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BID No. AB003A

MARCH 2024

MIAMI INTERNATIONAL AIRPORT (MIA)
CONCOURSE E SATELLITE
APM BRIDGE REHABILITATION PROJECT

CONTACT FOR THIS SOLICITATION:

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VOLUME 3

MDAD AND FDOT STANDARD

TECHNICAL SPECIFICATIONS

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<http://www.miami-airport.com>

OPERATIONAL DIRECTIVE NO. 21-03

Effective: October 12, 2021

SUBJECT: REQUIREMENTS, SAFETY PROTOCOLS AND PRECAUTIONS FOR WORK PERFORMED ON OR NEAR THE AUTOMATED PEOPLE MOVER SYSTEMS AT MIAMI INTERNATIONAL AIRPORT

PURPOSE: To establish the policy, requirements, and safety guidelines for work performed on, or adjacent to, the Automated People Mover (APM) Systems at Miami International Airport (MIA) to minimize potential hazards and promote a safe environment. This policy applies to all personnel performing work within the APM System's Right of Way (ROW) including, but not limited to, Miami-Dade Aviation Department (MDAD) employees, contractors, and subcontractors.

I. AUTHORITY:

- A. Operational Directive No. 99-03, Aviation Department Written Directive System.
- B. Operational Directive No. 99-2, Aviation Department Operational Directives
- C. Chapter 25-1.2 - Miami-Dade County Code, Chapter 25 Miami-Dade Aviation Department Rules and Regulations

II. DEFINITIONS:

- A. Automated People Mover (APM) System – The transportation systems operating at MIA comprised of the North Terminal Skytrain, MIA Mover, and the Satellite E Train.
- B. APM System Supplier/Maintainer – Contractor identified as the responsible party to oversee the maintenance and/or repairs of the MIA APM System.
- C. MDAD – Miami-Dade Aviation Department
- D. MIA – Miami International Airport
- E. APM Right of Way (ROW) – Identified as any area that is within 15 feet from the edge of an APM System guideway or other APM facility.

Departmental Operational Directive

OD No: 21-03

Effective: October 12, 2021

III. POLICY:

MDAD employees, contractors, subcontractors, or any personnel performing work on the APM system, adjacent to, or within the APM's ROW shall refer to and follow all protocols of the APM Access/Adjacent Work Requirements provided herein as Attachment I and all other documents referenced therein. All personnel shall attend a safety orientation training conducted by the corresponding APM System Supplier/Maintainer. Personnel shall also be aware of the potential hazards and conditions that exist within this area and use extreme caution when working in or near these restricted zones as the APM Systems consist of high voltage electrical components and fast-moving vehicles.

MDAD shall have the right to prevent access or halt any construction activities that may affect the safety of MIA and/or MDAD personnel, visitors, passengers, and facilities. MDAD will exercise reasonable advance notice for stoppage of work unless an immediate concern arises.

IV. AMENDMENTS:

The Department reserves the right to amend this operating policy at any time based on current law, Miami-Dade County policies and operating needs.

V. REVOCATION:

Revocations and removal of established Department policies requires written justification by requesting division management for review and concurrence by the Department's Professional Compliance Division. Upon written concurrence, the revocation request will be submitted, by Professional Compliance, for approval by the Aviation Director. Should the written directive be an Operational Directive, the authorized revocation justification will be sent to the Clerk of the Board for filing with the original Operational Directive under revocation. All approved revocation justification memoranda shall be posted to the Department's Written Directives Log to identify why the directive has been revoked to maintain ongoing operational accountability.

VI. SEVERABILITY:

If any court of competent jurisdiction determines that any provision in this policy is illegal or void, that provision shall be nullified and the remainder of this policy shall continue in full force and effect. If such court rules that any charge, fee, or security deposit requirement is illegal or void, the Aviation Director is authorized and

Departmental Operational Directive

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directed to impose a charge, fee, or security deposit requirement that complies with the court order or applicable provisions of law, which shall become effective on the date of imposition and shall continue until modified by the Miami-Dade County Board of County Commissioners.

VII. EFFECTIVE DATE:

This operational directive shall become effective 15 days subsequent to its filing with the Clerk of the Circuit Court as Clerk of the County Commission. This operational directive shall remain in effect until revoked or amended.

Approved By:



Ralph Cutié, Aviation Director

Date:

9/24/21

Attachment I - APM Access/Adjacent Work Requirements

APM Access / Adjacent Work Requirements (AAWR)

Miami International Airport

August 2021



MIAMI-DADE AVIATION DEPARTMENT

Documents Prepared and Submitted by:

Eddie China, MDAD APM Office

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1.0 INTRODUCTION AND PURPOSE

The Miami-Dade Aviation Department (MDAD) promotes a safe environment and considers safety a primary concern that affects all levels of MDAD activities, including transportation systems. MDAD has various forms of transportation systems operating on the Miami International Airport property. This document focuses on the three Automated People Mover (APM) Systems installed on Miami International Airport property (the North Terminal Skytrain APM System, the MIA Mover APM System, and the Satellite E eTrain APM System). Collectively, these three APM Systems are known as the “MIA APM Systems” and are referenced as such throughout this document.

These MIA APM Systems will, at times, require work to be performed for required periodic, scheduled and unscheduled maintenance, modifications, upgrades and repairs. There will also be maintenance/construction work to be performed by MDAD, not related to the APM systems, but within the System Right of Way (ROW). Access to perform these maintenance/construction and upkeep activities will be necessary. All contractor personnel (including MDAD personnel) performing work within the ROW, whether MDAD direct employees, personnel hired by MDAD, personnel hired by the respective APM Systems Supplier/Maintainer or as a subcontractor to any contractor performing work on Airport property adjacent to or within any APM System ROW, must adhere to the access and procedures outlined within this **APM Access / Adjacent Work Requirements (AAWR)** and as further required by all referenced documents including **MDAD’s Design Guidelines Manual (DGM)**. The System ROW’s are identified as any area that is within 15 feet from the edge of an APM Systems guideway or other APM facility, as shown in Appendix 4.

NOTE TO ALL MDAD PERSONNEL: All MDAD personnel performing any work within the ROW must follow all of the protocols defined in this AAWR.

The purpose of this Operational Directive (OD) is to identify and minimize potential hazards associated with the MIA APM Systems by identifying safe standard operating procedures and guidelines for work on or adjacent to any of the MIA APM Systems. Contractors are to be aware that there are potential hazards and unforeseen conditions that exist when Contractors are performing work on or adjacent to the operational areas of the MIA APM Systems. All Contractors must adhere to these operating procedures, guidelines and reference documents at all times while working on or around the ROW MIA APM Systems.

Contractors are to use extreme caution when working in or near any of these restricted areas as the MDAD APM Systems consist of high voltage electrical components and fast-moving vehicles.

2.0 OBJECTIVE



Warning: Working near the APM system without adhering to safety protocols and specific safety precautions may be harmful or fatal, given its automatic operation, elevated design, high voltage live rail, speed and quiet operation.

This document is intended to provide general guidelines for any contractor that needs to perform work near or within any MIA APM Systems ROW. The Contractor, in coordination with MDAD and the APM System Supplier / Maintainer, has the overall responsibility to ensure compliance with all applicable access and safety related standards. Non-compliance with any of the referenced standards may result in work stoppage, employee dismissal, and / or contractor suspension or dismissal. The objective of this document is to; (1) identify and mitigate potential hazards associated with contractors working on or near any MIA APM System; (2) to ensure all affected parties are made aware of work on or within these systems and the potential hazards and impacts to the operation / availability of the systems; and (3) to facilitate proper safety measures based on the established APM operations and access procedures referenced in this AAWR.

3.0 ACRONYMS

AAWR	APM Access / Adjacent Work Requirements
APM	Automated People Mover
CMSI	Crystal Mover Services, Inc.
DGM	Design Guidelines Manual
LPOA	Leitner-Poma of America
MDAD	Miami-Dade Aviation Department
MHIA	Mitsubishi Heavy Industries of America
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
ROW	Right-of-Way
RWP	Roadway Workers Protection
SSPP	System Safety Program Plan

4.0 REFERENCE DOCUMENTATION

- MDAD Design Guidelines Manual (DGM)
- MDAD Life Safety Plan
- MDAD System Safety Program Plan (SSPP)
- MDAD Standards Manual
- MDAD Standard Operating Procedures (SOPs)
- Utility Outage Notification (MDAD Construction Form 018)
- Hazard Assessment - Transit Project Safety Plan
- APM Site Specific References are provided in the following Appendices:
 - Appendix 1: Satellite E eTrain APM System

- Appendix 2: North Terminal Skytrain APM System
- Appendix 3: MIA Mover APM System

5.0 CONTRACTOR RESPONSIBILITIES

All Contractors shall be responsible to maintain a comprehensive understanding of the **AAWR** and all other APM System access and safety procedures as it applies to the MIA APM System and/or area for which the Contractor will be performing work.

The MIA APM System access and work guidelines provided herein are for reference. The Contractor is responsible for obtaining the most recent revision of these documents. Should the Contractor require additional information or clarification regarding work access and safety, the Contractor shall contact the MDAD Project/Construction Manager responsible for the work. The APM System Supplier/Maintainer Manager and the MDAD Chief of Airport APM & Transport Systems will also be available to the Contractor. All work performed within any APM System ROW requires prior coordination and approval of the APM Systems Supplier/Maintainer and the MDAD Chief of Airport APM & Transport Systems. This coordination shall continue throughout the work. The Contractor is responsible for obtaining such coordination and approvals. For any work performed directly for an APM System Supplier/Maintainer, the APM System Supplier/Maintainer maintains primary responsibility for ensuring access and safety for their Contractors while performing work. The APM Systems Supplier/Maintainer is responsible for providing a safe work environment for their employers and their direct suppliers/contractors.

In the event of a conflict between any of the APM Systems Supplier/Maintainer requirements and the requirements of this AAWR, the Contractor shall immediately bring it to the attention of the MDAD Project Manager, the MDAD Chief of Airport APM & Transport Systems and the applicable APM System Supplier/Maintainer for resolution.

5.1 Access Requirements

Contractor access to any of the MIA APM Systems shall be in accordance with the work safety and access guidelines of the applicable APM System for which work is to be performed. The Contractor is to refer to the applicable access and work guidelines identified in Section 4.0. The Contractor shall coordinate all access through their MDAD Project Manager and the APM Systems Supplier/Maintainer.

5.1.1 Site Access Badge

MDAD requires all Contractors to acquire MDAD issued badges, with custom seals (if applicable), for their employees prior to working in the secure areas of the airport. Contractors working in

areas located outside of the secure zones do not require site access badges; however, are subject to the badging requirements and restriction of the applicable APM System.

5.1.1.1 MDAD Issued Badge Qualifications

MDAD maintains a list of requirements to qualify for and receive an MDAD issued site access badge. The Contractor must adhere to the MDAD requirements as well as the requirements of the APM System Supplier/Maintainer for which work is being performed. Where conflicts exist, the Contractor is responsible for obtaining direction from the MDAD Project Manager or the APM System Supplier/Maintainer for which work is being performed.

5.1.1.2 Escort

In some cases, it may be necessary for the Contractor to escort personnel into restricted areas of the Miami International Airport. In such cases, the Contractor must adhere to the security policies set forth by MDAD and those of the APM System Supplier/Maintainer.

5.1.2 Contractor Safety Orientation Training

Contractors working on or near the ROW and other restricted access areas of the APM Systems are required to attend safety orientation training prior to accessing the site. Depending on the location where work is to be performed, the Contractor must attend safety familiarization training provided by the APM Contractor in accordance with this MDAD Operational Directive (OD). The Contractor is responsible for understanding these requirements in coordination with their MDAD Project Manager. For Contractors hired by MDAD to perform work, the Contractor is also required to attend the safety orientation training of the APM System Supplier/Maintainer responsible for the area where work is to be performed. In cases where the APM System Supplier/Maintainer has hired the Contractor to perform work, the APM System Supplier/Maintainer, is responsible for the development and implementation of training programs and for ensuring that personnel and Contractors working on or near the ROW and other restricted access areas of the APM System are properly trained. All employees of the Contractor (regardless of position) who will be working within an APM ROW are required to attend training as specified by this OD and as required by the APM System Supplier/Maintainer.

5.1.3 Safety Requirements

The Contractor is responsible for identifying and adhering to all safety procedures required by MDAD and the APM System Supplier/Maintainers. MDAD requires all Contractors working within any APM System ROW to fully comply with all safety requirements and all federal, state, and local laws, statutes, ordinances, rules, regulations, requirements and guidelines of

government authorities, agencies and any other authorities having control or bearing on the performance of work. The Contractor shall also adhere to the safety guidelines established by the APM Systems Supplier/Maintainers for which work is to be performed. It is the Contractor's responsibility to identify all safety requirements prior to work. Any questions shall be directed to the appropriate MDAD Project Manager.

5.1.3.1 General Safety Rules

The following are general safety rules, for which the Contractor is to adhere to when performing work associated with or in the vicinity of the APM Systems at the Miami International Airport. These are highlighted in addition to all safety requirements provided within the reference documents listed in Section 4.0 of this document. These rules are applicable for all work performed on the APM guideway, within the APM ROW, elevated locations near the energized power rail, emergency walkway, etc. The Contractor is responsible for identifying and following all applicable safety rules.

- 1) Proper personal protective equipment (PPE) must be worn at all times while working on the project site.
- 2) Appropriate fall protection equipment must be worn when working at specified heights.
- 3) Proper eye and/or face protection must be worn when working with equipment that can potentially cause injury to the eyes or face.
- 4) The use of unsafe tools and equipment are prohibited.

5.1.3.2 Work Safety Inspections

MDAD, in accordance with the requirements in SSPP Section 5.0, may audit the workplace Safety programs established by the Contractor at any time to ensure compliance with the State of Florida, OSHA, and this AAWR. The Contractor, in coordination with the MDAD Project Manager and the APM Systems Supplier/Maintainer for which work is to be performed, shall ensure that the work site provides a safe, healthy, and environmentally clean area for workers. The work area shall be inspected by the Contractor on a regular basis via industry standard, Work Safety Inspections.

Work Safety Inspections is the process of observing a project site or work area to identify unsafe employee behavior, unsafe site condition, etc.

5.1.4 Work Plan

The Contractor, prior to performing work, shall submit a Work Plan to the MDAD Project Manager and the applicable APM Systems Supplier/Maintainer for review and approval. The Work Plan shall include the following at a minimum:

1. Project Information
2. APM System where work is being performed on or near
3. Work description and location
4. Sequence of Work
5. Work duration
6. Required Documentation/Drawings
7. Special Equipment Requirements (i.e. cranes, etc.)
8. Special Permits and Requirements
9. Work Plan approval signature(s) and date(s)

5.1.4.1 Operational Requirements

MDAD shall have the right to halt any work or construction activities that affects the safety of the facilities, MDAD personnel, other persons, and normal passenger/personnel operations of the MIA APM Systems. MDAD will exercise reasonable advance notice, except for any matters related to immediate concerns which will require no advance notice. The APM System Supplier/Maintainers may also halt work if the work is impacting the safety or operation of the one of the MIA APM Systems.

Construction activity which may have an impact on the MIA APM Systems must be scheduled during specific Non-Operating Hours. Work may also be scheduled during Non-Peak Hours with advance coordination and approval of the APM System Supplier/Maintainer Manager and the MDAD Chief of Airport APM & Transport Systems. Refer to Appendices 1, 2 and 3 of this AAWR for the Hours of Service for each MIA APM System. Contractors are advised that the Hours of Operations may change without notice. It is the Contractor's responsibility to coordinate with APM System Supplier/Maintainer and the MDAD Chief of Airport APM & Transport Systems prior to work commencement.

The scheduling requirements for all work will be addressed on a project-by-project basis where the individual scheduling needs of the project can be evaluated with respect to the operational requirements of the MIA APM System where work is being performed.

5.1.4.2 General Conditions for Construction Adjacent to the APM Guideway/Facilities

1. Clear access must be maintained on a 24-hour basis for ingress and egress for APM passengers, fire and rescue personnel, and maintenance personnel.
2. A single contact person will be named by the Contractor to act as the liaison with the APM System Supplier/Maintainer Manager and the MDAD Chief of Airport APM & Transport Systems for all matters related to any work on or adjacent to any of the MDAD APM Systems.
3. MDAD shall have the right to review all plans and any construction with reasonable advance notice, except for any matters related to immediate system safety concerns which will require no advance notice.
4. Contractor shall arrange a pre-work meeting with the MDAD Project Manager, the APM System Supplier/Maintainer Manager and the MDAD Chief of Airport APM & Transport Systems prior to performing any work and then periodically throughout the work period as determined by MDAD.

5.1.4.3 Material Handling General Requirements

The following are general safety rules regarding material handling which must be adhered to by Contractor when performing work at the Miami International Airport. These are highlighted in addition to all safety requirements provided within the reference documents listed in Section 4.0 of this AAWR and as otherwise required by MDAD or Federal, State, and local laws and regulations.

1. All materials stored in tiers shall be secured to prevent sliding, falling or collapse.
2. Reinforcing steel shall not be used as a lifting ("Pick") point on any load or as a guy line anchor.
3. Hooks, except special sliding choker hooks shall be securely mounted when in use or shall be provided with a functioning safety latch.
4. Scrap material of any kind, type or nature shall be placed daily into appropriate containers specifically supplied for this purpose. Containers shall be removed from the work site when full.
5. Loose material on open decks, rooftops or other exposed locations shall be removed or secured at the end of each day to eliminate dislodgment by wind or other causes.

6. Compatibility of stored materials and storage methods will comply with all applicable OSHA, MDFR and all other applicable environmental agency standards.
7. Employees required to handle, use or dispose of hazardous materials shall be instructed regarding the safe handling, proper procedures, potential hazards, personal hygiene, and personal protective equipment required.
8. No explosive or flammable materials shall be stored within the ROW of any APM System.
9. Disposal of materials shall be in accordance with all applicable Federal, State and Local regulations and the MDAD DGM. All applicable recordkeeping and reporting requirements shall be met by the Contractors.

5.1.4.4 Adverse Weather Conditions General Requirements

The following are general safety rules regarding adverse weather conditions which must be adhered to by the Contractor when performing work at the Miami International Airport. These are highlighted in addition to all safety requirements provided within the reference documents listed in Section 4.0 of this AAWR and as otherwise required by MDAD or Federal, State, and local laws and regulations.

1. Disassemble all scaffolds, loose formwork, radio antennas and all loose materials and secure properly.
2. All items that cannot be secured shall be stored inside secured storage areas or buildings.
3. All crane booms shall be lowered to ground level and secured to prevent movement.
4. All office trailers shall be tied down in compliance with MDC Tie-Down Ordinance No. 77-1 upon original installation. All tie down straps, ground anchors, piers, etc., shall be checked for condition and operation.
5. All exposed glass on the Work Site shall be protected by a solid, rigid covering.
6. All free-standing walls shall be shored from both sides.
7. Before employees are dismissed from the Work Site, the Contractors shall make a thorough inspection to verify all necessary precautions have been taken.

8. All precautions for construction sites during hurricane conditions, as required by the Florida Building Code shall be met.

5.1.4.5 Housekeeping General Requirements

The following are general safety rules regarding general housekeeping which must be adhered to by the Contractor when performing work at the Miami International Airport. These are highlighted in addition to all safety requirements provided within the reference documents listed in Section 4.0 of this AAWR and as otherwise required by MDAD or Federal, State, and local laws and regulations.

1. All refuse piles shall be removed from the Work Site immediately.
2. Stored and stacked materials shall be kept orderly, properly stacked, choked, and secured.
3. Any protruding nails, etc., shall be bent, removed, or clinched immediately.
4. Oil, grease, and water spills shall be cleaned up immediately.
5. Loose materials, tools, or equipment shall be kept off stairs, ramps, platforms and out of walkways at all times when not in use.
6. Depressions and potholes in vehicle or walkway surfaces on the Work Site shall be properly filled and graded immediately.
7. Walkways, vehicle travel ways, ramps, railings, and stairways, shall be kept free from debris, properly installed and maintained.
8. Smoking or the use of open flames within 25 feet of flammable storage areas or fueling areas shall not be permitted.
9. Flammable storage areas shall be properly posted "**NO SMOKING**", provided with adequate fire extinguishers and free of combustible materials.
10. All sanitary facilities used on the Work Site shall be maintained daily.
11. All structures shall have a minimum of a 5-foot perimeter clearance that is to be free from any combustible debris or materials.

12. Before employees are dismissed from the Work Site at each shift or work break, the Contractors shall make a thorough inspection to verify all tools and equipment are removed.

5.1.4.6 Overhead Protection

The following are general safety rules regarding overhead protection which must be adhered to by Contractor when performing work at the Miami International Airport. These are highlighted in addition to all safety requirements provided within the reference documents listed in Section 4.0 of this AAWR and as otherwise required by MDAD or Federal, State, and local laws and regulations.

Overhead protection from falling objects shall be provided over MDAD facilities and work areas whenever there is a possibility, due to the nature of a construction operation, that objects could fall in or around all MDAD APM System guideways, at-grade sections, MDAD facilities, MDAD station entrances and all other areas designated for public access to MDAD facilities. Erection of the overhead protection for these areas shall be done in strict accordance with the requirements of this AAWR and as otherwise required by MDAD or Federal, State, and local laws and regulations.

5.1.4.7 Exterior Building Maintenance

Pressure Washing	Painting
Window Washing	Sandblasting
Stucco Damage Repair	Other Maintenance Operations
Structural/ Non-Structural Inspections	

General

In general, some routine maintenance activities associated with the exterior building envelope of buildings may not require a building permit. However, to adequately ensure the safety of the MIA APM Systems, provisions are made in this AAWR detailing specific requirements and limitations of allowed building maintenance activities within the System ROW.

Access to exterior building components located within the System ROW including window cleaning operations and roofing operations is prohibited during passenger service hours without an MDAD/APM Monitor. The straightforward MDAD policy is "There shall not be any exterior building maintenance activity at or above the elevation of any MDAD APM guideway during normal passenger operations without a MDAD/APM Monitor."

Maintenance

This section is intended to apply to all activity on the exterior of buildings located within the ROW including but not limited to maintenance, inspections, probing, stucco repair, painting, and waterproofing operations. In cases of practical difficulty and unnecessary hardship, or where other extenuating circumstances exist, MDAD may on a case-by-case basis grant an exception to the requirements stated herein or may permit alternative methods, but only when it is clearly evident as determined by MDAD that equivalent protection is thereby secured.

MDAD Operations and Scheduling

MDAD shall have the right to halt any work or construction activity that affects the safety of MDAD personnel, facilities and/or normal MDAD operations. MDAD will exercise reasonable advance notice, except for any matters related to immediate system safety concerns which will require no advance notice.

Construction activity which may have an impact on the MIA APM Systems must be scheduled during specific Non-Operating Hours. Work may also be scheduled during Non-Peak Hours with advance coordination and approval of the APM System Supplier/Maintainer Manager and the MDAD Chief of Airport APM & Transport Systems. Refer to Appendices 1, 2 and 3 of this AAWR for the Hours of Service for each MIA APM System. Contractors are advised that the Hours of Operations may change without notice. It is the Contractors responsibility to coordinate with APM System Supplier/Maintainer and the MDAD Chief of Airport APM & Transport Systems prior to work commencement.

Holidays & Special Events

Construction activity that may impact holidays or other special events shall be limited by MDAD. Scheduling requirements will be addressed on a project to project and case-by-case basis where the individual scheduling needs of the project can be evaluated with respect to the operations of the MDAD systems.

5.1.5 Briefing Requirements

Prior to starting work, the Contractor shall conduct a job briefing with the work group, including applicable MDAD and APM Systems Supplier/Maintainer staff to discuss access and safety requirements related to the work being performed. General topics of discussion must include:

1. Task to be performed.
2. Potential impacts to any MIA APM System operation or maintenance.

3. Work area/limits.
4. Work sequence.
5. Work duration.
6. Identification, elimination, contain, or communicate all potential hazards.
7. PPE details.
8. Tools and equipment inspection prior to use.
9. Follow up to ensure compliance with safe work practices.
10. Turnover of work area to MDAD or APM Systems Supplier/Maintainer, as applicable.

6.0 EMERGENCY PROCEDURES

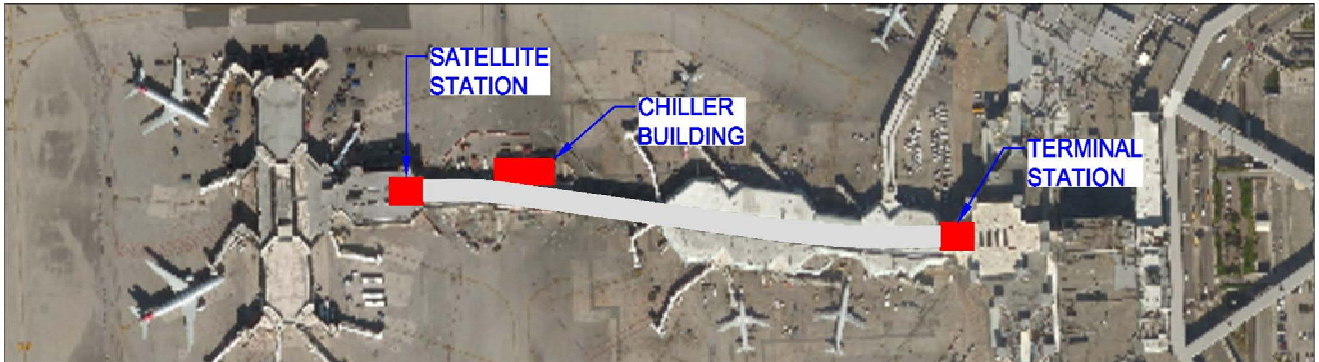
Emergencies such as employee injury, fire, property damage and/or other exposures in the work area shall be reported by the Contractor in accordance with MDAD's SSPP requirements and in accordance with the requirements of the APM Systems Supplier/Maintainer for which work is being performed.

Site specific Emergency Procedures and information regarding the APM Systems ROWs are provided in the following Appendices:

- Appendix 1: Satellite E eTrain APM System
- Appendix 2: North Terminal Skytrain APM System
- Appendix 3: MIA Mover APM System
- Appendix 4: APM Systems Typical Right of Way (ROW)

APPENDIX 1

Satellite E eTrain APM System



Hours of Operation		
Night Hours	00:00 – 05:00	On Call
Off-Peak Hours	05:00 – 08:00	Single Shuttle
Peak Hours	08:00 – 22:00	Dual Shuttle
Off-Peak Hours	22:00 – 24:00	Single Shuttle

MDAD Badge Requirements:

MDAD ID badge is required for access to the Satellite E eTrain APM System.

Contact information

Operation and Maintenance Manager:

Luis Martinez (970) 260-8074

Technical Manager:

Mark Jevons (970) 260-5014

MDAD Chief of Airport APM & Transport Systems

Eddie China (305) 869-4013

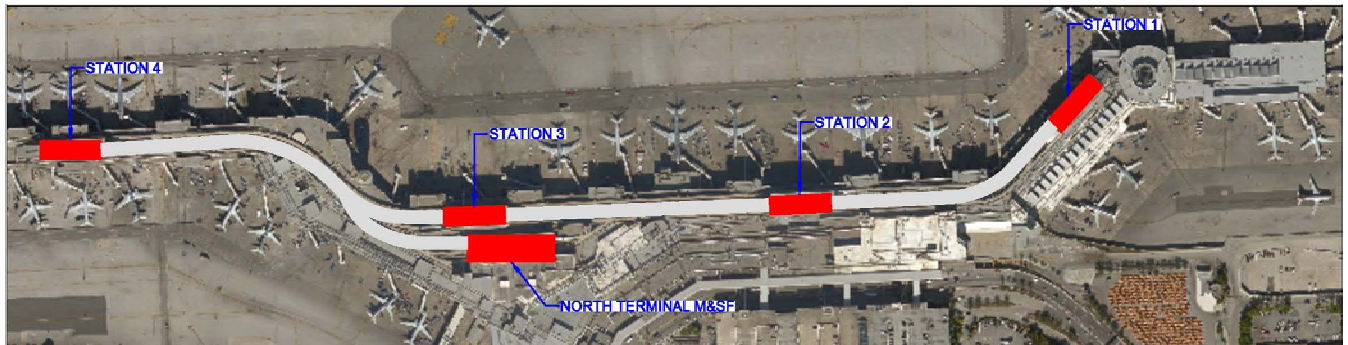
Reference Documents:

Leitner-Poma Contractors & Vendors Safety Acknowledgment

Leitner-Poma Safety Manual

APPENDIX 2

North Terminal Skytrain APM System



Hours of Operation		
Night Hours	00:00 – 05:00	0 trains
Off-Peak Hours	05:00 – 08:00	3 trains
Peak-Hours	08:00 – 20:00	4 trains
Off-Peak Hours	20:00 – 22:00	3 trains
Off-Peak Hours	22:00 – 00:00	2 trains

MDAD Badge Requirements:

MDAD ID badge is required to access North Terminal APM System

Contact information

Operation and Maintenance Manager:

Alan John Baptiste: (305) 913-9971

North Terminal First Shift Engineer:

Fabio Sanchez - 757-575-7987

MDAD Chief of Airport APM & Transport Systems:

Eddie Chinaea (305) 869-4013

(305) 613-7631

Reference Documents:

MHIA Project Site Safety Plan

MHIA Safety Briefing Summary

CMSI System Access Request

CMSI Power Rail Lockout / Tagout

APPENDIX 3

MIA Mover APM System



Hours of Operation		
Night Hours:	00:00 – 05:00	4 vehicles on call
Off-Peak Hours:	05:00 – 10:00	5 vehicles (2/2/1)
Peak Hours:	10:00 – 20:00	5 vehicles (2/2/1)
Off-Peak Hours:	20:00 – 00:00	5 vehicles (2/2/1)

MDAD Badge Requirements:

No MDAD ID badge is required to access MIA Mover APM System

Contact information

Operation and Maintenance Manager:

Alan John Baptiste: (305) 913-9971

MIA Mover Senior Engineer:

MC McCray - 786-457-0175

MDAD Chief of Airport APM & Transport Systems

Eddie Chinaea (305) 869-4013

Reference Documents:

MHIA Project Site Safety Plan

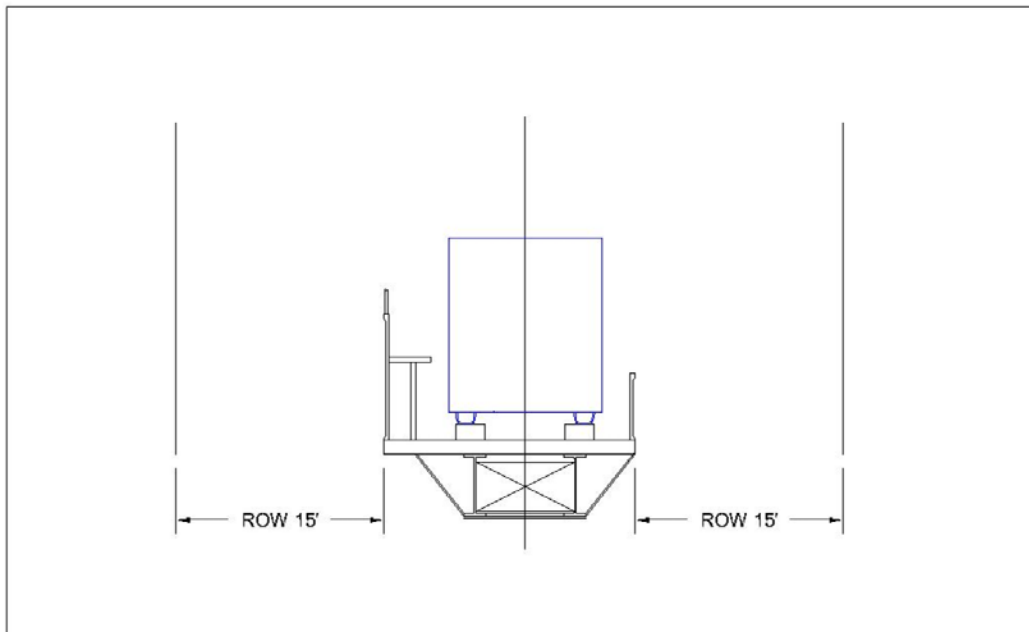
MHIA Safety Briefing Summary

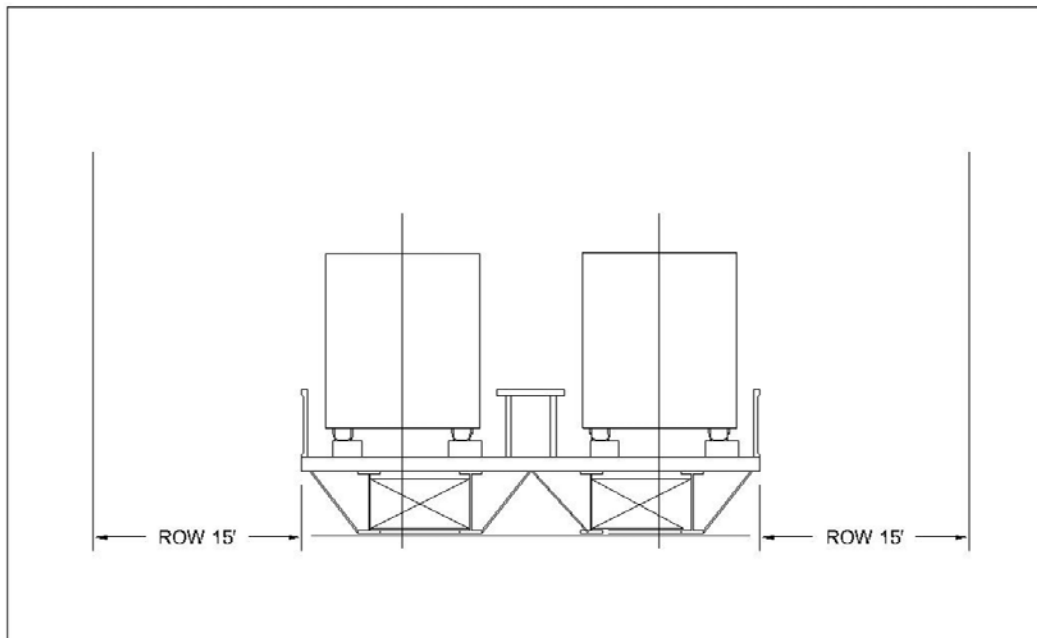
CMSI System Access Request

CMSI Power Rail Lockout / Tagout

APPENDIX 4

APM Systems Typical Right of Way (ROW)



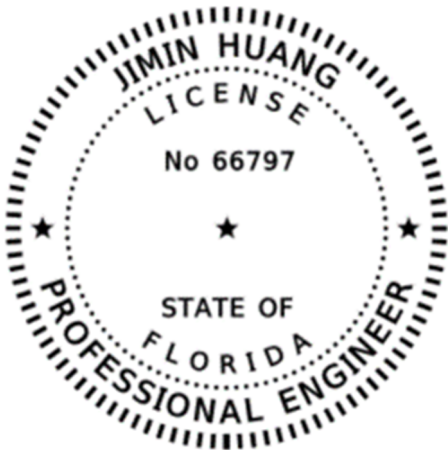


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TECHNICAL SPECIAL PROVISION
FOR
CONCOURSE E SATELLITE
APM BRIDGE REHABILITATION PROJECT
MDAD PROJECT NO. AB003A

This item has been digitally signed and sealed by Jimin Huang, P.E. on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Engineer of Record:	<u>Jimin Huang, P.E.</u>
Date:	<u>March 13th 2024</u>
Florida License No.:	<u>66797</u>
Firm Name:	<u>HDR Engineering</u>
Firm Address:	<u>3250 West Commercial Boulevard, Suite 100</u>
City, State, Zip Code:	<u>Fort Lauderdale, FL 33309</u>



General Notes for Special Technical Specifications

Unless noted otherwise in the Special Technical Specifications, the following construction specifications shall be used for the construction of the project.

**Standard Technical Specifications, Division 1 and Commissioning, Miami-Dade Aviation Department Edition
Date: 03/10. Miami International Airport (STS)**

Requirements, Safety Protocols and Precautions for Work Performed on or near the Automated People Mover Systems at Miami International Airport (Operational Directive No. 21-03. Effective: October 12, 2021)

As part of the Special Technical Specifications, FDOT Standard Specifications for Road and Bridge Construction (2023-2024 edition) are applicable to the project. The owner is MDAD in lieu of FDOT. The referenced FDOT specifications can be downloaded from FDOT website:

<https://www.fdot.gov/programmanagement/implemented/specbooks/default.shtm> (FDOT SP)



Selected sections from FDOT Standard Specifications are listed as follows.

- Section 5: Control of the work
- Section 6: Control of materials
- Section 7: Legal requirements and responsibility to the public
- Section 8: Prosecution and progress
- Section 100: Construction equipment – general requirements
- Section 103: Temporary work structures
- Section 104: Prevention, control, and abatement of erosion and water pollution
- Section 105: Contractor quality control general requirements
- Section 107: Litter removal and mowing
- Section 108: Monitor existing structures
- Section 110: Cleaning and grubbing
- Section 400: Concrete structures
- Section 411: Epoxy injection of cracks in concrete structures
- Section 413: Sealing cracks and concrete structure surfaces

Section 415: Reinforcing for concrete
Section 416: Installation of post-installed anchor systems and dowels for structural applications in concrete elements.
Section 458: Bridge deck joints
Section 460: Structural steel and miscellaneous metals
Section 462: Post-tensioning
Section 560: Coating new structures steel
Section 562: Repair of galvanized surfaces
Section 901 Coarse aggregate
Section 902: Fine aggregate
Section 921: Portland cement and blended cement
Section 923: Water for concrete
Section 924: Admixtures for concrete
Section 925: Curing materials for concrete
Section 926: Epoxy compounds
Section 929: Supplementary cementitious materials
Section 930: Materials for concrete repair
Section 932: Nonmetallic accessory materials for concrete pavement and concrete structures
Section 934: Non-shrink grout
Section 937: Post-installed anchor systems for structural applications in concrete elements
Section 962: Structural steel and miscellaneous metal items (other than aluminum)
Section 967: Components for guardrail
Section 975: Structural coating materials

For other sections not listed above and included in FDOT Standard Specifications, if they are applicable to this project, they are required for this project. The construction work in this project shall meet requirements of both MDAD and FDOT Standard Specifications. If there are any conflicts between MDAD specifications, the contractor shall contact MDAD for clarifications on project requirements. The contractor is responsible for the construction costs to meet requirements of both MDAD and FDOT Specifications and waive the right to dispute any additional costs required to meet requirements of either MDAD or FDOT specifications.

In addition to FDOT Standard Specifications, Section T401 Concrete Restoration is applicable to the construction of the project. Section T401 is attached to this document.

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SECTION T402 RESTORING SPALLED CONCRETE USING SHOTCRETE

T402-1 Description.

T402-1.1 General: The work under this Section consists of repairing spalled or otherwise deficient concrete by shotcrete methods at locations indicated in the Plans or as directed by the Engineer. Shotcrete designates concrete or mortar conveyed through a hose and pneumatically projected at high velocity onto a surface to achieve high in-place compaction of the projected material. Shotcrete shall be applied to structure components identified in the Plans. Unless otherwise specified in the Contract Documents, it is the Contractor's option to use either the dry process or the wet process shotcrete. However, the entire project shall be completed using the selected process. This specification does not apply to precast elements before their placement.

Submit for Engineer's approval the test data obtained from samples of shotcrete using the job material and equipment scheduled for production use on the actual project structure prior to the start of the shotcrete work.

T402-1.2 Machine Operating Requirements: Provide equipment that supplies shotcrete material at the nozzle that is uniform and not segregated, providing a steady, constant flow of shotcrete with no detrimental surging or pulsing. Maintain the velocity and consistency of shotcrete exiting the nozzle at a uniform rate appropriate for the given job conditions to achieve satisfactory material consolidation and minimum rebound. Provide gauges at or near the dispensing guns and at or near the nozzles to check working pressures. Air for the shotcrete application shall be constant, dry, and free of oils or other contaminants.

T402-1.3 Corrosion Damage: Perform repairs of corrosion-induced concrete spalls in phases for specific components where the structural integrity of the component may be affected due to the amount of required concrete removal when indicated in the Plans or as determined by the Engineer. Perform an inspection to locate and document spalled, cracked, and/or unsound concrete to be repaired prior to commencing the repair work when only estimated quantities are indicated in the Plans due to the continuous progression of damage by active corrosion.

T402-1.3.1 Quantities: When the work quantities are to be determined based on the Contractor's inspection as indicated in 402-1.3, the Department shall have the authority to increase, decrease, or delete the Plan quantities above or below the percentages allowed in Section 4-3.1 of the Standard Specifications with no adjustment to the contract unit prices. When the quantities are determined based on the Contractor's inspection, the work will be assigned by the Engineer to a specific group of locations at a time. The Contractor shall propose the repair schedule for Engineer's approval.

Perform the inspection by sounding the concrete within the areas indicated in the Plans. Include in the inspection survey all areas already identified in the Plans to verify locations, dimensions, and newly identified areas. Perform the survey in the presence of the Engineer prior to commencing any repair work. The removal and replacement of damaged concrete require the previous Engineer's approval.

T402-1.3.2 Tracking Repair Quantities: Prepare a detailed report with the identified areas documented as per 402-1.3, indicating the square footage of each deficiency and the estimated total amount of repairs. Format the report to indicate the precise location of each area, estimated quantities for each repair, and calculations for each.

When work assignments are issued, do not commence work on any new work assignment until the satisfactory completion or substantial progress (more than 40% completion) of previously issued assignments has been confirmed in writing by the Engineer.

T402-1.4 Work Staging: Do not place or store equipment on the roadway unless specifically approved. Use proper equipment to execute the work and proper staging to house all the equipment considering site conditions. The Department will not allow additional time for work delays if it determines that the chosen equipment was inadequate for the existing site conditions.

Provide special access system for sounding and repairs for spalls located at high elevations and inside pier columns and/or superstructure segments. Remove any anchors and patch any holes created to support scaffold, forms, falsework, and related holes with an appropriate approved mortar or epoxy. Do not anchor to bridge superstructure segments. Do not use permanent attachments or modify the bridge structure for staging/access.

T402-1.5 Shop Drawings: Provide and submit shop drawings indicating the proposed type of access and form systems, including supports, method of shotcrete placement, and containment of shotcrete and waste materials. Assure containment systems continually function as intended daily as a minimum. Approval of the containment system will ultimately be based upon continued satisfactory performance.

T402-1.6 Work Plan and Work Schedule: Submit a detailed testing and work plan and schedule to the Engineer for all the types of concrete restoration work as stated in the Contract Documents for review and written approval before beginning the concrete restoration work. Include in the work plan the anticipated repair volumes, prepackaged mix (if any), approach to spalls with concrete volumes exceeding that allowed by the manufacturer of prepacked materials, and repair methods before beginning work.

T402-1.7 Shotcrete Application Personnel: Use only experienced workers under the constant direction of an experienced superintendent. The superintendent must have a minimum of 5 years of experience working with the same type of shotcrete method used and on projects of a similar type. Provide references showing satisfactory performance on at least three similar previous projects.

Use a Nozzlemen with at least 100 hours of documented experience in using the proposed shotcrete method on other similar projects. Alternatively, when the proposed Nozzlemen do not have the required minimum experience or the Engineer deems the work critical, Nozzlemen shall possess a valid, up-to-date American Concrete Institute (ACI) Mix Process Certification for the type of shotcreting being used (dry or wet mix). Documentation for the superintendent and Nozzlemen showing compliance with the above requirements must be submitted to the Engineer for approval prior to starting the shotcrete operation.

T402-2 Materials.

Provide a shotcrete mix design meeting the required compressive strengths shown in Table 402-1 and other requirements as specified herein. Prepare a preconstruction trial mix and a mock-up application using the proposed materials and production equipment to confirm that the mix meets the requirements with sufficient time for testing prior to commencing the production work. Furnish to the Engineer for approval a certified test report for the Portland cement shotcrete proposed for use and described in this specification, indicating that the material meets all requirements specified following the preconstruction trial mix. The shotcrete mixture shall be prepackaged material or ready mixed concrete containing at least: Portland cement, silica fume,

aggregates, and, if specified in the Plans, synthetic fibers. Admixtures and Class F fly ash or slag cement will be permitted.

The Contractor may propose the approval of slight adjustments to the mix if it results in a better placement or a denser, more uniformly completed surface if the minimum strength and other properties requirements are met. Mix all materials dry in an approved skip-operated mixer of at least one bag capacity before placing them in the shotcrete hopper.

Test for chloride content of the preconstruction trial mix shotcrete per FM 5-516. Test for chloride content of production shotcrete as directed by the Engineer. The chloride content of the in-place prepackaged or ready-mix shotcrete shall not exceed 0.4 pounds per cubic yard, measured per FM 5-516.

T402-2.1 Prepackaged Shotcrete: Use a polymer-modified Portland cement shotcrete containing corrosion inhibitors unless otherwise allowed in the Contract Documents. The polymer-modified Portland cement shotcrete shall have a maximum water-cementitious materials (W/CM) ratio of 0.45 and meet the requirements shown in Table 402-1 at a minimum unless otherwise specified in the Contract Documents. Require the manufacturer to provide a Field Representative upon request by the Engineer.

Mix and install the materials per the manufacturer’s written recommendations, unless otherwise specified in the Contract Documents.

Table 402-1 Minimum Compressive Strength of Shotcrete	
Testing Age (days)	Compressive strength (psi)
1	3,000
7	4,000
28	5,500

T402-2.2 Ready Mix Shotcrete Materials: Meet the requirements of FDOT Standard Specifications Division III and as follows:

- Type II Portland cement Section 921
- Coarse Aggregate* Section 901
- Fine Aggregate** Section 902
- Water Section 923
- Chemical Admixtures Section 924
- Supplementary Cementitious Materials..... Section 929
- Fibers*** ASTM C1116

Notes:

**Coarse Aggregate- No. 89 gravel stone.*

***Fine aggregate - Silica Sand*

***** Fibers - When specified, use non-metallic fibers meeting the requirements of ASTM C1116, Type II, or Type III dosed as per manufacturer or approved design mix specifications.*

T402-2.3 Bonding Agent: Use a bonding agent specifically formulated to work with shotcrete. Apply the bonding agent to the existing concrete and reinforcing steel before placing the shotcrete repair material. Ensure that such bonding agent is a solvent-free epoxy-cement-based agent. Do not use the bonding agent as a vapor barrier. Mix the bonding agent and apply it per the manufacturer's specifications for use with shotcrete. Schedule the placement of the repair material according to the manufacturer's allowed time and conditions when specifically used for shotcrete.

T402-3 Construction Methods.

T402-3.1 Surface Preparation of Repair Area: Provide surface preparation by hydro demolition or mechanically removing all unsound concrete within the repair area to sound concrete. Chip back unsound concrete to sound concrete. Provide conditions of sound, clean, and free of any contaminants to all areas to be repaired prior to placing the spall repair material. Perform the sounding test and remove all delaminated, cracked, or otherwise deficient concrete from the areas that sound hollow. Additionally, solid sound concrete may require removal to obtain a ¾-inch to 1-inch clearance behind the existing reinforcing steel to achieve a mechanical bond. A mechanical bond is required for all spall repairs. In no case shall a spall edge exceed 4 inches without a mechanical bond to the rebar in a vertical and/or horizontal direction. Insert stainless steel dowels if no reinforcement is available to provide the mechanical bond. Use a 15-pound maximum chipping hammer for removing spalled and behind bars concrete and a 4-pound maximum scaling hammer for profiling. Remove additional 6 inches of sound concrete beyond the edge of the spall if corrosion is noted at the edge of the spall. If corrosion is still present after removing the additional 6 inches, stop the repair work and notify the Engineer.

Chip concrete substrate to obtain a surface profile of 1/16 inch to 1/8 inch deep with a new fractured aggregate surface. Roughen profile to edge of spall, including the sawcut sides. Sandblast clean all exposed steel as per The Society for Protective Coatings (SSPC) report number 10 (SP 10). No traces of rust, mill scale, epoxy, or other contaminants shall be present after sandblasting. Ensure that the backside of the exposed reinforcement is clean. Add new rebars where reinforcement with over 25% section loss is indicated in the Plans.

Exercise great care to prevent damage to any reinforcing steel and damage to sound concrete not intended for removal within or outside the delaminated areas. Stop work and submit to the Engineer the report of the damages to the concrete and reinforcing steel due to the Contractor's operation. Submit a repair method for the damaged area(s) for the Engineer's approval prior to continuing the concrete removal and restoration work.

Saw cut the perimeter of the spalls to a minimum depth of ¾ inch or as specified by the product manufacturer if prepacked shotcrete is used. Adjust the depth of the sawcut if shallow steel is encountered as approved by the Engineer to avoid damage to the steel. No feathered edges are allowed. Provide horizontal and vertical cuts that follow the general pattern of the spall, avoiding 90-degree angles as the geometry of the spall permits. The sawcut method and equipment shall be included in the Work Plan for approval by the Engineer before commencing any work.

Place welded wire reinforcing or supplemental reinforcing bars for shotcrete work exceeding 3 inches of cover.

T402-3.2 Shotcrete Placement (General).

T402-3.2.1 Shotcrete Processes:

1. Wet Process: Mix materials for wet process shotcrete per Section 346 unless pre-packed shotcrete is used. Apply the shotcrete within 90 minutes after batching. The consistency of each batch must be uniform within each batch and uniform from batch to batch when discharged into the shotcrete placement equipment.

2. Dry Process: Pre-dampen solid ingredients for dry-mix shotcrete as needed and mix in a batch-type or continuous-type mixer. Add the mixing water for the shotcrete at the nozzle. Accurately control the proportion of water added to the mixture to produce thorough and uniform hydration of the shotcrete. Apply dry-mix shotcrete material within 30 minutes after batching or pre-dampening. Do not use shotcrete material mix left in the hopper overnight.

3. Mix pre-packed shotcrete as per manufacturer instructions.

T402-3.2.2 Shotcrete Applications Requirements:

Maintain the temperature of the shotcrete at least 50 degrees Fahrenheit but no more than 90 degrees Fahrenheit during application. The ambient and surface temperature of the repair component shall be at least 50 degrees Fahrenheit and rising.

Provide shotcrete layers thickness such that no sloughing, sagging, tearing, or debonding will occur. Sandblast clean existing concrete within 24 hours prior to the shotcrete application and damp the surface of the concrete just before application.

Allow the initial set of the first layer to develop using the initial set time determined from the demonstration mix prior to placing the following layer. Then, remove loose, uneven, or excess material. Remove glaze and rebound by brooming, scraping, or other means.

Whenever possible, sections shall be gunned in one layer to the full design thickness. However, for multiple layers of reinforcement, gunning of one layer of shotcrete may be required for each layer of reinforcement. Hold the shotcrete nozzle closer than normal and at a slight, upward angle when encasing reinforcement. The mixture may be wetter than normal but not so wet that sloughing behind the reinforcement will occur.

Place shotcrete starting from the bottom on vertical surfaces. Do not incorporate rebound or previously expended material in any applied layer. Remove all such material from the surface and work area before the final set and before placing shotcrete on adjacent surfaces. Do not place shotcrete if drying or stiffening of the mixture is occurring.

Presoak the prepared concrete surface with fresh potable water to provide a saturated, surface dry (SSD) condition or as per the bonding agent's manufacturer published specifications.

Apply shotcrete in layers not to exceed 1 inch thick when more than one layer is required. Decrease the thickness as necessary for overhead surfaces. Consider the thickness limit, which can be applied in each layer or lift when the material starts to sag or separate. Direct the spray into voids to avoid trapping air pockets in the voids. Troweling may be required to thoroughly work the shotcrete material into smaller voids and check for complete filling of the voids.

Thoroughly wash down the shotcrete surface with a stream of fresh potable water and air hose excess water before continuing with the remaining shotcrete layer(s) if work stops for longer than 2 hours on any shotcrete layer before it has been built up to the required thickness. Remove any surface deposits that take a final set by abrasive blast cleaning and clean the surface with an air-water blast from the nozzle. Do not apply the curing compounds to the surfaces that will be covered by an additional layer of shotcrete.

Use shooting strips or guide wires which do not entrap rebound sand to bring the finished work to approximate shape. Slightly round the edges to an approximate shape of a 3/4-inch radius to remove any sharp corners. Provide a positive means of checking the total thickness of the applied shotcrete by using small concrete blocks with built-in galvanized wire fasteners to allow them to be secured to the mesh or by using guide wires which can be removed prior to the final finish coat. Bring the application of shotcrete to within approximately 1/4-inch of the specified finished surface immediately preceding the final coat. Rod to line by using a flat steel-edge screed or trowel without shoving or breaking the shotcrete from its bond. Shoot the final coat in place and float or trowel as needed to give a uniform surface without sloughing or sagging.

In-place shotcrete shall be uniform and dense, free from hollow sound areas that indicate laminations, voids, sand pockets, or debonded material. Do not square shotcrete construction joints. Slope the material at all construction joints to a thin edge. Thoroughly clean and wet all construction joints before shooting an adjacent section. Do not apply shotcrete on surfaces with standing or running water.

T402-3.3 Preconstruction Field Demonstration of Shotcrete Mix:

Ensure that the field demonstration of the proposed shotcrete mix includes the fabrication, evaluation, and testing of a mock-up product representative of the production work. The preconstruction field demonstration of the Shotcrete mix shall include the following:

1. Prepare two 24-inch x 24-inch x 4-inch-deep test panels containing steel reinforcement representing the partial mock-up of the project.
2. Each nozzleman shall gun two test panels with the proposed mix design to be used on the project and for each gunning orientation to be encountered on the job.
3. Cure the panels in the field in the same manner as the structure for 1 day and then transport them to the designated testing laboratory, where curing shall be continued until the testing time.
4. Cut one of the test panels with a trowel or a metal template before the initial set to visually check for possible voids under the reinforcement for shotcrete projects of less than 200 square feet in the presence of the Engineer.
5. For larger-size projects where specific evidence of good encasement of reinforcing bars is needed, cut cores from the test panels after the concrete has hardened for at least 3 days. Cores shall be cut through the steel for evaluation.
6. Use the second panels for small and large projects for compressive strength testing of the applied shotcrete. Take 2-inch to 4-inch diameter core samples from the panel at the locations between the reinforcement. The designated laboratory shall perform the compressive strength of the cores at the specified age per ASTM C42.
7. Determine the initial and final set time for the shotcrete mix using ASTM C191 or ASTM C403 as applicable.
8. Ensure that the in-place shotcrete demonstrates consistent quality and is free from segregation, honeycombing, sand pockets, sand lenses, sagging, dry patches, overspray, rebound, or incomplete encasement of reinforcement. Shotcrete shall also be free from delamination, cracking, or single voids with more than 1/4-inch dimensions. Chlorides shall not exceed 0.4 pounds of chlorides per cubic yard of shotcrete.

T402-3.4 Testing of Production Shotcrete.

T402-3.4.1 Quality Control Testing: Thoroughly check for sags, bridging, and other deficiencies immediately after shotcrete surfaces are brought to final thickness. At a

minimum of 3 days after completion of the placing of the shotcrete, thoroughly test again with a small hammer for any deficient sections. At this time, the shotcrete will have attained sufficient strength for all sound sections to ring sharply. Remove and replace any unsound portions of the work found during this inspection period or at any other time prior to the final inspection of the work, at no cost to the Department.

Sample and test production shotcrete at the frequency specified in this Section. At a minimum, compressive strength, air content, and flexural strength tests shall be performed for each testing cycle. Test boiled absorption and chlorides for the in-place shotcrete when required in the Contract Documents or as directed by the Engineer. Condition and test shotcrete panels per ASTM C1140.

Prepare one test panel for each shotcrete crew per LOT consisting of one day of production or 200 square feet, whichever occurs first for compressive strength tests. Use the same ingredients of shotcrete and gunning orientation as the shotcrete applied to the job in the testing sample preparation. Prepare the test panels at the same time as the production shotcreting. These panels shall be cured and delivered to the designated testing laboratory. Test values on such panels shall equal or exceed the required 28-day and other specified age compressive strengths.

Obtain a minimum of three cores from the panel representative of the tested area. The average compressive strength of the cores taken from the work shall equal or exceed the specified strength for the class of shotcrete applied, and no single core shall have strength less than 85% of the specified value.

If deemed necessary by the Engineer, the adequacy of the bond between the existing concrete and the shotcrete shall be determined by pull-off tests per ACI 503. Minimum bond strength of 250 psi will be accepted as satisfactory.

The sampling schedule for production testing may be reduced as directed by the Engineer based on a minimum of three previous satisfactory test results and adequate Contractor quality control.

T402-3.4.2 Verification Testing: The Department may verify the testing of any section and reject shotcrete that does not conform to the specification requirements regarding test values, soundings, visual examination, and chloride content. The cost of any additional testing of a suspect or disputed shotcrete that results in rejection shall be borne by the Contractor. The Contractor shall remove and replace or correct defective shotcrete to the satisfaction of the Engineer.

T402-3.5 Finishing: Surfaces of all repaired areas shall be smooth and uniform and match the concrete components' original profile unless otherwise required in the Contract Documents. Adjust shotcrete placement and finishing methods to prevent gaps between the existing concrete and the shotcrete patching material. Prior to the initial set, the shotcrete surface shall be scraped or cut with a trowel or metal template to obtain an even and aesthetically acceptable appearance. The final finishing shall be with a wet sponge unless otherwise specified. Trowel or float smoothing will not be allowed.

T402-3.6 Curing: Protect the surfaces of finished shotcrete from drying or cracking after placement. Use fogging before the application of moist curing when necessary.

Wet cure all finished shotcrete surfaces for 7 days by saturating the surface a minimum of four times daily with a fine spray of fresh potable water. The concrete may be cured by using a curing compound. The rate of curing compound application shall be less than 1 gallon of curing compound per 100 square feet of the surface. The color of the curing compound shall be approximately that of the existing concrete.

Wet burlap curing may be necessary as directed by the Engineer. Start curing as soon as the finished shotcrete surface withstands the curing operation without damage.

Trowel finish repair edges requiring touch-up work with the same type of shotcrete material used for the repair as directed by the Engineer.

Do not apply curing compound to shotcrete spall repairs on components within the limits of cathodic protection.

T402-4 Durability of the Spall Repair.

Use concrete repair materials included explicitly in the Contract Documents or previously approved by the Engineer. Perform repairs on new concrete to last as much as the native concrete. Repairs on ten-year-old or older concrete with Portland-Cement-based mixes shall have a maintenance-free service life of two years. Repairs on ten-year-old or older concrete with Polymer-Modified mixes shall have a maintenance-free service life of four years.

T402-5 Method of Measurement.

The quantity to be paid for will be based on the volume, in cubic feet, of defective areas restored and approved by the Engineer. The method utilized in determining the volume shall be the area in square feet of spalled areas multiplied by the average depth of such areas.

T402-6 Basis of Payment.

The quantity to be paid for shall be the volume, in cubic feet, of spalled or otherwise deficient areas restored, complete, in place, and accepted satisfactory by the Engineer.

The quantity determined as provided in 402-1.3 shall be paid for at the contract unit price bid for restoring the defective concrete areas. Such price and payment shall be full compensation for all work specified in this Section and shall include all materials, testing, equipment, labor, concrete removal and disposal, saw-cutting, surface preparation, new reinforcement, forming, curing, and incidentals necessary to complete the work.

Cost for restored spall areas will be paid based on the volume of actual spalls restored by the Contractor and the specified repair material. Quantities given in the Plans are estimates and may be increased, decreased, or deleted beyond the limits allowed by Section 4 of the Specifications as necessary based on actual conditions found on the structure.

Payment will be made under the appropriate Pay Item:

401-70-7	Restore spalled or deficient Concrete - Shotcrete - per cubic foot.
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