accumulations of tare materials and to discharge fully.

- iii) An automatic recording device capable of recording all of the individual ingredients of the mix shall be installed at the point of manufacture of the concrete.
- iv) Scales. The scales for weighing aggregates and cement shall be of either the beam or the spring less dial type. They shall be accurate within 0.5% throughout their range of use. When beam-type scales are used, provision, such as "tell-tale" dial, shall be made for indicating to the operator that the required load in the weighing hopper is being approached.

A device on the weighing beams shall clearly indicate critical position. Poises shall be designed to be locked in any position and to prevent unauthorized change. The weight beam and "tell-tale" device shall be in full view of the operator while charging the hopper, and he shall have convenient access to all controls.

Scales shall be inspected and sealed as often as the Engineer may deem necessary to assure their continued accuracy. The Contractor shall have on hand not less than ten 50-pound weights for frequent testing of all scales.

2) Mixers

- i) General. Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. Each mixer shall have attached in a prominent place a manufacturer's plate showing the capacity of the drum in terms of volume of mixed concrete and the speed of rotation of the mixing drum or blades.

A device, accurate within 3% and satisfactory to the Engineer, shall be provided at the mixer for determining the amount of air-entraining agent ~~be~~ that is added to each batch requiring such admixture.

Mixers shall be examined daily for the accumulation of hard concrete or mortar and the wear of blades.

- ii) Mixers at construction sites. Mixing shall be in an approved mixer capable of combining the aggregates, cement, and water into a thoroughly mixed and uniform mass within the specified mixing period, and of discharging and distributing the mixture without segregation on the prepared grade. The mixer shall be equipped with an approved timing device which will automatically lock the discharge lever when the drum has been charged and release it at the end of the mixing period. The device shall be equipped with a bell or other suitable warning device adjusted to give a clearly audible signal each time the lock is released. In case of failure of the timing device, the mixer may be used for the balance of the day while it is being repaired, providing that each batch is mixed 90 seconds. The mixers shall be cleaned at suitable intervals. The pickup and throwover blades in the drum(s) shall be repaired or replaced when they are worn down 3/4 inch or more. The Contractor shall have available at the job site a copy of the manufacturer's design, showing dimensions and

arrangements of blades in reference to original height and depth, or provide permanent marks on blades to show points of 3/4 inch wear from new conditions. Drilled holes of 1/4 inch diameter near each end and at the midpoint of each blade are recommended.

- iii) Central plant mixers. Mixers for central plant mixing (plant mixer, revolving drum type mixer, single opening revolving truncated drum mixer, and a revolving drum charging at one end and discharging at the other end) shall have attached thereto, in a prominent place by the manufacturer, a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the normal capacity (in cubic feet) of the drum or container in terms of the volume of mixed concrete, and the speed of rotation of the mixing drum or blades. Central plant mixers shall be equipped with an acceptable timing device that will not permit the batch to be discharged until the specified mixing time has elapsed. The water system for a central mixer shall be either a calibrated measuring tank or a meter and shall not necessarily be an integral part of the mixer.

The mixers shall be cleaned at suitable intervals. They shall be examined daily for changes in condition due to accumulation of hard concrete or mortar or to wear of blades. The pickup and throwover blades shall be replaced when they have worn down 3/4 inch or more. The Contractor shall provide the Engineer with a copy of the manufacturer's design showing dimensions and arrangement of blades in reference to original height and depth.

- iv) Truck Mixers and Truck Agitators. Truck mixers used for mixing and hauling concrete, and truck agitators used for hauling central mixed concrete, shall conform to the requirements of AASHTO M 157.
- v) Non-agitator Trucks. Non-agitating hauling equipment shall conform to the requirements of AASHTO M 157.

3) Finishing Equipment.

- i) Finishing machine. The finishing machine shall be self propelled and equipped with at least two oscillating type transverse screeds.
- ii) Vibrators. Vibrators, for full width vibration of concrete paving slabs, may be either the surface pan type or the internal type with either immersed tube or multiple spuds. They may be attached to the spreader or the finishing machine, or they may be mounted on a separate carriage. They shall not come in contact with the joint, load transfer devices, subgrade, or side forms. The frequency of the surface vibrators shall be not less than 3,500 impulses per minute and the frequency of the internal type shall be not less than 5,000 impulses per minute for tube vibrators and not less than 7,000 impulses per minute for spud vibrators.

When spud internal vibrators are used adjacent to forms, they shall have a frequency of not less than 3,500 impulses per minute.

- 4) Concrete Saw. When sawing of joints is elected or specified, the Contractor shall provide sawing equipment adequate in number of units and power to complete the sawing to the required dimensions and at the required rate. The Contractor shall provide at least one standby saw in good working order. An ample supply of saw blades shall be maintained at the site of the work at all times during sawing

operations.

The Contractor shall provide adequate artificial lighting facilities for night sawing. All of this equipment shall be on the job both before and at all times during concrete placement. Immediately after the initial sawing, the Contractor shall flush out the slurry in the joint with water and install a backer rod slightly larger in diameter than the width of the saw cut, at the bottom of the saw cut. The length of the backer rod shall be extended approximately 6" beyond the slab edge for future overlap of the adjacent slab.

- 5) Forms. Straight side forms shall be made of metal having a thickness of not less than 7/32" and shall be furnished in sections of not less than 10 feet in length. Forms shall have a depth equal to the prescribed edge thickness of the concrete, without horizontal joint, and a base width equal to the depth of the forms. Flexible or curved forms of proper radius shall be used for curves of 100 foot radius or less. Flexible or curved forms shall be of a design acceptable to the Engineer. Forms shall be provided with adequate devices for secure settings so that when in place they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Flange braces shall extend outward on the base not less than two-thirds the height of the form. Forms with battered top surfaces, and bent, twisted, or broken forms shall be removed from the work. Repaired forms shall not be used until inspected and approved. Built-up forms shall not be used, except as approved by the Engineer. The top face of the form shall not vary from a true plane more than 1/8 inch in 10 feet, and the upstanding leg shall not vary more than 1/4 inch. The forms shall contain provisions for locking the ends of abutting sections together tightly for secure setting.

- (b) Form Setting. Forms shall be set sufficiently in advance of the concrete placement. After the forms have been set to correct grade, the grade shall be thoroughly tamped, either mechanically or by hand, at both the inside and outside edges of the base of the forms. Forms shall be staked into place with not less than 3 pins for each 10 foot section. A pin shall be placed at each side of every joint. Form sections shall be tightly locked and shall be free from play or movement in any direction. The forms shall not deviate from true line by more than 1/4 inch at any point. Excessive settlement or springing of forms under the finishing machine will not be tolerated. Forms shall be cleaned and oiled prior to the placing of concrete.

The alignment and grade elevations of the forms shall be checked and corrections made by the Contractor immediately before placing the concrete. When any form has been disturbed or any grade has become unstable, the form shall be reset and rechecked.

- (c) Conditioning of Underlying Course. Ruts or depressions caused by hauling or usage of other equipment shall be filled, as they develop, with suitable material to the satisfaction of the Engineer. A multiple-pin template weighing not less than 1,000 pounds (per 20 foot machine) or other approved template shall be provided and operated on the forms immediately in advance of the placing of the concrete. If the mixer is operated upon the grade, the template shall be operated between the mixer and the spreader; in any case, it shall be propelled only by hand and plates shall be adjustable so that they may be set and maintained at the correct contour of the underlying course. The adjustment and operation of the template shall be such as will provide an accurate retest of the grade before placing the concrete thereon. All excess material shall be removed. If the grade is found to be below the true elevation, the depressions shall be filled with approved material and thoroughly compacted to the proper cross section by rolling or tamping with a hand tamp.

- 1) The template shall be maintained in accurate adjustment, at all times by the

Contractor, and should be checked daily.

- 2) The work described under the foregoing paragraphs does not contemplate a regular subgrading operation, but rather a final accurate check of the underlying course.
- (d) Handling, Measuring and Batching Materials. The batch plant site, layout, equipment, and provisions for transporting material shall assure a continuous supply of material to the work. Stockpiles shall be built up in layers of not more than 3 feet in thickness. Each layer shall be completely in place before beginning the next, which shall not be allowed to "cone" down over the next lower layer. Aggregates from different sources and of different gradings shall not be stockpiled together.
- 1). Aggregates shall be handled from stockpiles or other sources to the batching plant in such manner to secure the specified grading of the material. Aggregates that have become segregated or mixed with earth or foreign material shall not be used. All aggregates produced or handled by hydraulic methods, and washed aggregates, shall be stockpiled or binned for draining at least 12 hours before being batched. Rail shipments requiring more than 12 hours will be accepted as adequate binning only if the car bodies permit free drainage. In case the aggregates contain high or non-uniform moisture content, storage or stockpile periods in excess of 12 hours may be required by the Engineer.
 - 2). The fine aggregate and each size of coarse aggregate shall be separately weighed into hoppers in the respective amounts set by the job mix. Cement shall be measured by the sack or by weight. Separate scales and hoppers, with a device to indicate positively the complete discharge of the batch of cement into the batch box or container, shall be used for weighing the cement. Ninety-four pounds of bulk cement shall be considered one sack. Batches involving fractional sacks shall not be allowed, except when bulk cement is used.
 - 3). When mixing is at the site of the work, aggregates shall be transported from the batching plant to the mixer in batch boxes, vehicle bodies, or other containers of adequate capacity and construction to properly carry the volume required. Partitions separating batches shall be adequate and effective to prevent spilling from one compartment to another while in transit or while being dumped. When bulk cement is used, the Contractor shall use a suitable method of handling the cement from weighing hopper or transporting container or into the batch itself for transportation to the mixer, such as a chute, boot, or other approved device, to prevent loss of cement. The device shall be arranged to provide positive assurance of the actual presence in each batch of the entire cement content specified.
 - 4). Bulk cement shall be transported to the mixer in tight compartments capable of carrying the full amount of cement required for the batch, or if permitted, between the fine and coarse aggregate. When cement is placed in contact with the aggregates, batches may be rejected unless mixed 1-1/2 hours of such contact. Cement in original shipping packages may be transported on top of the aggregates, each batch containing the number of sacks required by the job mix.
 - 5). Batches shall be delivered to the mixer separately and intact. Each batch shall be dumped into the mixer without loss of cement, and when more than one batch is carried on the truck, it shall be dumped without spilling of material from one batch compartment into another. Batching shall be conducted so that the results in the weights of each material required will be within a tolerance of 1% for cement and 2% for aggregates.

- 6). Water may be measured either by volume or by weight. The accuracy of measuring the water shall be within $\pm 1\%$ of required amounts. Unless the water is to be weighed, the water-measuring equipment shall include an auxiliary tank from which the measuring tank shall be filled. The measuring tank shall be equipped with an outside tap and valve to provide checking of the setting, unless other means are provided for readily and accurately determining the amount of water in the tank. The volume of the auxiliary tank shall be at least equal to that of the measuring tank.

Methods and equipment for adding air-entraining agent or other admixtures to the batch, when required, shall be approved by the Engineer. All admixtures shall be measured into the mixer with an accuracy of $\pm 3\%$.

(e) Proportions.

- 1). At least thirty (30) days prior to the start of concrete paving operations and after approval of all material to be used in the concrete, the Contractor shall submit the proportions of the material to produce the specified flexural strength of 650 psi at 28 days and 735 psi at 90 days. During the mix design process, additional beams shall be made to determine the strength at 24 hours, 36 hours and 48 hours. The Contractor shall submit for approval the job mix formula, at his expense, to the Engineer at least thirty (30) days prior to construction. The proportioning shall be approved in writing by the Engineer to the Contractor. Should a change in sources of materials be made, or if different sources of materials are to be used, proportions for these materials shall also be approved in writing by the Engineer before said materials are incorporated into the mix. The approved mix shall be a workable concrete designed for a one (1) inch slump, with one-half ($\frac{1}{2}$) inch as the minimum and one and one-half (1- $\frac{1}{2}$) inches as the maximum allowable in any specimen and an air content of 4% to 6%. If the Contractor proposes to place concrete by methods other than slip forming that requires a higher slump, the slump may be increased to a maximum of 2- $\frac{1}{2}$ " provided the Contractor has had a mix designed and approved to the criteria specified herein.

The mix design for the low slump, low strength base course replacement shall follow the general requirements of this section. The concrete shall be designed for a 1" to 2" slump, 5% to 7% air content and a 7 day compressive strength of 2000 psi. The low slump concrete shall also be used for capping the underdrain trenches, duct banks, and conduit trenches in the base materials.

The mix design procedure shall include testing for gradation, specific gravity, fineness modulus, dry rodded unit weight, abrasion, compressive and tensile strengths of cement, slump, air, yield, strength, time of set, shrinkage, and statistical analysis. Sufficient beams shall be cast during the mix design process to adequately determine the strengths at 3 days, 7 days, 14 days, 28 days, and 90 days to insure compliance with the requirements of the contract documents. The use of maturity meters shall be used to monitor and determine the concrete strength. The meters shall be IntelliRock Maturity Meters supplied by Engius of Stillwater, Oklahoma. Curves shall be developed during the mix design process and further proved during the concrete placement.

During construction, the Contractor shall make at least seven (7) beams for each 200 cubic yards, or fraction thereof, placed. Each individual three (3), seven (7) twenty-eight (28) day flexural strength test, consisting of the average of two (2) beam breaks, shall represent that amount of concrete each side of the test location midway to the adjacent test locations or to end of lane, whichever is applicable. The quantity of concrete represented by each test shall be as near as practical to the specified

frequency. Beams shall be tested at three (3) and seven (7) twenty-eight (28) and ninety (90) days. The flexural strength average of any four (4) consecutive strength tests, tested at the end of twenty-eight (28) days, shall have an average flexural strength equal to or greater than the specified flexural strength. When the maturity meter curves have been developed to an acceptable level, the frequency of casting test beams will be modified to one set per 500 cubic yards. This shall apply to each approved mix design specifically. When the test specimens fail to conform to the requirements for strength, the Engineer shall have the right to order changes in the concrete sufficient to increase the strength to meet these requirements.

In order to monitor quality control the Contractor shall make test beams and the Contractor shall provide the concrete and adequate facilities for sampling, making, (including the beam molds), storing, curing, and breaking the beams in accordance with the ASTM specifications, at facilities set up by the Contractor at the worksite. Complete records shall be maintained on a daily basis, showing the location, age, test results, standard deviation, consecutive four (4) average, remarks and other data necessary to monitor quality control.

Should any portion of the concrete pavement fail to meet the requirement of the average four (4) consecutive twenty-eight (28) day flexural strength tests, the following shall apply:

- i) Twenty-eight (28) day strengths shall be adjusted for any variation from design strengths in proportion to the square of the thickness as follows:

$$f_{s_{adjusted}} = \frac{t_{actual}^2}{t_{design}^2} \times f_{s_{actual}}$$

Where: t_{actual} = actual pavement thickness

t_{design} = design thickness

$f_{s_{actual}}$ = actual 28 day flexural strength

$f_{s_{adjusted}}$ = adjusted 28 day flexural strength

- ii) If the concrete pavements fail to meet the strength tests after adjustment for thickness, the unit price shall be adjusted for that quantity of concrete as defined by the 200 cubic yards, or 500 cubic yards represented by the beam specimens.

TABLE III

<u>Adjusted Deficiency in Flexure Strength-PSI</u>	<u>Proportional Part of Contract Price Allowed</u>
650 psi and above	100%
649 psi to 645 psi	90%
644 psi to 640 psi	80%
639 psi to 635 psi	70%
634 psi to 630 psi	60%
629 psi to 625 psi	50%

Any adjusted deficiency below 625 psi shall be removed or, if approved by the Engineer, may be left in place without payment.

- (f) Mixing Concrete. The concrete may be mixed at the work site in a central mix plant or in truck mixers. The mixer shall be of an approved type and capacity. Mixing time shall be measured from the time all materials, except water, are emptied into the drum. Ready-mixed concrete shall be mixed and delivered in accordance with the requirements of AASHTO M-157.
- 1). When mixed at work site or in a central mixing plant, the mixing time shall be not less than 50 seconds nor more than 90 seconds. Four seconds shall be added to the specified mixing time if timing starts the instant the skip reaches its maximum raised position. Mixing time ends when the discharge chute opens. Transfer time in multiple drum mixers is included in mixing time. The contents of an individual mixer drum shall be removed before a succeeding batch is emptied therein.
 - 2). The mixer shall be operated at the drum speed as shown on the manufacturer's nameplate on the approved mixer. Any concrete mixed less than the specified time shall be discarded by the Contractor at his expense. The volume of concrete mixed per batch shall not exceed the standard rating plate on the mixer, except that an overload up to 10% above the mixer's nominal capacity may be permitted, provided concrete test data for strength, segregation, and uniform consistency are satisfactory, and provided no spillage of concrete takes place.
 - 3). The batch shall be charged into the drum so that a portion of the mixing water shall enter in advance of the cement and aggregates. The flow of water shall be uniform and all water shall be in the drum by the end of the first 15 seconds of the mixing period. The throat of the drum shall be kept free of such accumulations as may restrict the free flow of materials into the drum.
 - 4). Mixed concrete from the central-mixing plant shall be transported in truck mixers, truck agitators, or nonagitating trucks having special bodies. The time elapsing from the time water is added to the mix until the concrete is deposited in place at the work site shall not exceed 30 minutes when the concrete is hauled in nonagitating trucks, nor 60 minutes when the concrete is hauled in truck mixers or truck agitators.
 - 5). Retempering concrete by adding water will not be permitted. Concrete that is not within the specified slump limits at the time of placement shall not be used. Admixtures for increasing the workability or for accelerating the set will be permitted only when specifically specified for in the contract.
- (g) Limitations of Mixing. No concrete shall be mixed, placed or finished when the natural light is insufficient, unless an adequate and approved artificial lighting system is operated.
- 1). Unless authorized in writing by the Engineer, mixing and concreting operations shall be discontinued when a descending air temperature in the shade and away from artificial heat reaches 40°F., and shall not be resumed until an ascending air temperature in the shade and away from artificial heat reaches 35°F.
 - 2). When concreting is authorized during cold weather, the aggregates may be heated by either steam or dry heat prior to being placed in the mixer. The apparatus used shall heat the mass uniformly and shall be so arranged as to preclude the possible occurrence of overheated areas which might injure the materials. Unless otherwise authorized, the temperature of the mixed concrete shall be not less than 50°F., and not more than 80°F., at the time of placement in the forms.

- 3). If the air temperature is 35°F., or less at the time of placing concrete, the Engineer may require the water and/or the aggregates to be heated to not less than 70°F., nor more than 150°F. Concrete shall not be placed on frozen subgrade nor shall frozen aggregates be used in the concrete.
- 4). Sufficient cold weather protection shall be provided to cover and protect the freshly placed concrete for a period of a minimum of five (5) days.
- 6). Placement of concrete during hot weather shall be controlled by various means to maintain the concrete temperature at the time of placement in the forms to 85°F.

The temperature of the various materials and the final concrete may require the use of several simultaneous cooling methods including covering the aggregate stockpiles, sprinkling the aggregates, chilled water, substituting crushed ice for a portion of the mixing water, and/or any other method to maintain the temperature of the concrete at the time of placement to a maximum of 85° F.

- (h) Placing Concrete. The concrete shall be deposited on the thoroughly moistened grade in such a manner as to require as little rehandling as possible. Unless truck mixers, truck agitators, or non-agitating hauling equipment are equipped with means for discharge of concrete without segregation of the materials, the concrete shall be unloaded into an approved spreading device and mechanically spread on the grade in such a manner as to prevent segregation of the materials. Placing shall be continuous between transverse joints without the use of intermediate bulkheads. Necessary hand spreading shall be done with shovels, not rakes. Workmen shall not be allowed to walk in the freshly mixed concrete with boots or shoes coated with earth or foreign substances.
- 1). Concrete shall be thoroughly consolidated against and along the faces of all forms and along the full length and on both sides of all joint assemblies by means of vibrators inserted in the concrete. Vibrators shall not be permitted to come in contact with a joint assembly, the grade, or a side form. In no case shall the vibrator be operated longer than 15 seconds in any one location.
 - 2). Concrete shall be deposited as near to expansion and contraction joints as possible, without disturbing them but shall not be dumped from the discharge bucket or hopper onto a joint assembly unless the hopper is well centered on the joint assembly.
 - 3). Should any concrete materials fall on or be worked into the surface of a completed slab, they shall be removed immediately by approved methods.
- (i) Strike-Off of Concrete and Placement of Reinforcement. Following the placing of the concrete, it shall be struck-off to conform to the cross section shown on the plans and to an elevation such that when the concrete is properly consolidated and finished, the surface of the pavement shall be at the elevation shown on the plans. When reinforced concrete pavement is placed in two layers, the bottom layer shall be struck-off to such length and depth that the sheet of fabric or bar mat may be laid full length on the concrete in its final position without further manipulation. The reinforcement shall then be placed directly upon the concrete, after which the top layer of the concrete shall be placed, struck-off and screeded. Any portion of the bottom layer of concrete which has been placed more than 30 minutes without being covered with the top layer shall be removed and replaced with freshly mixed concrete at the Contractor's expense. When reinforced concrete is placed in one layer, the reinforcement may be positioned in advance of concrete placement or it may be placed in

plastic concrete by mechanical or vibratory means after spreading.

- 1) Reinforcing steel, at the time concrete is placed, shall be free of mud, oil, or other organic matter that may adversely affect or reduce bond.
- 2) Reinforcing steel with rust, mill scale, or a combination of both will be considered satisfactory, provided the minimum dimensions, weight, and tensile properties of a hand wire-brushed test specimen are not less than the applicable AASHTO specification requirement.
- 3) The Contractor shall, at his option, either place pavement reinforcing manually in the plane shown on the plans and then place the final lift or he may set the reinforcing into place using mechanical equipment to be approved by the Engineer prior to its use, after the placement of the concrete.
- 4) Mechanical equipment to place the pavement reinforcing after the placement of concrete shall be capable of positioning the pavement reinforcing at the required depth in the wet concrete without damaging the edges and finished surface of the concrete pavement. The Contractor shall use a finishing machine, equipped with side forms, to correct and refinish the surface of the concrete pavement to provide a smooth riding surface in accordance with the requirements of the specifications.

(j) Joints.

- 1) General. Longitudinal and transverse joints shall be constructed as indicated on the plans and in accordance with these requirements. All joints shall be constructed true to line with their faces perpendicular to the surface of the pavement. Joints shall not vary more than 1/4 inch from true line or from their designated position. The vertical surface of the pavements adjacent to all expansion joints shall be finished to a true plane and edged to a radius of 1/4 inch, or as shown on the plans. The surface across the joints shall be tested with a 10 foot straightedge as the joints are finished and any irregularities in excess of 1/8 inch shall be corrected before the concrete has hardened. Transverse joints shall be at right angles to the centerline of the pavement and shall extend the full width of the slab. The transverse joints in succeeding lanes shall be placed in the line with similar joints in the first lane. In the case of widening existing pavements, transverse joints shall be placed in line with similar joints in the existing pavement. All transverse contraction joints shall be saw cut to the depths and widths shown in the plans.

- i) Deformed Dowel Bars. Deformed dowel bars of the dimensions and spacings as shown on the plans shall be installed principally in longitudinal construction joints as shown on the plans. The dowel bars shall be placed at right angles to the centerline of the concrete slab and shall be spaced at intervals of 12 inches, unless otherwise specified. They shall be held in position parallel to the pavement surface and midway between the surfaces of the slab.

When deformed dowel bars extend into an unpaved lane, they shall be drilled and epoxy grouted into the poured lane as hereinafter specified, unless threaded bolt or other assembled deformed dowel bars are specified. These bars shall not be painted, greased, or enclosed in sleeves.

- ii) Smooth Dowel Bars. Smooth dowel bars or other load-transfer units of an approved type shall be placed across transverse, longitudinal, or other joints in the manner as specified on the plans. They shall be of the dimensions

and spacings as shown and held rigidly in the middle of the slab depth in the proper horizontal and vertical alignment by an approved assembly device to be left permanently in place. When the dowels for longitudinal construction joints extend into an unpaved lane, they shall be drilled and epoxy grouted into the poured lane as hereinafter specified. The dowel or load-transfer and joint devices shall be rigid enough to permit complete assembly as a unit ready to be lifted and placed into position. The portion of each dowel painted with rust preventative paint, as required under Paragraph 02(f) hereinbefore, shall be thoroughly coated with Asphalt MC-70, or an approved lubricant, to prevent the concrete from binding to that portion of the dowel. In lieu of using dowel assemblies at contraction joints, dowel bars may be placed in the full thickness of pavement by a mechanical device approved by the Engineers.

- 2). Installation. If the paving mixer is operated from an adjacent lane, any joint materials required shall be set immediately after the final testing of the grade. If the paving mixer is operated from the lane being poured, the materials shall be set immediately after the mixer moves forward to permit as much time as possible for proper installation. All joint materials required shall be put in place on the completed and accepted grade. The materials and joint position shall be either at right angles or parallel to the centerline of the pavement, except for fillets or irregular sections. The top of an assembled joint device shall be set at the proper distance below the pavement surface and the elevation shall be checked. Such devices shall be set to the required position and line and shall be securely held in place by stakes or other means during the pouring and finishing of the concrete. The premolded joint material shall be placed and held in a vertical position; if constructed in sections there shall be no offsets between adjacent units. Dowel bars shall be checked for exact position and alignment as soon as the joint device is staked in place and the device shall be tested to determine whether it is firmly supported. Any joint installation not firmly and securely supported shall be reset.
 - i) When joints in concrete pavements are sawed, the joints shall be cut at the time and in the manner approved by the Engineer. The equipment used shall be as described in paragraph 03(a)4).
 - ii) The circular cutter shall be capable of cutting a groove in a straight line; the circular cutter shall produce a slot at least 1/8 inch wide. When shown on the plans or required by the specifications, the top portion of the slot or groove shall be widened by means of a second shallower cut or by suitable and approved beveling to provide adequate space joint sealers. Sawing of the joints shall commence as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling or tearing. Sawing shall be carried on both during the day and night as required. The joints shall be sawed at the required spacing consecutively in sequence of the concrete placement, unless otherwise approved by the Engineer.
- 3). Longitudinal Joints.
 - i) Construction. Longitudinal construction joints necessary for lane construction shall be formed against suitable forms made of steel. Wooden forms may be used under special conditions, when approved by the Engineer. The construction joints shall be a butt-type joint with smooth dowel bars or deformed tie-bars, as indicated on the plans. The dowels for this type joint shall be painted and greased. The edges of the joint shall be finished with a grooving tool or edging tool and a space or slot shall be

formed along the joint of the dimensions, as indicated, to receive the joint sealing material. Provisions shall be made for the installation of tie bars as noted on the plans.

- ii) Contraction or Weakened-plane Type. The longitudinal groove formed or sawed in the top of the slab shall be installed where indicated on the drawings. The groove shall be formed in the plastic concrete with suitable tools or material to obtain the width and depth specified, or it shall be sawed with approved equipment in the hardened concrete to the dimensions required. When the groove is formed in plastic concrete, it shall be true to line with not more than 1/4 inch variation in 10 feet; it shall be uniform in width and depth; and the sides of the groove shall be finished evenly and smoothly with an edging tool. If an insert material is used, the installation and edge finish shall be according to the manufacturer's instructions. The sawed groove shall be straight and of uniform width and depth. In either case, the groove shall be clean cut so that spalling will be avoided at intersections with transverse joints. Tie bars shall be installed across those joints, as shown on the plans.
- iii) Expansion. Longitudinal expansion joints shall be installed where designated on the plans. These shall be of a butt type without load-transfer devices and shall include a premolded expansion material. The thickness of the concrete at these joints shall be increased by at least 25% of the normal pavement thickness to the nearest inch but not less than 2 inches. This increase shall slope to normal thickness in not less than 10 feet from the joint unless otherwise indicated on the plans or to the nearest joint such as a groove joint. The premolded filler, of the thickness as shown on the plans, shall extend for the full depth and width of the slab at the joint, except for space for sealant at the top of the slab. The filler shall be securely staked or fastened into position perpendicular to the proposed finished surface.

A metal or wooden cap shall be provided to protect the top edge of the filler and to permit the concrete to be placed and finished. After the concrete has been placed and struck-off, the cap shall be carefully withdrawn leaving the space over the premolded filler. The edges of the joint shall be finished and tooled while the concrete is still plastic. The width of the joint shall be corrected for temperature, nominal width shown on the plans to be at 68°F.

4). Transverse Joints.

- i) Expansion. Transverse expansion joints shall be installed at the locations and spacing as shown on the plans. The joints shall be installed at right angles to the centerline and perpendicular to the surface of the pavement. The joints shall be so installed and finished to insure complete separation of the slabs.

Expansion joints shall be of a premolded type conforming to these specifications and with the plans and shall be the full width of the pavement strip.

All concrete shall be cleaned from the top of the joint material. Before the pavement is opened to traffic this space shall be swept clean and filled with approved joint sealing material.

The filler shall be placed on the side of the installing plate nearest the mixer. The top edge of the filler shall be protected by a metal channel cap of at

least 10 gauge material. The installing device may be designed with this cap self-contained.

All devices used for the installation of expansion joints shall be approved by the Engineer. They shall be easily removable without disturbing the concrete and held in proper transverse and vertical alignment. Immediately after forms are removed, any concrete bridging the joint space at the ends shall be removed for the full width and depth of the joint.

When specified, expansion joints shall be equipped with dowels of the dimensions and at the spacing and location indicated on the plans. The dowels shall be firmly supported in place and accurately aligned parallel to the subgrade and the centerline of the pavement by means of a dowel assembly which will remain in the pavement and will insure that the dowels are not displaced during construction.

Other types of load-transfer devices may be used, when approved by the Engineer. The width of the joint shall be corrected for temperature, nominal width shown on the plans to be at 68°F.

- ii) Contraction. Transverse contraction joints, weakened-plane joints, or both, shall be installed at the locations and spacing as shown on the plans. These joints will be installed by forming a groove or cleft in the top of the slab while the concrete is still plastic or by sawing a groove into the concrete surface after the concrete has hardened in the same manner as specified in paragraph 03)(j)3)ii).

Dowel bar assembly shall be installed when required, as shown on the plans.

- iii) Construction. Transverse construction joints shall be installed in accordance with the details on the plans and ordinarily are only needed when it is necessary to suspend the work for more than 30 minutes. The construction joint shall be located at a planned contraction or expansion joint. The fresh concrete shall be removed back to the previously spaced regular joint.
- iv) Construction of Connection Between New and Existing Pavement. The Contractor shall hand excavate, using extreme care, to the dimensions shown in the plans, adjacent to the edges of all existing pavements to prevent any damage to the existing pavement.

The connection between the new and existing pavements shall be constructed as shown on the plans.

Any damage to the existing pavement caused by the Contractor's operations shall be repaired by him, to the satisfaction of the Engineer at no cost to the Owner.

(k) Final Strike-Off, Consolidation and Finishing.

- 1). Sequence. The sequence of operations shall be the strike-off and consolidation, floating and removal of laitance, straightedging, and final surface finish. The addition of superficial water to the surface of the concrete to assist in finishing operations

generally will not be permitted. If the application of water to the surface is permitted, it shall be applied as a fog spray by means of approved spray equipment.

2), Finishing at Joints.

- i) The concrete adjacent to joints shall be compacted or firmly placed without voids or segregation against the joint material; it shall be firmly placed without voids or segregation under and around all load-transfer devices, joint assembly units, and other features designed to extend into the pavement. Concrete adjacent to joints shall be mechanically vibrated as required in paragraph 03(h).
- ii) After the concrete has been placed and vibrated adjacent to the joints as required in paragraph 03(h), the finishing machine shall be operated in a manner to avoid damage or misalignment of joints. If uninterrupted operations of the finishing machine, to, over, and beyond the joints causes segregation of concrete, damage to, or misalignment of the joints, the finishing machine shall be stopped when the front screed is approximately 8 inches from the joint. Segregated concrete shall be removed from the front of and off the joint; the front screed shall be lifted and set directly on top of the joint and the forward motion of the finishing machine shall be resumed.

When the second screed is close enough to permit the excess mortar in front of it to flow over the joint, it shall be lifted and carried over the joint. Thereafter, the finishing machine may be run over the joint without lifting the screeds, provided there is no segregated concrete immediately between the joint and the screed or on top of the joint.

3). Machine Finishing.

- i) A belt finish or burlap drag will be acceptable on the taxiway and roadway pavements. The final elevations of all pavements shall not vary more than one fourth (1/4) inch from the finished grade elevations.
- ii) Vibratory Method. When vibration is specified, vibrators for full-width vibration of concrete paving slabs shall meet the requirement specified in paragraph 03)(a)3) ii). If uniform and satisfactory density of the concrete is not obtained by the vibratory method at joints, along forms, at structures, and throughout the pavement, the Contractor will be required to furnish equipment and methods which will produce pavement conforming to the specifications.

When in operation, the screed shall be moved forward on the forms with a combined longitudinal and transverse shearing motion, always moving in the direction in which the work is progressing, and so manipulated that neither end is raised from the side forms during the striking-off process. If necessary, this shall be repeated until the surface is of uniform texture, true to grade and cross section, and free from porous areas.

4). Hand Finishing. Unless otherwise specified, hand finishing methods will not be permitted, except under the following conditions:

- i) In the event of breakdown of the mechanical equipment, hand methods may be used to finish the concrete already deposited on the grade.

- ii) Narrow widths or areas or irregular dimensions where operation of the mechanical equipment is impractical may be finished by hand methods.
 - iii) Concrete, as soon as placed, shall be struck-off and screeded. An approved portable screed shall be used. A second screed shall be provided for striking-off the bottom layer of concrete when reinforcement is used.
 - iv) The screed for the surface shall be at least 2 feet longer than the maximum width of the slab to be struck-off. It shall be of approved design, sufficiently rigid to retain its shape, and shall be constructed either of metal or of other suitable material, shod with metal.
 - v) Consolidation shall be attained by the use of a suitable vibrator or other approved equipment.
- 5). Floating. After the concrete has been struck-off and consolidated, it shall be further smoothed, trued, and consolidated by means of a longitudinal float, using one of the following methods, as specified or permitted:
- i) Hand Method. The hand-operated longitudinal float shall be not less than 12 feet in length and 6 inches in width, properly stiffened to prevent flexibility and warping. The longitudinal float, operated from foot bridges resting on the side forms and spanning but not touching the concrete, shall be worked with a sawing motion, while held in a floating position parallel to the road centerline and passing gradually from one side of the pavement to the other. Forward movement along the centerline of the pavement shall be in successive advances of not more than one-half the length of the float. Any excess water or soupy material shall be wasted over the side forms on each pass.
 - ii) Mechanical Method. The mechanical longitudinal float shall be approved by the Engineer, and it shall be in good working condition. The tracks from which the float operates shall be accurately adjusted to the required crown. The float shall be accurately adjusted and coordinated with the adjustments of the transverse finishing machine so that a small amount of mortar is carried ahead of the float at all times. The forward speed shall be adjusted so that the float will lap the distance specified by the Engineer on each transverse trip. The float shall pass over each pavement at least two times, but excessive operation over a given area will not be permitted. Any excess water or soupy material shall be wasted over the side forms on each pass.
 - iii) Alternative Mechanical Method. As an alternative to paragraph 03(k)5)ii., Contractor may use a machine composed of a cutting and smoothing float(s) suspended from and guided by a rigid frame. The frame shall be carried by four or more visible wheels riding on, and constantly in contact with, the side forms.

If necessary, following one of the preceding methods of floating, long-handled floats having blades not less than 5 feet in length and 6 inches in width may be used to smooth and fill in open-textured areas in the pavement. Long-handled floats shall not be used to float the entire surface of the pavement in lieu of, or supplementing, one of the preceding methods of floating. When strike-off and consolidation are done by hand, and the crown

of the pavement will not permit the use of the longitudinal float, the surface shall be floated transversely by means of the long-handled float. Care shall be taken not to work the crown out of the pavement during the operation. After floating, any excess water and laitance shall be removed from the surface of the pavement by a straightedge 10 feet or more in length. Successive drags shall be lapped one-half the length of the blade.

- 6). Straight-edge Testing and Surface Correction. After the floating has been completed and the excess water removed, but while the concrete is still plastic, the surface of the concrete shall be tested for trueness with a 16 foot straightedge. For this purpose the Contractor shall furnish and use an accurate 16 foot straightedge swung from handles 3 feet longer than one-half the width of the slab. The straightedge shall be held in contact with the surface in successive positions parallel to the centerline and the whole area gone over from one side of the slab to the other, as necessary. Advancing shall be in successive stages of not more than one half the length of the straightedge. Any depressions shall be immediately filled with freshly mixed concrete, struck-off, consolidated, and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across joints meets the requirements for smoothness. Straightedge testing and surface correction shall continue until the entire surface is found to be free from observable departures from the straightedge and until the slab conforms to the required grade and cross section.
- 7). Final Finish. Taxiways, roadways and other pavements may be finished with either a belt finish, or a burlap drag finish.
 - i) Belt Finish. If the surface texture is to be a belt finish, when straightedging is completed and water sheen has practically disappeared and just before the concrete becomes non-plastic, the surface shall be belted with a 2-ply canvas belt not less than 8 inches wide and at least 3 feet longer than the pavement width. Hand belts shall have suitable handles to permit controlled, uniform manipulation. The belt shall be operated with short strokes transverse to the centerline and with a rapid advance parallel to the centerline.
 - ii) Drag Finish. If the surface texture is to be a drag finish, a drag shall be used; it shall consist of a seamless strip of damp burlap and it shall produce a uniform surface of gritty texture after dragging it longitudinally along the full width of pavement. For pavement 16 feet or more in width, the drag shall be mounted on a bridge which travels on the forms. The dimensions of the drag shall be such that a strip of burlap at least 3 feet wide is in contact with the full width of pavement surface while the drag is used. The drag shall consist of not less than two layers of burlap with the bottom layer approximately 6 inches wider than the upper layer. The drag shall be maintained in such a condition that the resultant surface is of uniform appearance and reasonably free from grooves over 1/16 inch in depth. Drags shall be maintained clean and free from encrusted mortar. Drags that cannot be cleaned shall be discarded and new drags substituted.

- 8). Edging at Forms and Joints. After the final finish, but before the concrete has taken its initial set, the edges of the pavement along each side of each slab, and on each side of transverse expansion joints, formed joints, transverse construction joints, and emergency construction joints shall be worked with an approved tool and rounded to the radius required by the plans. A well-defined and continuous radius shall be produced and a smooth, dense, mortar finish obtained. The surface of the slab shall not be unduly disturbed by tilting of the tool during use.

At all joints, any tool marks appearing on the slab adjacent to the joints shall be eliminated by brooming the surface. In doing this, the rounding of the edge shall not be disturbed. All concrete on top of the joint filler shall be completely removed.

All joints shall be tested with a straightedge before the concrete has set, and correction shall be made if one side of the joint is higher than the other or if they are higher or lower than the adjacent slabs.

- (l) Surface Test. The Contractor shall also have a 16' rolling straightedge on the work to check the completed pavement. Surface deviations in excess of 1/4 inch in 16 feet in any direction will require correction by planing. Deviations exceeding 1/2" shall be cause for removal and replacement .

Any area or section so removed shall not be less than 10 feet in length nor less than the full width of the lane involved. When it is necessary to remove and replace a section of pavement, any remaining portion of the slab adjacent to the joints that is less than 10 feet in length shall also be removed and replaced.

- (m) Curing. Immediately after the finishing operations have been completed and marring of the concrete will not occur, the entire surface of the newly placed concrete shall be cured in accordance with one of the following methods. In all cases in which curing requires the use of water, the curing shall have prior right to all water supply or supplies. Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately take care of both curing and other requirements, shall be cause for immediate suspension of concreting operations. The concrete shall not be left exposed for more than 1/2 hour between stages of curing or during the curing period.

- 1). Impervious Membrane Method. The entire surface of the pavement shall be sprayed uniformly with white pigmented curing compound immediately after the finishing of the surface and before the set of the concrete has taken place. The curing compound shall not be applied during rainfall.

Curing compound shall be applied by mechanical sprayers under pressure at the rate of 1 gallon to not more than 125 square feet. The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. During application the compound shall be stirred continuously by effective mechanical means. Hand spraying of off widths or shapes and concrete surfaces exposed by the removal of forms will be permitted. Curing compound shall not be applied to the inside faces of joints to be sealed.

The curing shall be of such character that the film will harden within 30 minutes after application. Should the film become damaged from any cause within the required curing period, the damaged portions shall be repaired immediately with additional compound.

Upon removal of side forms, the sides of the exposed slabs shall be protected immediately to provide a curing treatment equal to that provided for the surface.

- 2). Curing in Cold Weather. When the average daily temperature is below 40°F., curing shall consist of covering the newly laid pavement with a protective curing authorized by the Engineer, which shall be retained in place as determined by the Engineer. Admixture for curing or temperature control may be used only when authorized by the Engineer.

When concrete is being placed and the air temperature may be expected to drop below 30°F., a sufficient supply of suitable blanketing material shall be provided along the work. Any time the temperature may be expected to reach the freezing point during the day or night, the material so provided shall be spread over the pavement to prevent freezing of the concrete. The period of time such protection shall be maintained shall be determined by the Engineer. The Contractor shall be responsible for the quality and strength of the concrete placed during cold weather, and any concrete injured by frost action shall be removed and replaced at the Contractor's expense.

- (n) Removing Forms. Unless otherwise specified, forms shall not be removed from freshly placed concrete until it has set for at least 12 hours, except where auxiliary forms are used temporarily in widened areas. Forms shall be removed carefully to avoid damage to the pavement. After the forms have been removed, the sides of the slab shall be cured as outlined in one of the methods indicated in paragraph (m) above. Major honeycombed areas shall be considered as defective work and shall be removed and replaced. Any area or section so removed shall be not less than 10 feet in length nor less than the full width of the lane involved. When it is necessary to remove and replace a section of pavement, any remaining portion of the slab adjacent to the joints that is less than 10 feet in length shall also be removed and replaced.
- (o) Sealing Joints. The joints in the pavement shall be sealed in accordance with Section P-605 of these specifications.
- (p) Protection of Pavement. The Contractor shall protect the pavement and its appurtenances against both public traffic and traffic caused by his own employees and agents. This shall include watchmen to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges, or crossovers, etc.

The plans or special provisions will indicate the location and type of device or facility required to protect the work and provide adequately for traffic. Any damage to the pavement occurring prior to final acceptance shall be repaired or the pavement replaced at the Contractor's expense.

- (q) Loading on new concrete The pavement shall attain a strength of 450 psi for dowel drilling equipment on the new concrete, 500 psi for paving equipment on the new pavement and 650 psi for opening to air traffic. The strength shall be determined based on the actual strength adjusted for the ratio of the design thickness compared to the actual thickness based on the pavement design.
- (r) Opening to Traffic. The Engineer shall decide when the pavement shall be opened to traffic, based on maturity meter readings and/or flexural strength testing. The pavement shall not be opened to traffic for at least 3 days after the concrete has been placed. Prior to opening, the pavement shall be cleaned.

- (s) Surface Tolerances. Extreme care must be exercised in all phases of the operation to assure that the pavement will pass the specified tolerances. The following tolerances are applicable:
- 1). Lateral deviation from established alignment of the pavement edge shall not exceed plus or minus 0.10 foot in any lane.
 - 2). Vertical deviation from established grade shall not exceed plus or minus 0.04 foot at any point.
 - 3). Surface smoothness deviations shall not exceed 1/4" from a 16-foot straightedge placed in any direction, including placement along and spanning any pavement joint or edge, and in addition shall not exceed the requirements as stated in 03)(L).
 - 4). In order to stay within the above tolerances, the Contractor must control the tolerances on all phases of construction preceding the placement of pavement and is cautioned that additive deviations may result in the removal and replacement of out of tolerance construction and/or price adjustments for deficient construction in accordance with the specifications as stated herein.

TESTING AND MATERIAL REQUIREMENTS

<u>Test and short title</u>	<u>Material and short title</u>
AASHTO T-26 -- Water	AASHTO M 6 -- Fine Aggregate
AASHTO T-23 -- Test Specimens	AASHTO M 80 -- Coarse Aggregate
AASHTO T-97 -- Flexural Strength	AASHTO M 85 -- Portland Cement Concrete
AASHTO T-119 -- Slump	AASHTO M 154 -- Air-entrained PC
AASHTO T-152 -- Air (Aggregate)	AASHTO M 151 -- Slag PC
	AASHTO M 90 -- Joint Filler
ASTM T-173 -- Air (Slag)	AASHTO M 153 -- Joint Filler
AASHTO T-121 -- Yield	AASHTO M 213 -- Joint Filler
AASHTO T-84 and T-85 -- Absorption and Specific Gravity	AASHTO M 55 -- Wire
AASHTO T-148 -- Cores	AASHTO M 137 -- Bars
ASTM C1260 -- ASR	AASHTO M 54 -- Bars
ASTM C1293 -- ASR	AASHTO M 31 -- Bars
	AASHTO M 42 -- Bars
	AASHTO M 73 -- Mats
	AASHTO M 139 -- Paper
	AASHTO M 171 -- Polyethylene
	AASHTO M 182 -- Burlap
	AASHTO M 148 -- Membrane
	ASTM C 618 -- Fly Ash
	ASTM C 402 -- Pozzolans
	ASTM C 260 -- Air-entraining
	ASTM C 494 -- Water Reducing
	AASHTO M 157 -- Ready Mix
	Fed. Spec. TT-C-800 -- Membrane

Note: Others as required by referenced specifications.

END OF SECTION P-501

SECTION P-504 HIGH EARLY STRENGTH CEMENT CONCRETE PAVEMENT

1) DESCRIPTION

This work shall consist of pavement composed of a quick setting high early strength concrete, with or without reinforcement, constructed on existing base courses, after removal of the existing pavement. The work shall comply with applicable sections of the 501 Specifications referenced herein, and shall conform to the lines, grades, thickness and typical cross sections shown on the drawings.

2) QUALITY CONTROL

Quality Control shall be as specified in the "Quality Control" section of the contract documents and in Section P-501- Portland Cement Concrete Pavement, with the addition of the following:

If the concrete is produced at the paving site with a mobile batching-mixing plant, the equipment shall be capable of producing the specified concrete mix to the standards of quality and uniformity that would be required for production by a permanent or portable batch plant. Specifically, the equipment shall be capable of consistent production to the concrete uniformity requirements of Table A1.1 in ASTM C685 - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing. Compliance with these requirements shall be demonstrated by quality control testing of the mix produced by each equipment unit proposed for use on the project. A qualified independent laboratory, at the Contractor's expense shall perform the testing. The test results and a certification by the laboratory that the equipment meets the above stated requirements shall be submitted and approved by the Engineer before the start of full pavement production will be authorized. If the equipment compliance documentation is not previously submitted and approved, the required testing shall be accomplished during the Mix Design Development process.

3) MATERIALS

(a) Fine Aggregate

Fine Aggregate for concrete shall conform to the requirements of ASTM C33 and shall meet the requirements of Table 1, as specified in Section P-501 - Portland Cement Concrete Pavement.

(b) Coarse Aggregate

As specified in Section P-501 - Portland Cement Concrete Pavement.

(c) Cement

Cement shall be one of the following:

- 1) Portland Cement conforming to the requirements of ASTM C150, Type I, Type II, or Type III.
- 2) "Rapid Set C-150 Cement" as manufactured by the CTS Cement Manufacturing Company, or an approved equal.
- 3) A combination of the above.

All cement of a particular type shall be the product of one manufacturer. If, for any reason, cement becomes partially set or contains lumps of caked cement, it shall be rejected. Cement salvaged from discarded or used bags shall not be used.

The cement listed above shall be capable of producing a quick setting high early strength concrete with the following properties:

- (1) Development of flexural strength in excess of 550 psi at 24 hours from the completion of concrete placement.
- (2) Development of flexural strength in excess of 650 psi at pavement opening time.

If the Contractor proposes to use a cement other than Rapid-Set C-150 cement, information relating to the proposed cement shall be submitted indicating the use of the material under (5) separate contracts for the previous (5) years.

(a) Admixtures

As specified in Section P-501 - Portland Cement Concrete Pavement.

(b) Water

As specified in Section P-501 - Portland Cement Concrete Pavement.

(c) Steel Reinforcement, Dowels, and Tie Bars

Steel reinforcement, dowels, and tie bars shall meet the requirements of Section P-501 - Portland Cement Concrete Pavement.

(d) Premolded Joint Filler

As specified in Section P-501 - Portland Cement Concrete Pavement.

(e) Joint Sealer

The sealer for joints in the concrete pavement shall meet the requirements of Section P-605 - Joint Sealing Filler.

(f) Cover Material for Curing

Curing materials and methods shall conform to the recommendations of the curing material manufacturer and the cement manufacturer, and Section P-501 - Portland Cement Concrete Pavement.

4) MIX DESIGN

(a) General

As specified in Section P-501 - Portland Cement Concrete Pavement, with the exception of the following:

- 1) A mix design shall be developed to allow for the construction of 12.5 to 50 x 25-foot slabs within the closure periods specified on the plans. The mix design shall meet the criteria specified in 4) Mix Design (b) Strength and Proportions.

- 2) Several quick setting high early strength concrete mix designs, utilizing RAPID-SET Cement as manufactured by CTS Cement Company, were developed, that met the above criteria, and were used on airfield pavement projects at Hartsfield-Jackson Atlanta International Airport. CTS Corporation may be contacted at 1-800-929-3030 for information on use of high-early strength cement.
- 3) The previous project experience with quick setting concrete mix designs showed variability in the set time of the concrete mix and the cement material used. The Contractor shall develop a mix design and quality control program to allow adjustment in the procedures so the concrete mix that is used consistently meets the criteria specified at no cost to the Owner.

(b) Strength and Proportions

As specified in Section P-501 - Portland Cement Concrete Pavement, with the exception of the following:

A mix design shall be developed by the Contractor to meet the following properties:

1. The concrete mix shall achieve a minimum flexural strength of 650 psi before pavement opening time, and shall achieve a minimum flexural strength of 750 psi in 28 days.
2. The concrete must attain the 650-psi flexural strength before the pavement is opened to traffic.
3. The concrete mix shall have a set time of a minimum of 30 minutes beyond the time established by the Contractor's procedure to batch, transport, and place the mix and no further surface finishing can be accomplished.

The proportions of the concrete mix shall be as developed by the Contractor to meet the specified criteria. There is no specified minimum cement content, slump, water/cement ratio or restriction on admixtures.

(c) Cementitious Materials

Fly ash and silica fume may be used in the mix. Ground blast-furnace slag shall not be used.

(d) Admixtures

As specified in Section P-501 - Portland Cement Concrete Pavement, with the exception of the following:

Air Entraining: The average air content shall be 4.5 percent, plus or minus 1.0 percent, and the mix shall have a durability factor of 95 or more when tested in accordance with ASTM C-666. The durability factor shall be determined by a test of the actual concrete mix to be used on the project.

(e) Mix Design Development

The Contractor shall develop a mix design that meets the criteria specified in section 4) Mix Design. The process shall include the development of a minimum of three trial batches with decreasing water/cement ratios.

The batches shall use the intended raw materials to be used for the project, including cement, fine and coarse aggregates as well as chemical and mineral admixtures. The trial batch mixtures shall maintain the same fine aggregate/coarse aggregate ratios as well as the same proportions of intended admixtures, only the water/cement ratio shall be varied. The testing of the trial

batches shall, at a minimum, include flexural strength, temperature development, air content and slump. Flexural beam tests and temperature development specimens shall be prepared in accordance with ASTM C31, except that specimens shall be surrounded with insulative blankets for minimum of 5 hours following addition of water to the mix. Freeze-thaw durability testing shall be required only on the specific mix design intended for use on the project.

(a) Flexural Strength Testing

The average of a minimum of two flexural strength test results shall be completed at 12 hours, 24 hours, 36 hours, 7 days and 28 days for each of the three trial batches. The results shall be plotted on a flexural strength versus water/cement ratio curve.

(b) Temperature Development

The trial batches shall be monitored for development of temperature from the time the water is added to the mix until an age of 36 hours at 1-hour intervals. The temperature of the water and other materials and the ambient temperature at the time of batching shall be recorded. The time at which the mix takes a set shall be recorded along with the corresponding temperature of the mix. The temperature shall be taken with a thermometer accurate to within 0.5 °F. The thermometer shall remain inserted in the curing sample throughout the period of testing. The temperature data shall be plotted for each trial batch, with temperature on the vertical scale and time on the horizontal. The set time of the mix shall be identified for each batch.

(c) Freeze-Thaw Durability

The mix intended for use on the project shall be tested for durability in accordance with ASTM C666.

(d) Mix Design Submittal

The mix design submittal shall include the following minimum information:

1. Type(s) of cement.
2. Water/cement ratio.
3. Slump.
4. Air Entrainment percentage.
5. Flexural strength test results at 12, 24, and 36 hours, 7 days and 28 days.
6. Results of durability test in accordance with ASTM C666.
7. Temperature development of mix and set time.
8. Plant/lab mix certification of proportion of materials.
9. Fine and coarse aggregate supplier, pit location, gradation, fineness modulus, tested wear, specific gravity, absorption capacity and moisture content.
10. Manufacturer's name, catalog information for the cement(s) and admixtures used, including ASTM certification information.
11. Certification of Testing Laboratory designing the mix.

(e) Tentative Mix Design Approval

When a mix design meeting all the specified criteria and documentation requirements have been met and approved by the Engineer, the mix design may be given tentative approval. Tentative approval may be granted prior to the receipt of the 28-day strength tests, if 750-psi flexural strength has been demonstrated at an earlier test period.

(f) Full Mix Design Approval

Full approval of the mix design will be granted when the following requirement has been met:

1. Acceptable results from the 28-day strength.

5) CONSTRUCTION METHODS

(a) Equipment

As specified in Section P-501 - Portland Cement Concrete Pavement, with the following exceptions and additions:

- 1) Backup Equipment: For pavement removal and replacement under night working conditions, the Contractor shall provide backup units for each item of equipment that is essential to the timely completion of the work. The backup equipment shall be itemized and submitted for review and approval prior to the placement of any pavements.
- 2) If the concrete is produced at the paving site with a mobile batching-mixing plant, the equipment shall meet the requirements specified in Section 2 Quality Control. Inspection of each equipment unit for calibration and effective operation shall occur at least once during every work period of production and for every 40 cubic yards of concrete produced.

(b) Form Setting

The concrete shall be placed and formed in accordance with the following:

- 1) Against the sides of previously placed concrete slabs, or against other existing slabs or structures which will remain: Unless the slabs are separated by expansion joint material, the sides of the adjacent concrete shall be sprayed with a debonding agent, approved by the Engineer, that will prevent bonding at the face of the joint. The prevention of bonding is critical to the prevention of cracking in the newly placed concrete.

(c) Conditioning of Underlying Surface, for Side-Form and Fill-In Slab Construction.

The base shall be well moistened with water, without saturating, immediately ahead of concrete placement to prevent loss of moisture from the concrete. The elevations of the finished base course shall be properly recorded at sufficient locations (grid pattern not exceeding five foot spacing) in each slab in order to establish the depth of the new concrete slab.

(d) Handling, Measuring and Batching Material

As specified in Section P-501 - Portland Cement Concrete Pavement.

(e) Mixing Concrete

As specified in Section P-501 - Portland Cement Concrete Pavement.

(f) Limitations of Mixing and Placing

As specified in Section P-501 - Portland Cement Concrete Pavement, with the following exceptions and additions:

- 1) Portable Lighting Units sufficient for control and observation of the work shall be in position at the concrete placement site prior to mixing concrete each night. In addition, adequate lighting shall be provided at the batch plant to facilitate quality control and safe operations.

- 2) Concrete shall be mixed only in quantities, which are required for immediate use and can be placed and finished prior to final setting of the concrete.
- 3) Unless authorized in writing by the Engineer, mixing and concreting operations shall be discontinued when a descending air temperature reaches 40°F and shall not be resumed until an ascending air temperature reaches 35°F.
- 4) To compensate for cool temperatures and to enhance early concrete curing and strength gain, the Engineer may require the water and/or aggregates to be heated to not less than 70°F nor more than 150°F.

(g) Placing Concrete

As specified in Section P-501 - Portland Cement Concrete Pavement, with the following exceptions and additions:

- 1) Slip forming is not an appropriate method for placement of the concrete covered by these specifications.
- 2) The Contractor shall use all means necessary to protect concrete materials before, during and after installation and to protect the installed work and materials of all other trades such that final conditions will be as specified. In the event of damage, immediately make all repairs and replacements necessary, to the satisfaction and approval of the Engineer and at no additional cost to the Owner.
- 3) The concrete shall be deposited on the moistened base in a manner, which requires as little rehandling as possible. Unless truck mixers, truck agitators, or non-agitating hauling equipment is equipped with means for discharge of concrete without segregation of the materials, the concrete shall be unloaded into an approved spreading device and mechanically spread to prevent segregation of the materials. Necessary hand spreading shall be done with shovels - not rakes. Workmen shall not be allowed to walk in the freshly mixed concrete with boots coated with foreign substances.
- 4) Concrete shall be thoroughly consolidated against and along the faces of all adjacent slabs and along the full length and on both sides of all joint assemblies by means of vibrators inserted in the concrete. Vibrators shall not be permitted to come in contact with a joint assembly, the base or adjacent slabs. In no case shall a vibrator be operated longer than 15 seconds in any one location, nor shall they be used to move concrete. The contractor shall demonstrate that the method of vibration he chooses to use will properly consolidate the concrete and shall not build up excessive slurry on the surface.

(h) Strike-Off of Concrete and Placement of Reinforcement

As specified in Section P-501 - Portland Cement Concrete Pavement.

(i) Joints

As specified in Section P-501 - Portland Cement Concrete Pavement, excluding provisions for slip-form construction, which is not applicable. Prior to placing the new concrete, the existing concrete faces shall be sprayed with an approved debonding agent to prevent bond of new concrete to the existing concrete.

(j) Final Strike-Off, Consolidating and Finishing

As specified in Section P-501 - Portland Cement Concrete Pavement.

(k) Surface Texture

As specified in Section P-501 - Portland Cement Concrete Pavement.

(l) Surface Testing

As specified in Section P-501 - Portland Cement Concrete Pavement, except the requirement for GSI testing shall be waived.

(m) Curing

The initial method of curing, to begin immediately after the finishing and set of the pavement surface, shall be water curing. The entire surface shall be inundated for at least 2 hours, or until the concrete cools.

After the minimum water-curing period and before opening the pavement to traffic, an impervious curing membrane shall be applied as specified in Section P-501 - Portland Cement Concrete Pavement.

Pavement shall cure for a minimum of 36 hours before opening to traffic. This period begins at the time concrete placement ends. Pavement shall not open to traffic until the 36-hour curing period has expired.

(n) Sealing Joints

As specified in Section P-605 - Joint Sealing Filler.

(o) Protection of Pavement

As specified in Section P-501 - Portland Cement Concrete Pavement.

(p) Opening to Traffic

The Engineer shall decide when the pavement will be opened to traffic. The flexural strength of the permanent concrete required for opening the pavement to normal airport traffic (vehicles and aircraft) is 650 psi, based on testing in accordance with ASTM C78. The 36-hour curing period must be completed before the pavement is opened to traffic.

In addition to the above requirements, all equipment, materials and debris shall be removed and the pavement in the immediate work area shall be cleaned by the Contractor to the satisfaction of the Engineer prior to each pavement opening.

6) MATERIAL ACCEPTANCE

(a) Acceptance Sampling and Testing

Concrete samples shall be furnished by the Contractor and shall be taken in the field to determine the consistency, air content and strength of the concrete. Flexural test beams shall be made each work period that the concrete is placed. The specimens shall be made in accordance with ASTM C31. Each group of test beams shall be molded from the same batch of concrete and shall consist of a sufficient number of specimens to provide at least two flexural strength tests at each of the test ages specified below. However, at the start of paving operations and when the aggregate source, aggregate characteristics, or mix design is changed, additional groups of test beams may be required

and testing of beams at various hourly ages may be required, until the Engineer is satisfied that the concrete mixture being used complies with the strength requirements of these specifications, for the actual placement schedule.

- 1) The time scheduled for opening the pavement to normal airport traffic (aircraft and vehicles) is 0800 hours. The test reports for all beams shall record the age of the concrete, from the batching to the time of testing.
- 2) Test ages for the concrete placement shall be the following:
 - I. If concrete batching ends later than 36 hours prior to scheduled pavement opening, beams made from concrete that is placed in the last slab constructed shall be tested at or slightly before the scheduled time for pavement opening, to insure that the required strength has been attained. Tests made at that time shall be the OPENING TIME tests.
 - II. If concrete placement ends earlier than 36 hours prior to scheduled pavement opening, one set of beams shall be tested at an age of 36 hours from completion of placement. These tests shall be continued only to the extent determined necessary by the Engineer to evaluate the performance of the specified 36-hour mix design requirement. They shall be used as the OPENING TIME tests only if the 36-hour age coincides with the scheduled opening time.
 - III. If concrete placement ends earlier than 36 hours prior to scheduled pavement opening, beams made from concrete that is placed in the last slab constructed shall be tested at or slightly before the scheduled time for pavement opening, to insure that the required strength has been attained. Tests made at that time shall be the OPENING TIME tests.
 - IV. Initially, beams shall be tested at ages of 12 hours, 24 hours, and 36 hours. When the consistency of the Contractor's paving operations, placement completion time and concrete strength gain has been demonstrated to the satisfaction of the Engineer, some or all of the testing at these ages may be terminated.
 - V. Beams shall be tested at an age of 28 days, for the duration of the project. These tests shall be the 28-DAY tests used in the computation of pay factors.
- 3) The flexural strength of the concrete shall meet the following requirements:
 - I. The average strength of the concrete tested shall not be less than 650 psi at the time the pavement is scheduled for opening to normal airport traffic.
 - II. The average strength of the concrete tested at an age of 28 days shall not be less than 750 psi.
- 4) Specimens, which are obviously defective, shall not be considered in the determination of strength. The specimens with the least imperfections shall be used for the earlier tests.
- 5) When the satisfactory relationship between the 36 hour and 28 day strengths has been established and approved, the 24-hour results may be used as an indication of the 28-day strengths, for purposes of interim acceptance and progress payments. However, final acceptance and payment will be based only on the 28 DAY strengths, with the following exception: If the OPENING TIME strength of any lot of concrete is 750 psi or more, the pay factor from that lot shall be 1.0, regardless of the 28 DAY strength.
- 6) Final acceptance and payment for each work period's production, regardless of quantity, shall be considered as one lot. Except as provided above, the pay factor for each lot shall be established

on the basis of the 28 DAY-strength test results, according to Table 1, below.

TABLE 1: 28-DAY PAY FACTORS

28-Day Flexural Strength	Factor
750 psi min.	1.00
740 to 749 psi	.90
720 to 739 psi	.70
700 to 719 psi	.50
650 to 699 psi	.30
Below 650 psi	.00

- I. If the average OPENING TIME strength for any lot is below 600 psi, concrete placement shall be suspended until the deficiency is investigated and corrections acceptable to the Engineer are made. The corrections which the Engineer shall have the right to require include additional test strips using the current mix, changes to the mix, and establishing an earlier time deadline for final batching and placement of concrete.
- II. Closure of the pavement beyond the scheduled opening time of 0800 hours due to concrete strength deficiencies or other concrete deficiencies, will subject the Contractor to liquidated damages as specified in the Contract.
- III. If the average OPENING TIME strength for any lot is less than 650 psi, the Contractor shall remove and replace the concrete at his own expense.
- IV. If the average 28-DAY strength for any lot is less than 650 psi, regardless of the OPENING TIME strength, the Contractor shall remove and replace the concrete at his own expense.

(b) Acceptance Criteria

1) Flexural Strength

Acceptance based on flexural strength shall be as specified in Section 6) Material Acceptance (a) Acceptance Sampling and Testing.

2) Thickness

Cores shall be made to determine thickness and consolidation. No deductions will be made for deficient thickness unless the pavement elevations, as determined by survey, are not within the specification requirements.

TEST REQUIREMENTS

As specified in Section P-501 - Portland Cement Concrete Pavement.

MATERIAL REQUIREMENTS

As specified in Section P-501 - Portland Cement Concrete Pavement.

END OF SECTION P-504

SECTION P-605 JOINT SEALING FILLER

01) DESCRIPTION

- (a) This section shall consist of providing and installing resilient and adhesive joint sealing filler capable of effectively sealing joints and cracks in pavements and structures and around the various electrical items embedded in the pavement.
- (b) This section includes routing and sealing pavement cracks as directed by the Engineer.
- (c) It is the intent of this specification to provide a superior sealed joint, considerably in excess of normal industry standards.

02) MATERIALS

- (a) The joint sealing material for concrete pavement joints shall conform to the requirements of Table I.
 - 1) Cold Applied Sealant for Joints.

TABLE 1 - SILICONE SEALANT REQUIREMENT

<u>Test Method</u>	<u>Test</u>	<u>Material Requirement</u>
<u>As Supplied</u>		
ASTM D 2202	Flow, maximum	0.2
ASTM D-1475	Specific Gravity	1.450 - 1.515
ASTM C 1183 (Type S)	Extrusion Rate, mL/minute, minimum	50
ASTM C 679	Tack-Free Time, minutes	35 - 75
<u>Upon Complete Cure</u>		
ASTM D 2240	Durometer ¹ , Shore A, points	15 - 25
ASTM D 412, Die C	Modulus, at 150% Elongation ¹ , psi (k Pa), maximum.....	45 (310)
ASTM D 412, Die C	Elongation ¹ , minimum	1200
ASTM D 5329 ² (Section 9, Modified)	Adhesion to Concrete, minimum % elongation.....	500
<u>Performance</u>		
ASTM C 719	Movement, 10 cycles at 100/-50 %	No failure
ASTM C 793	Accelerated Weathering, @ 5,000 hours.....	No cracks, blisters or bond loss

¹ Sample cured 7 days at 77 ± 2 F (25 ± 1 C) and 50 ± 5% relative humidity. Proper joint design and proper joint preparation are necessary for maximum performance.

² Tested on random samples at least on a Quarterly basis. The Engineer shall have additional tests performed in accordance with ASTM C-719 on random samples taken from material supplied to the work. Material not passing the testing shall be removed and replaced at the contractor's cost.

- (b) The joint sealing material for the concrete and asphalt joint interfaces shall conform to the requirements of Table II.

TABLE 2 - SL SELF-LEVELING SILICONE SEALANT REQUIREMENT

<u>Test Method</u>	<u>Test</u>	<u>Material Requirement</u>
<u>As Supplied</u>		
ASTM D 1475	Specific Gravity.....	1.26 – 1.34
ASTM C 1183 (Type S)	Extrusion Rate, mL/minute, minimum.....	50
CTM 0098	Skin Over Time, minutes, maximum.....	60
CTM 0208	Non-Volatile Content, minimum	96
<u>Upon Complete Cure</u>		
ASTM D 412, Die C, Modified	Elongation ¹ , % minimum	1400
ASTM D 5329 (Section 9 Modified)	Joint Modulus at 50% elongation ¹ , psi (kPa), maximum	7 (49)
	Joint Modulus at 100% Elongation ¹ , psi (kPa), maximum	8 (56)
	Joint Modulus at 150% Elongation ¹ , psi (kPa), maximum	9 (62)
ASTM D-5329 (Section 9, modified)	Adhesion to Asphalt/Concrete ¹ , elongation	600 min
<u>Performance</u>		
ASTM C 719	Movement, 10 cycles at + 100/-50 %.....	No failure
ASTM C 793	Accelerated Weathering, at 5,000 hours.....	No cracks, blisters, or bond loss

¹ Sample cured 7 days at 77 ± 2 F (25 ± 1 C) and 50 ± 5% relative humidity. Proper joint design and proper joint preparation are necessary for maximum performance.

² Tested on random samples at least on a Quarterly basis. The Engineer shall have additional tests performed in accordance with ASTM C-719 on random samples taken from material supplied to the work. Material not passing the testing shall be removed and replaced at the contractor's cost.

03) PREFORMED BACKUP RODS

Prefomed backup rods, as shown on the plans and as recommended and approved by the sealant manufacturer, shall be used with cold applied sealants to control the depth of the sealant, to achieve the desired shape factor, to support the sealant against indentation and sag, and shall be a non-moisture absorbing resilient material. Backup materials shall be compatible with the sealant, shall not adhere to the sealant, shall be compressible without extruding the sealant, and shall recover to maintain contact with the joint faces when the joint is open.

Samples of all materials which the Contractor proposes for use and copies of the sealant manufacturer's recommendations for mixing and installation shall be submitted to the Engineer for approval at least thirty (30) days prior to use.

An appropriate primer, compatible with the seal and either manufactured by or approved by the sealant manufacturer shall be used with the sealant.

Each lot or batch of sealing material shall be delivered to the job-site in the manufacturer's original sealed container. Each container shall be labeled to include the following:

- (a) Name of Material.
- (b) Manufacturer's Name.
- (c) Manufacturer's Lot Number.
- (d) Shelf Life.
- (e) Mixing Instructions.
- (f) Storage Instructions.

04) CONSTRUCTION METHODS

- (a) Time of Application. The joints shall be sealed immediately following the curing period or as soon thereafter as weather conditions permit, and before the pavement is opened to traffic, including construction traffic. At the time of application of the sealing compound, the atmospheric and pavement temperature shall be above 50°F and the weather shall not be rainy or foggy. The temperature requirements may be waived only when so directed by the Engineer.

At a temperature of 75°F. (24°C) and 50% relative humidity, the sealant will cure to a tack-free surface in about one hour. At a temperature of 40°F. (4°C) the tack-free time will be about 2-3 hours.

- (b) Equipment. All equipment necessary for the proper construction of this work shall be on the project in first class working condition. The equipment shall be as recommended by the manufacturer of the filler and approved by the Engineer before construction is permitted to start. Air compressors shall be equipped with suitable traps capable of removing all free water and oil from the compressed air and shall be capable of furnishing air with a pressure greater than 90 psi.
- (c) Preparation of Joints. Immediately after final saw cutting and beveling is complete, the resulting cement slurry, laitance, curing compound and other foreign material shall be completely removed from the joint by water blasting. After cleaning is complete the joint shall be blown out with compressed air. When the surfaces are clean and dry, and just prior to placement of the backer rod and sealant, the joint shall be sand blasted with two passes, i.e., one pass on each bond face, then compressed air shall be used to blow out the joint and remove all residual dust.

Preparation for concrete pavement crack routing and sealing shall be by properly routing the crack to be slightly lower than the existing crack to ensure proper adhesion to the sidewalls. The cracks should be routed out to provide a minimum sealant reservoir 3/8" wide with a minimum depth of 3/8". The contractor shall use a specialized crack router that is designed to automatically

follow the crack. Thickness and depth below the pavement surface shall be as specified for joint sealant. The cracks should be free of dirt, dust, and moisture and be frost-free.

- (d) Installation of Sealants. Joints and cracks shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the Engineer before sealing is allowed. Sealants shall be installed in accordance with the manufacturer's recommendations and the following requirements:

- 1) Cold Applied Sealants. A backer rod shall be installed as shown on the plans and the primer shall be applied in the correct sequence in accordance with the sealant manufacturer's instructions, prior to placement of the joint sealer. The sealant shall be applied in a continuous operation, with an approved mechanical device that will force the sealant to the bottom of the joint and completely fill the joint without spilling the material on the surface of the pavement, and shall adhere to the concrete and be free of voids.

The sealant shall then be tooled, with an appropriate tool, to produce a slightly concave surface approximately 1/4" below the pavement surface for roadways, 3/8" below the surface for aprons and taxiways and 1/2" below the surface of runways. The sealant shall have a minimum thickness of 3/8". Tooling shall be accomplished before a skin forms on the surface, usually within 10 minutes of application.

The sealant shall be tooled in both directions to ensure a void-free installation. Sealant which does not bond to the concrete surface of the joint walls, contains voids, or fails to set to a tack-free condition will be rejected and replaced by the Contractor at no additional cost. Before sealing the joints, the Contractor shall demonstrate that the equipment and procedures for preparing, mixing, and placing the sealant will produce a satisfactory joint seal. This shall include the preparation of two small batches and the application of the resulting material.

- 2) A manufacturer's representative(s) is to conduct the demonstration(s), train the Contractor's personnel, and ensure the installation procedures are in accordance with the manufacturer's directions prior to the start of the sealing operations. The representative(s) shall visit the job-site at least four (4) times during the sealing operation for each type of sealant, and after the sealing is complete, is to conduct a general inspection of the work and perform more extensive inspections and/or testing on a random basis to reasonably assure that the construction is in accordance with the manufacturer's recommended construction methods and procedures. A report outlining the findings is to be submitted at the completion of the inspection.
- 3) In order to ensure that the superior workmanship is achieved throughout the contract, the Contractor shall be required to construct a test section per crew on a portion of the contract site prior to commencing the contract work in order to evaluate workmanship of each of the Contractor's crews. If the test sites are completed to the satisfaction of the Engineer, the Contractor shall then receive notice to proceed with the approved crews with the remainder of the Contract work.

However, to maintain an acceptable level of productivity, the Contractor shall be required to maintain the same crew members per crew who performed work in the test area together throughout the duration of the contract. If any personnel changes are anticipated by the Contractor, either reducing the work force or changing specific individuals, the Engineer is to be notified. If, at any point during the construction period after a personnel change has been made, the Engineer believes the workmanship has diminished, the crew shall be ordered to halt all construction operations. The Contractor shall then be required to reinstate the original work crew or set-up with the Engineer to perform in another test area to re-qualify the new crew.

A new test area will then be developed by the Engineer. Upon a successful evaluation of the new test area, the evaluated crew may proceed with the contract construction.

- 4) The Contractor shall be required to perform test cores on portions of the newly installed joint seals at intervals outlined below. The cores shall be analyzed by the Engineer to evaluate the Contractor's workmanship. If the cores indicate unacceptable workmanship, the Contractor will be required to replace the sealant to the last acceptable core.

If deemed necessary by the Engineer, additional test cores will be required to determine the limits of defective work. Any additional cores shall be taken by the Contractor at no additional cost to the Owner.

- i. At expansion joints, the Contractor will perform a test core every 100 feet per crew.
- ii. At longitudinal and transverse joints, the Contractor will perform a test core every 100 feet per crew.

If the test results indicate satisfactory work is obtained by a crew on a continuous basis, the Engineer may reduce the number of cores required from the original amount of 100 feet for that crew. The specific intervals increasing or decreasing the amount of cores, is at the Engineer's discretion.

05) TEST CORE

As stated above, the resealed joints are to be tested at specific intervals. The size of the test cores shall be as follows:

- (a) Transverse and longitudinal joints in general shall require a 1-1/2 inch diameter core. The actual core size will be based on the minimum core required to include the portion of the joint between the top edges of the beveled edge to a depth of 1/2 inch below the backer rod (see detail on Plans).
- (b) The expansion joint in general shall require a 2-1/2 inch to a 5 inch core drilled to a depth of at least 2 inches below the backer rod. The actual core size will be based on a minimum core size required to include the portion of joint between the top of the beveled edges (see detail on Plans).
- (c) The cores for the completed joint seal shall not be taken until after the seal has cured for 14 to 28 days as recommended by the seal manufacturer.
- (d) The Contractor shall patch the core holes by preparing the core hole in the same manner as for seal placement. A short section of backer rod shall be coiled in the hole prior to sealant placement. After sealant placement the material shall be tooled to ensure bonding to the entire surface.
- (e) Warranty. The sealant shall be warranted for repair and/or replacement for all defects in materials and workmanship by both the Contractor and the Sealant Manufacturer for a period of five (5) years.

06) METHOD OF MEASUREMENT

- (a) Joint sealing material shall be measured by the linear foot of sealant in place, complete, and accepted.
- (b) Crack routing and sealing shall be measured by the linear foot of sealant in place, complete, and accepted.

- (c) Expansion joint replacement shall be measured by the linear foot of expansion joint in place, complete, and accepted. This shall include specially fabricated sections of expansion joint material as may be required.

07) BASIS OF PAYMENT

- (a) Payment for joint sealing material shall be made at the contract unit price per linear foot. The price shall be full compensation for all joint preparation, furnishing all materials including backer rod, expansion filler, and sealant, delivery, placing of the material, for test coring, and for all labor, equipment, tools, and incidentals necessary to complete the item.
- (b) Payment for crack routing and sealing shall be made at the contract unit price per linear foot. The price shall be full compensation for all crack preparation, furnishing all materials including backer rod and sealant, delivery, placing of the material, for test coring, and for all labor, equipment, tools, and incidentals necessary to complete the item.
- (c) Payment for expansion joint replacement shall be made at the contract unit price per linear foot. The price shall be full compensation for all joint preparation, removal of existing expansion joint material, furnishing all materials, special fabrication as necessary, delivery, placing of the material, locating reinforcing steel, and for all labor, equipment, tools, and incidentals necessary to complete the item.
- (d) Payment will be made under:

Item P-605-1	Cold Applied Sealant, Contraction, Construction and Longitudinal Joints - Per Linear Foot.
Item P-605-2	Cold Applied Sealant, Expansion Joints - Per Linear Foot.
Item P-605-3	Cold Applied Sealant, Asphalt – Concrete Joint Interface - Per Linear Foot.
Item P-605-4	Crack Routing and Sealing - Per Linear Foot.

TESTING AND MATERIAL REQUIREMENTS

Test and Short Title

MIL-S-8802	Flow, Extrusion Rate, Tack-Free Time, Adhesion
ASTM D-1475	Specific Gravity
ASTM D-2240	Durometer
ASTM D-412,	Die C Modulus, Elongation
ASTM C-719	Movement
ASTM D-793	Accelerated Weathering
ASTM D-2202	Flow or Sag
AASHTO T-132	Bond to Concrete

END OF SECTION P-605

SECTION P-615 SITE CONCRETE

1.01 DESCRIPTION

- A. This section shall consist of constructing concrete curb and gutter, sidewalks, paved ditches and miscellaneous site work concrete in accordance with the lines, grades and dimensions shown on the plans or as required by the Engineer.

2.01 MATERIALS

- A. Concrete and other required materials shall conform to the requirements of Article 441.2 of the Georgia Department of Transportation's Standard Specifications. Modify the concrete to use a minimum compressive strength of 3000 PSI at 28 days.

3.01 CONSTRUCTION METHODS

- A. These items shall be constructed in accordance with the requirements of the applicable portions of Article 441.3 of the Georgia Department of Transportation's Standard Specifications.
- B. The compaction and testing requirements for the subgrade materials under these items shall be the same as the requirements for subgrades under paved areas in Section P-152, Excavation and Embankment.
- C. Parking bumper blocks shall be installed at the locations and in accordance with details shown on the plans.

4.01 METHOD OF MEASUREMENT

- A. Concrete curb and gutter will be measured per linear feet of curb and gutter, completed in-place and accepted.
- B. Excavation and backfill will not be measured for payment.
- C. Ditch paving will be measured by the cubic yard, complete, in place and accepted.
- D. Concrete traffic island and sidewalk paving will be measured by the square yard, complete, in place and accepted.
- E. Concrete bumper blocks will each be counted for payment, completed and accepted.

5.01 BASIS OF PAYMENT

- A. Payment will be made at the Contract unit price per linear foot for curb and gutter, complete in-place. These prices shall be full compensation for furnishing all materials, preparations and placing of the materials and for all labor, equipment, tools, and incidentals necessary to complete this item.
- B. Payment will be made at the Contract unit price per cubic yard of ditch and sidewalk paving, complete in-place. These prices shall be full compensation for furnishing all materials, preparations and placing of the materials and for all labor,

equipment, tools, and incidentals necessary to complete this item. Steel reinforcing bars or mats will not be paid separately.

- C. Payment will be made at the contract unit price per square yard for traffic islands, complete in place, including steel where required.
- D. Payment will be made at the contract unit price for concrete bumper blocks, including rebar, installation, and for all labor, tools, equipment and incidentals necessary to complete the item.
- E. Payment will be made under:

Item P-615-1 - Concrete Curb and Gutter - Per Linear Foot

Item P-615-2 - Concrete Ditch Paving - Per Cubic Yard

Item P-615-3 - Concrete Sidewalk - Per Square Yard

Item P-615-4 - Concrete Island Paving - Per Square Yard

Item P-615-5 - Concrete Bumper Blocks - Per Each

END OF SECTION P-615

SECTION P-621 - PAVEMENT MARKINGS AND MARKING REMOVAL

01) DESCRIPTION

This section shall consist of the preparation and painting of markings and stripes, and the removal of existing markings, on the surface of Runway, Taxiways and Roadways applied in accordance with these specifications and at the locations shown on the plans, or as directed by the City.

02) MATERIALS

- (a) Materials Acceptance. The Contractor shall furnish manufacturer's certified test reports for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. The reports can be used for material acceptance or the Engineer may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers for inspection by the Engineer. Material shall not be loaded into the equipment until inspected by the Engineer.
- (b) Paint. Paint shall be Waterborne meeting the requirements of Federal Specification TT-P-1952D, Type II, furnished in White – 37925, Yellow – 33538 or 33655, Red – 31136, and Black – 37038, in accordance with Federal Standard No. 595. The color pink shall be made using one part Red – 31136 to two parts White – 37925.
- (c) Reflective Media. This feature will be provided by the addition of glass spheres to the surface of the pigmented binder. Glass spheres shall meet the requirements of Federal Specification TT-B-1325D, Type III.
- (d) Water. Water to be used by high-pressure water equipment for removing pavement markings shall be obtained by the Contractor from a potable source.
- (e) Chemicals. The use of chemicals for removing pavement markings will not be permitted.

03) CONSTRUCTION METHODS

- (a) Weather Limitations. The painting shall be performed only when the existing surface is dry and clean, when the atmospheric temperature is at least 45°F and rising, when the pavement surface temperature is at least 5°F above the dew point, and when the weather is not excessively windy, dusty, or foggy. The suitability of the weather will be determined by the City.

Do not perform work when the atmospheric temperature is below 40 degrees F or when the pavement is covered with snow or ice.

If markings are applied with wind speeds sustained in excess of 10 knots, windscreens shall be used to shroud the material guns.

- (b) Equipment. All equipment for the work shall be approved by the City and shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

- 1) The mechanical marker shall be an approved atomizing spray-type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall be designed so as to apply markings of uniform cross sections and clear-cut edges without running or spattering and within the limits for straightness set forth herein. When needed, a dispenser shall be furnished which is properly designed for attachment to the mechanical marker and suitable for dispensing the required quantity of reflective media.
 - 2) Suitable adjustments shall be provided on the sprayer(s) of a single machine or by furnishing additional equipment for painting the width required.
- (c) Preparation of Surfaces. Immediately before application of the paint, the existing surface shall be dry and entirely free from dirt, grease, oil, acids, laitance or other foreign matter which would reduce the bond between the coat of paint and the pavement. The surface shall be thoroughly cleaned by waterblasting as required to remove all dirt, laitance and loose materials. After the cleaning operations, vacuuming or other City-approved cleaning methods shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.
- 1) During blasting, dust and debris will be controlled and contained by vacuums or other approved processes.
 - 2) Obliterating pavement markings by masking with paint, bituminous material, surface treatments or other cover material will not be an acceptable removal method.
 - 3) Paint shall not be applied to new Portland cement concrete pavement until the concrete in the areas to be painted is clean of curing material and/or removal of existing markings. Sandblasting or high pressure water shall be used to remove curing material and laitance from the concrete surfaces.
- (d) Removal Methods. Pavement markings shall be removed from indicated areas by methods acceptable to the Engineer, such as sandblasting, waterblasting, or beadblasting, that cause negligible damage to existing pavements, surface texture, joint sealants, or other airfield appurtenances as determined by the City. The Contractor shall repair at his expense any damage to the pavement, surface texture, sealant, or appurtenances caused by the removal work. Methods to repair damages shall be acceptable to the City.
- 1) Contractor shall be aware that existing paint to be removed may contain lead. Safety precautions shall be taken for environmental concerns. Contractor shall test the area prior to submitting a bid for this condition.
 - 2) Any removal method that causes objectionable dust, contaminated water runoff, or other such hazard or nuisance shall be controlled by means approved by the City that eliminate such causes of objection or its use will not be allowed.
- (e) Layouts and Alignment. On those sections of pavements where no previously applied figures, markings, or stripes are available to serve as a guide, suitable layouts and lines of proposed stripes shall be spotted in advance of the paint application. Control points shall be spaced at such intervals as will insure

accurate location of all markings. All stripes shall be accurately surveyed and layout accomplished well in advance of painting and shall be approved by the City prior to applying paint.

- 1) The Contractor shall provide an experienced technician to supervise the location, alignment, layout, dimensions and application of the paint.
- 2) Single stripes shall be applied wholly on one side of the longitudinal pavement joints. Double or multiple stripes shall be centered over similar joints.

(f) Application. Markings shall be applied at the locations and to the dimensions and spacing indicated on the plans or as specified. Paint shall not be applied until the layouts, indicated alignment and the condition of the existing surface have been approved by the City. Pavement shall be dry to the satisfaction of the City prior to application of paint.

- 1) The paint shall be mixed in accordance with the manufacturer's instructions before application. The paint shall be thoroughly mixed and applied to the surface of the pavement with the marking machine at its original consistency without the addition of thinner. The paint shall be applied uniformly by suitable equipment at the following rates:

	<u>Pavement Type</u>	<u>Paint Application Rate</u>
	Portland Cement Concrete	115 Square Feet per
Gallon		
	Freshly Sealcoated Asphalt Concrete	75 Square Feet per
Gallon		
	Other Asphalt Concrete	115 Square Feet per
Gallon		

If the paint is applied by brush, the surface shall receive two coats; the first coat shall be thoroughly dry before the second coat is applied.

- 2) The reflective media shall be distributed to the surface of the pigmented binder immediately after application and imbedded at the rate and depth as required to provide adhesion and reflection. Glass spheres shall be applied at the rate of 12 pounds per gallon of paint. High-intensity granules shall be applied at the rate of 1.7 pounds per gallon of paint.
- 3) In the application of markings, any deviation in the edges exceeding 1/2" in 50 feet shall be obliterated and the marking corrected. The dimensions of the markings shall be as designated within a tolerance of plus or minus 5%. All painting shall be performed to the satisfaction of the City by competent and experienced equipment operators, laborers, and artisans in a neat and workmanlike manner.
- 4) No paint shall be applied to bituminous pavement until the pavement has been allowed to cure to the City's satisfaction. Upon application to properly prepared surfaces after curing, the paint shall not bleed excessively, blister, peel, curl, or discolor.
- 5) The Contractor shall furnish certified test reports for the materials shipped to the project. These reports shall not be interpreted as a basis for final acceptance. The City shall be notified upon arrival of a shipment of paint to the job site for inspecting and sampling of the materials. The Contractor shall make an accurate accounting of the paint materials used in the accepted work.

- (g) Protection. After application of the paint, all markings shall be protected while the paint is drying. The fresh paint shall be protected from injury or damage of any kind. The Contractor shall be directly responsible and shall erect or place suitable warning signs, flags or barricades, and protective screens or coverings as required. All surfaces shall be protected from disfiguration by spatter, splashes, spillage, drippings of paint or other materials.
- (h) Cleanup. The Contractor shall remove from the site all debris, waste, loose or unadhered reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.
- (i) Defective Workmanship or Material. When any material not conforming to the requirements of the specifications or plans has been delivered to the project or incorporated in the work, or any work performed is of inferior quality, such material or work shall be considered defective and shall be corrected as directed by the City, at the expense of the Contractor. Any areas of paint that chips or peels or wears excessively in respect to the overall shall be repainted within the warranty period.

04) METHOD OF MEASUREMENT

- (a) The payment for the removal of existing pavement markings shall be the number of square feet of paint removed.
- (b) The quantity of pavement striping and marking, shall be paid by the number of square feet of paint applied in accordance with the specifications and accepted by the City.

05) BASIS OF PAYMENT

- (a) Payment shall be made at the Contract unit price per square foot for striping or marking removed. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools and incidentals necessary to complete the item.
- (b) Payment shall be made at the Contract unit price per square foot for pavement striping, and marking, including the surface prep prior to paint application, paint and the reflective media. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools and incidentals necessary to complete the item.
- (c) Payment will be made under:

Item P-621-1 – Pavement Striping and Marking Removal – Per Square Foot

Item P-621-2 – Pavement Striping and Marking – Per Square Foot

TESTING AND MATERIAL REQUIREMENTS

Test and short title	Material and short title
TT-B-1325C ₁	Beads (Glass Spheres) Retro-reflective
TT-P-1952D ₁	Paint, Traffic and Airfield Marking, Waterborne
Federal STD 595	Colors used in Government Procurement

1 Federal Specification

END OF SECTION P-621

SECTION P-660 CONCRETE FILLED STEEL GUARD POSTS

01) DESCRIPTION

- (a) This item shall consist of constructing concrete filled steel guard posts. This item shall be constructed in accordance with this specification, or as required by the Engineer.

02) MATERIALS

- (a) Concrete and other required materials shall conform to the requirements of Article 441.02 of the Georgia Department of Transportation's Standard Specifications.
- (b) Structural steel (plates, etc.) for guard posts shall meet the requirements of ASTM A36-75. Steel pipe shall conform to the requirements of ASTM A53 Schedule 40.

03) CONSTRUCTION METHODS

- (a) This item shall be constructed in accordance with the requirements of the applicable portions of Article 441.03 of the Georgia Department of Transportation's Standard Specifications.
- (b) The compaction and testing requirements for the subgrade materials under these items shall be the same as the requirements for the roads where this item is required.
- (c) The contractor shall cast three (3) 12" x 6" cylinders for each concrete pour, one cylinder tested at 7 days and 2 at 28 days. Slump and air test shall also be made for each sample.

04) METHOD OF MEASUREMENT

- (a) Guard posts will be measured by each post completed in-place and accepted.
- (b) Excavation and backfill will not be measured for payment.

05) BASIS OF PAYMENT

- (a) Payment will be made at the contract unit price per each guard post, completed in-place and accepted. This price shall be full compensation for furnishing and placing all materials necessary and for all labor, equipment, tools, and incidentals necessary to complete the item.
- (b) Payment will be made under:

Item P-660-1 - Concrete Filled Steel Guard Post - Per Each.

END OF SECTION

Hartsfield-Jackson Atlanta International Airport
City of Atlanta
Department of Aviation
Bureau of Planning & Development

Concessions New Construction/Modifications Design Guidelines – Structural

03/28/2014	Revised for Concessions Work only
Last Revised Date	Description of Changes
Revisions	

Design Guidelines Structural

Table of Contents

Section		Page
1.0	Purpose	Error! Bookmark not defined.
1.1	General	Error! Bookmark not defined.
1.1.1	Applicable Codes	1
1.1.2	Modifying Existing Structures.....	1
1.1.3	Floor, Wall and Roof Penetrations	2
1.1.4	Design Calculations	1
1.1.5	Loads and Loading Combinations.....	2
1.1.6	Foundation Systems	2
1.1.7	Drawings	3
1.1.8	Specifications	3

Design Guidelines Structural

1.0 Purpose

The purpose of this document is to outline the minimum structural engineering requirements for new construction and/or modifications related to Concessions submitted projects at the City of Atlanta's Hartsfield-Jackson Atlanta International Airport (H-JAIA).

1.1 General

All design work shall be performed in accordance with generally accepted professional principles and practices for structural engineering and in compliance with all applicable Department of Aviation Design Standards, Federal, State and City of Atlanta Design Codes, Standards and Regulations.

1.1.1 Applicable Codes

The requirements of the following codes shall form the minimum criteria for structural design projects at Hartsfield-Jackson Atlanta International Airport. Where there may be conflicting requirements in the cited codes, the most stringent provision, as determined by the airport's Planning and Development Division shall be applied.

- 1.1.1.1 International Building Code, 2012 with all Georgia Amendments shall govern the design of all structures except bridges.
- 1.1.1.2 Federal Aviation Administration Advisory Circular 150/5300-13, Airport Design requirements.
- 1.1.1.3 American Association of State Highway & Transportation Officials LRFD Bridge Design Specifications, 4th Edition with 2007 through 2009 Interim Revisions shall apply for all bridge design unless expressly agreed otherwise by the Department prior to initiating design activities.
- 1.1.1.4 The American Concrete Institute's ACI 318-11, "Building Code Requirements for Structural Concrete."
- 1.1.1.5 The American Institute of Steel Construction's ANSI/AISC 360-10 (current printing), "Specification for Structural Steel Buildings."
- 1.1.1.6 The Masonry Society, American Concrete Institute and American Society of Civil Engineers joint standards "TMS 402-11/ACI 530-11/ASCE 5-11, Building Code Requirements for Masonry Structures" and "TMS 602-11/ACI 530.1-11/ASCE 6-11, Specification for Masonry Structures."
- 1.1.1.7 The American Iron & Steel Institute's "NAS-01, North American Standard for the Design of Cold-formed Steel Structural Members, including 2004 Supplement."
- 1.1.1.8 Other materials used in construction shall be governed by the applicable standard identified in the IBC 2012.

1.1.2 Modifying Existing Structures

- 1.1.2.1 The installation or relocation of heavy equipment shall be evaluated and endorsed by a Structural Engineer.
- 1.1.2.2 Proposed improvements that require partial or complete, severing, altering or removal of structural members shall require evaluation and design by a Structural Engineer.

- 1.1.2.3 Walls proposed for partial or full demolition shall be evaluated by a Structural Engineer to determine whether they are load-bearing. If they are, drawings shall indicate the sequence of operations required to avoid collapse.
 - 1.1.2.4 Modifications to existing structures shall not be made without prior approval by the Department of Aviation.
- 1.1.3 Floor, Wall and Roof Penetrations
- 1.1.3.1 Proposed penetrations and openings for existing floors, walls and roofs shall be located where there are no impacts to existing concrete reinforcements. Contractor shall be required to locate existing reinforcements prior to commencing coring operations.
 - 1.1.3.2 If reinforcements must be severed due to the size of the opening or its required location, evaluation and design shall be made by a Structural Engineer.
 - 1.1.3.3 Proposed rectangular openings in existing walls, floor slabs and roof shall be detailed with required core holes of sufficient diameter at each corner to prevent over cut upon installation.
 - 1.1.3.4 Concessionaire shall be responsible for reinstating any existing wall, floor and roof penetrations and/or openings in the space, which are to be abandoned (See Architectural Guidelines for penetration repair details)
- 1.1.4 Design Calculations
- 1.1.4.1 Basis-of-design calculations shall be prepared for any project that propose modification to an existing joist, beam, column or foundation, and shall demonstrate (the airport's satisfaction) that designed alterations do not degrade overall structural capacity to resist code prescribed loads.
 - 1.1.4.2 Calculations shall be neatly presented and include sketches proportioned to reflect relative scale, illustrating design intent. Provide linkage in the calculations for all primary structural members proposed. All commercial computer software utilized in the production of the design shall be identified by name and version. All input files and corresponding output files (in native format), shall be recorded to DVD/CD optical media, suitably labeled and included with the submittal.
 - 1.1.4.3 Any in-house proprietary computer software utilized in the design shall have the solution of verification problems documented in the appendix.
 - 1.1.4.4 All final calculations shall be sealed, signed and dated by the Structural Engineer of Record.
- 1.1.5 Loads and Loading Combinations
- 1.1.5.1 Load combinations used for the design/modification of airport structures shall be in strict compliance with the requirements of the applicable provisions of ASCE/SEI 7-10, Minimum Design Loads for Buildings and Other Structures (current printing) and the structural codes identified in the general requirement section above.
- 1.1.6 Foundation Systems
- 1.1.6.1 Where applicable, foundation designs shall be based on the recommendations of a Georgia registered geotechnical engineer unless the structural support demand

is deemed to be of minor significance and with the concurrence of the Department of Aviation.

1.1.7 Drawings

1.1.7.1 All structural drawing packages shall include at a minimum, the following sheets in addition to other sheets that are necessary to depict the work of the project.

1.1.7.1.1 General Notes – General notes applicable to the overall design and structural materials proposed, abbreviations used within the structural drawings, symbol legend(s) as appropriate. The general notes shall include all the information required by section 1603 of the IBC.

1.1.7.1.2 Demolition plans shall be prepared for all projects that propose new slab or other structural member penetrations. Proposed and existing slab penetrations shall be identified on the demolition plan indicating sizes and spatial relationships to known points on the floor plan.

1.1.7.1.3 Penetrations for roof-mounted equipment shall be supported by supplementary members designed by a Georgia structural engineer, unless it is demonstrated by calculation, to the airport's satisfaction, that supplemental members are not required.

1.1.8 Specifications

1.1.8.1 Specifications defining the quality of workmanship and materials to be incorporated into the work shall be prepared as a separate document or placed on the structural drawings.

Hartsfield-Jackson Atlanta International Airport
City of Atlanta
Department of Aviation
Bureau of Planning & Development

Concessions New Construction/Modifications Design Guidelines – Electrical

03/28/14	Revised for Concessions work only
Last Revised Date	Description of Changes
Revisions	

Design Guidelines Electrical

Table of Contents

Section	Page
1.1 Introduction	1
1.2 Construction Drawings.....	1
1.3 General Design Requirements.....	2
1.3.1 General.....	2
1.3.2 Wiring	2
1.3.3 Circuiting	3
1.3.4 Exclusions	4
1.3.5 Other Requirements	4
1.4 Lighting Systems Design	4
1.4.1 Interior Lighting Systems Design	4
1.5 Receptacle System Design	4
1.6 Low Voltage Power Systems Design (<600 volts)	5
1.6.1 General.....	5
1.6.2 Electric Metering.....	5
1.6.3 Panelboards	5
1.6.4 Low Voltage Switchgear/Switchboards.....	6
1.6.5 One-Line Power Diagram.....	7
1.6.6 Low Voltage Dry Type Transformers	8
1.6.7 Motors	9
1.7 Lightning Protection Systems Design	9
1.8 Building Grounding System Design.....	10
1.9 Design Calculations	10
1.9.1 General.....	10
1.9.2 Voltage-Drop Calculations	11
1.10 Brand Circuit Board Directories	11

Design Guidelines Electrical

1.1 Introduction

The primary objective of these guidelines is to achieve consistency throughout electrical designs for all facilities.

1.2 Construction Drawings

Table 1 presents suggested plans and/or drawings required for a typical electrical job.

Table 1 - Electrical Construction Drawings

Drawing	Scale	Remarks
Electrical Site Plan	1 inch = 20 feet	
Lightning Protection and Counterpoise Composite Plan	1 inch = 20.0 feet	
Grounding Plan	1 inch = 20.0 feet	
Power: One-Line Diagram	--	
Grounding: One-Line Diagram	--	
Power Plans	¼ inch = 1.0 feet	1/8 inch may be used for large spaces
Lighting Plans	¼ inch = 1.0 feet	1/8 inch may be used for large spaces
Special Systems Plans as Required	¼ inch = 1.0 feet	1/8 inch may be used for large spaces
Grounding Details	--	
Low Voltage Switchgear Elevation and Details	--	
Motor Control Center Elevation and Details	--	
Miscellaneous Elementary and Wiring Diagrams	--	
Miscellaneous Details: Lightning Protection	--	
Equipment List	--	
Power Duct Bank Plan and Profile (Civil Work Drawing)	1 inch = 50 feet horizontal	
High Voltage Switchgear, Transformer, Metering Pad Details	--	
Primary Electrical System One-Line Diagram	¾ inch = 1 foot	
Electric Manhole Plan, Details and Section	--	

Panel schedules
 Electrical riser
 Legend and lighting fixture schedule

for multi-story buildings

Locate all electrical symbols and equipment locations to scale on plan drawings.

1.3 General Design Requirements

1.3.1 General

Resolve code conflicts by using the more stringent applicable portion of conflicting codes unless DOA grants a written waiver.

- Keep abbreviations to a minimum.
- Use only standard technical abbreviations from the ANSI and the IEEE on all drawings.
- Single line drawings are required for any project. Riser diagram is not a substitution for single line drawing however; riser diagram AND single line diagram are required for multiple story projects. All electrical data such as sizing, of cables, conduits, breaker sizes, AIC ratings, metering, interconnection to utilities and downstream devices and other information shall be listed on the single line diagram.

1.3.2 Wiring

- All wiring shall be in electrical metallic tubing, wire ways, approved raceways or cable trays. EMT may be used for concealed installations but GRS should be used for exposed conduit. Only cast metal boxes should be used for exposed installation. EMT with compression fittings can be used in lieu of GRS with prior DOA approval and where the circuit is not subject to any mechanical damage. EMT with set screws is not allowed.
- Surface nonmetallic raceways shall not be permitted.
- Branch circuit conductors shall be minimum 12 AWG and shall be copper, type THHN/THWN unless otherwise noted. Minimum conduit size shall be 3/4".
- Control wiring shall be minimum 14 AWG.
- No reduced sized neutrals will be allowed. Each single pole over current device shall have its own separate neutral conductor.
- Neutral conductor sizes shall not be less than the respective feeder or phase conductor sizes. Coordinate with the 6th bullet in section 1.3.3.
- Power conductors shall be routed separately from all other conductor types. Also normal and emergency power conductors shall be routed separately.
- Include equipment grounding conductors sized per NEC with all power and control circuits over 50 volts.
Install computer-related circuits and receptacles separate from motor load circuits. If required by the manufacturer to minimize noise, provide a separate grounding conductor back to the branch circuit breaker for each circuit, consistent with NEC grounding criteria.
- All buried cables shall be protected by a conduit or concrete encased duct bank. Do not exceed 5 percent combined voltage drop on feeders and branch circuits if the transformer providing service is located within the facility. If the Transformer is located exterior to the facility, limit the combined voltage drop for service conductors, feeders, and branch circuits to 5 percent. Individual voltage drop on branch circuits should not exceed 3 percent. The NEC is generally concerned with amperage more than voltage drop and only addresses the above limits in NEC Articles 210.19(A)(1) (Fine Print Note [FPN] No. 4) and 215.2(A)(4) (FPN No. 2) (2002 Edition) . Branch circuits supplying sensitive circuits should be limited a voltage drop, not exceeding 1 percent to 2 percent. IEEE 1100, Powering and Grounding Sensitive Electronic Equipment, recommends a maximum voltage drop of 1 percent for electronic installations.
- Ensure feeders have amperage adequate for the loads to be served. Demand Factors are allowed in accordance with NEC.
- Wiring for airfield lighting shall be in polyvinyl chloride conduit.

- Circuit conductors for lighting shall be L-824 Type C Underground Electrical Cable for Airport Lighting Circuits.
Lighting circuits for taxiway lighting shall be 8 AWG and 6 AWG for runway lighting. Cable size is not dependant on whether it is a runway or taxiway circuit but is based on the size Constant Current Regulator that is energizing the circuit. #6 AWG FAA spec L-824C cables are used for 50KW CCRs.

1.3.3 Circuiting

- Home runs for receptacle, power, and lighting shall be indicated with an arrowhead, panel/terminal cabinet number, and circuit/terminal block number.
- Identify the conduit size and then number and type of conductors it contains.
- For typical circuits, this information may be listed by general note. For example, "All conductors are 12 AWG THHN/THWN in ¾ -inch conduit unless otherwise noted".
- Switching schemes for local lighting control may be indicated with lower case letters at the switches with matching lower case letters at the corresponding controlled lighting fixture.
- Show exterior conduits running to or from a building on electrical and civil works (exterior utilities) site plans.
- Avoid shared neutral circuiting. Coordinate with the 6th bullet in section 1.3.2.
- Group circuit homeruns where feasible and derate as required per NEC Table 310.15(B)(2)(a).
- Branch circuit design for general use power outlets shall be limited to no more than six receptacles per circuit. This is intended to accomplish the following:
 1. Minimize the number and variety of sensitive equipment sharing a common circuit.
 2. Minimize voltage drop.
 3. Minimize the likelihood of interaction between circuits.
 4. Allow flexibility for future load growth or equipment changes.General use power outlets shall be NEMA 5-20R.
- Except for life safety requirements, circuits shall not be connected to the emergency power system without DOA approval.
- Dedicated circuits shall be marked accordingly in the panel directory distinguishing them from the other circuits.
- Maintain a minimum of four spare circuit breakers and/or spaces in existing panel boards. Provide new panel boards to accommodate the circuit excess. |
- If any circuits from an existing panel are demolished first use these spare circuits for any new work before using existing spaces or spare circuit breakers.
- Include notes on the drawings to instruct the contractor to efficiently use wall space or electrical room space when installing new electrical equipment in order to maintain space for future work.
- For very small loads explore the possibility of using existing circuits instead of proposing a new circuit. Verify the loads on existing circuits if possible and practical.
- Provide list of demolished circuits and update circuit directories.
- Airfield lighting circuits shall be spliced only in manholes, hand holes, pull cans or light bases for light fixtures and signs with an FAA approved L-823 cable connector kit.
- All airfield lighting circuits shall be designed to be installed in duct bank or single duct. All ducts shall be concrete encased unless otherwise permitted by DOA.
- The design for airfield lighting circuits shall be high voltage series circuits and the routing of the conductors shall be designed in a manner to keep the two conductors for the circuit together in the same conduit at all times.
- Provide circuit designations with the size and number of conductors contained within the conduit for airfield lighting circuits on the circuit routing drawing.

- Show the lighting fixture circuit and sequential number adjacent to the lighting fixture on the lighting layout plan.

1.3.4 Exclusions

No welding or cutting of structural steel for electrical systems is allowed unless specifically approved by DOA.

1.3.5 Other Requirements

- Size of all junction and pull boxes shall be shown on drawings.
- Prepare elevations and details to show the mounting method for all other equipment such as large transformers, large junction boxes and large control cabinets. Mounting details are not necessary for small wall mounted devices. Indicate mounting height above finished floor or above finished grade.
- Specify 3" concrete housekeeping pads for all floor mounted electrical equipment with the exception of electrical equipment installed in the Airfield Lighting Vaults.
- Indicate all fire barrier penetrations on electrical plan drawings.
- Specify fire stopping rated sealant for penetrations in fire-resistance rated walls, partitions, floors and ceilings in order to maintain the fire-resistance rating. Coordinate with the project architect or consult with an architect for method of sealing and sealant type.
- Locations, such as offices, data centers, and communications complexes, that use electrically sensitive equipment such as computers, data processing equipment and other similar equipment should be provided with dedicated circuits fed from local dedicated panels as necessary. Dedicated panel boards should be fed from separate feeders to the service entrance if possible.
- In general, equipment specified must meet the energy efficiency requirements.

1.4 Lighting Systems Design

1.4.1 Interior Lighting Systems Design

System Drawings:

- Locate lighting fixtures on reflected ceiling plans in coordination with the project architect.

Design Philosophy:

Provide adequate, comfortable, and reliable indoor illumination levels appropriate for the tasks to be performed. Lighting levels shall conform to DOA standards (see Required Performance and Features). Levels not covered in this document shall be referenced to the latest Illuminating Engineering Society of North America (IESNA) Lighting Handbook published standards.

1.5 Receptacle System Design

System Drawings:

- Locate on power plans.

Design the receptacle system per the following minimum requirements:

- Outlets are to be wired vertically in and on walls; do not run circuits horizontally within walls; avoid running circuits horizontally on the outside of walls.
- Flush mount outlets in areas such as lobbies, conference rooms, user hallways and office spaces.
- Surface mounted outlets in areas including warehouses, equipment chases and electrical/mechanical rooms.
- Provide dedicated outlets for janitorial equipment in hallways and aisles maximum 50 feet apart; mount at 36 inches above the finished floor, and segregate from other receptacles.
- Provide general-purpose outlets in electrical and mechanical rooms; outlets shall be Ground Fault Circuit Interrupter (GFCI) protected.
- Do not wire GFCI's and non GFCI's in the same circuit.
- Avoid back to back installation.
- Provide general-purpose outlets adjacent to each exterior door; outlets shall be weatherproof and GFCI protected.
- Provide rooftop maintenance outlets per NEC; outlets shall be weatherproof and GFCI protected.

1.6 Low Voltage Power Systems Design (<600 volts)

1.6.1 General

This section covers the general power requirements for low voltage systems consisting of systems less than 600 volts.

System Drawings:

- Show Current Transformer (CT), Potential Transformer (PT), and meter connections, also indicate CT and PT ratios on one-line diagrams.
- For indoor installation locate meter, communication circuit connections points and termination points on power plans.
- For outdoor installations, locate meter, communication circuit connections and termination points on Civil Works (exterior utilities) plans.

1.6.2 Electric Metering

Electric metering will be provided at all building service entrances, and at disconnecting means downstream of the service entrances, as necessary to separately meter building and process loads.

When metering at switchboards/switchgear and panel boards, the meter(s) shall, where feasible, be supplied with the original equipment manufacturer and installed in the equipment.

1.6.3 Panel boards

System Drawings:

- Locate on power plan drawings.
- Provide completed panel schedules on drawings. Each circuit on the panel schedule shall be described to reflect function and location of each load (for example, lighting room xx apron level). Each circuit shall show a connected, demand or estimated load in KVA whether the circuit is new or existing.

Panel boards shall be as follows:

- Locate indoors where possible. Avoid outdoor or rooftop locations.
- Locate in hallways and dedicated electrical rooms or closets where possible; avoid user or passengers spaces.
- Flush-mount only in areas such as user hallways and office spaces. When flush-mounted, provide spare conduits, skirting or other provisions to facilitate future modifications.
- Surface-mount in all other areas including user storages, warehouses, equipment chases and electrical or mechanical rooms.
- Panel boards located in areas accessible to users shall be designed to be less than 10,000A available fault duty current.
- Panel boards with greater than 10,000A available fault duty current shall be located in electrical rooms/closets or mechanical/electrical spaces accessible only to qualified personnel.
- Multiple section panels are not permitted. Where it is necessary to have more than 42 circuits in a lighting or appliance panel board in the same location, use additional separate panel boards.
- Avoid sub feed or dual-feed lugs.
- Avoid individually-mounted sub feed circuit breakers.
- Main circuit breakers are to be sized according to the appropriate NEC section for any location. If a larger breaker is installed, then the appropriate trip plug must be installed as well. It is not permitted for the trip settings to be dialed-down to meet the intent of this Section.
- Where a panel board is supplied through a transformer, provide the over current protection on the secondary side of the transformer in addition to primary over current protection.
- Provide Transient Voltage Surge Suppression (TVSS) for all panel boards serving electronic loads.
- Oversize neutrals when required per harmonic analysis and for all electronic loads.
- Provide Main Lug only when the panel board is located in the same room with their feeder breaker otherwise, provide Main Circuit Breaker.

1.6.4 Low Voltage Switchgear/Switchboards

System Drawings:

- Locate on power plan drawings.
- Detail feeder and branch circuit wiring sizes on one-line diagram.
- Provide load information, voltage, phase, circuit numbering, AIC ratings, mains ratings, load summary, demand load summary, circuit breaker sizes, spare sizes and space information in panel schedules..
- Provide elevation showing all circuit breaker locations and circuit numbering.
- Provide additional details on drawings as necessary for construction.

Low Voltage Switchgears/Switchboards shall be as follows:

- Locate indoors where possible. Avoid outdoor locations.
- Locate in dedicated electrical rooms accessible only to qualified personnel.
- Front accessible where possible, except service entrance equipment.
- For service entrance equipment, provide rear access when possible.
- Copper main bus; 100 percent capacity full length.
- Copper neutral bus, if required; 100 percent capacity full length.
- Copper ground bus; full length.

- Main and feeder circuit breakers arranged for compression connectors.
- Provide branch circuit monitoring/embedded metering for all new concession switchboards. Branch circuit monitoring/embedded metering shall be factory pre-wired.
- Coordinate with DOA Electrical Engineering for the requirements of current transformers (CT's) when adding branch circuit breakers to an existing concession switchboard.
- All circuit breakers shall be constructed according to NEMA standards.
- All circuit breakers shall have provisions for lockout/tag out (LOTO).
- All circuit breakers shall include electronic interchangeable trip with adjustable LTPU, LTD, STPU, STD and INST functions. When required, provide integral GFPU and GFD functions.
- When ground fault is required, provide two level protections (main and feeders).
- Provide service entrance label when required.
- Provide minimum 20 percent spare capacity.
- Provide minimum 1-spare circuit breaker of each frame size (excluding main) used.
- Circuit breakers less than 100 amps shall not be permitted on switchgears or switchboards, unless approved in writing from the DOA Engineering.
- Provide future bus extension and dedicated space for at least one future section.
- Provide integral TVSS to meet requirements of NFPA 780, when required.
- Where draw out circuit breakers are specified, provide manufacturer's overhead lifting device suitable for all circuit breaker sizes and locations.
- Provide manufacturer's test kit for all circuit breaker types and functions used.
- All circuit breakers larger than 200 amps shall be tested.
- Main circuit breakers are to be sized according to the appropriate NEC section for any location. If a larger breaker is installed, then the appropriate trip plug must be installed. It is not permitted for the trip settings to be dialed-down to meet the intent of this article.
- Provide Main Lug only when the switchboard is located in the same room with their feeder breaker otherwise, provide Main Circuit Breaker.

1.6.5 One-Line Power Diagram

System Drawings:

- Develop or add to one-line diagram drawing as noted below.

Starting at the top of the drawing with the building transformers(s), show all pertinent electrical equipment down to the panel board level. This includes switchboard/switchgear, panel boards, MCCs, generators, transfer switches, uninterruptible power supplies, Inverter systems, motors, starters, disconnect switches, etc.

For transformers, note the kVA size, primary and secondary voltages, phasing (building service entrance only), and impedance. Show the distribution switchboard/switchgear in "expanded" form. The drawing should detail main breaker, tie breaker, feeder breakers, spare breakers, CT's, PT's, and meter. Note switchboard rated amperage, voltage, and short circuit capability. Include frame and trip size of all breakers in the gear.

Note the service entrance, feeder wire and conduit sizes.

For larger buildings, additional one-line diagram drawings may be required. If the building utilizes Motor Control Centers (MCCs), separate one-lines may be required. When MCCs are necessary, provide them in "expanded" form. Drawings should be

called MCC One-Line Diagram and be numbered sequentially with the Main One-Line. Indicate starter/breaker sizes, bus tap sizes, wire, and conduit size ending with each motor or other load. If the building has a large Standby Power System or Blue System, provide in "expanded" One-Line of this system also.

In general, use the following guidelines:

- If a Building transformer is not associated directly with the building, start the One-Line with the largest distribution panel board.
- If all details can be shown on one sheet, it is allowable to use "expanded" details on all necessary equipment.
- Place highest voltage lines at the top of the drawing with successively lower voltages placed downward.
- Use standard symbols listed in ANSI standards.
- All "expanded" gear shall be shown with a dashed outline. All singular items shall be shown with solid outlines
- Draw circuits in the most direct and logical sequence. Draw lines between symbols either vertically or horizontally with a minimum of line crossing.
- Note panel boards and major equipment locations (Column D4, NE Equipment Room, etc.) Try to group equipment on drawings by physical locations.
- To avoid clutter, do not put specialty symbols and construction notes on the One-Line. Grounding, controls, metering and miscellaneous details should be on separate drawings.

1.6.6 Low Voltage Dry Type Transformers

System Drawings:

- Locate on power plan drawings.
- Provide additional elevation or mounting details as required for construction.

Low Voltage Dry Type Transformers shall be as follows:

- Locate indoors where possible; avoid outdoor locations.
 - Energy efficient type; meet NEMA TP-1.
 - Specify transformer to include +2/-4 at 2.5 percent taps.
 - Transformers located in areas accessible to users shall be designed to produce less than 10,000A available short circuit current.
 - Transformers allowing more than 10,000A available short circuit current shall be located in electrical rooms/closets or mechanical/electrical spaces accessible only to qualified personnel.
 - Transformers shall be provided with separate primary and separate secondary windings for each phase.
 - Transformers shall be provided with copper windings, aluminum is not acceptable.
 - Insulation provided in transformers having ratings not exceeding 25 KVA shall have 185 degree centigrade rise rating. Insulation provided in transformers exceeding 25 KVA shall have 220 degree centigrade rise rating.
- The sizing of step down or step up dry type transformers shall take into consideration the current or expected normal and harmonic loading. The decision to use "K" transformers will be based on harmonic analyses of the connected and forecast load.

1.6.7 Motors

System Drawings:

- Locate on power plan drawings.

Motors that are controlled by across the line motor starters and are 25 HP or larger shall include power factor correction capacitors at the motor starter in order to achieve 95 percent power factor. VFC controlled motors are excluded from the power factor correction requirement.

To ensure a minimum standard of quality, identify devices, fittings, fixtures, and equipment on equipment list drawings with their electrical sizes, ratings, manufacturer, and catalog number. This is not necessary for items such as panel boards where complete specifications are written.

- Identify motor starters on the motor control schedule. Identify all equipment by using standard symbols and equipment schedules. In addition to the items already mentioned, the schedule should include information to help the contractor obtain the equipment and materials intended by the design.
- Specify nameplates on all control items used on the job. Specify each nameplate either on the motor schedule or on the equipment list. Each nameplate identifies the system and the function of that device to the system.

1.6.8 Busway Systems

- Busway shall be copper with 100% neutral bus minimum.
- Busway shall be totally enclosed in non-ventilated aluminum housing.
- Use IP54 or greater for indoor installations and NEMA 3R for outdoor installations.
- Busway shall be protected against overcurrent in accordance with the allowable current rating of the busway.
- Where busway is used as a feeder, the voltage drop should not exceed 3 percent.
- All busway shall be grounded.
- Provide expansion fittings for all busways at building expansion joints.
- Show the entire busway run on power plan drawings.
- Where busway penetrates walls and floors, seal all penetrations with the appropriate fire stopping material to maintain fire rating of walls and floors.

1.7 Lightning Protection Systems Design

System Drawings:

- Show components on Lightning Protection and Counterpoise Composite Plan.
- Details as required.
- Show lightning protection system connection to the building counterpoise system.
- Show lightning protection and ground systems and details on electrical drawings.

Lightning protection systems shall conform to UL Standard UL 96A requirements and NFPA 780, Installation of Lightning Protection Systems. All structures with lightning protection systems will require a UL Letter of Findings. Note on the drawings which certification is required (UL Letter of Findings, or No Certification required).

Consultant shall provide direction to contractors to provide UL Master Label for any structure, even in case of building addition or renovation.

1.8 Building Grounding System Design

System Drawings:

- Grounding plans
- Grounding one-line
- Grounding details
- Grounding plans and grounding details to be placed on electrical drawings
- Reference Article 250 as a requirement for all grounding work.

The drawings shall show interconnection of the following:

1. All metal systems of the building such as:
 - a. Interior and exterior water system
 - b. Metal ductwork
 - c. Building steel and HVAC roof top units (if applicable).
 - d. Lightning protection system
 - e. Made electrodes, etc.
 - f. Building foundation rebar
 - g. Metal roof drains.
 - h. Antennas and Apron light poles.
2. Where in the electrical system bonding will be required (that is, neutral or ground bushing on transformer).
3. Where the electrode system connects into the rest of the grounding system.
4. Any other special requirements for the building grounding system (that is, static or signal grounds).
5. The size of all required grounding conductors (grounding electrode conductor, equipment grounding conductors, main bounding jumpers, etc.).

The design shall take into account that the NEC as a minimum requirement and other factors need to be considered when designing the system, signal grounds, and lengths of grounding conductors to ground.

1.9 Design Calculations

1.9.1 General

All electrical calculations shall be stamped by a Georgia Professional Electrical Engineer. The original stamped signed copy of the calculations shall be provided to DOA as part of the design submittal.

Present all electrical calculations using the guidelines provided in this section. Provide two 8-1/2- by 11-inch, 3-hole-bound reports that contain all electrical calculations, time coordination curves, and protective device settings. Provide one-line diagrams and electronic files with all calculations. At the end of the project, update both reports and electronic files in the same manner as other as-built drawings.

1.9.2 Voltage-Drop Calculations

Prepare a complete set of voltage-drop calculations. When both normal and standby primary feeders serve a facility, provide calculations for both feeders. The calculation shall be performed utilizing the latest EDSA Systems Analysis or SKM software.

The maximum allowable steady state voltage drop shall not exceed 5 percent total for building wiring.

Design the standard voltage profile for regulated power distribution systems to comply with ANSI/IEEE Standard 141-1993 (Red Book) or the latest edition.

Calculate voltage drop for the longest branch circuit to include the drop in feeders, sub-feeders, and transformers back to the first bus with automatic regulation (usually the primary master unit substation). Do not use a building transformer to correct the secondary voltage drop. Set transformer voltage taps to nominal voltage values under no-load conditions.

Unless loading can actually be predicted, assume the full load for all branch circuits as that limited by the maximum load on the conductors by these standards and/or applicable codes. The power factor for future loading is considered to be the same as when designed. Voltage drop calculations are not required for circuits powering airfield lighting visual aids. The design for all other feeders and branch circuits associated with the airfield lighting visual aids facilities shall comply with this section.

1.9.3 Short Circuit, Circuit Breaker Coordination Study and Arc Flash calculations.

Prepare a complete set of short-circuit calculations. When both normal and standby primary feeders serve a facility, provide calculations for both. The calculation shall be performed utilizing the latest EDSA Systems Analysis or SKM software.

Calculations shall consider both three-phase and single-phase to ground fault current on secondary systems. State the base MVA/kVA on the calculations.

Prepare protective device coordination graphs that demonstrating coordination of devices for interrupting faults. Prepare these graphs for all new or modified primary and secondary systems. Coordination curves shall be prepared along with the single line diagram indicating the devices in question. Provide a flag on all coordination curves indicating the available short circuit current at each device. Curve plots from the software EDSA shall be used.

Arc Flash calculations shall be in accordance with NFPA 70E and IEEE STD-1584

Provide complete electronic calculation in its original format (i.e. EDSA or SKM files). Coordination study shall be from the utility transformer to the largest breaker in the smallest panel. Similar panels can be omitted from the study however; the final report shall indicate the panel names and indicate the word typical to panel's xxxxxx Electrical System shall be fully coordinated.

Indicate in the coordination sheet, short circuits (with flags), breaker type, settings and scales.

For arc flash, provide calculations for each piece of electrical equipment and provide 3 samples of the arc flash label to DOA for approval.

Final report shall be provided in a 3" binder and CD's for electronic files.

Present the manufacturer's catalog data for each protective device to show they have adequate fault current interrupting capacity for the available short circuit current.

1.10 Branch Circuit Panel board Directories

Provide schedule under plastic jacket or protective cover for protection from damage or dirt. Hand written schedules are not allowed. As a minimum provide the following:

- Number each single pole space. Odd-numbered circuits on left side starting at the top, even on right side starting from the top.
- Securely mount directories on inside face of panel board door.
- Where there is no cover or door, provide individual nameplates for each over current and other device.
- Define briefly, but accurately, nature of connected load (i.e. lighting office number, receptacles, electrical room, etc..)
- Provide CPTC official room number locations for all loads and indicate panel name on schedule.
- Multi-pole circuits shall utilize all pole space numbers as its circuit identifier, i.e, a three pole circuit will have three space numbers.
- Spare circuit number shall be annotated in pencil
- Panel board schedules and as-built circuit numbers shall be reconciled and match

Hartsfield-Jackson Atlanta International Airport
City of Atlanta
Department of Aviation
Bureau of Planning & Development

Concessions New Construction/Modifications Design Guidelines – Mechanical

3/28/2014	Revised for Concessions Work only
Last Revised Date	Description of Changes
Revisions	

Design Guidelines Mechanical

Table of Contents

1.0	Purpose	1
1.1	Codes and Standards	1
1.2	General Drawing Requirements.....	2
1.3	Trade Specific Drawing Requirements	2
1.3.1	HVAC	2
1.3.2	Plumbing	2
1.3.3	Fire Protection.....	2
1.4	General System Descriptions (HVAC).....	3
1.4.1	Large CPTC Public Spaces HVAC	3
1.4.2	Zoned CPTC Public Spaces HVAC	3
1.5	Concessions Space Design Guidelines.....	3
1.5.1	Engineer/A&E Site Visit Requirements	3
1.5.2	Existing System Coordination/Remediation Requirements	4
1.5.3	Technical System Descriptions.....	5
1.6	HVAC Materials and Equipment	7
1.6.1	Variable Air Volume Boxes	7
1.6.2	Ductwork	7
1.6.3	Duct Insulation.....	8
1.6.4	Air Distribution Devices	8
1.6.5	Controls Commissioning	8
1.6.6	Test and Balance	8
1.6.7	Utility Piping.....	8
1.7	Plumbing Materials and Equipment	9
1.7.1	Sanitary Waste and Vent Piping	9
1.7.2	Domestic Water Piping.....	9
1.7.3	Natural Gas Piping	9
1.7.4	Insulation.....	9
1.7.5	Water Heaters.....	10
1.8	Fire Protection Materials and Equipment	10
1.8.1	Fire Protection piping	10
1.8.2	Fire Protection Equipment.....	10
1.8.3	Sprinkler Heads.....	10

Design Guidelines Mechanical

1.0 Purpose

- 1.0.1 The purpose of this document is to outline the minimum design standards and installation requirements for mechanical systems (mechanical, plumbing and fire protection), which are installed to serve various concessions spaces throughout the Central Passenger Terminal Complex (CPTC) at Hartsfield-Jackson Atlanta International Airport (H-JAIA or "Airport").
- 1.0.2 Each lease space is designated as available for a particular type of tenant. Tenants fall into one of two major categories: Concessions and Non-concessions. Non concessions tenants are typically airline support service spaces or DOA/CPTC support spaces. Concessionaire spaces are typically categorized in three groups: Food & Beverage, Retail & Specialty Retail. The scope of this guideline is to set the minimum mechanical design requirements for concession type tenant.

1.1 Codes and Standards

- 1.1.1 A&E shall design to the most current codes adopted by the city and state. Code conflicts shall be resolved by using the more stringent applicable code, unless granted a waiver by DOA.
- 1.1.2 All Concessions designs shall be by professional engineers registered in the discipline specific to the trade work indicated on the contract drawings.
- 1.1.3 All governing codes and standards indicated in the trade sections of this guideline will be adhered to by the designers of the concessions construction documents.
Applicable Codes (Building Codes and regulations as adopted by the State of Georgia)
- International Plumbing Code with Georgia Amendments
 - International Building Code
 - International Fuel Gas Code
 - International Mechanical Code
 - International Energy Conservation Code
 - National Fire Protection Association (NFPA) Codes
 - NFPA 70 National Electrical Code
 - NFPA 90A Standard For the Installation of Air Conditioning and Ventilation Systems
 - NFPA 90B Standard for the Installation of Warm Air Heating and Air Conditioning Systems
 - NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
 - NFPA 101 Life Safety Code
 - NFPA 13 Standard for the installation of Sprinkler Systems
 - Standard Building Code
- 1.1.4 Standards
- ANSI American National Standards Institute
 - ASHRAE 62.1 Ventilation for Acceptable Indoor Air Quality
 - ASHRAE 90.1 Energy Standard for Buildings

- ASME American Society of Mechanical Engineers
- National Green Building Standards

1.2 General Drawing Requirements

- 1.2.1 Drawings shall be neat, orderly and complete, showing all information required to convey the scope of work to general contractors or reviewing entities. Drawings will be prepared under the supervision of a state licensed professional engineer and shall bear his/her seal.
- 1.2.2 Mechanical plans shall be consistent with the Architectural plans (e.g., same scale, match lines, common graphic standards) as the base set of documents. Part plans for mechanical equipment rooms, restrooms, kitchens and all rooms shall be provided where the density of support equipment prohibits clear documentation of the systems serving the space at the architectural base scale.

1.3 Trade Specific Drawing Requirements:

1.3.1 HVAC

- Show all primary and secondary ductwork using double line graphic standards. HVAC plan drawings shall be 1/8" or larger.
- Provide sections as required to show inter-trade coordination in space restricted areas (i.e. ceiling plenums, mechanical chases, baggage handling areas, etc.)
- Provide HVAC installation details as required.
- Provide schedules for all HVAC equipment
- Provide air flow balance summations for space (or building) as required to indicate/validate positive pressure relationship between critical building components.(critical for Food & Beverage tenants)
- Provide Control schematic diagrams for all equipment tied to DDC system or under standalone control. Provide I/O summary and written sequence of operation on drawings.
- Provide HVAC calculations (load, pump, fan, etc.) for review.
- See Table 1 for Operating Parameters.

1.3.2 Plumbing

- Use 1/4" scale plans for all restrooms and food service areas
- Provide riser diagrams for all sanitary, natural gas and domestic water systems.
- Provide plumbing fixture schedules with connection sizes for all sanitary and domestic water systems.
- Indicate clearly locations and line sizes of all connections to existing systems.
- Provide schedules for all major plumbing devices including but not limited to, water heaters, pumps, air compressors, etc. Example:
 - Water Heater Schedules should include,, location, storage size, number of elements, KW, etc.
 - Pump Schedule should include, location, service, capacity GPM, RPM, etc.

1.3.3 Fire Protection

- Provide fire protection plan drawings, 1/8" scale or larger.
- Provide Hazard classification, including density and remote square footage and location of same for all spaces within a design.
- Provide specifications including but not limited to, piping and sprinkler heads (type and temperature).

- Provide piping layout plans for major renovation projects and new construction.
- Provide hydraulic calculations with shop drawings done by a certified fire protection system designer. Sprinkler shop drawings and as-built drawings to be submitted to DOA in AUTO-CADD and PDF format.

1.4 General System Infrastructure Descriptions

1.4.1 Large CPTC Public Spaces

- Spaces which fall under this heading are free of interior partitions, relatively large volumes which can either be interior zones or combination interior/exterior zones with the provision that both thermal and air diffusion through the space is relatively uniform and unencumbered. Spaces which generally fall under this category include (but are not limited to) Terminal ticketing and baggage claim areas, Large Terminal Atria, Public seating & Circulation areas, TSA and Concession Cue areas.
- Large CPTC Public spaces are to be served by medium and low pressure VAV Rooftop AHUs wherever possible. VAV indoor AHUs can be used as an alternate, when practical, provided a clean source for OA can be routed to the interior mechanical room. Sufficient space for economizer and relief air must also be provided. Separated ductwork and motorized damper for minimum and economized outside air shall be provided. Outside air and return air in mechanical rooms shall be ducted to AHUs.
- Provide Single Zone VAV AHUs for these large-open volume public spaces which have relatively uniform heating and cooling load distributions. These AHUs will utilize chilled and hot water from the central water loops.

1.4.2 Zoned CPTC Public Spaces

- Spaces which fall under this heading are located adjacent to each other, but have varying load profiles due to external heat gains, or differences in internal space utilization. Spaces which generally fall under this category include (but are not limited to) Concourse main circulation corridors, Hold Rooms, smaller Concourse Atria, Food Courts, and Concession, Tenant Cue areas, General Office and Back of House spaces.
- Zoned CPTC Public spaces are to be served by medium and low pressure VAV Rooftop AHUs wherever possible. VAV indoor AHUs can be used as an alternate, when practical, provided a clean source for OA can be routed to the interior mechanical room. Sufficient space for economizer and relief air must also be provided. AHUs in locations subject to intake of jet exhaust shall be provided with carbon filtration as described later in the document. If OA route pressure drop is more than 0.75" W.C. consider providing OA injection for to induce minimum required OA when supply fan VFD is in low speed.
- Provide VAV AHUs for these spaces. These AHUs will utilize chilled and hot water from the central water loops. Provide VAV terminal units with hydronic heating.
- Note: Use of Fan powered terminal units/power induction units (PIUs) are discouraged in the CPTC base systems. Coordinate with DOA/AATC to receive prior approval before using PIUs in any special applications.
- Plumbing infrastructure consist of Domestic water supplied from the city water system at a pressure of 60 to 70 pounds. There is a sanitary sewer system at each concourse. There is natural gas supplied on the roof of concourse T, A, B , C, D and inside E and F.
- Fire protection is supplied by a fire pump and jockey pump on each concourse.

1.5 Concessions Space Design Guidelines

1.5.1 Engineer/A&E Site Visit Requirements

1.5.1.1 The following requirements shall be adhered to by designers of concessions spaces:

- Designers shall provide due diligence to investigate existing conditions including requesting as-built drawings from AATC and/or DOA as required. The designers shall visit the site and check as-built conditions against previous design drawings.
- When existing conditions are concealed behind inaccessible spaces, Designers shall modify drawings during the demolition phase of work as previously concealed utilities are exposed. The engineer should require the owners representative and GC keep the latest revisions of design documents on site.
- Designers shall visit the site to inspect the existing conditions after demolition has occurred, periodically during the new construction to ensure that the design intent is being maintained, prior to the drywall and ceiling installation to confirm that on site as-built drawings are correct (prior to concealing) and at the end of construction to provide final punch of the installation, confirming that all systems operate in accordance with the design intent.

1.5.2 Existing System Coordination/Remediation Requirements

- The Concession and Designer are responsible for bringing all systems which exist in their space(s) as well as those which are directly dedicated to serving their space(s) up to both current code and DOA standards as herein indicated.
- The Designer is responsible for analyzing the impact the concession modifications will have on the existing systems. The designer is responsible for ensuring that the existing common systems (AHUs, concourse pumps, primary ductwork, CHW/HW piping mains, natural gas, sanitary mains, domestic water mains, fire protection mains & zones) are not over taxed by the addition of systems required to serve tenant spaces.
- Determine if AHUs and Pump systems can handle the additional loads.
- TAB the entire AHU system which has been modified to ensure that other tenants have not been adversely affected by the Tenant modifications. TAB to specified summer and winter design conditions if design drawings are available, or current existing maximum air/water flows as determined by pre testing.
- Determine that maximum velocities have not been exceeded in pipe and duct systems.
- Determine that AHUs have the spare capacity for any additional loads added.
- The Tenant is responsible for making all reasonable modifications to existing systems to meet code minimum requirements, good design practice and DOA requirements. A sample of typical modifications includes but is not limited to:
 - Upgrade controls
 - Replace fiber board duct with sheet metal

- Replace flexduct systems over 10 years old.
 - Replace/repair duct and piping insulation systems
 - Replace M/P/FP piping and ductwork mains as required to meet new loads.
 - Replace AHUs and pumping systems when the additional loads exceed the capacities of existing equipment. (or provide new system – coordinate with DOA engineering)
 - Replace PVC drainage piping with C. I. or stainless steel.
 - Repair exterior cladding and new insulation to maintain the building envelope integrity.
- The Tenant is also responsible for the demolition of all systems not required to serve the space in its final configuration with the exception of active systems serving other spaces passing thru the lease area.
 - Removal shall include, but not be limited to: all existing piping, conduit, controls, hangers and equipment, etc. used to serve the space regardless of location within or outside the boundary of the lease space. Remove all abandoned rooftop equipment and appurtenances (capping roof openings) and all utilities (CHW/HW Primary/secondary Air, Duct, DW/sanitary/FP/Storm/Water, etc.) located in the ceiling plenum or chases of adjacent floors. Piping abandoned will be removed back to active main and capped. Cap seal and insulate as required any active utilities. Demo electrical service back to the power panel. Coordinate the removal requirements for any buried piping and conduit with DOA engineering.
 - DOA is the final arbiter of what constitutes reasonable modifications to base building systems.

1.5.3 Technical System Description

1.5.3.1 HVAC

- VAV AHUs with VAV terminal units using hydronic heating coils serve the majority of all concession spaces within the CPTC. Existing concession spaces have terminal units providing conditioned air to the space. New spaces typically have primary air trunk ducts with tap points indicated for future use. Existing HWS/HWR piping runs adjacent to most spaces. Existing terminal units have individual piping run outs to their respective coils.
- Where it is determined that base building systems cannot accommodate the new loads, dedicated equipment will be the alternate source of HVAC. CHW/HW AHUs, RTUs connected to the base building hydronic systems are the preferred systems to install, for larger areas as an alternate. DX cooling and electric heating RTUs may be used. Coordinate with DOA once the determination that supplemental systems will be required to determine which system alternative will be used.

1.5.3.2 BMS Controls

- DDC interface: The base building control infrastructure is based on a Metasys control system. All new controls shall be DDC and shall be BACNET compatible. All new controls shall be compatible with the standard protocols (device naming, addressing, graphic standards) for HJAIA. The tenant is responsible for retrofitting the controls to existing equipment

servicing their spaces to the new standard. (Upgrading the systems will be required any time a renovation project is enacted, regardless of the extent of HVAC work being done.)

- The Tenant DDC system shall be able to operate in stand alone mode if the building DDC system is disabled. The tenant DDC system shall be compatible with the latest communication protocols.
- The tenant is responsible for the update of all BMS Graphics associated with the build out of their space as well as providing all final documentation and systems commissioning required to ensuring proper HVAC systems operation and to meet DOA/AATC close out and turn over requirements.

1.5.3.3 Rooftop Equipment

- All rooftop equipment will be installed on curbs or rails. Provide details to insure that roofing system integrity is maintained. All roofing work will be performed by certified contractors as to not void any roofing warranties.
- Rooftop equipment will have laminated nameplates which will identify the system type (exhaust fan- EF-1, Make-up air unit MAU-1 etc.) as well as the concession space it is serving (Joe's Coffee house, Burger Barn, etc). Major equipment capacity information will also be indicated on the equipment.
- Rooftop equipment will be feed from electrical panels dedicated to the concession space the equipment serves.
- Rooftop equipment will have lighting protection grounding.
- Rooftop AHU outside air intake shall be 10 feet or more away from an exhaust fan.
- Cooling coil condensate will be routed to sanitary system (floor sinks, hub drains or mop sinks).

1.5.3.4 Food and Beverage special requirements:

1.5.3.4.1 HVAC

- The designer is required to provide the following additional services on F&B designs:
- Provide an air flow balance summary schedule which shows that the kitchen is negative relative to the dining area which is negative to the public corridor.
- Provide tempered (heated and cooled) make-up air. Make-up air units in the 1,000 – 1,200 CFM range may be exempt from the tempered air requirements based on the overall air balance of the concourse/terminal in which it is located. Coordinate with DOA mechanical to see if the exception will be allowed on a case by case basis. Coordinate with DOA Engineering to determine if makeup air is to use gas or electric heating. Provide an interlock to ensure that whenever the Exhaust fan to the kitchen hood(s) is energized, that the make-up air system is energized.
- Wrap all grease duct systems in the appropriate fire rated insulation. Show installation detail on the details sheet.
- Grease exhaust fans will be up-blast type designed for the particular application. Provide a drip assembly with pan and curb to protect the roof membrane from grease run off and splatter.

1.5.3.5 Plumbing

1.5.3.5.1 General: Spaces have the utility services listed below.

- Domestic Water: Domestic water service typically runs down the public access corridors in the concourses. It is stubbed into existing tenant spaces. Newly designated spaces must provide new taps into the existing domestic water system. The designer is responsible for making all field surveys of the existing systems to determine where the appropriate place.
- Sanitary Connections: Sanitary waste and vent systems typically run in the ceiling plenum of the apron level (sanitary) or down the public access corridors in the concourses. They are stubbed into existing tenant spaces. Newly designated spaces must provide new taps into the existing sanitary waste and vent systems. The designer is responsible for making all field surveys of the existing systems to determine where the appropriate place. Sanitary waste must be kept separate from grease waste until after the grease trap.
- Grease Waste: All F&B spaces which use cream based foods or liquids and or grease/oils in any of their entrees or for cooking must have a grease interceptor. Major F&B providers, ones with large kitchens, or seating areas or produce menu items which generate significant grease waste by-product (as determined by The Department of Watershed Management- DWM) must connect to a minimum 1500 gallon grease interceptor as required by the DWM per Ordinance, part 154, division IV, section 154-297. All dishwashers, floor drains, three compartment sinks mop sinks and food grinder waste water shall discharge into grease interceptor. Indicate on drawing with stamp that DWM approval has been granted.
- F&B service providers are required to provide and install their own GI either in ground or above ground. The design AE shall coordinate the final location and GI type with DOA engineering and Facilities.
- If the DWM allows and a contractual arrangement can be made between all parties, the sharing of 1500 gallon GI is acceptable by DOA Engineering. Coordination of any agreements must be made through DOA Concessions. Any agreement must clearly outline the shared cost/responsibility of removing the grease waste on a regular basis as well an upkeep of any common pipe.
- Natural Gas Connection: Natural gas is supplied to concourses T, A, B, C and D on the roof. Tenant is to provide their own meter and regulator to serve their space. Terminal, Concourse E and F have natural gas supplied at food courts in back of house.
- Fire Protection: The existing spaces will have an existing sprinkler system that will be modified to meet the new space layout..

1.6 HVAC Materials and Equipment

1.6.1 Variable Air Volume Boxes (VAV)

- VAV Boxes shall be single-duct terminal unit complete with modulating damper, airflow measuring sensor, and internally insulated casing. Reheat boxes shall be provided with hot water reheat coils. DDC controls and damper actuator will be provided by Controls contractor.
- Power wiring for damper actuators shall be provided for in design.

1.6.2 Ductwork

- Ductwork shall be galvanized steel sheet metal designed and constructed per SMACNA duct construction standards. Fiberboard duct is not permitted. Main duct trunks shall be located over common areas or corridors whenever possible. Balancing dampers shall be provided at proper locations to allow balancing of systems.
- Flex duct run-outs to diffusers shall not be longer than 6 feet. Flex duct shall not be used in exhaust systems.

1.6.3 Duct Insulation

- Duct insulation for supply outside and return ducts above ceilings shall be fiberglass blanket wrap, 2" thick, 1.5 lb./cu.ft. density with a factory-applied FSK vapor barrier. Insulation thermal conductivity at 75°F shall be 0.27 BTU-in./hr./sq.ft./ °F. On rectangular ducts 24 inches wide and larger, apply stick pins and washers on 18 inch centers on bottom side of duct.
- Duct insulation for supply outside and return ducts in exposed unconditioned spaces shall be rigid fiberglass board insulation, 2" thick, 3 lb./cu.ft. density with factory-applied FSK vapor barrier.

1.6.4 Air Distribution Devices

- Air distribution devices selected shall match the style of devices in existing areas. Devices shall be provided with dampers and shall be selected based on throw and noise criteria. Linear slot diffusers shall be used at large glass areas on exterior walls.

1.6.5 Controls Commissioning

- All new systems and controls shall be commissioned by a certified commissioning agent. Commissioning shall include all requirements to meet AATC project turn over criteria.

1.6.6 Test and Balance

- All HVAC systems shall be tested and balanced upon completion of installation. The TAB services shall be performed by an AABC-certified contractor.

1.6.7 Utility Piping

- Chilled Water and Heating Hot Water pipe shall be ASTM A-53 Grade B pipe carbon steel. Piping 2 ½" and smaller shall be threaded and coupled with 150 lb. threaded fittings. Type L hard-drawn copper with solder joint fitting may be used on for piping

2 ½" and smaller with DOA approval. Piping 3" and larger shall be plain end pipe with 150 lb. butt-welded fittings.

- Piping headers shall be routed over corridors or common areas for access.
- Cooling coil condensate will be routed to sanitary system (floor sinks, hub drains or mop sinks).
- Pipe insulation shall be rigid fiberglass pipe insulation with all-service jacket vapor barrier. Piping located outside shall be covered with aluminum jacketing.
- New piping shall be thoroughly cleaned and flushed before placing into service.
- Avoid routing CH/HW piping in electrical rooms.

1.7 Plumbing Materials and Equipment

1.7.1 Sanitary waste and Vent and Kitchen Piping

- Sanitary waste and vent and storm piping shall be service weight cast iron pipe and fittings with factory asphalted coating.
 - Underground piping shall be hub and spigot with push-on compression joints with neoprene gaskets.
 - Above ground piping shall be no-hub joints with stainless steel bands and neoprene sealing sleeve.
- Kitchen (greasy) waste, from dishwasher, floor drains, floor sinks, three compartment sink, mop sink and food grinder waste water to grease interceptor shall be stainless steel piping with hub and spigot with push on joints.

1.7.2 Domestic Water Piping

- Potable water piping shall be type "L" copper.
 - Fittings 2-1/2" and smaller shall be solder using 95/5 lead free solder.
 - Fittings larger than 2-1/2" shall be rolled groove.
 - Fittings 2" and less shall be press fit with neoprene "O" ring.

1.7.3 Natural Gas Piping

- Above ground gas piping shall be schedule 40 black steel.
 - Gas piping in return air plenum and larger than 2" shall be welded.
 - Gas piping 2" and smaller shall be threaded.
- Above ground piping exposed outdoors shall be coated and wrapped or painted with a minimum two coats of yellow epoxy paint.

1.7.4 Insulation

- Domestic cold water, ½" thick fiberglass pipe insulation
- Domestic hot and hot water return, 1" thick fiberglass pipe insulation.
- Domestic water piping exposed outdoors or in heavy traffic areas will be the same as in kitchen except with aluminum jacket

- Domestic water piping exposed in kitchen or wash down areas shall be ½" for cold and 1" for hot and hot water return closed cell insulation with PVC jacket.
- Sanitary drainage, p-trap and horizontal piping, serving HVAC condensate shall be insulated the same as roof drains and horizontal piping.
- P-traps, sanitary piping, kitchen piping and domestic water exposed to freezing shall be heat traces and insulated with aluminum jacket.

1.7.5 Water Heaters

- Water heaters shall be electric where possible or approved by DOA.

1.8 Fire Protection Materials and Equipment

1.8.1 Fire Protection Piping

- All components of the fire protection systems and installation shall meet NFPA 13 requirements.
- Above ground sprinkler piping shall be schedule 40 carbon steel with welded or threaded joints and schedule 10 rolled grooved. Fittings shall be UL-listed and FM-approved for fire protection service. Mechanical grooved fittings and couplings which are UL-listed and FM-approved are permitted.

1.8.2 Fire Protection Equipment

- Wet sprinkler systems shall be designed through an alarm check valve in lieu of a straight way check valve with flow switch.

1.8.3 Sprinkler heads

- Concealed type sprinkler heads shall be located in sheet rock ceilings and 2X4 lay-in ceiling (at ¼ points).
- Semi-recessed heads shall be used in 2X4 lay-in ceiling (at ¼ points)
- Upright heads shall be used for areas without ceiling or for dry systems.
- Concession can use any UL, FM approved head in their space.

Table 1 – Passenger Facilities – HVAC Operating Parameters

Passenger Facilities HVAC Operating Parameters								
Space/Function	Indoor Design Condition				HVAC Load Data			
	Summer- °F	% RH	Winter- °F	% RH	People FT ² /PPL	Outside Air CFM/PPL	Lights Watts/FT ²	Equipment Watts/FT ²
Hold Rooms	74	50	70	-	200 PPL/Gate	10	1.5	2.0
Interior Corridors	74	50	70	-	100 FT ² /PPL	10	1.5	1.5
Concessions (Restaurant)	74	50	70	-	30 FT ² /PPL or Count	10	3.0	10.0
Concessions (Retail Store)	74	50	70	-	45 FT ² /PPL or Count	10	6.0	3.0
Crown Room	74	50	70	-	45 FT ² /PPL or Count	20	3.0	3.0
Break Room/ Group Room	74	50	70	-	100 FT ² /PPL or Count	10	1.5	1.5
Office/ Administration	74	50	70	-	100 FT ² /PPL or Count	20	1.5	1.5
Third Level Tenant Space	74	50	70	-	100 FT ² /PPL	20	2.5	2.5
Smoking Room	74	50	70	-	15 FT ² /PPL	60	1.5	1.5
Apron Level (Air Conditioned Spaces)	74	50	70	-	100 FT ² /PPL or Count	20	2.5	1.5
Classroom/Training/Conference	74	50	70	-	30 FT ² /PPL or Count	20	2.5	1.5
Toilet Room/Locker Room	74	50	70	-	0	0	1.5	0.0
Storage Area	74	50	70	-	0	0	1.5	1.0

OUTDOOR DESIGN CONDITIONS

Summer 94 °F DB/ 74 °F WB

Winter 17 °F DB

Cooling Supply Air Design

Supply air Delta T (Space Temp- Leaving Coil Temp): 23 ° F

Chilled & Hot Water Design: Supply- Return Delta T

Secondary CHW: 16 °F

Air Handling Unit CHW: 18 °F

Secondary HW: 40 °F

Hartsfield-Jackson Atlanta International Airport
City of Atlanta
Department of Aviation
Bureau of Planning & Development

Concession Kiosks – Permanent & Temporary Design Guidelines

03/28/2014	Revised for Concessions Work only			
Last Revised Date	Description	Approved By		
Revisions				

Design Guidelines Concession Kiosks – Permanent & Temporary

Table of Contents

1.0	Purpose	3
2.0	Scope	3
3.0	Responsibilities	3
4.0	Technical Requirements	3
4.1	Architectural	3
4.2	Signage	3
4.3	Electrical	4
4.4	Plumbing and Fire Protection	5
5.0	Building Permit	5
6.0	Construction	5

1.0 PURPOSE

The purpose of these design guidelines is to provide Concessions with the Department of Aviation (DOA) minimum technical requirements for submitting a Permanent (New Construction) and/or Temporary (Modified) Kiosk project for review and approval.

2.0 SCOPE

These design guidelines apply to all Concession Tenants including Designers, Vendors, Contractors and Sub-Contractors.

3.0 RESPONSIBILITIES

- 3.1 Submit the required documentation for the proposed Kiosk per the DOA Concessions Project Submittal/Review Guidelines.
- 3.2 Comply with the technical requirements of these guidelines.
- 3.3 Construct/install the project in accordance with the DOA stamped/accepted drawings.
- 3.4 Submit revisions or modifications to the Concessions DOA stamped/accepted drawings for DOA review and approval.
- 3.5 Obtain required building permits from appropriate agencies before start of any construction/installation work.

4.0 TECHNICAL REQUIREMENTS

4.1 Architectural

The kiosk design should be unique to the airport, providing identity for the Stakeholders and interest for prospective customers. And, it should provide a sense of belonging within its surrounding environment.

- 4.1.1 Overall kiosk measurements shall not exceed 9'-0" in height by 3'-6" wide.
- 4.1.2 Materials for construction and finishes shall be selected based on their durability, low maintenance requirements, hazard free, and energy efficient.
- 4.1.3 Hinges are to be fully concealed from view when door is closed and shall permit 120 or 170 degree door swing. Hinge crank shall be heavy steel with a concealed, integral self-closing spring mechanism.
- 4.1.4 Concealed storage for personal items shall be provided.
- 4.1.5 DOA shall review and approve the kiosk concept design
- 4.1.6 Kiosk design shall comply with all ADA and Building Code Requirements.

4.2 Signage

- 4.2.1 Kiosk signage shall be integral to the unit.
- 4.2.2 Kiosks shall not have blade type signage.
- 4.2.3 Surface mounted box or cabinet type signs are permitted as part of the kiosk design.
- 4.2.4 Signs shall be limited to trade name and logo/symbol only.
- 4.2.5 Size of letters, logos and graphics shall be proportionate to the Kiosk design.

4.2.6 Materials

- 4.2.6.1 Signs engraved or sandblasted in granite, marble or other stone are acceptable.
- 4.2.6.2 Sandblasted or etched signs on glass are acceptable.

- 4.2.6.3 Pin mounted letters shall not stand away from the background plane of the signage band more than two inches (2").
- 4.2.6.4 Formed plastic or injection molded signs, or vacuum formed letter signs are not permitted.
- 4.2.6.5 Signs fabricated from simulated materials such as plastic laminates are not permitted.
- 4.2.6.6 Hand lettered signs of any type are expressly prohibited.

4.2.7 Lighting

- 4.2.7.1 No exposed raceways, ballast, transformers, or readily visible sign company names or labels are permitted.
- 4.2.7.2 Neon-formed letter tubing and/or neon tenant logos shall not be used.
- 4.2.7.3 Back lit, halo lit, front lit, rear-lit channel or halo-reverse-lit channel letters illuminated with neon with the rear face of each letter shall be no more than two inches (2") away from the background plane of the signage band.
- 4.2.7.4 Light sources shall be recessed or concealed.
- 4.2.7.5 All signs must be Underwriter Laboratory approved.

4.3 Electrical

- 4.3.1 Provide One Line Diagram containing all electrical distribution equipment starting from the 480V Concessions Switchboard down to the 208/120V distribution panel powering the kiosk.

- 4.3.2 Provide 208/120V panel schedule with load tabulation.

4.3.3 Wiring

- 4.3.3.1 All wiring shall be in electrical metallic tubing, wire ways, approved raceways or cable trays. EMT may be used for concealed installations but GRS should be used for exposed conduit. Only cast metal boxes should be used for exposed installation. EMT with compression fittings can be used in lieu of GRS with prior DOA approval and where the circuit is not subject to any mechanical damage. EMT with set screws is not allowed.
- 4.3.3.2 Branch circuit conductors shall be minimum 12 AWG and shall be copper, type THHN/THWN unless otherwise noted. Minimum conduit size shall be ¾".
- 4.3.3.3 No reduced sized neutrals will be allowed. Each single pole over current device shall have its own separate neutral conductor.
- 4.3.3.4 Neutral conductor sizes shall not be less than the respective feeder or phase conductor sizes.
- 4.3.3.5 Power conductors shall be routed separately from all other conductor types.
- 4.3.3.6 Include equipment grounding conductors sized per NEC with all power circuits
- 4.3.3.7 Ensure feeders have amperage adequate for the loads to be served. Demand Factors are allowed in accordance with NEC

4.3.4 Circuiting

- 4.3.4.1 Home runs for receptacle, power, and lighting shall be indicated with an arrowhead, panel/terminal cabinet number, and circuit/terminal block number

- 4.3.4.2 Identify the conduit size and then number and type of conductors it contains.
- 4.3.4.3 For typical circuits, this information may be listed by general note. For example, "All conductors are 12 AWG THHN/THWN in ¾ -inch conduit unless otherwise noted"
- 4.3.4.4 Avoid shared neutral circuiting
- 4.3.4.5 Group circuit homeruns where feasible and derate as required per NEC Table 310.15(B)(2)(a)
- 4.3.4.6 Branch circuit design for general use power outlets shall be limited to no more than six receptacles per circuit. General use power outlets shall be NEMA 5-20R
- 4.3.4.7 Except for life safety requirements, circuits shall not be connected to the emergency power
- 4.3.4.8 Dedicated circuits shall be marked accordingly in the panel directory distinguishing them from the other circuits
- 4.3.4.9 If any circuits from an existing panel are demolished first use these spare circuits for any new work before using existing spaces or spare circuit breakers.
- 4.3.4.10 Include notes on the drawings to instruct the contractor to efficiently use wall space or electrical room space when installing new electrical equipment in order to maintain space for future work
- 4.3.4.11 Provide list of demolished circuits and update circuit directories

4.4 Plumbing & Fire Protection

- 4.4.1 Concession/Designer/Contractor shall review existing sprinklers for clearance. If sprinkler heads are blocked, Concessionaire/Designer shall be responsible for relocating or adding new sprinkler heads if required. Drawings showing design intent shall be required.
- 4.4.2 If drainage is required, Concession/Designer/Contractor shall be responsible for routing waste to a DOA approved location. City of Atlanta Department of Watershed Management shall review and approve Grease Trap requirements. Any preparation or production sink shall require point of use Grease Trap with calculations.
- 4.4.3 If water is required, Concession/Designer/Contractor shall be responsible for connecting to a DOA approved water line. An isolation valve for the concession that is accessible from the finish floor shall be required.
- 4.4.4 Concession/Designer/Contractor shall be responsible for replacing and/or repairing any surface/material that is affected/damaged by the Concession/Designer/Contractor's work.

5.0 BUILDING PERMIT

- 5.1 Concessionaire/Designer shall submit the DOA stamped/accepted construction set of documents to the City of Atlanta, Bureau of Buildings (BOB) for review and issuance of a construction building permit.
BOB shall not review any submittal without the DOA seal of acceptance.

6.0 CONSTRUCTION

- 6.1 All Concession projects shall be constructed in accordance with the DOA stamped/accepted documents.
- 6.2 Any revisions or modifications to the Concessions DOA stamped/accepted documents shall be submitted to DOA for review and approval.
- 6.3 Concessionaire/Designer/contractor shall be responsible for addressing/completing all "Conditionally Closed" comments as part of the construction work.

Hartsfield-Jackson Atlanta International Airport
City of Atlanta
Department of Aviation
Bureau of Planning & Development

Concessions New Construction/Modifications Design Guidelines - Grease Interceptors

03/28/2014	Revised for Concessions Work Only			
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Design Guidelines Grease Interceptors

Table of Contents

1.0	Purpose	3
2.0	Scope.....	3
3.0	Responsibilities.....	3
3.1	DOA Responsibilities	3
3.2	Concessionaire & Architect/Engineer of Record.....	3
3.3	Concessionaire's Contractor/Sub-Contractors Responsibilities	4
4.0	Procedure.....	4
4.1	Design Phase - DOA.....	4
4.2	Design phase – Concessionaire & Architect/Engineer of Record.....	4
4.3	Construction Phase - DOA.....	5
4.4	Construction Phase – Concessionaire & Architect/Engineer of Record	5
4.5	Construction Phase – Concessionaires & Contractor/Sub-Contractor	5
5.0	Attachments.....	6
5.1	DOA Civil Installation Standards	6
5.2	DOA Civil Installation Specifications	7
6.0	Related Design Guidelines.....	7
7.0	Contacts	7

1.0 PURPOSE

The purpose of these guidelines is to provide Concessionaires with required Department of Aviation (DOA) process and information for the design and installation of new underground Grease Interceptors at Hartsfield-Jackson Atlanta International Airport (H-JAIA).

2.0 SCOPE

These guidelines apply to all Airport Concessionaires and their Architect/Engineer of Record and Contractors/Sub-Contractors.

3.0 RESPONSIBILITIES

3.1 DOA Responsibilities

- 3.1.1 DOA shall be responsible for cost and ownership of all Grease Interceptors and associated piping to the building penetration at H-JAIA.
- 3.1.2 DOA shall be responsible for determining the locations of all Grease Interceptors.
- 3.1.3 DOA and Department of Watershed Management (DWM) shall be responsible for reviewing and approving the design and installation of all Grease Interceptors, associated piping and apron pavement modifications.
- 3.1.4 DOA shall be responsible for overseeing the installation of all Grease Interceptors.

3.2 Concessionaire & Architect/Engineer of Record Responsibilities

- 3.2.1 Concessionaires and Architect/Engineer of Record shall be responsible for the design and installation of the Grease Interceptors, associated piping and apron pavement modifications based on DOA locations and DOA Civil design standards, specifications and criteria (Refer to Section 5.0 below)
- 3.2.2 Concessionaires and Architect/Engineer of Record shall be responsible for complying with all City of Atlanta (COA) Ordinance(s) and DWM regulations as it relates to Grease Interceptor Requirements.
- 3.2.3 Concessionaires and Architect/Engineer of Record shall be responsible for field verification of the selected Grease Interceptor location by DOA, verifying site conditions and compliance with all of DOA design and installation standards, specifications and criteria.
- 3.2.4 Concessionaires and Architect/Engineer of Record shall be responsible for submitting the Design and Issue for construction documents for DOA and (DWM) review and approval.
- 3.2.5 Concessionaires and Architect/Engineer of Record shall be responsible for submitting As-Built drawings to DOA.

3.2.6 Concessionaires shall be responsible for the Operation and Maintenance of the Grease Interceptors and all its associated appurtenances.

3.3 Concessionaire's Contractor/Subcontractors Responsibilities

3.3.1 Concessionaires Contractor and Subcontractors shall be responsible for complying with all the requirements set forth in section 4.5 of these guidelines and adhering to the DOA Concessions/Tenant Construction Guidelines.

4.0 PROCEDURE

4.1 Design Phase - DOA

4.1.1 DOA Facilities Construction Management (FCM) and DOA Engineering shall be responsible for determining the preliminary and final location of all Grease Interceptors

4.1.2 FCM shall be responsible for coordinating the preliminary Grease Interceptor locations with the affected Airlines and/or other H-JAIA Tenants in order to obtain their concurrence with the preliminary locations. Review of the preliminary locations shall be based on the following:

4.1.2.1 Emergency egress locations

4.1.2.2 Emergency fuel shutoff controls

4.1.2.3 Operational interferences such as tug lanes, ground support equipment locations, aircraft safety lanes, passenger boarding bridge travel, etc.

4.1.2.4 25' x 25' slab replacement parameters

4.1.3 FCM shall be responsible for providing field survey data collection of existing conditions, underground utilities and airport grid coordinates for all Grease Interceptor's preliminary and final locations.

4.1.4 FCM shall be responsible for establishing the final Grease Interceptor locations based on DOA Engineering review of the survey data collected, absence of operational constraints, and final approval from the Airlines and/or other H-JAIA Tenants.

4.1.5 FCM shall be responsible for providing written and graphic confirmation of the final Grease Interceptor location to Airline Representatives, DOA Concessions, DOA Engineering, Atlanta Airlines Terminal Corporation (AATC), and DOA Document Control.

4.1.6 DOA and DWM shall review and approve all Concessionaire Grease Interceptor Design and Issue for Construction submittals.

4.2 Design Phase – Concessionaires and Architects/Engineers of Record

- 4.2.1 Concessionaire and Architect/Engineer of Record shall be responsible for field survey and verification of the final Grease Interceptor location as approved by DOA and verification of existing site conditions including underground utilities.
 - 4.2.2 Concessionaire and Architect/Engineer of Record shall be responsible for reviewing and complying with all Federal, State and COA codes, regulations and ordinances, and DOA/DWM design and installation standards, specifications and criteria.
 - 4.2.3 Concessionaire and Architect/Engineer of Record shall be responsible for the design and development of construction documents for their Grease Interceptors.
 - 4.2.4 Concessionaire and Architect/Engineer of Record shall be responsible for submitting 100% Design documents (including Structural, Plumbing and Mechanical calculations) for DOA and DWM review. Once the 100% submittal is approved, the A/E shall submit the Issue for Construction documents for final DOA/DWM stamp approval.
- 4.3 Construction Phase – DOA
- FCM shall be responsible for providing the Airline Representatives and AATC with the Grease Interceptor installation schedule and work area plan as developed by the Concessionaire's Contractor.
- 4.3.1 FCM shall be responsible for confirming the approved Grease Interceptor location with the Concessionaire's Contractor and assure that all pre-construction requirements are met.
 - 4.3.2 FCM shall be responsible for overseeing the installation of the Grease Interceptor work and assure that the Concessionaire's Contractor is in compliance with all DOA installation standards and requirements including Safety.
 - 4.3.3 FCM and DOA Engineering shall be responsible for the submittal review of Grease Interceptor concrete pavement mix design, beam breaks and reinforcement certification and shall notify the Contractor of any issues.
- 4.4 Construction Phase – Concessionaire and Architect/Engineer of Record
- 4.4.1 Concessionaires and Architect/Engineers of Record shall be responsible for submitting any revisions or modifications to the DOA stamped/approved documents for DOA review and approval.
- 4.5 Construction Phase – Concessionaire and Contractor/Sub-Contractor
- 4.5.1 Concessionaire and Contractor/Sub-Contractor shall be responsible for submitting a construction baseline schedule at the Pre- Construction meeting to include the following (minimum) information regarding the installation of the Grease Interceptor:
 - 4.5.1.1 FAA 7460-1 permit paperwork
 - 4.5.1.2 Construction/Installation of the Grease Interceptor
 - 4.5.1.3 Installation of concrete barriers
 - 4.5.1.4 Saw cutting and removal of concrete

- 4.5.1.5 Excavation
- 4.5.1.6 Plumbing tie-in
- 4.5.1.7 Concrete pouring
- 4.5.1.8 Any required inspections/testing
- 4.5.1.9 Removal of concrete barriers
- 4.5.1.10 All other required construction/installation work
- 4.5.2 Concessionaire and Contractor/Sub-Contractor shall be responsible for submitting to the FCM, on a weekly basis, three (3) week look-ahead schedule.
- 4.5.3 Concessionaire and Contractor/Sub-Contractor shall be responsible for submitting to the FCM, the following information, four (4) weeks prior to the start of construction:
 - 4.5.3.1 Construction Schedule
 - 4.5.3.2 Construction plan to include the following:
 - 4.5.3.2.1 Safety perimeter barricades
 - 4.5.3.2.2 Dumpster locations, requirements and pick up schedule
 - 4.5.3.2.3 Ground markings for the Grease Interceptor location
 - 4.5.3.3 Storage location needs for on-site equipment and materials.
 - 4.5.3.4 Delivery plan and schedule for regular equipment and material drop-off and pick up (Daytime deliveries shall not be allowed).
 - 4.5.3.5 List of contractor and sub-contractor key contact information.
- 4.5.4 Concessionaire and Contractor/Sub-Contractor shall be responsible for submitting to AATC, shut down requests prior to the start of any construction work.
- 4.5.5 Concessionaire and Contractor/Sub-Contractor shall be responsible for submitting the Grease Interceptor concrete pavement mix design, beam breaks and reinforcement certification for FCM and DOA Engineering review.
- 4.5.6 Concessionaire and Contractor/Sub-Contractor shall be responsible for adhering to DOA Tenant Construction Guidelines.
- 4.5.7 Concessionaire and Contractor/Sub-Contractor shall be responsible for submitting to the FCM, As-Built Drawings (two (2) full size hard copies and two (2) CAD & PDF electronic copies)

5.0 DOA Civil Design Standards and Specifications (for attachments refer to the Concessions New Construction/Modifications Design Guidelines – Civil)

- 5.1 DOA Civil Design Standards (Dated February 2014)
 - 5.1.1 Sheet No. CON-01-100 Bollard Detail
 - 5.1.2 Sheet No. CON-01-200 Full Depth Pavement Replacement Details-1
 - 5.1.3 Sheet No. CON-01-201 Full Depth Pavement Replacement Details-2
 - 5.1.4 Sheet No. CON-01-300 Full Depth Pavement Replacement Details
 - 5.1.5 Sheet No. CON-01-400 Pavement Detail at Utility Slab (For Manholes in Apron Pavement)
 - 5.1.6 Sheet No. CON-01-500 Typical Grease Interceptor Installation (Top of Interceptor Flush with Pavement Surface Designed for Tug Loading) – Case 1

- 5.1.7 Sheet No. CON-01-501 Below Pavement Grease Interceptor Details (Interceptor Not Designed for Tug Loading) Case 2
- 5.1.8 Sheet No. CON-01-502 Below Pavement Grease Interceptor Details (Interceptor Not Designed for Tug Loading) Case 3
- 5.1.9 Sheet No. CON-01-600 Utility Slab Detail for Interceptor Below Pavement
- 5.1.10 Sheet No. CON-01-700 Pipe Details
- 5.1.11 Sheet No. CON-01-800 Underdrain Details for Repairs

5.2 DOA Civil Design Specifications

- 5.2.1 Section 02085 Interceptors
- 5.2.2 Section D-705 Pipe for Underdrains
- 5.2.3 Section D-750 Sanitary Sewers
- 5.2.4 Section P-501 Portland Cement Concrete Pavement
- 5.2.5 Section P-504 High Early Strength Cement Concrete Pavement
- 5.2.6 Section P-605 Joint Sealing Filler
- 5.2.7 Section P-615 Site Concrete
- 5.2.8 Section P-621 Pavement Markings and Marking Removal
- 5.2.9 Section P-660 Concrete Filled Steel Guard Post

5.3 City of Atlanta Grease Management Ordinance

6.0 Related Design Guidelines

- 6.1 Concessions Project Submittal & Review Guidelines
- 6.2 Concessions New Construction & Modifications Design Guidelines – Mechanical
- 6.2 Concessions New Construction & Modifications Design Guidelines – Electrical
- 6.3 Concessions New Construction & Modifications Design Guidelines –Architectural
- 6.4 Concessions New Construction & Modifications Design Guidelines – Structural
- 6.5 Tenant Construction Guidelines

7.0 Contacts

- 7.1 Regional Houston (404) 867-0399
reggiehouston@atlanta-airport.com
DOA Facilities Construction Manager

Hartsfield-Jackson Atlanta International Airport
City of Atlanta
Department of Aviation
Bureau of Planning & Development

Tenant Construction Guidelines

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1.0 PURPOSE

The purpose of these guidelines is to provide airport Tenants with specific Department of Aviation (DOA) requirements for performing any construction work at Hartsfield-Jackson Atlanta International Airport (H-JAIA). These guidelines shall be incorporated into the projects by the Architect/Engineer of Record and Tenants shall furnish their contractors with these guidelines during the pricing phase.

2.0 SCOPE

These guidelines apply to all Airport Tenants (Leaseholders, Concessions, Airlines, Vendors, Contractors, Sub-Contractors and DOA Stakeholders). Access this document at <tt://apps.atlanta-airport.com/engineeringguidelines//index.asp>

3.0 RESPONSIBILITIES

3.1 General Conditions

3.1.1 **Tenant Projects:** After following/complying with the Concessions/Tenant Project Submittal and Review Guidelines, Tenant projects shall be constructed in accordance with the DOA stamped and approved documents.

3.1.2 **Construction Oversight:** Construction oversight shall be conducted by a DOA Facilities Construction Manager (FCM). Contact: Reggie Houston (404-867-0399/reggie.houston@atlanta-airport.com).

3.1.3 **Construction Coordination:** All planned and active construction activities shall be reported by the Tenant's Contractor on a weekly, bi-weekly or monthly basis coordination meeting to be established by the FCM.

3.1.4 **Tenant Construction Guidelines:** All Tenant construction projects shall comply with all the requirements of these guidelines. Failure to comply shall result in suspension of work by the FCM, Airport Security or Airport Police.

3.1.5 **Security Requirements:** Tenant's Contractors and Sub-Contractors shall conform to all DOA Airport Operation Requirements, including Security, Badging, OCIP Badge and Custom Seals (If required). Contact DOA Security Office at (404) 530-6667 for all Security information and requirements.

3.1.6 **Logistics Plan:** Tenant's Contractor shall develop and submit to FCM a Logistics Plan to include as required: dumpster locations (dumpster cover required), staging area, ramp vehicle and equipment parking locations, limits of construction, location of temporary barriers and delivery access routes prior to commencement of any construction work. Such plan shall conform to DOA's master Logistic Plan and Airport Standards "Grease Interceptors Design & Construction Guidelines.

3.1.7 **Safety Plan:** Tenant's contractor shall submit a project specific Safety Plan to the FCM. The plan shall be approved before any demolition/construction work begins. As part of the Safety Plan, the contractor shall include an emergency Contact List. The Emergency Contact List shall be updated with current information throughout the duration of the project. The FCM shall enforce all

OSHA, State and Local Codes as well as Airport Standards (Access Airport Standards at <http://apps.atlantaairport.com/engineeringguidelines/index.asp>)

- 3.1.8 **Pre-Construction Conference:** A pre-construction conference scheduled by the FCM shall be held at least seven (7) days prior to commencement of any construction work. No Construction work shall commence without a pre-construction conference. Tenant shall provide copy of the construction permit issued by the City of Atlanta, Bureau of Buildings (BOB) at the pre-construction conference.
- 3.1.9 **Notification:** Tenant's Contractors shall provide notification to the following entities at least Seventy-Two (72) hours prior to the start of any construction work and moving of personnel or material onto H-JAIA property:
- 3.1.9.1 FCM (contact: Reggie Houston @ (404) 867-0399) for all Tenant projects.
 - 3.1.9.2 TBI @ (404) 530-2021 for projects in Concourse D South, Concourse E and Concourse F.
 - 3.1.9.3 DOA Landside Operations @ (404) 530- 2021 for projects in the Domestic Terminal and Concourses T, A, B, C, and D North.
 - 3.1.9.4 Airside Operations @ (404) 530-6620 for all airside ramp projects.
- 3.1.10 **Work Hours:** Standard DOA approved hours for all Tenant Construction work shall be performed between 11:00 PM and 5:00 AM Sunday thru Thursday. Ramp construction work shall be performed between 11:00 PM and 5:00 AM daily. In case(s) of Irregular Operations (IROPS), the hours available to a Contractor or Sub-Contractor shall be subject to change without prior notice. Daytime work shall only be authorized by the FCM if work is contained inside the approved wall in construction area/space and it does not cause excessive noise, dust, use of volatile organic compounds or welding.
- 3.1.11 **Permits and Code Compliance:** Tenant's Contractor shall obtain all necessary federal, state, county and city permits and shall comply with all applicable laws, codes and regulations.
- 3.1.12 **Insurance:** Tenant's Contractor working on the Airport controlled facilities or property shall be duly licensed and shall provide proof of adequate insurances when requested.
- 3.1.13 **Existing Conditions:** Tenant's Contractor shall be responsible for site verification of all existing conditions and requesting as-built data from DOA. If any utility shall be disturbed or damaged during the construction work, the Contractor shall notify FCM and Atlanta Airlines Terminal Corporation (AATC) immediately. Tenant shall be responsible for all costs associated with the repair or replacement of any damaged utility and affected property.
- 3.1.14 **Digging:** Before any digging is performed, the Tenant's Contractor shall be responsible for the following:

- 3.1.14.1 Contacting the Georgia Utilities Protection Center @ 1-800-282-7411 for notification to Owners of all buried utilities before digging.
- 3.1.14.2 Tenant's Contractor and Sub-Contractors shall adhere to the rules, regulations and laws dictated by the Georgia Utilities Protection Center.
- 3.1.14.3 Tenant's Contractor and Sub-Contractors shall protect all utilities not designated for removal, relocation or replacement in the course of the construction work.
- 3.1.14.4 In case (s) of accidental disturbance of utilities, the Tenant's Contractor/Sub-Contractor shall immediately notify the utility Owner and the FCM.
- 3.1.14.5 Responsible for coordinating the repair of the interrupted utility per the time-line and requirements indicated by the FCM and any other matters where the proposed construction may present operational problems to H-JAIA or its Tenants.

3.1.15 **Deliveries:** Standard DOA approved delivery and debris removal shall only be between 11:30 PM and 5:00 AM

3.2 Special Conditions

3.2.1 **Construction Notice:** Tenant's Contractor shall furnish and install a Document Display device outside the construction barrier wall or door providing the following information:

- Tenant's Name & Contract Information
- Contractor's name & Contact Information
- DOA Approved Project Start Date
- DOA Approved Project Completion Date
- DOA Approved Hours of Operation

3.2.2 **Support Equipment:** Tenant's Contractor shall request permission and register all support vehicles (cars and trucks) and construction equipment (lifts, forklifts, work boxes, trash dumpsters, etc.) operating on the H-JAIA premises during the construction of a project. The approved vehicles shall display the operating certificates inside front window at all times. Identification tags shall be attached to the construction equipment at all times. The operating certificates and identification tags shall be obtained from DOA Landside Operations at (404) 209-4142. Unapproved vehicles and equipment shall be subject to removal by the DOA at the expense of the Tenant/Contractor. Any vehicle or piece of equipment parked in a no parking zone, outside the limits of construction, outside previously approved parking locations, or considered a hazard shall be subject to removal by the DOA at the expense of the Tenant/Contractor and/or could result in the suspension of all construction work.

3.2.3 **Height Restrictions:** FAA Regulations regarding the use of cranes and other equipment operating airside or extending above the roof of the building shall be strictly enforced. Tenant's Contractor shall be responsible for submitting FAA Form 7460 to the DOA for review and approval (contact: Chaim Vanprooyen, 404- 382-1372).

3.2.4 **Temporary Barriers:** Temporary Interior and Exterior construction wall and/or barrier shall be constructed per DOA/H-JAIA requirements as follows:

- No plastic "fillable" barriers shall be permitted on the Aircraft Operations Area (AOA).
- All interior construction requires a temporary barrier.
- Temporary barriers shall create a dust barrier and meet one of three conditions: 1) Extend to ceiling/structure above, 2) Extend to a height that shall not allow visibility of work site, 3) Provide a top enclosure to isolate the work site.
- All barriers shall be constructed of a standard stud wall with finished drywall, painted, painted and/or graphics, cove base and trim.
- All barriers shall be maintained in good condition throughout the entire project.
- Barriers shall not expose non-construction personnel to pinch points, slips, trips, falls, or cut hazards.
- Barriers shall be installed on a plywood/hardboard base per DOA/H-JAIA requirements to prevent floor damage.
- Access doors to the construction areas shall be self-closing, metal type and secured using a Best or equivalent seven-pin type cored locking device operator using green, orange, sand or other construction core as required by the DOA.
- Following the project completion, all finishes (project related or adjacent to the project) shall be restored to a DOA acceptable condition.

3.2.5 **Construction Area Access:** Doors or openings through security barriers or partitions shall be maintained secured 24 hours a day. If the doors or openings are unlocked, properly badge or authorized Contractor provided personnel shall maintain doors under continuous control observation.

3.2.6 **Tools:** Tenant's Contractor shall maintain a tool inventory list and be responsible for ensuring that all tools and construction materials are fully secured at all times to prevent passengers or unauthorized persons from gaining access to them beyond Security Check Points and Security Screening Areas or in the Terminal Buildings.

3.2.7 **Debris:** All debris resulting from the construction work or incidental thereto shall be contained and promptly removed by the Tenant's Contractor per H-JAIA standards. Immediately upon completion of the construction work, Tenant's Contractor shall dispose of all debris off H-JAIA property.

3.2.8 **Waste Collection and Removal:** Tenant's Contractor and Sub-Contractors shall be responsible for the collection and removal of construction waste attributable to all Tenants' construction projects per H-JAIA Concessions Construction Waste Collection & Removal Guidelines. Dumpsters shall be labeled in large lettering with a 24 hour contact name and phone number to call in the event there is an issue with debris.

- 3.2.9 **Clean Site:** Tenant's Contractor shall be responsible for maintaining the work site safe, clean and orderly at all times. Failure to comply, DOA may accomplish same at Tenant's Contractor expense and/or suspend all construction until the situation is corrected.
- 3.2.10 **Restoration:** Tenant's Contractor shall be responsible for restoring contiguous areas affected by the construction work to its original condition.
- 3.2.11 **Temporary Construction Facility Privileges:** Any temporary construction facility or trailer shall be approved by FCM before installation. The contractor shall be responsible for maintaining the grounds associated with this privilege. Noncompliance in maintaining the grounds shall result in loss of this privilege. Approved facilities shall be removed at the completion of the construction project and the premises shall be restored to its original condition.
- 3.2.12 **Protection of Airport Operation Systems:** If any portion of any Airport operations system is damaged by the Tenants' Contractor or Sub-Contractors, or anyone operating under their control or direction, Tenant's Contractor or Sub-Contractors shall immediately notify FCM and propose both temporary and permanent repairs to restore system functions and return the system to its original condition at no additional cost to the DOA.
- 3.2.13 **Aircraft Ramp Work:** Airport Operations shall govern all ramp activities. Construction activities shall not supersede Airport Operations for any reason. When Tenant project construction requires work on the aircraft ramps, Tenant's Contractor & Sub-Contractors shall comply with all DOA Specifications, Standards and Criteria which are found at <http://apps.atlanta-airport.com/engineeringguidelines/index.asp>
- 3.2.14 **Operating within Critical Areas:** When construction work requires the Tenant's Contractor and Sub-Contractors to conduct its operations within areas adjacent to active aircraft gates, taxi lanes, and/or the apron. The work shall be coordinated with FCM. Tenant's Contractor shall request authorization from the FCM forty-eight (48) hours prior to any gate closure or interference with the Aircraft Operations.
- 3.2.15 **Technical Requirements:** Tenant's Contractor and Sub-Contractors shall be responsible for complying with the following H-JAIA requirements:
- 3.2.15.1 **Electrical Power:** Any unauthorized connection to an airport power source shall be disconnected/de-energized by the Tenant's Contractor or Sub-Contractor per the FCM direction. Failure to comply, DOA shall disconnect or de-energize at Tenant's Contractor/Sub-Contractor expense.
- 3.2.15.2 **Conduit:** All conduits shall be concealed from public view.
- 3.2.15.3 **Floor Slab Penetrations:** Tenant's Contractor/Sub-Contractor shall be responsible for scanning (GPR or X-Ray) and providing DOA with the scan results which shall include a detailed drawing of the area to be core drilled. All floor slabs that require drilling, core drilling,

embedding or demolition of any conduit and other utility lines, shall be constructed per DOA Design/Construction Standards.

- 3.2.15.4 **Abandon Penetrations:** Tenant's Contractor/Sub-Contractor shall be responsible for covering any new, existing or abandon floor slab penetrations (Floor/Ceiling) at all times during construction. All abandon penetrations shall be filled per DOA Design/Construction Standards.
- 3.2.16 **Access Control and Alarm Monitoring System (SACS/ACAMS):** When these systems are impacted or tie-ins are required by the Tenant's construction project, the Tenant's Contractor/Sub-Contractor shall be responsible for restoring, maintaining the integrity and be compatible with the existing H-JAIA SACS/ACAMS system. Tenant's Contractor shall coordinate with and use the existing DOA Operations & Maintenance provider to accomplish this work. . All work associated with these systems shall be coordinated through the FCM and shall be review and approved by DOA Security prior to start of any work. Notice shall be provided to the FCM at least 48 hours prior to disturbing the existing SACS/ACAMS system.
- 3.2.17 **Building Management System (BMS)/Fire Suppression and Life Safety Systems:** When these systems are impacted or tie-ins are required by the Tenant's construction project, the Tenant's Contractor/Sub-Contractor shall be responsible for restoring, maintaining the integrity and be compatible with the existing H-JAIA BMS/Fire Suppression and Life Safety Systems. Tenant's Contractor shall coordinate with and use the existing AATC Operations & Maintenance provider to accomplish this work. All work associated with these systems shall be coordinated through the FCM and AATC prior to start of any work.
- 3.2.18 **Environmental Requirements:** When construction mitigation work is required, Tenant's Contractor shall be responsible for complying with H-JAIA Tenant Environmental Compliance Guide (contact DOA Environmental at 404-530-5500 for information). All required project specific mitigation, spill/emergency response and hazardous management plans shall be coordinated through the FCM and shall be review and approved by DOA Environmental prior to start of any mitigation work.