VIRGINIA RAILWAY EXPRESS

ADDENDUM OF SOLICITATION

INVITATION FOR BIDS (IFB)

ADDENDUM NO. 5

Issued: August 1, 2025

IFB No.: 025-013	**Title: Construction of the Alexandria Station Improvements and King Street and Commonwealth Avenue Bridge Replacement Project**

Contact: Ramon Paez **Email:** rpaez@vre.org **Telephone:** (703) 838-5447

This addendum is hereby incorporated into the solicitation documents of the above referenced IFB. The following items are clarifications, corrections, additions, deletions and/or revisions to the IFB, which shall take precedence over the original documents. ***Bold and Italics*** indicates additions while deletions are indicated by ~~strikethrough~~. Bidders must acknowledge receipt of this addendum by returning a signed original with your Bid.

DESCRIPTION OF ADDENDUM

The above numbered solicitation is amended as follows:

1. **REVISIONS TO TECHNICAL SPECIFICATIONS (ATTACHMENT A)**

   A. Note the following revisions to the Technical Specifications Table of Contents:

   DELETE THE FOLLOWING:
   ~~03 09 00 - Concrete~~

   RE-ISSUE THE FOLLOWING:
   00 01 10- Table of Contents
   01 35 14- Alexandria Corridor Coordination
   03 21 00- Reinforcement
   03 31 31- Concrete Mixing, Placing, Jointing, and Curing
   05 12 00- Structural Steel

   ADD THE FOLLOWING:
   23 05 53- Identification for HVAC, Ductwork, Piping and HVAC Equipment
   23 74 36- Refrigerant Piping System
   23 80 00- HVAC - Equipment

B. Note the following revision to Specification Section 00 01 10 “Table of Contents”

Replace Existing Specification Section 00 01 10, “Table of Contents” with Specification Section 00 01 10 “Table of Contents” Addendum No. 5, dated August 1, 2025.

C. Note the following revision to Specification Section 01 35 14 “Alexandria Corridor Coordination”

Replace Existing Specification Section 01 35 14, “Alexandria Corridor Coordination” with Specification Section 01 35 14, “Alexandria Corridor Coordination” noted Addendum No. 5, dated August 1, 2025.

D. Note the following revision to Specification Section 03 09 00 “Concrete”

DELETE Specification Section 03 09 00 in its entirety.

E. Note the following revision to Specification Section 03 21 00 “Reinforcement”

Replace Existing Specification Section 03 21 00, “Reinforcement” with Specification Section 03 21 00, “Reinforcement” noted Addendum No. 5, dated August 1, 2025.

F. Note the following revision to Specification Section 03 31 31 “Concrete Mixing, Placing, Jointing, and Curing”

Replace Existing Specification Section 03 31 31, “Concrete Mixing, Placing, Jointing, and Curing” with Specification Section 03 31 31, “Concrete Mixing, Placing, Jointing, and Curing” noted Addendum No. 5, dated August 1, 2025.

G. Note the following revision to Specification Section 05 12 00 “Structural Steel”

Replace Existing Specification Section 05 12 00, “Structural Steel” with Specification Section 05 12 00, “Structural Steel” noted Addendum No. 5, dated August 1, 2025.

H. Note the following addition of Specification Section 23 05 53, “Identification for HVAC, Ductwork, Piping and HVAC Equipment”

A**DD Specification Section 23 05 53 in its entirety, attached to this addendum.**

I. Note the following addition of Specification Section 23 74 36, “Refrigerant Piping System”

A**DD Specification Section 23 74 36 in its entirety, attached to this addendum.**

J. Note the following addition of Specification Section 23 80 00, “HVAC - Equipment”

A**DD Specification Section 23 80 00 in its entirety, attached to this addendum.**

2. **REVISIONS TO PLANS/DRAWINGS (ATTACHMENT B)**

A. CITY OF ALEXANDRIA CIVIL NOTES- 2 OF 3

1. Replace Existing Drawing C-004 with new Drawing C-004 noted Addendum No. 5, dated August 1, 2025.

B. SITE PLAN 6 OF 8

1. Replace Existing Drawing C-206 with new Drawing C-206 noted Addendum No. 5, dated August 1, 2025.

C. EROSION AND SEDIMENT CONTROL PHASE 1- OVERALL

1. Replace Existing Drawing C-300 with new Drawing C-300 noted Addendum No. 5, dated August 1, 2025.

D. EROSION AND SEDIMENT CONTROL PHASE 1- 2 OF 3

1. Replace Existing Drawing No. C-302 with new Drawing C-302 noted Addendum No. 5, dated August 1, 2025.

E. EROSION AND SEDIMENT CONTROL PHASE 1- 3 OF 3

1. Replace Existing Drawing No. C-303 with new Drawing C-303 noted Addendum No. 5, dated August 1, 2025.

F. EROSION AND SEDIMENT CONTROL PHASE 2- OVERALL

1. Replace Existing Drawing No. C-304 with new Drawing C-304 noted Addendum No. 5, dated August 1, 2025.

G. EROSION AND SEDIMENT CONTROL PHASE 2- 2 OF 3

1. Replace Existing Drawing No. C-306 with new Drawing C-306 noted Addendum No. 5, dated August 1, 2025.

H. EROSION AND SEDIMENT CONTROL PHASE 2- 3 OF 3

1. Replace Existing Drawing No. C-307 with new Drawing C-307 noted Addendum No. 5, dated August 1, 2025.

I. BRIDGE GENERAL NOTES- 1 OF 3

1. Replace Existing Drawing No. S2-001 with new Drawing S2-001 noted Addendum No. 5, dated August 1, 2025.

J. KING ST STAIR WALL ELEVATION AND SECTION

1. Replace Existing Drawing No. S2-304 with new Drawing S2-304 noted Addendum No. 5, dated August 1, 2025.

K. KING ST REINFORCING SCHEDULE- 2 OF 2

1. Replace Existing Drawing No. S2-531 with new Drawing S2-531 noted Addendum No. 5, dated August 1, 2025.

L. GROUND LEVEL DEMOLITION PLAN

1. Replace Existing Drawing No. XA1-101 with new Drawing XA1-101 noted Addendum No. 5, dated August 1, 2025.

M. PLATFORM LEVEL DEMOLITION PLAN- 1 OF 5

1. Replace Existing Drawing No. XA1-102 with new Drawing XA1-102 noted Addendum No. 5, dated August 1, 2025.

N. PLATFORM LEVEL DEMOLITION PLAN- 2 OF 5

1. Replace Existing Drawing No. XA1-103 with new Drawing XA1-103 noted Addendum No. 5, dated August 1, 2025.

O. PLATFORM LEVEL DEMOLITION PLAN- 3 OF 5

1. Replace Existing Drawing No. XA1-104 with new Drawing XA1-104 noted Addendum No. 5, dated August 1, 2025.

P. PLATFORM LEVEL DEMOLITION PLAN- 4 OF 5

1. Replace Existing Drawing No. XA1-105 with new Drawing XA1-105 noted Addendum No. 5, dated August 1, 2025.

Q. PLATFORM LEVEL DEMOLITION PLAN- 5 OF 5

1. Replace Existing Drawing No. XA1-106 with new Drawing XA1-106 noted Addendum No. 5, dated August 1, 2025.

R. PLATFORM CANOPY DEMOLITION PLAN- 1 OF 2

1. Replace Existing Drawing No. XA1-107 with new Drawing XA1-107 noted Addendum No. 5, dated August 1, 2025.

S. PLATFORM CANOPY DEMOLITION PLAN- 2 OF 2

1. Replace Existing Drawing No. XA1-108 with new Drawing XA1-108 noted Addendum No. 5, dated August 1, 2025.

T. ARCHITECTURAL SITE PLAN

1. Replace Existing Drawing No. A1-100 with new Drawing A1-100 noted Addendum No. 5, dated August 1, 2025.

U. CONSTRUCTION KEY PLANS

1. Replace Existing Drawing No. A1-101 with new Drawing A1-101 noted Addendum No. 5, dated August 1, 2025.

V. PLATFORM LEVEL PLAN – 3 OF 5

1. Replace Existing Drawing No. A1-105 with new Drawing A1-105 noted Addendum No. 5, dated August 1, 2025.

W. PLATFORM CANOPY ROOF PLAN – 1 OF 3

1. Replace Existing Drawing No. A1-108 with new Drawing A1-108 noted Addendum No. 5, dated August 1, 2025.

X. PLATFORM CANOPY REFLECTED CEILING PLAN – 1 OF 3

1. Replace Existing Drawing No. A1-111 with new Drawing A1-111 noted Addendum No. 5, dated August 1, 2025.

Y. EAST PLATFORM ELEVATIONS LOOKING EAST

1. Replace Existing Drawing No. A1-201 with new Drawing A1-201 noted Addendum No. 5, dated August 1, 2025.

Z. PLATFORM SIGNAGE PLAN- 2 OF 4

1. Replace Existing Drawing No. A1-709 with new Drawing A1-709 noted Addendum No. 5, dated August 1, 2025.

AA. ENLARGED ELEVATOR HVAC PLANS

1. Replace Existing Drawing No. H1-101 with new Drawing H1-101 noted Addendum No. 5, dated August 1, 2025.

3. **LIST OF ADDENDUM NO. 5 DOCUMENTS (IN PDF)**

A. Revision to Drawings: Replace the existing sheets below with new sheets noted Addendum No. 5, dated 8/1/2025:

1. The following Drawings are re-issued with this Addendum:

C-004	C-206	C-300	C-302	C-303
C-304	C-306	C-307	S2-001	S2-304
S2-531	XA1-101	XA1-102	XA1-103	XA1-104
XA1-105	XA1-106	XA1-107	XA1-108	A1-100
A1-101	A1-105	A1-108	A1-111	A1-201
A1-709	H1-101			

B. The following Specifications are re-issued noted Addendum No. 5, dated 8/1/2025:

- SECTION 00 01 10- Table of Contents
- SECTION 01 35 14- Alexandria Corridor Coordination
- SECTION 03 21 00- Reinforcement
- SECTION 03 31 31- Concrete Mixing, Placing, Jointing, and Curing
- SECTION 05 12 00- Structural Steel

C. The following Specification is deleted noted Addendum No. 5, dated 8/1/2025:

- SECTION 03 09 00 – Concrete

D. The following Specifications are added noted Addendum No. 5, dated 8/1/2025:

- SECTION 23 05 53- Identification for HVAC, Ductwork, Piping and HVAC Equipment
- SECTION 23 74 36- Refrigerant Piping System
- SECTION 23 80 00- HVAC - Equipment

4. Except as specifically amended herein, all other terms and conditions of this solicitation remain unchanged and in full force and effect.

Bidders <u>must</u> acknowledge receipt of this Addendum by returning a signed original with the Bid package prior to the hour and date specified in the solicitation. Failure to acknowledge receipt of this Addendum may be grounds to declare your Bid non-responsive.

Company_____

Address _____

City _____State_____ Zip Code _____

Name of Person Authorized to Sign _____
Print

Signature_____Date_____

TABLE OF CONTENTS

SECTION 01 35 14

ALEXANDRIA CORRIDOR COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for coordinating construction operations with other Owners and Contractors working on concurrent projects as part of the Alexandria Corridor Transforming Rail in Virginia Program (Alexandria Corridor), including, but not limited to, the following:

1. Alexandria Corridor Concurrent Projects Coordination Requirements
2. Alexandria Corridor Phasing and Coordination Requirements
3. Shared Use of Corridor Requirements
4. Maintenance of Rail Requirements
5. Exhibit A – Alexandria Corridor Projects Phasing Diagrams***, dated June 2025***
6. Exhibit B – Alexandria Station and King & Commonwealth Bridges Replacement Suggested Phasing Diagrams
7. Exhibit C – Crystal City Station Improvements Suggested Phasing Diagrams
8. Exhibit D – CSX Standard Specification Section 010010 Part 1.1.A

1.2 RELATED SECTIONS

A. Section 01 24 00 – Value Engineering

B. Section 01 31 00 – Project Management and Coordination

C. Section 01 31 33 – Project Meetings

D. Section 01 32 20 – Construction Progress Schedule

E. Section 01 33 00 – Submittal Procedures

F. Section 01 35 13 – Host Railroad Coordination

G. Section 01 73 00 – Execution of Work

1.3 ALEXANDRIA CORRIDOR CONCURRENT PROJECTS COORDINATION REQUIREMENTS

A. The Contractor shall coordinate construction operations with the other contractors working on concurrent contracts in the Alexandria Corridor projects listed below as required by this Section and Section 01 73 00 – Execution of Work. The Contractor shall cooperate with the other contractors in the phasing and performance of the work so as not to delay, interrupt, or hinder the progress or completion of work being performed by the other contractors.

1. Alexandria Fourth Track (CSX)

   The Alexandria Fourth Track project constructs railroad track and related infrastructure in a 6-mile rail corridor in Arlington and Alexandria, VA. The project extends from the

southern end of the existing Long Bridge to the AF interlocking just south of Telegraph Road and will add one additional track to the existing three-track segment.

Critical items affecting this Contract include (but are not limited to): Maintenance of rail traffic through the project area, the maintenance of rail traffic through the Washington, DC to Richmond, VA corridor, grading, and track/civil construction.
The Alexandria Fourth Track project is an overlapping project in the Alexandria Corridor. All projects in the Alexandria Corridor are anticipated to be under construction simultaneously, and close coordination between the projects and Contractors will be required as detailed in this Section.

2. VRE Crystal City Station Improvements (VRE)

   The project will construct an island platform to allow simultaneous boarding of two eight-car train sets and the planned fourth track at and around the station. The station is designed to be constructed immediately north of the separate Amtrak Crystal City Station project. The shared stair and elevator tower at the confluence of these two projects is also designed to be connected to a future Crystal City to Ronald Reagan National Airport (CC2DCA) pedestrian bridge being designed by Arlington County. The VRE project will include a new underpass pedestrian tunnel at the northern end of the platform, running beneath Track 5 to connect with Crystal Drive. Track 5 in the station's vicinity will be removed by the Alexandria Fourth Track project, prior to the station construction within the right of way. Track 5's replacement will be funded and constructed through the Crystal City Station Improvement project

   Critical items affecting this Contract include (but are not limited to): Maintenance of rail traffic through the project area, maintenance of rail traffic through the Washington DC to Richmond VA corridor, maintaining passenger station operations during construction, grading, pedestrian bridge construction, pedestrian underpass construction, station platform construction, and elevator construction.

   The VRE Crystal City Station Improvements project is an overlapping project in the Alexandria Corridor. All projects in the Alexandria Corridor are anticipated to be under construction simultaneously, and close coordination between the projects and Contractors will be required as detailed in this Section.

3. Amtrak Crystal City Station Improvements (Amtrak)

   The project will construct an island platform to allow simultaneous boarding of two train sets and the planned fourth track at and around the station. The station is designed to be constructed immediately south of the separate VRE Crystal City Station Improvements project. The shared stair and elevator tower at the confluence of these two projects is also designed to be connected to a future CC2DCA pedestrian bridge being designed by Arlington County.

   Critical items affecting this Contract include (but are not limited to): Maintenance of rail traffic through the project area, maintenance of rail traffic through the Washington DC to Richmond VA corridor, grading, station platform construction, and escalator construction.

   The Amtrak Crystal City Station project is an overlapping project in the Alexandria Corridor. All projects in the Alexandria Corridor are anticipated to be under construction simultaneously, and close coordination between the projects and Contractors will be required as detailed in this Section.

4. Long Bridge Project, South Package (VPRA)

   The Long Bridge Project, South Package will construct a new, two-track railroad bridge next to the existing Long Bridge, creating a four-track corridor. The project will construct an additional track at the RO interlocking and generally overlap the north end of the Alexandria Fourth Track project.

   Critical items affecting this Contract include (but are not limited to): Maintenance of rail traffic through the project area, maintenance of rail traffic through the Washington, DC to Richmond, VA corridor, grading, drainage construction, and bridge construction.

   The Contractor shall be aware that the Long Bridge Project, South Package is anticipated to be under construction at the same time as this Contract, and close coordination of staging, phasing, and scheduling will be required.

5. Long Bridge Project, North Package (VPRA)

   The Long Bridge Project, North Package will connect the new two-track bridge over the Potomac to the existing three-track corridor and new fourth track at L'Enfant in Washington, DC, including a new bridge over I-395 and WMATA, and replacement of existing two-track bridges with four-track bridges over Ohio Drive SW, Washington Channel, and Maine Avenue.

   Critical items affecting this Contract include (but are not limited to): Maintenance of rail traffic through the Washington, DC to Richmond, VA corridor.

   The Contractor shall be aware that the Long Bridge Project, North Package, is anticipated to be under construction at the same time as this Contract.

6. L’Enfant Station Improvements & Fourth Track (VRE)

   The L’Enfant Station Improvements & Fourth Track project will expand VRE's busiest station. It will also construct an additional mainline track between the Virginia (VA) and L'Enfant (LE) interlockings in Washington, DC. The expanded station will enable simultaneous boarding of two full-length trains.

   Critical items affecting this Contract include (but are not limited to): Maintenance of rail traffic through the Washington, DC to Richmond, VA corridor and maintaining passenger station operations during construction.

   The Contractor shall be aware that the L'Enfant Station Improvements & Fourth Track project is anticipated to be under construction at the same time as this Contract.

7. Franconia-Lorton Third Track (CSX)

   The Franconia to Lorton Third Track will increase rail capacity and alleviate congestion for passenger and freight services by adding a third mainline track along one of the most heavily traveled rail sections between DC and Richmond. This additional 6 miles of mainline third track from Franconia to Lorton will create a continuous three-track corridor between Alexandria and Lorton. In addition, the project will construct railroad bridges over Newington Road and Lorton Road, as well as other infrastructure to accommodate the additional third track.

   Critical items affecting this Contract include Maintenance of rail traffic through the Washington, DC to Richmond, VA corridor.

The Contractor shall be aware that the Franconia-Lorton Third Track project is anticipated to be under construction at the same time as this Contract.

8. Franconia-Springfield Bypass (VPRA)

   Franconia-Springfield Bypass, located just south of Franconia-Springfield station, is a rail bridge allowing passenger trains to cross over the freight trains. This is necessary because the passenger rail stations south of the bypass are located on the east side of the railroad tracks, and the passenger rail stations north of the bypass are on the west side. Currently, an interlocking allows passenger trains to switch sides with the freight trains. However, this creates a bottleneck and significant delays. The bridge structure will eliminate the conflict, reduce congestion, and improve reliability for freight and passenger trains.

   Critical items affecting this Contract include (but are not limited to): Maintenance of rail traffic through the Washington, DC to Richmond, VA corridor.

   The Contractor shall be aware that the Franconia-Springfield Bypass project is anticipated to be under construction at the same time as this Contract.

9. Franconia-Springfield Station Improvements (VRE)

   The Franconia-Springfield Station Improvements will extend the existing platforms to allow simultaneous boarding of two eight-car train sets. A new pedestrian ramp and underpass tunnel will be constructed from the eastern platform to Barry Road to accommodate the third track to be constructed under the Franconia-Lorton Third Track project.

   Critical items affecting this Contract include (but are not limited to): Maintenance of rail traffic through the project area, maintenance of rail traffic through the Washington DC to Richmond VA corridor, maintenance of passenger station operations, maintenance of pedestrian access to the adjacent WMATA station, grading, pedestrian underpass construction, and station platform construction.

   The Contractor shall be aware that the Franconia-Springfield Station Improvements project is anticipated to be under construction at the same time as this Contract.

1.4 ALEXANDRIA CORRIDOR PROJECTS PHASING AND COORDINATION REQUIREMENTS

A. The Alexandria Corridor Phasing Diagrams appended at the end of this Section have been collaboratively developed for the Alexandria Corridor Projects (Alexandria 4th Track, Alexandria Station and King & Commonwealth Bridges Replacement, and Crystal City Station Improvements). Phase milestones are provided for reference below and do not take precedence over contractual milestones. Phase milestones shall be included in the Contractor's "CPM Construction Schedule" per Section 01 32 20 – Construction Progress Schedule.

   1. Completion of Phase 1 by 03/10/2026
   2. Completion of Phase 2 by ~~11/15/2026~~***11/12/2026***
   3. Completion of Phase 3 by 05/20/2027
   4. Completion of Phase 4 by 10/06/2027
   5. Complete Phase 5 by 12/31/2027

B. The Contractor shall maintain the number of available tracks and boarding edges identified in each phase of the Alexandria Corridor Phasing Diagrams. Alexandria Corridor Phasing may be changed only by the consensus of CSX, VRE, and VPRA (collectively, the "Owners") and their respective contractors for the Alexandria Corridor Projects. The Contractor may propose changes in accordance with Section 01 24 00 – Value Engineering.

C. No work requiring track outages may occur from November 15th to January 15th of any year, and the maximum number of tracks identified in the Suggested Phasing Plans must be available for railroad traffic. Modifications to track outages will not be considered during this period.

D. The Contractor shall identify all work items requiring coordination for the Alexandria Corridor Projects (Alexandria 4th Track, Alexandria Station and King & Commonwealth Bridges Replacement, and Crystal City Station Improvements) and the other concurrent projects listed in Section 1.03 above (including critical items listed in each project description) and coordinate the sequence and timing of their execution and completion with the other contractors. The Contractor shall include these work items in the Contractor's "CPM Construction Schedule" per Section 01 32 20 – Construction Progress Schedule. Failure to consider the sequence and timing of interfacing activities from the Alexandria Corridor Concurrent Projects is not a basis for additional compensation or time.

E. The Contractor shall submit a duplicate copy of the "CPM Construction Schedule" to the CM for VPRA's Enterprise P6 Cloud Tool. The Contractor shall coordinate with the contractors for the Alexandria Corridor Projects (Alexandria 4th Track, Alexandria Station and King & Commonwealth Bridges Replacement, and Crystal City Station Improvements) to resolve conflicts as required by this Section and Section 01 73 00 – Execution of Work.

F. The Contractor shall participate in bi-weekly corridor coordination meetings for the Alexandria Corridor Projects (Alexandria 4th Track, Alexandria Station and King & Commonwealth Bridges Replacement, and Crystal City Station Improvements) per Section 01 31 33 – Project Meetings requirements. Bi-weekly corridor coordination meetings shall be scheduled by VPRA and include the owners of each project and their respective contractors and representatives. The meeting shall generally cover topics such as corridor-level scheduling, sequencing and conflicts, discussion of any proposed changes to the phasing plan, overall use of the corridor during construction, and maintenance of railroad traffic. Contractor's from the other concurrent projects listed in Section 1.03 above may participate at the Owner's discretion.

1.5 SHARED USE OF CORRIDOR REQUIREMENTS

A. When necessary for the proper prosecution of work, the Contractor shall permit the other Alexandria Corridor Owners and Contractors access through the overlapping construction areas and use any access or haul roads constructed by others.

B. When necessary for the proper prosecution of work, the Contractor shall permit the other Alexandria Corridor Owners and Contractors access to work within predetermined areas of overlapping construction work areas for a predetermined duration. The Contractor working within the adjacent overlapping construction work areas will be responsible for cleaning the work area upon completion and leaving the work area in a suitable condition, including application of temporary erosion control measures as required, to the satisfaction of both Engineers. Examples of work requiring occupation of overlapping work areas include (but are not limited to) earth excavation/grading, landscaping, maintenance of erosion control items, and ballast and track installation.

C. Any damages resulting from the shared use of access facilities or overlapping work areas shall be repaired by the Contractor that caused the damage at its own expense, and no additional cost to the Contract.

1.6 MAINTENANCE OF RAIL TRAFFIC REQUIREMENTS

A. The Contractor shall maintain the specified number of tracks for the work's duration per the CSX Standard Specification Section 010010 Part 1.1 requirements, incorporated as an appendix to this Section. Work on projects across the Alexandria Corridor and larger Washington-Richmond corridor must be coordinated to maintain rail traffic. The CMs shall facilitate such coordination, and the Contractor shall attend meetings in support of this effort at the direction of the CMs.

END OF SECTION

Exhibit A

Alexandria Corridor Projects Phasing Diagrams *dated June 2025*

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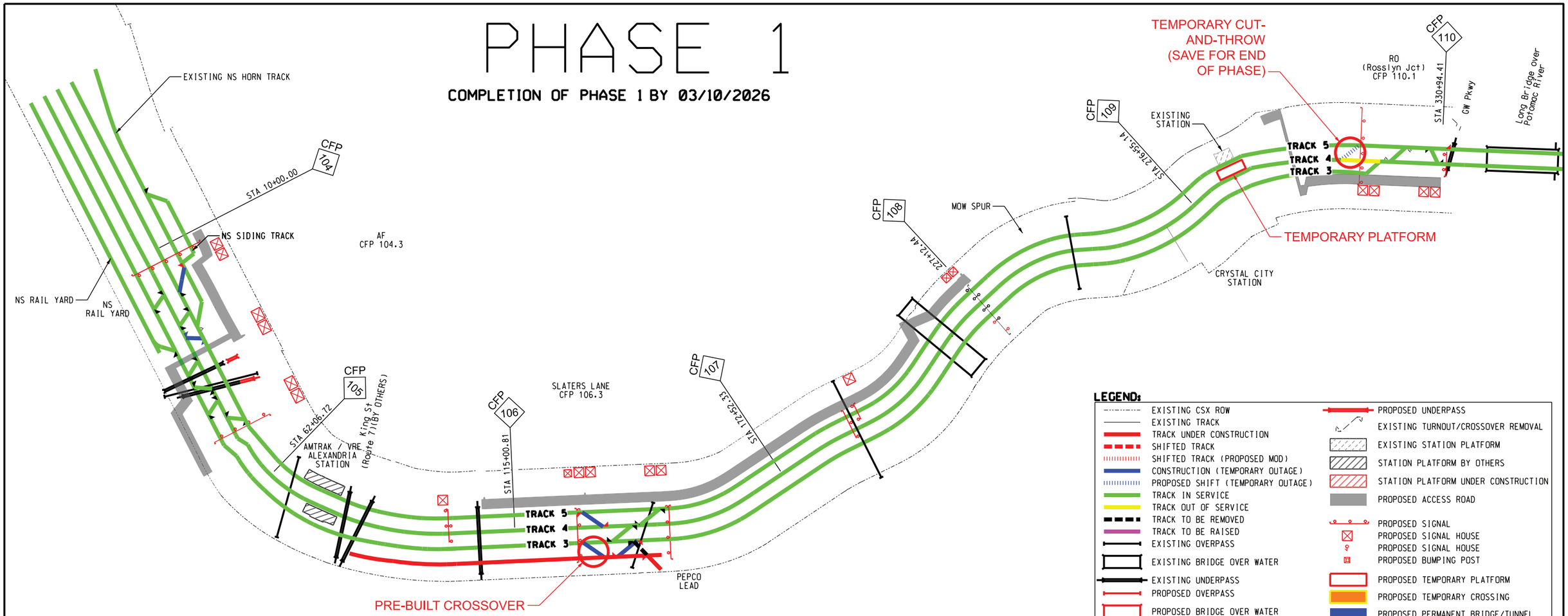
PHASE 1

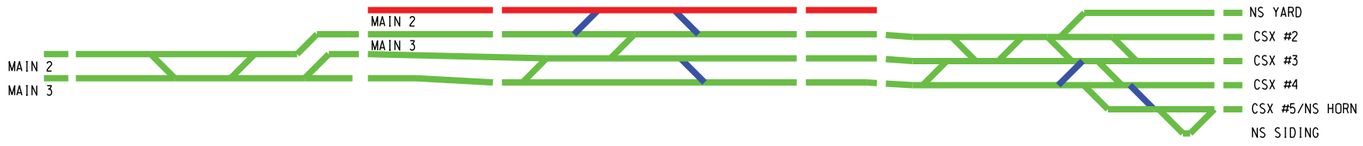
COMPLETION OF PHASE 1 BY 03/10/2026



LEGEND:

- EXISTING CSX ROW
- EXISTING TRACK
- TRACK UNDER CONSTRUCTION
- SHIFTED TRACK
- SHIFTED TRACK (PROPOSED MOD)
- CONSTRUCTION (TEMPORARY OUTAGE)
- PROPOSED SHIFT (TEMPORARY OUTAGE)
- TRACK IN SERVICE
- TRACK OUT OF SERVICE
- TRACK TO BE REMOVED
- TRACK TO BE RAISED
- EXISTING OVERPASS
- EXISTING BRIDGE OVER WATER
- EXISTING UNDERPASS
- PROPOSED OVERPASS
- PROPOSED BRIDGE OVER WATER
- PROPOSED UNDERPASS
- EXISTING TURNOUT/CROSSOVER REMOVAL
- EXISTING STATION PLATFORM
- STATION PLATFORM BY OTHERS
- STATION PLATFORM UNDER CONSTRUCTION
- PROPOSED ACCESS ROAD
- PROPOSED SIGNAL
- PROPOSED SIGNAL HOUSE
- PROPOSED SIGNAL HOUSE
- PROPOSED BUMPING POST
- PROPOSED TEMPORARY PLATFORM
- PROPOSED TEMPORARY CROSSING
- PROPOSED PERMANENT BRIDGE/TUNNEL

← L'ENFANT RO (CFP 110.1/STA. 325+00) SLATER'S LANE (CFP 106.3/STA 130+00) AF (CFP 104.3/STA. 25+00) FRANCONIA →



Pen Table File
$TIME$
$DATE$

WORK ELEMENT	PHYSICAL ENTITY	CONTRACT DESIGNATOR	LINE ITEM	COST ELEMENT	PROJECT NUMBER

LEVEL #

REV	DATE	DESCRIPTION	BY	SUB	APP

DESIGNED BY TWKII
DRAWN BY TWKII
CHECKED BY MJK
APPROVED BY MJK
DATE JUNE 2025

CSX TRANSPORTATION, INC.
ENGINEERING DEPARTMENT
DESIGN & CONSTRUCTION
JACKSONVILLE, FLORIDA

Michael Baker INTERNATIONAL

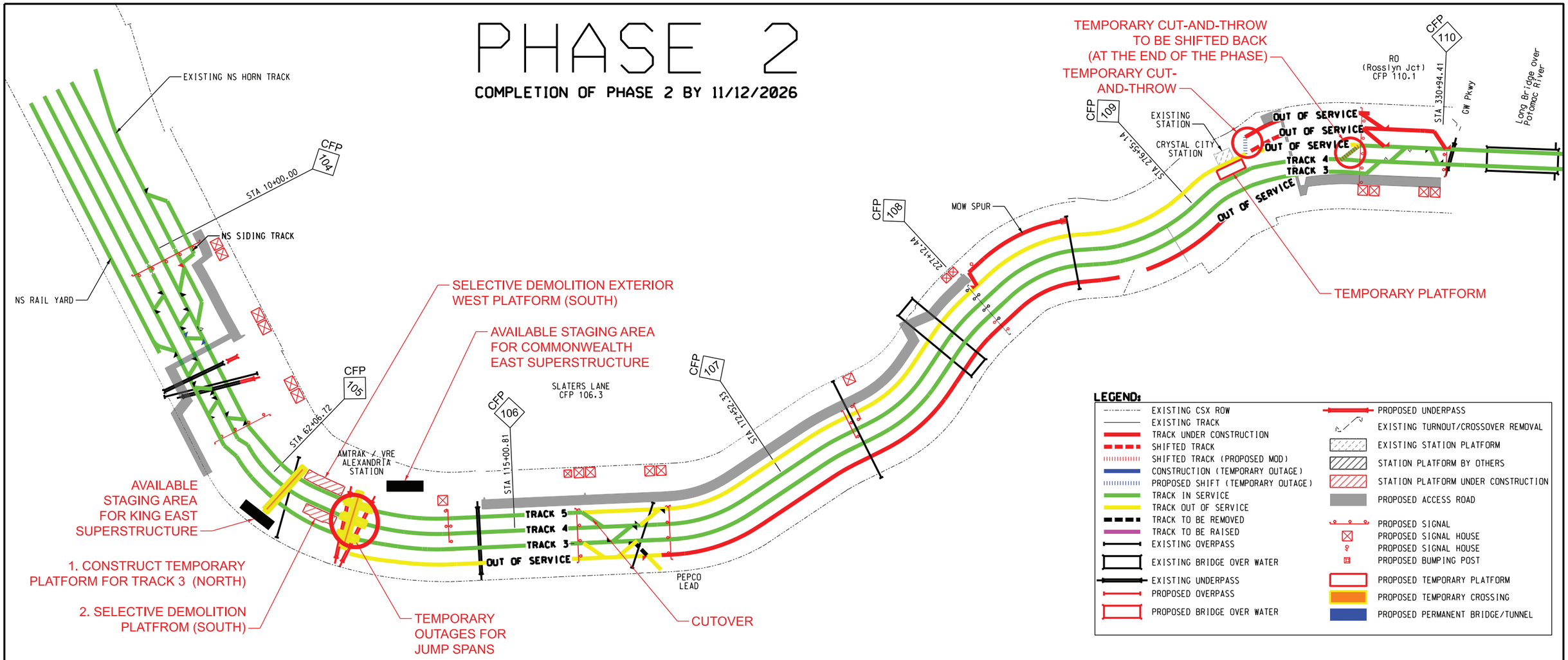
VAL. SEC.

PROJECT NO. 188957
DRAWING NO. SD-01
REVISION 0
SHEET NO. 1 OF 10
SCALE N.T.S.

ALEXANDRIA FOURTH TRACK PROJECT
ALEXANDRIA & ROSSLYN
ARLINGTON AND FAIRFAX COUNTIES, VIRGINIA
SUBDIVISION: RF&P ZONE: CENTRAL

PHASE 2

COMPLETION OF PHASE 2 BY 11/12/2026



LEGEND:

- EXISTING CSX ROW
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- SHIFTED TRACK
- SHIFTED TRACK (PROPOSED MOD)
- CONSTRUCTION (TEMPORARY OUTAGE)
- PROPOSED SHIFT (TEMPORARY OUTAGE)
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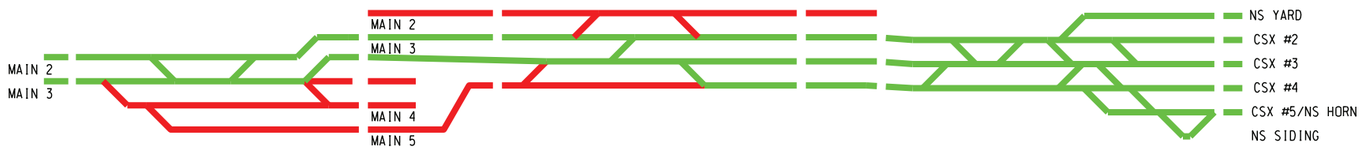
- TRACK OUT OF SERVICE
- TRACK TO BE REMOVED
- TRACK TO BE RAISED
- EXISTING OVERPASS
- EXISTING BRIDGE OVER WATER
- EXISTING UNDERPASS
- PROPOSED OVERPASS
- PROPOSED BRIDGE OVER WATER
- PROPOSED UNDERPASS
- EXISTING TURNOUT/CROSSOVER REMOVAL
- EXISTING STATION PLATFORM
- STATION PLATFORM BY OTHERS
- STATION PLATFORM UNDER CONSTRUCTION
- PROPOSED ACCESS ROAD
- PROPOSED SIGNAL
- PROPOSED SIGNAL HOUSE
- PROPOSED SIGNAL HOUSE
- PROPOSED BUMPING POST
- PROPOSED TEMPORARY PLATFORM
- PROPOSED TEMPORARY CROSSING
- PROPOSED PERMANENT BRIDGE/TUNNEL

← L'ENFANT — RO (CFP 110.1/STA. 325+00) — SLATER'S LANE (CFP 106.3/STA 130+00) — AF (CFP 104.3/STA. 25+00) — FRANCONIA →



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PROJECT NUMBER	COST ELEMENT	LINE ITEM	CONTRACT DESIGNATOR	PHYSICAL ENTITY	WORK ELEMENT

REV	DATE	DESCRIPTION	BY / SUB	APP
		LEVEL #		

DESIGNED BY	TWKII
DRAWN BY	TWKII
CHECKED BY	MJK
APPROVED BY	MJK
DATE	JUNE 2025

CSX TRANSPORTATION, INC.
ENGINEERING DEPARTMENT
DESIGN & CONSTRUCTION
JACKSONVILLE, FLORIDA

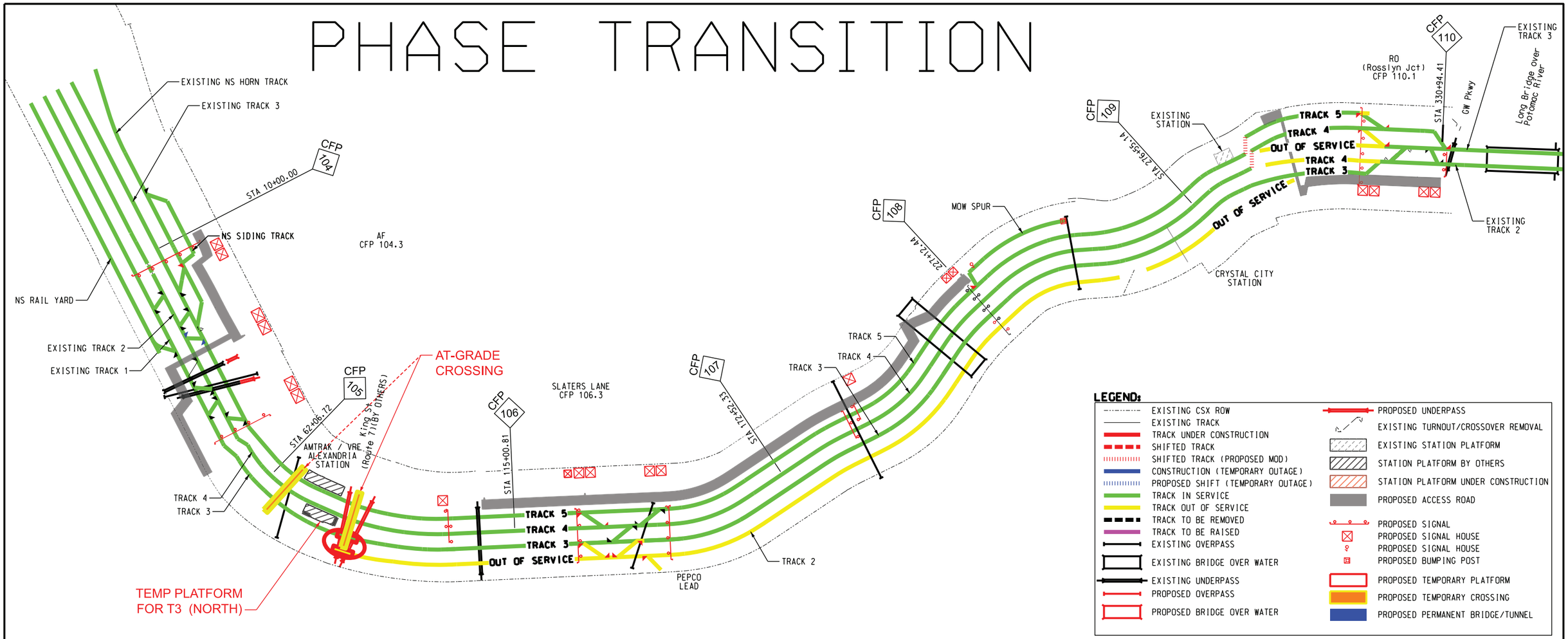
Michael Baker INTERNATIONAL

VAL. SEC.

CONTRACT NO.	188957
DRAWING NO.	SD-02
REVISION	0
SHEET NO.	2 OF 10
SCALE	N.T.S.

ALEXANDRIA FOURTH TRACK PROJECT
ALEXANDRIA & ROSSLYN
ARLINGTON AND FAIRFAX COUNTIES, VIRGINIA
SUBDIVISION: RF&P ZONE: CENTRAL

PHASE TRANSITION



LEGEND:

- EXISTING CSX ROW
- EXISTING TRACK
- TRACK UNDER CONSTRUCTION
- SHIFTED TRACK
- SHIFTED TRACK (PROPOSED MOD)
- CONSTRUCTION (TEMPORARY OUTAGE)
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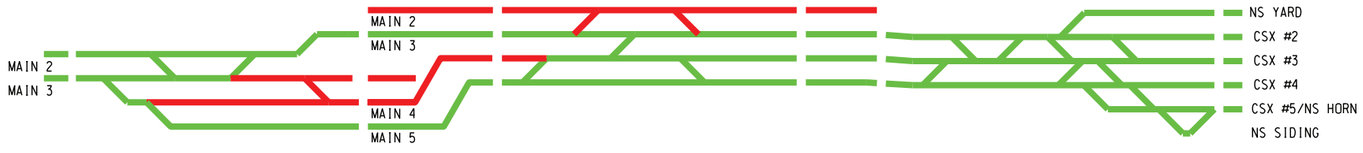
← L'ENFANT | RO (CFP 110.1/STA. 325+00) | SLATER'S LANE (CFP 106.3/STA 130+00) | AF (CFP 104.3/STA. 25+00) | FRANCONIA →



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WORK ELEMENT	PHYSICAL ENTITY	CONTRACT DESIGNATOR	LINE ITEM	COST ELEMENT	PROJECT NUMBER

LEVEL #

REV	DATE	DESCRIPTION	BY	SUB	APP

DESIGNED BY	TWKII
DRAWN BY	TWKII
CHECKED BY	MJK
APPROVED BY	MJK
DATE	JUNE 2025

CSX TRANSPORTATION, INC.
ENGINEERING DEPARTMENT
DESIGN & CONSTRUCTION
JACKSONVILLE, FLORIDA

Michael Baker INTERNATIONAL

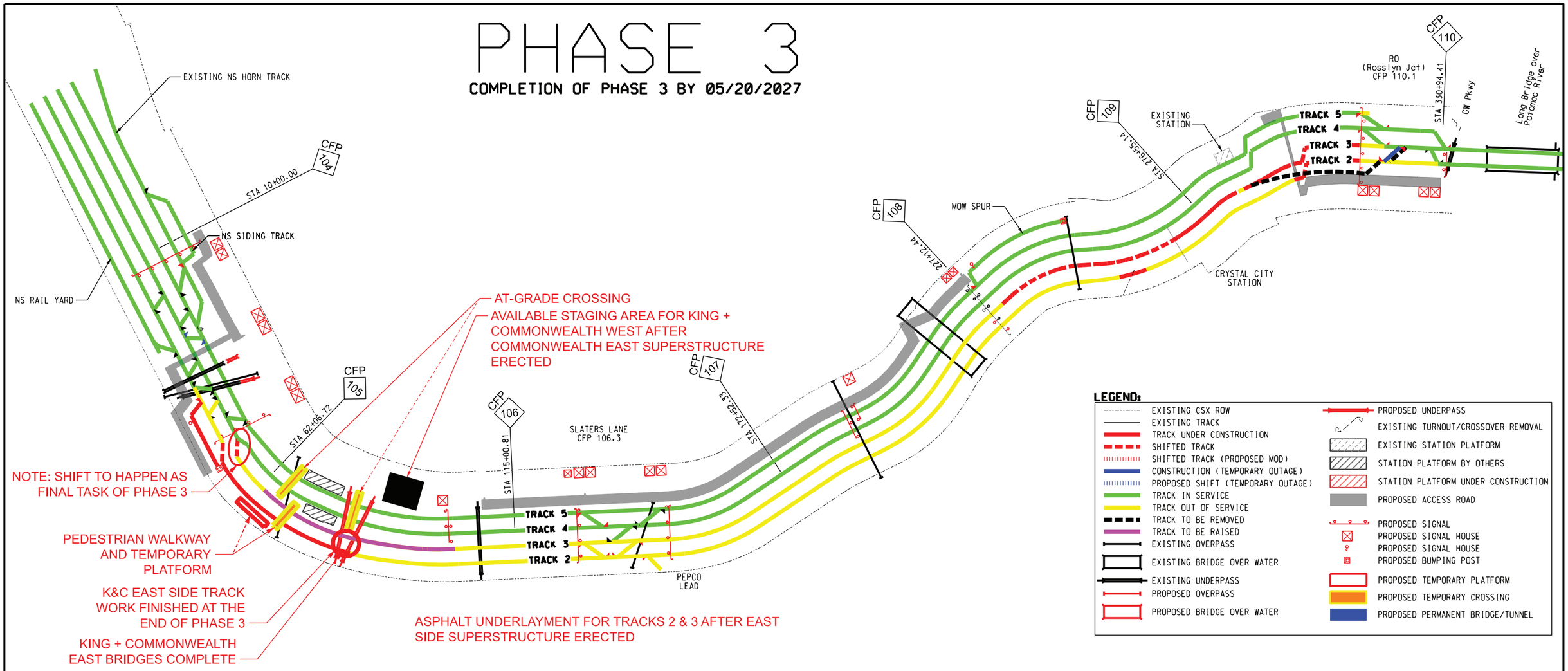
VAL. SEC.

CONTRACT NO.	188957
DRAWING NO.	SD-03
REVISION	0
SHEET NO.	3 OF 10
SCALE	N.T.S.

ALEXANDRIA FOURTH TRACK PROJECT
ALEXANDRIA & ROSSLYN
ARLINGTON AND FAIRFAX COUNTIES, VIRGINIA
SUBDIVISION: RF&P ZONE: CENTRAL

PHASE 3

COMPLETION OF PHASE 3 BY 05/20/2027



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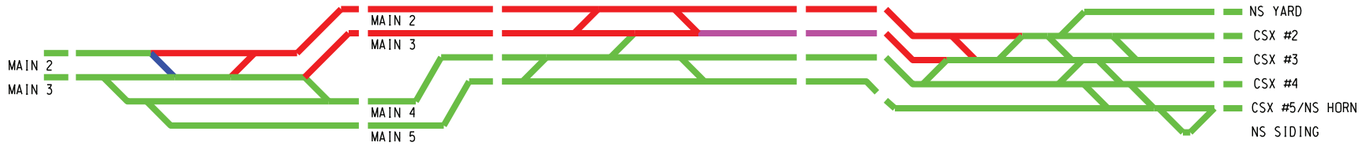

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DATE	JUNE 2025

CSX TRANSPORTATION, INC.
ENGINEERING DEPARTMENT
DESIGN & CONSTRUCTION
JACKSONVILLE, FLORIDA

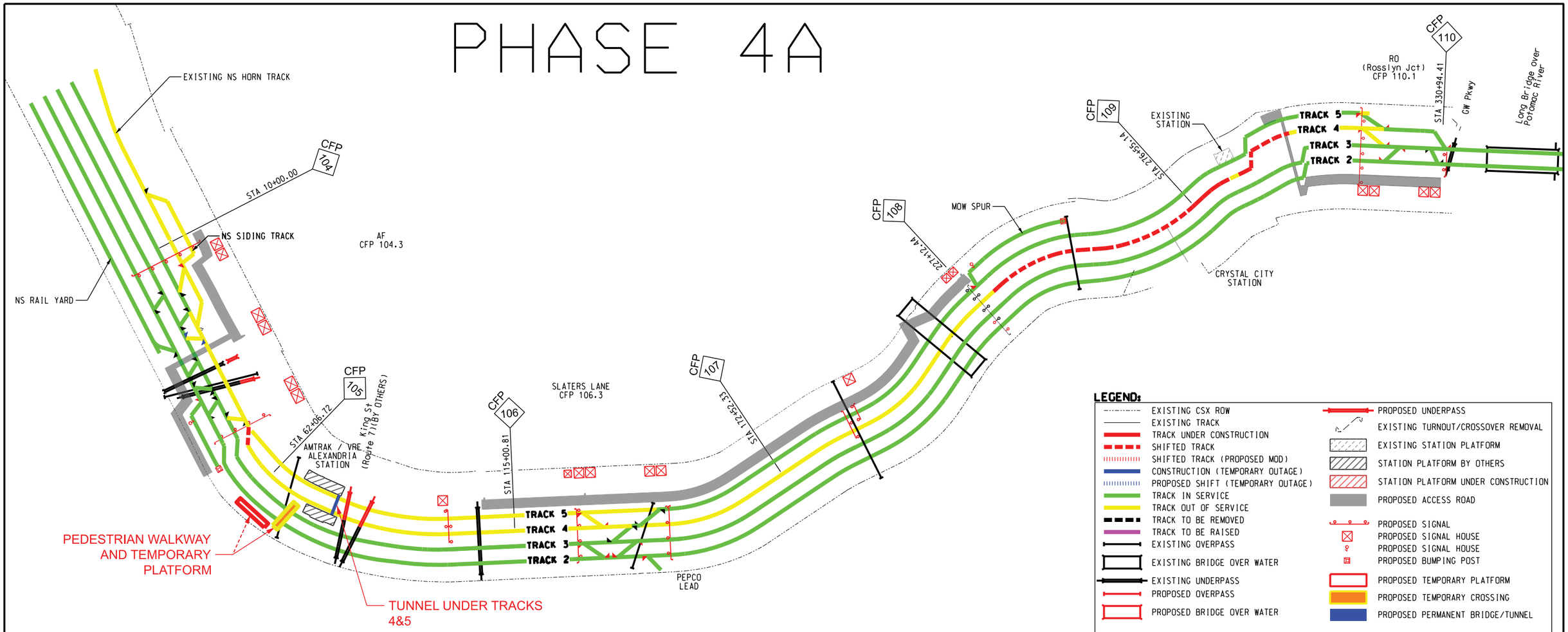
Michael Baker INTERNATIONAL

VAL. SEC.

CONTRACT NO.	188957
DRAWING NO.	SD-04
REVISION	0
SHEET NO.	4 OF 10
SCALE	N.T.S.

ALEXANDRIA FOURTH TRACK PROJECT
ALEXANDRIA & ROSSLYN
ARLINGTON AND FAIRFAX COUNTIES, VIRGINIA
SUBDIVISION: RF&P ZONE: CENTRAL

PHASE 4A



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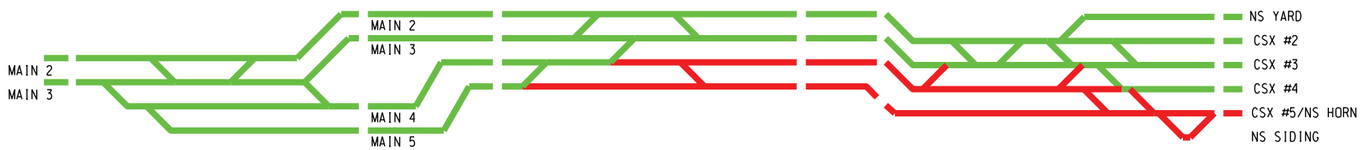

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CSX TRANSPORTATION, INC.
ENGINEERING DEPARTMENT
DESIGN & CONSTRUCTION
JACKSONVILLE, FLORIDA

[CSX]

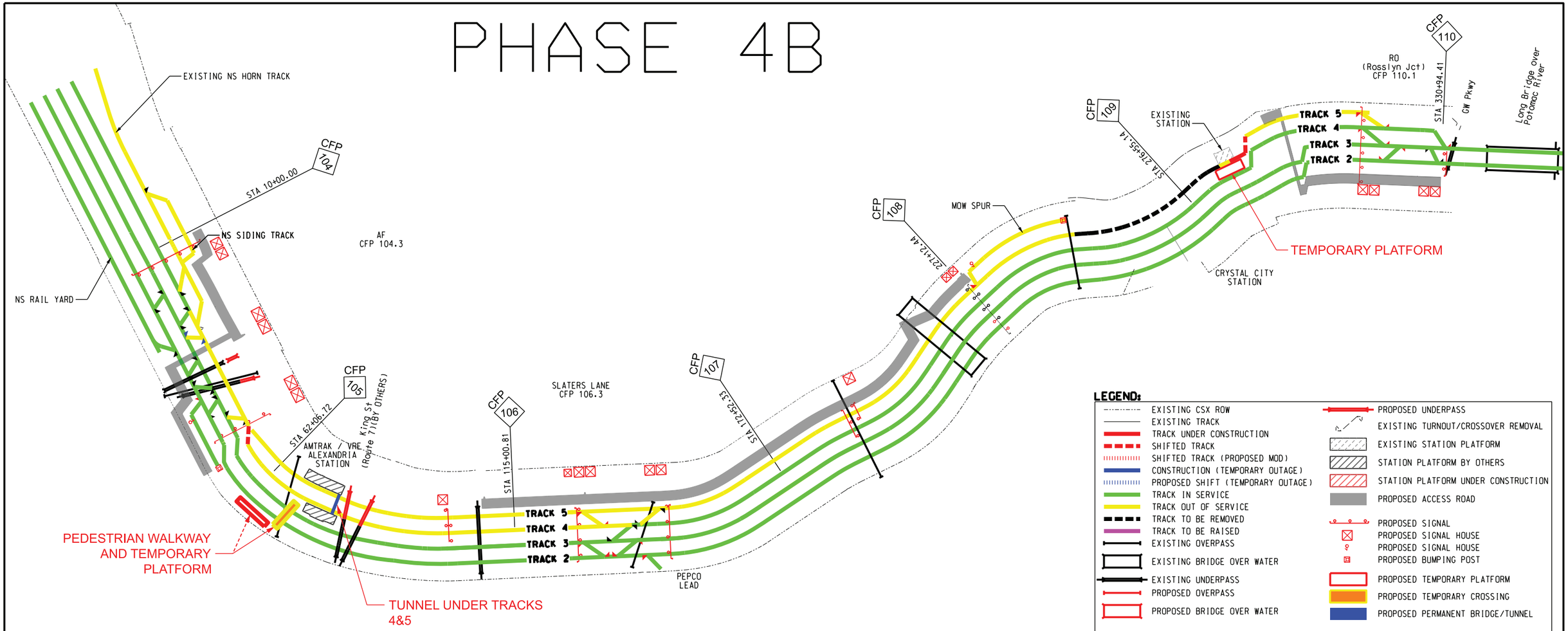
Michael Baker INTERNATIONAL

VAL. SEC.

CONTRACT NO.	188957
DRAWING NO.	SD-05
REVISION	0
SHEET NO.	5 OF 10
SCALE	N.T.S.

ALEXANDRIA FOURTH TRACK PROJECT
ALEXANDRIA & ROSSLYN
ARLINGTON AND FAIRFAX COUNTIES, VIRGINIA
SUBDIVISION: RF&P ZONE: CENTRAL

PHASE 4B



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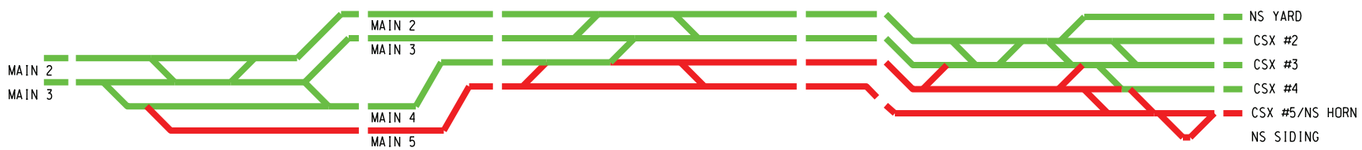

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REV	DATE	DESCRIPTION	BY / SUB	APP
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DRAWN BY	TWKII
CHECKED BY	MJK
APPROVED BY	MJK
DATE	JUNE 2025

CSX TRANSPORTATION, INC.
ENGINEERING DEPARTMENT
DESIGN & CONSTRUCTION
JACKSONVILLE, FLORIDA

[CSX]

Michael Baker INTERNATIONAL

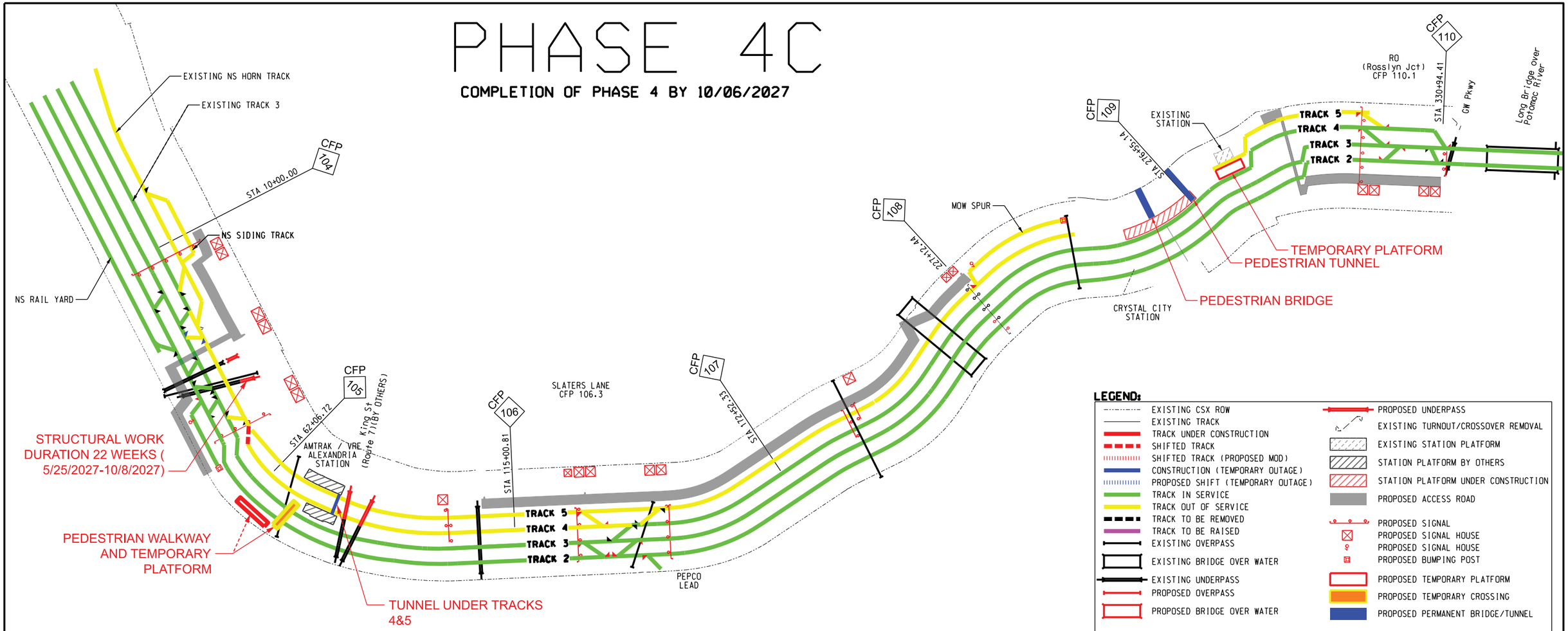
VAL. SEC.

CONTRACT NO.	188957
DRAWING NO.	SD-06
REVISION	0
SHEET NO.	6 OF 10
SCALE	N.T.S.

ALEXANDRIA FOURTH TRACK PROJECT
ALEXANDRIA & ROSSLYN
ARLINGTON AND FAIRFAX COUNTIES, VIRGINIA
SUBDIVISION: RF&P ZONE: CENTRAL

PHASE 4C

COMPLETION OF PHASE 4 BY 10/06/2027



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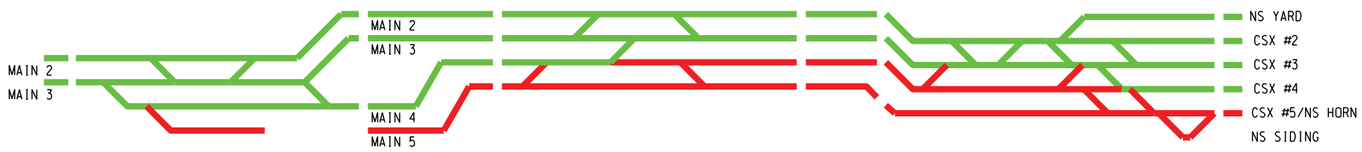

Pen Table File
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$DATE$

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LEVEL #

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DRAWN BY	TWKII
CHECKED BY	MJK
APPROVED BY	MJK
DATE	JUNE 2025

CSX TRANSPORTATION, INC.
ENGINEERING DEPARTMENT
DESIGN & CONSTRUCTION
JACKSONVILLE, FLORIDA

[CSX]

Michael Baker INTERNATIONAL

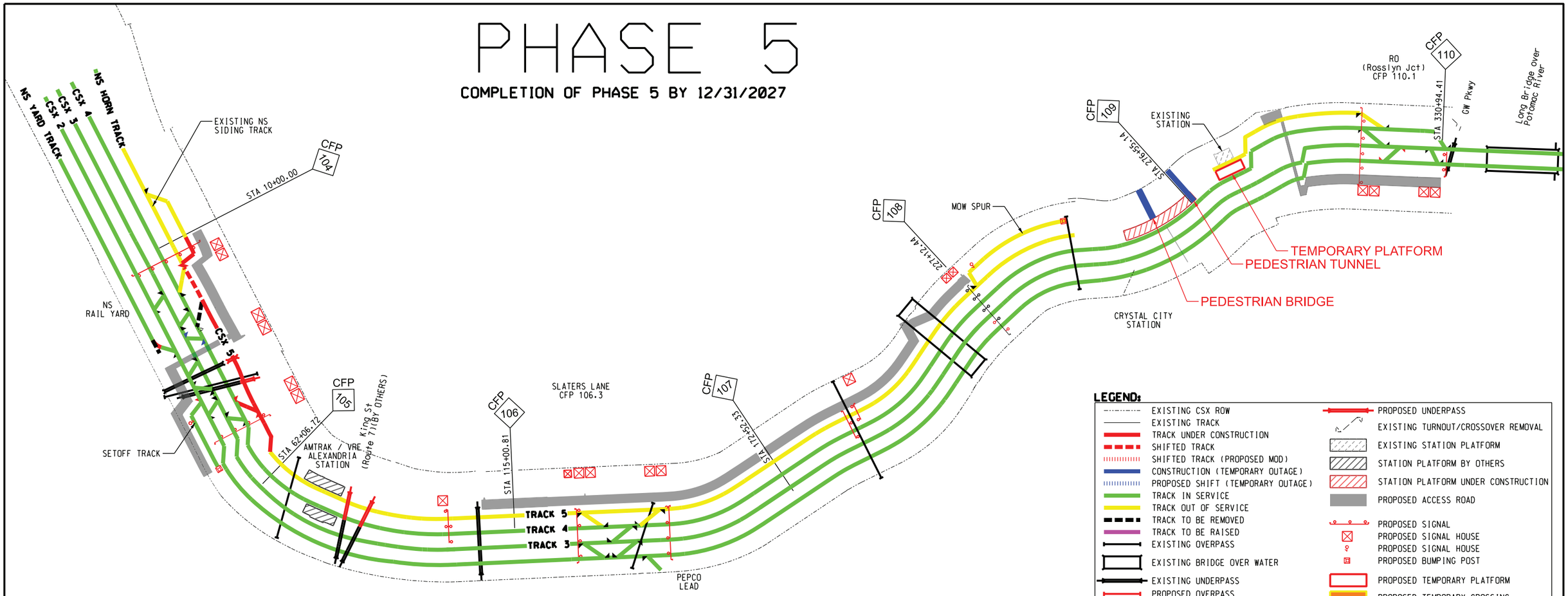
VAL. SEC.

CONTRACT NO.	188957
DRAWING NO.	SD-07
REVISION	0
SHEET NO.	7 OF 10
SCALE	N.T.S.

ALEXANDRIA FOURTH TRACK PROJECT
ALEXANDRIA & ROSSLYN
ARLINGTON AND FAIRFAX COUNTIES, VIRGINIA
SUBDIVISION: RF&P ZONE: CENTRAL

PHASE 5

COMPLETION OF PHASE 5 BY 12/31/2027



LEGEND:

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Pen Table File
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CHECKED BY	MJK
APPROVED BY	MJK
DATE	JUNE 2025

CSX TRANSPORTATION, INC.
ENGINEERING DEPARTMENT
DESIGN & CONSTRUCTION
JACKSONVILLE, FLORIDA

Michael Baker INTERNATIONAL

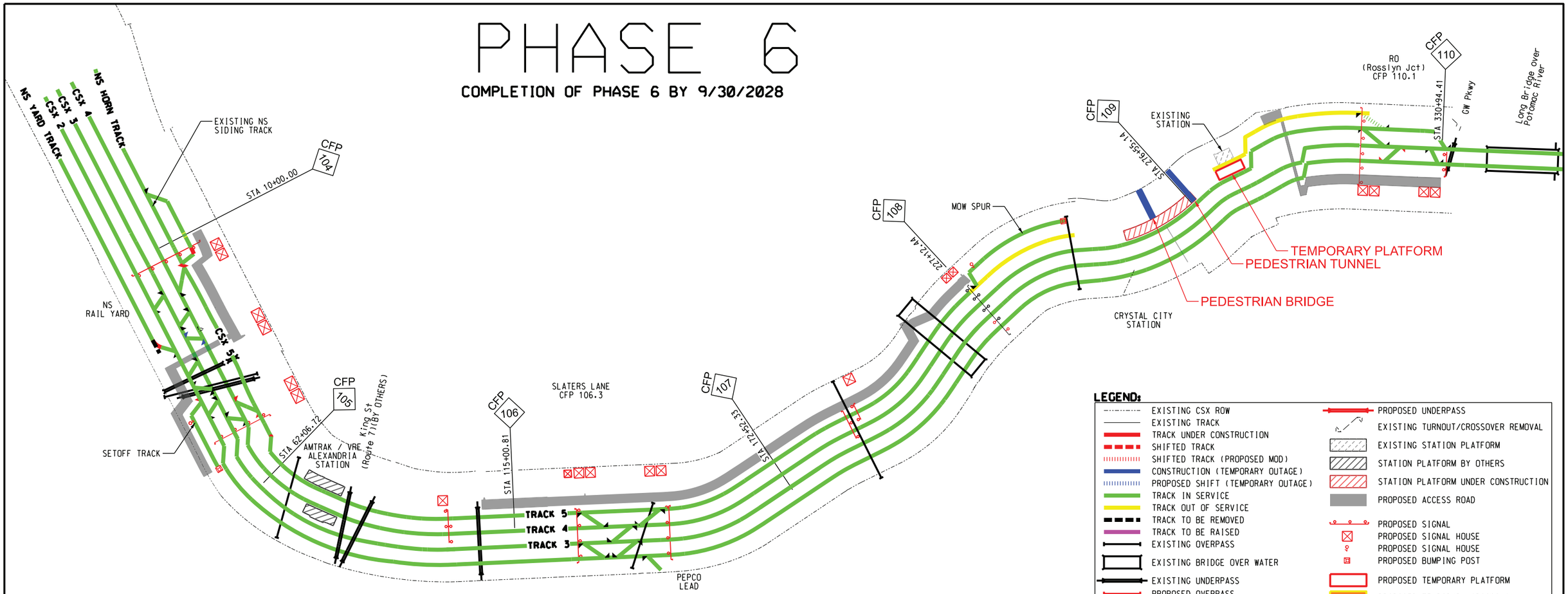
VAL. SEC.

CONTRACT NO.	188957
DRAWING NO.	SD-08
REVISION	0
SHEET NO.	8 OF 10
SCALE	N.T.S.

ALEXANDRIA FOURTH TRACK PROJECT
ALEXANDRIA & ROSSLYN
ARLINGTON AND FAIRFAX COUNTIES, VIRGINIA
SUBDIVISION: RF&P ZONE: CENTRAL

PHASE 6

COMPLETION OF PHASE 6 BY 9/30/2028



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Pen Table File
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PROJECT NUMBER	COST ELEMENT	LINE ITEM	CONTRACT DESIGNATOR	PHYSICAL ENTITY	WORK ELEMENT

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CSX TRANSPORTATION, INC.
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JACKSONVILLE, FLORIDA

Michael Baker INTERNATIONAL

VAL. SEC.

CONTRACT NO.	188957
DRAWING NO.	SD-09
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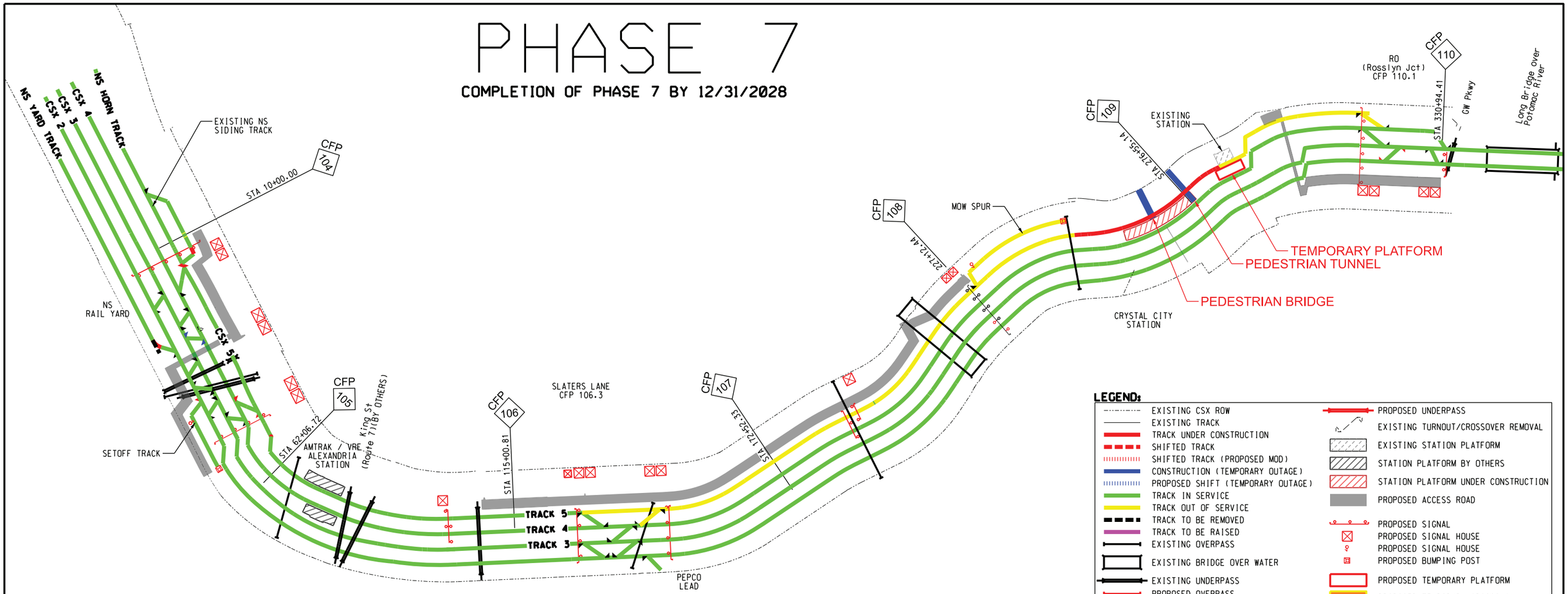
SHEET NO.	9 OF 10
SCALE	N.T.S.

ALEXANDRIA FOURTH TRACK PROJECT
ALEXANDRIA & ROSSLYN
ARLINGTON AND FAIRFAX COUNTIES, VIRGINIA
SUBDIVISION: RF&P ZONE: CENTRAL

PHASE 7

COMPLETION OF PHASE 7 BY 12/31/2028



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CSX TRANSPORTATION, INC.
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JACKSONVILLE, FLORIDA

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ALEXANDRIA FOURTH TRACK PROJECT
ALEXANDRIA & ROSSLYN
ARLINGTON AND FAIRFAX COUNTIES, VIRGINIA
SUBDIVISION: RF&P ZONE: CENTRAL

Exhibit B

VRE Alexandria Station and King & Commonwealth Bridges Suggested Phasing Diagrams

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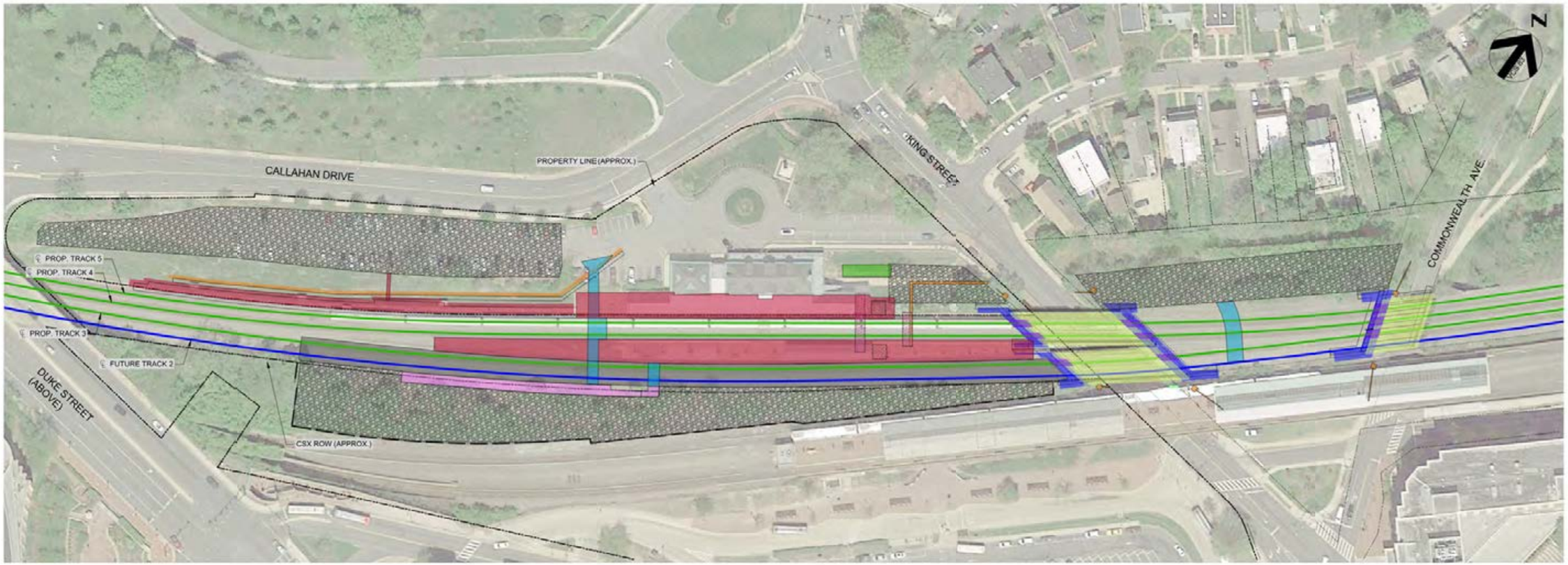

OVERVIEW OF SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES

1"=60'-0"

SCHEDULING SEQUENCE		OVERVIEW ACTIVITIES
CSX	VRE	
NTP / PRE-CONSTRUCTION	NTP PRE-CONSTRUCTION	1) CSX INSTALLS TWO TEMPORARY CONSTRUCTION AT-GRADE CROSSINGS
PHASE 1		
PHASE 2 & PEAK SEASON	PHASE 1 STAGE 1	1) PREPARATION TO CONSTRUCT BRIDGE SUBSTRUCTURES 2) STATION SITEWORK
	PHASE 1 STAGE 2	1) COMPLETION OF BRIDGE SUBSTRUCTURES 2) PREPARATION AND CONSTRUCTION OF TEMPORARY AND EAST PLATFORMS 3) OFFLINE CONSTRUCTION OF SUPERSTRUCTURES FOR EAST BRIDGES
PHASE 3	PHASE 1 STAGE 3	1) COMPLETION OF EAST BRIDGES 2) COMPLETION OF TEMPORARY AND EAST PLATFORMS 3) PREPARATION AND FOUNDATIONS FOR EAST ELEVATOR 4) CSX REMOVES AT-GRADE CROSSINGS FROM 5) CSX RELOCATES PEDESTRIAN CROSSING ACROSS PROPOSED TRACKS 4 AND 5
PHASE 4	PHASE 2 STAGE 1	1) OFFLINE CONSTRUCTION OF SUPERSTRUCTURES FOR WEST BRIDGES 2) PREPARATION AND CONSTRUCTION OF WEST SIDE OF ISLAND PLATFORM
	PHASE 2 STAGE 2	1) COMPLETION OF WEST BRIDGES 2) COMPLETION OF WEST PLATFORMS 3) COMPLETION OF EAST AND WEST ELEVATORS 4) COMPLETION OF TUNNEL AND UTILITIES 5) CSX REMOVES TEMPORARY CONSTRUCTION CROSSING BETWEEN KING STREET AND COMMONWEALTH AVENUE
PHASE 5	PHASE 3	1) REMOVAL OF TEMPORARY EAST PLATFORM 2) CSX REMOVES ALL REMAINING AT-GRADE CROSSINGS WITHIN PROJECT LIMITS

LEGEND:

- ASPHALT UNDERLAY
- AT-GRADE CROSSING
- CONSTRUCTION LAYDOWN AREA
- DRAINAGE
- ELEVATOR
- GENERATOR ENCLOSURE
- TUNNEL & UTILITIES
- JUMP SPAN
- PLATFORM
- SUBSTRUCTURE
- SUPERSTRUCTURE
- TEMPORARY PLATFORM
- TRACK IN SERVICE
- FUTURE TRACK

NOTE:

1) THE PURPOSE OF VRE PHASE 1:
   a. PREPARE AND INSTALL THE TWO BRIDGES SUBSTRUCTURE
   b. CONSTRUCT THE PART OF THE ISLAND PLATFORM ADJACENT TO PROPOSED TRACK 3
   c. CONSTRUCT THE EAST BRIDGES SUPERSTRUCTURE
2) THE PURPOSE OF VRE PHASE 2:
   a. CONSTRUCT THE SIDE OF THE PLATFORM ADJACENT TO PROPOSED TRACK 4 AND 5
   b. CONSTRUCT THE WEST BRIDGE
   c. CONSTRUCT THE ELEVATOR AND PLATFORM TUNNEL
3) TRACK NUMBERING WILL CHANGE AT SOME TIME DURING CONSTRUCTION AS FOLLOW:

CURRENT NO.	PROPOSED NO.
0	2
1	3
2	4
3	5

0 30' 60' 120'
HORIZONTAL SCALE 1"=60'

ALEXANDRIA STATION AND BRIDGE IMPROVEMENTS

DATE: 05/22/2025

CONSTRUCTION PHASING OVERVIEW

SCALE: 1" = 60'

SHEET NO: 01 OF 07

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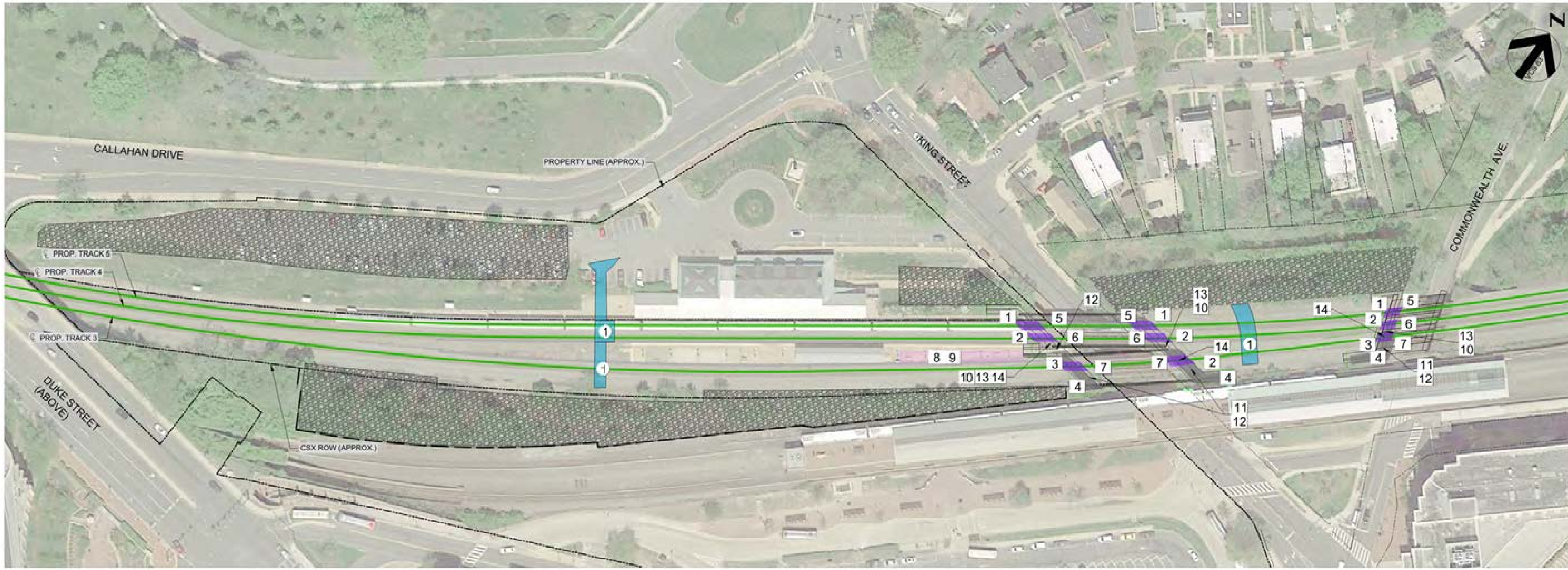

SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES

1"=60'-0"

SCHEDULING SEQUENCE		SEQUENCE ACTIVITIES
CSX	VRE	
NTP / PRE-CONSTRUCTION; PHASE 1	NTP PRE-CONSTRUCTION	1) INSTALLS TWO TEMPORARY CONSTRUCTION AT-GRADE CROSSINGS ACROSS ALL THREE EXISTING TRACKS - CSX INSTALLS CROSSINGS ON EXISTING TRACKS TIES - CONTRACTOR WILL LAYDOWN FILTER FABRIC ON BALLAST AND INSTALL ASPHALT BETWEEN CROSSING SURFACES AND ON BOTH FIELD SIDES OF TRACKS
PHASE 2 & PEAK SEASON	PHASE 1 STAGE 1	1) INSTALL SOE DURING PROPOSED TRACK 5 OUTAGE 2) INSTALL SOE DURING PROPOSED TRACK 4 OUTAGE 3) INSTALL SOE DURING PROPOSED TRACK 3 OUTAGE 4) INSTALL SOE FOR FUTURE TRACK 2 5) INSTALL JUMP SPANS DURING TRACK 5 OUTAGE 6) INSTALL JUMP SPANS DURING TRACK 4 OUTAGE 7) INSTALL JUMP SPANS DURING TRACK 3 OUTAGE 8) GRADING FOR TEMPORARY PLATFORM TRACK 3 9) INSTALL TEMPORARY PLATFORM AT PROPOSED TRACK 3 10) EXCAVATE FOR PROPOSED TRACKS 5, 4, AND 3 BRIDGE FOUNDATIONS 11) EXCAVATE FOR FUTURE TRACK 2 BRIDGE FOUNDATIONS 12) INSTALL MICROPILES FOR FUTURE TRACK 2 13) INSTALL MICROPILES FOR PROPOSED TRACKS 3, 4, AND 5 14) FORM, INSTALL REBAR, AND POUR MONOLITHIC FOUNDATION
	PHASE 1 STAGE 2	

OPERATION / STATUS	TRACK (BEFORE STAGE)	STATION (BEFORE STAGE)
IN SERVICE	1) PROPOSED TRACK 3 2) PROPOSED TRACK 4 3) PROPOSED TRACK 5	1) PLATFORM TUNNEL 2) WEST PLATFORM 3) EAST PLATFORM 4) WEST BRIDGE 5) EAST BRIDGE 6) NORTH STAIRS AT EAST PLATFORM 7) CENTER STAIRS AT EAST PLATFORM
OUT OF SERVICE		
CONSTRUCTION ACTIVITIES	1) TEMPORARY OUTAGES OF TRACKS 3, 4, AND 5 TO INSTALL SOE AND JUMP SPANS	
OPERATION / STATUS	**TRACK (AFTER STAGE)**	**STATION (AFTER STAGE)**
IN SERVICE	1) PROPOSED TRACK 3 2) PROPOSED TRACK 4 3) PROPOSED TRACK 5	1) PLATFORM TUNNEL 2) NORTH ENDS OF EAST AND WEST PLATFORMS AFTER INSTALLING AT-GRADE CROSSINGS 3) WEST BRIDGE 4) EAST BRIDGE 5) TEMPORARY PLATFORM TRACK 3
OUT OF SERVICE		1) SOUTH ENDS OF EAST AND WEST PLATFORMS AFTER INSTALLING AT-GRADE CROSSINGS 2) NORTH STAIRS TO EAST PLATFORM

LEGEND:

- ASPHALT UNDERLAY
- AT-GRADE CROSSING
- CONSTRUCTION LAYDOWN AREA
- DRAINAGE
- ELEVATOR
- GENERATOR ENCLOSURE
- TUNNEL & UTILITIES
- JUMP SPAN
- PLATFORM
- SUBSTRUCTURE
- SUPERSTRUCTURE
- TEMPORARY PLATFORM
- (1) CSX ACTIVITY
- [1] VRE ACTIVITY
- TRACK IN SERVICE
- TRACK OUT OF SERVICE

NOTE:

1) THIS IS A SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES AND IS NOT A DIVISION OF WORK.
2) DIAGRAM DOES NOT CONVEY FINAL CONDITIONS.
3) TRACK NUMBERING WILL CHANGE AT SOME TIME DURING CONSTRUCTION AS FOLLOW:

CURRENT NO.	PROPOSED NO.
0	2
1	3
2	4
3	5

0 30' 60' 120'
HORIZONTAL SCALE 1"=60'

ALEXANDRIA STATION AND BRIDGE IMPROVEMENTS

NTP / PRE-CONSTRUCTION AND PHASE 1 - STAGE 1

DATE: 05/22/2025
SCALE: 1" = 60'
SHEET NO: 02 OF 07

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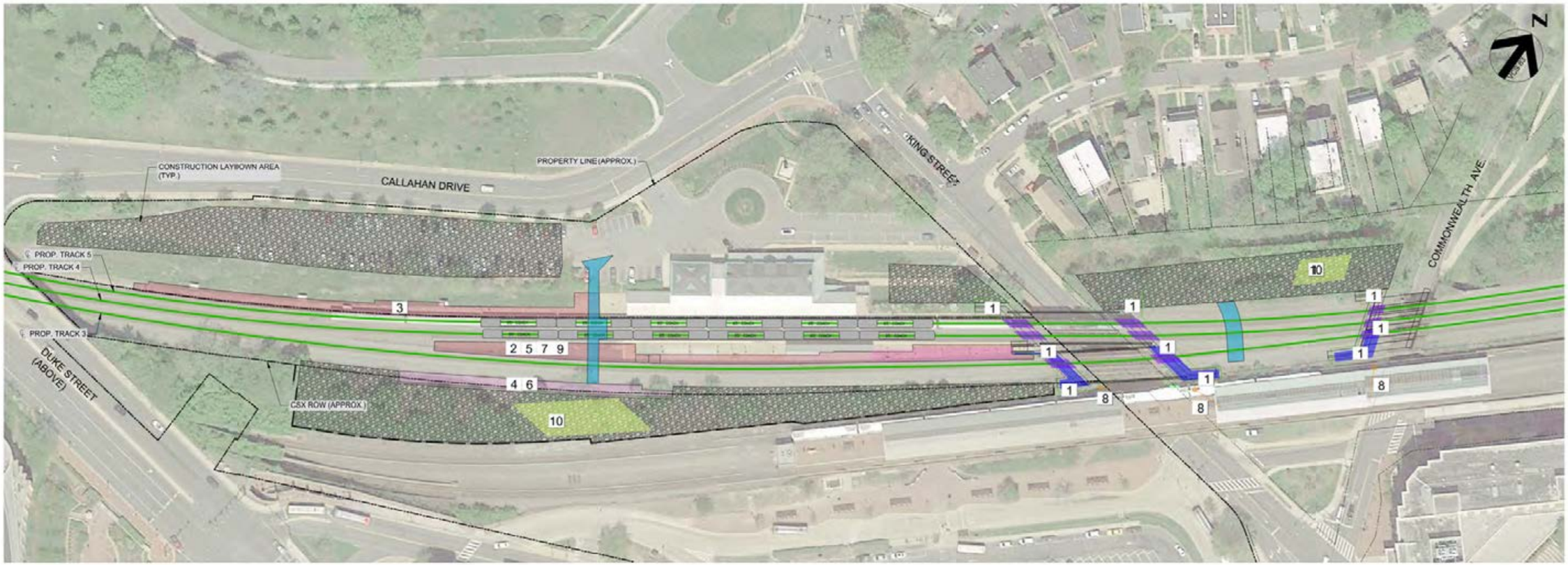

SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES

1"=60'-0"

SCHEDULING SEQUENCE		SEQUENCE ACTIVITIES
CSX	VRE	
PHASE 2 & PEAK SEASON	PHASE 1 STAGE 1	
	PHASE 1 STAGE 2	1) FORM, INSTALL REBAR, AND POUR ABUTMENT AND WING WALLS 2) SELECTIVE DEMOLITION OF EXISTING PLATFORM ADJACENT TO PROPOSED TRACK 3 3) SELECTIVE DEMOLITION OF EXISTING PLATFORM ADJACENT TO TRACK 5 4) GRADING FOR TEMPORARY PLATFORM AT PROPOSED TRACK 2 5) GRADING FOR PLATFORM AT PROPOSED TRACK 3 6) INSTALL DRAINAGE AND UTILITIES FOR TEMPORARY PLATFORM AT PROPOSED TRACK 2 7) INSTALL DRAINAGE AND UTILITIES FOR PLATFORM AT PROPOSED TRACK 3 8) INSTALL DRAINAGE AT EAST ABUTMENTS 9) FORM, INSTALL REBAR, AND POUR EAST PLATFORM AT PROPOSED TRACK 3 10) CONSTRUCT EAST BRIDGE SUPERSTRUCTURES OFFLINE

OPERATION STATUS	TRACK (BEFORE STAGE)	STATION (BEFORE STAGE)
IN SERVICE	1) PROPOSED TRACK 3 2) PROPOSED TRACK 4 3) PROPOSED TRACK 5	1) PLATFORM TUNNEL 2) NORTH ENDS OF EAST AND WEST PLATFORMS AFTER INSTALLING AT-GRADE CROSSINGS 3) WEST BRIDGE 4) EAST BRIDGE 5) CENTER STAIRS AT EAST PLATFORM
OUT OF SERVICE		1) SOUTH ENDS OF EAST AND WEST PLATFORMS AFTER INSTALLING AT-GRADE CROSSINGS 2) NORTH STAIRS AT EAST PLATFORM
CONSTRUCTION ACTIVITIES		
OPERATION STATUS	TRACK (AFTER STAGE)	STATION (AFTER STAGE)
IN SERVICE	1) PROPOSED TRACK 3 2) PROPOSED TRACK 4 3) PROPOSED TRACK 5	1) PLATFORM TUNNEL 2) NORTH ENDS OF EAST AND WEST PLATFORMS AFTER INSTALLING AT-GRADE CROSSINGS 3) WEST BRIDGE 4) EAST BRIDGE 5) TEMPORARY PLATFORM TRACK 3
OUT OF SERVICE		1) SOUTH ENDS OF WEST PLATFORM 2) DEMOLISHED AREAS OF EAST PLATFORM 3) NORTH STAIRS TO EAST PLATFORM

LEGEND:

- ASPHALT UNDERLAY
- AT-GRADE CROSSING
- CONSTRUCTION LAYDOWN AREA
- DRAINAGE
- ELEVATOR
- GENERATOR ENCLOSURE
- TUNNEL & UTILITIES
- JUMP SPAN
- PLATFORM
- REMOVED PLATFORM
- SUBSTRUCTURE
- SUPERSTRUCTURE
- TEMPORARY PLATFORM
- (1) CSX ACTIVITY
- [1] VRE ACTIVITY
- TRACK IN SERVICE

NOTE:

1) THIS IS A SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES AND IS NOT A DIVISION OF WORK.
2) DIAGRAM DOES NOT CONVEY FINAL CONDITIONS.
3) TRACK NUMBERING WILL CHANGE AT SOME TIME DURING CONSTRUCTION AS FOLLOW:

CURRENT NO.	PROPOSED NO.
0	2
1	3
2	4
3	5

0 30' 60' 120'
HORIZONTAL SCALE 1"=60'

ALEXANDRIA STATION AND BRIDGE IMPROVEMENTS

PHASE 1
STAGE 2

DATE: 05/22/2025
SCALE: 1" = 60'
SHEET NO: 03 OF 07

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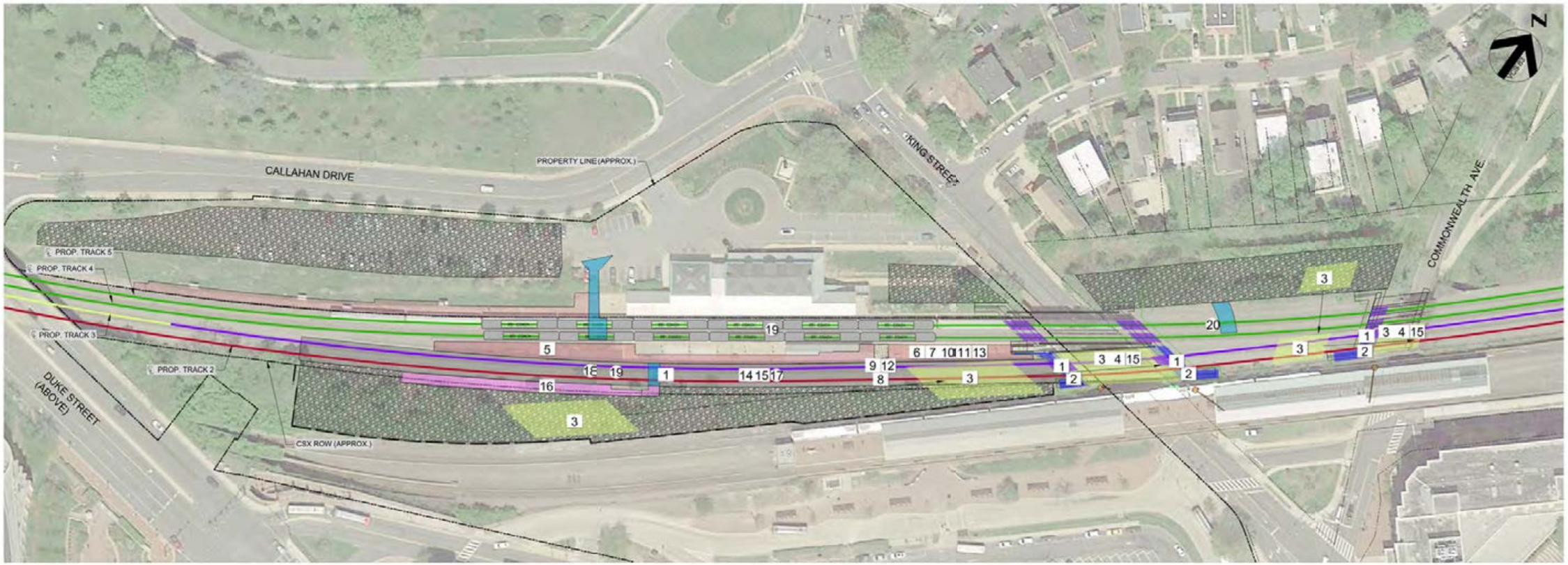

SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES

1"=60'-0"

SCHEDULING SEQUENCE		SEQUENCE ACTIVITIES
CSX	VRE	
PHASE 3	PHASE 1 STAGE 3	1) REMOVE JUMP SPANS AS SOON AS TRACK 3 IS REMOVED A. CSX TO REMOVE TRACK FROM JUMP SPANS, BRIDGE SUPERSTRUCTURE, AND ASPHALT UNDERLAYMENT AREA. 2) INSTALL PRECAST BACKWALL FOR TRACKS 2 AND 3 3) MOVE SUPERSTRUCTURES OF EAST BRIDGES ONTO SUBSTRUCTURES 4) COMPLETE SUPERSTRUCTURE CONSTRUCTION 5) CONSTRUCT CANOPIES, LIGHTING, SECURITY, AND PIMS ON EAST PLATFORMS 6) REMOVE TEMPORARY PLATFORM AT TRACK 3 7) SELECTIVE DEMOLITION OF EXISTING PLATFORM ADJACENT TO PROPOSED TRACK 3 8) INSTALL SOE FOR EAST ELEVATOR 9) EXCAVATE FOR EAST ELEVATOR 10) GRADING FOR PLATFORM AT TRACK PROPOSED TRACK 3 11) INSTALL DRAINAGE AND UTILITIES FOR PLATFORM AT PROPOSED TRACK 3 12) FORM, INSTALL REBAR, AND POUR FOUNDATION FOR EAST ELEVATOR 13) FORM, INSTALL REBAR, AND POUR EAST PLATFORM AT PROPOSED TRACK 3 14) INSTALL ASPHALT UNDERLAYMENT FOR PROPOSED TRACKS 2 AND 3 15) INSTALL 6" OF BALLAST ON UNDERLAYMENT AND SUPERSTRUCTURES 16) INSTALL TEMPORARY PLATFORM AT PROPOSED TRACK 2 17) CSX INSTALLS TRACKS 2 AND 3 TO FINAL ALIGNMENT AND PROFILE 18) CSX REMOVES CONSTRUCTION AT-GRADE CROSSING FROM TRACK 3 19) CSX RELOCATES PEDESTRIAN CROSSING FROM PROPOSED TRACKS 4 AND 5 TO PROPOSED TRACKS 2 AND 3 20) CSX REMOVES CONSTRUCTION AT-GRADE CROSSING FROM PROPOSED TRACKS 4 AND 5

OPERATION / STATUS	TRACK (BEFORE STAGE)	STATION (BEFORE STAGE)
IN SERVICE	1) PROPOSED TRACK 3 2) PROPOSED TRACK 4 3) PROPOSED TRACK 5	1) PLATFORM TUNNEL 2) NORTH ENDS OF EAST AND WEST PLATFORMS AFTER INSTALLING AT-GRADE CROSSINGS 3) WEST BRIDGE 4) EAST BRIDGE 5) CENTER STAIRS AT EAST PLATFORM
OUT OF SERVICE		1) SOUTH END OF WEST PLATFORM 2) DEMOLISHED AREAS OF EAST PLATFORM 3) NORTH STAIRS TO EAST PLATFORM
CONSTRUCTION ACTIVITIES	1) TEMPORARY OUTAGES OF TRACKS 3, 4, AND 5 TO MOVE EAST BRIDGE SUPERSTRUCTURE IN PLACE 2) TEMPORARY OUTAGE OF ROADWAY UNDERNEATH BRIDGES WHILE DISASSEMBLING EXISTING EAST BRIDGES	
OPERATION / STATUS	TRACK (AFTER STAGE)	STATION (AFTER STAGE)
IN SERVICE	1) PROPOSED TRACK 4 2) PROPOSED TRACK 5	1) PLATFORM TUNNEL 2) NORTH END OF WEST PLATFORM 3) WEST BRIDGE
OUT OF SERVICE	1) PROPOSED TRACK 3	1) SOUTH END OF WEST PLATFORM 2) DEMOLISHED AREAS OF EAST PLATFORM 3) EAST BRIDGE 4) NORTH STAIRS TO EAST PLATFORM

LEGEND:

- ASPHALT UNDERLAY
- AT-GRADE CROSSING
- CONSTRUCTION LAYDOWN AREA
- DRAINAGE
- ELEVATOR
- GENERATOR ENCLOSURE
- TUNNEL & UTILITIES
- JUMP SPAN
- PLATFORM
- REMOVED PLATFORM
- SUBSTRUCTURE
- SUPERSTRUCTURE
- TEMPORARY PLATFORM
- (1) CSX ACTIVITY
- [1] VRE ACTIVITY
- TRACK IN SERVICE
- TRACK OUT OF SERVICE
- TRACK UNDER CONSTRUCTION
- SHIFTED TRACK

NOTE:

1) THIS IS A SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES AND IS NOT A DIVISION OF WORK.
2) DIAGRAM DOES NOT CONVEY FINAL CONDITIONS.
3) TRACK NUMBERING WILL CHANGE AT SOME TIME DURING CONSTRUCTION AS FOLLOW:

CURRENT NO.	PROPOSED NO.
0	2
1	3
2	4
3	5

0 30' 60' 120'
HORIZONTAL SCALE 1"=60'

ALEXANDRIA STATION AND BRIDGE IMPROVEMENTS

PHASE 1
STAGE 3

DATE: 05/22/2025

SCALE: 1" = 60'

SHEET NO: 04 OF 07

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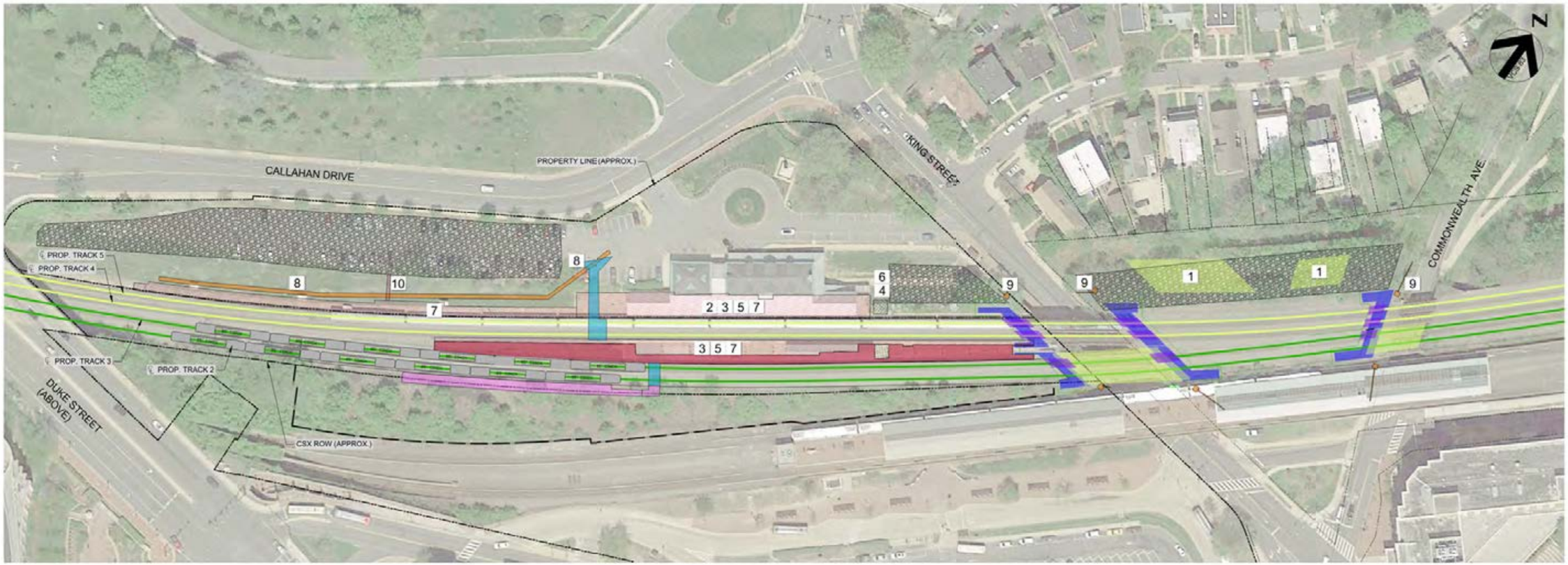

SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES

1"=60'-0"

SCHEDULING SEQUENCE		SEQUENCE ACTIVITIES
CSX	VRE	
PHASE 4	PHASE 2 STAGE 1	1) OFFLINE CONSTRUCTION OF SUPERSTRUCTURES FOR WEST BRIDGES 2) DEMOLITION OF WEST PLATFORMS ADJACENT TO PROPOSED TRACKS 4 AND 5 3) GRADING FOR WEST PLATFORMS 4) INSTALL SOE FOR WEST ELEVATOR 5) INSTALL DRAINAGE AND UTILITIES FOR WEST PLATFORMS 6) FORM, INSTALL REBAR, AND POUR FOUNDATION FOR WEST ELEVATOR 7) FORM, INSTALL REBAR, AND POUR WEST PLATFORMS 8) INSTALL DRAINAGE AND BMPS SOUTH OF STATION 9) INSTALL DRAINAGE AT WEST ABUTMENTS 10) INSTALL SOUTH STAIRS FROM WEST PLATFORM TO PARKING AREA
	PHASE 2 STAGE 2	

OPERATION STATUS	TRACK (BEFORE STAGE)	STATION (BEFORE STAGE)
IN SERVICE	1) PROPOSED TRACK 4 2) PROPOSED TRACK 5	1) PLATFORM TUNNEL 2) NORTH END OF WEST PLATFORM 3) WEST BRIDGE 4) CENTER STAIRS AT EAST PLATFORM
OUT OF SERVICE	1) PROPOSED TRACK 3	1) SOUTH END OF WEST PLATFORM 2) DEMOLISHED AREAS OF EAST PLATFORM 3) EAST BRIDGE 4) NORTH STAIRS TO EAST PLATFORM
CONSTRUCTION ACTIVITIES		

OPERATION STATUS	TRACK (BEFORE STAGE)	STATION (BEFORE STAGE)
IN SERVICE	1) PROPOSED TRACK 3 2) PROPOSED TRACK 2	1) SOUTH END OF EAST PLATFORM 2) TEMPORARY PLATFORM 3) EAST BRIDGE
OUT OF SERVICE	1) PROPOSED TRACK 4 2) PROPOSED TRACK 5	1) NORTH ENDS OF WEST AND EAST PLATFORMS 2) WEST BRIDGE 3) NORTH STAIRS TO EAST PLATFORM 4) CENTER STAIRS TO EAST PLATFORM 5) PLATFORM TUNNEL

LEGEND:

- ASPHALT UNDERLAY
- AT-GRADE CROSSING
- CONSTRUCTION LAYDOWN AREA
- DRAINAGE
- ELEVATOR
- GENERATOR ENCLOSURE
- TUNNEL & UTILITIES
- JUMP SPAN
- PLATFORM
- SUBSTRUCTURE
- SUPERSTRUCTURE
- TEMPORARY PLATFORM
- (1) CSX ACTIVITY
- [1] VRE ACTIVITY
- TRACK IN SERVICE
- TRACK OUT OF SERVICE

NOTE:

1) THIS IS A SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES AND IS NOT A DIVISION OF WORK.
2) DIAGRAM DOES NOT CONVEY FINAL CONDITIONS.
3) TRACK NUMBERING WILL CHANGE AT SOME TIME DURING CONSTRUCTION AS FOLLOW:

CURRENT NO.	PROPOSED NO.
0	2
1	3
2	4
3	5

0 30' 60' 120'
HORIZONTAL SCALE 1"=60'

ALEXANDRIA STATION AND BRIDGE IMPROVEMENTS

PHASE 2
STAGE 1

DATE: 05/22/2025

SCALE: 1" = 60'

SHEET NO: 05 OF 07

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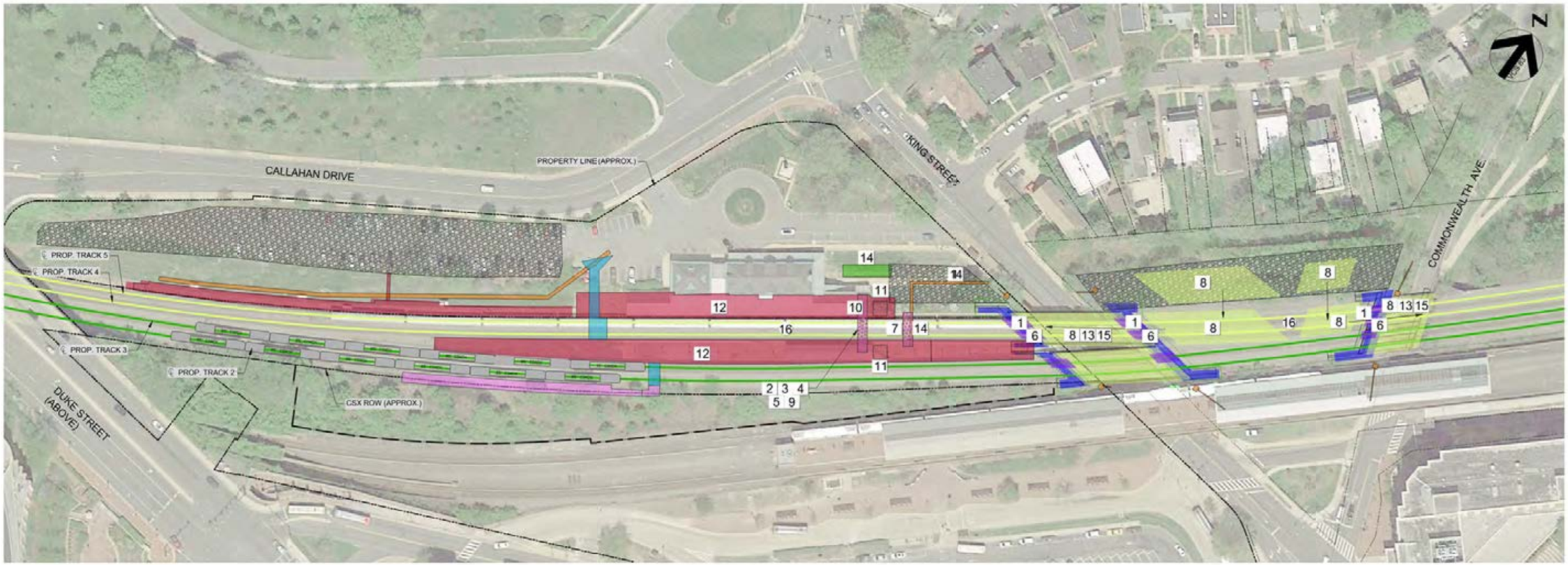

SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES

1"=60'-0"

SCHEDULING SEQUENCE		SEQUENCE ACTIVITIES
CSX	VRE	
PHASE 4	PHASE 2 STAGE 1	
	PHASE 2 STAGE 2	1) REMOVE JUMP SPANS WHILE TRACK 4 AND 5 ARE OUT OF SERVICE 2) INSTALL SOE FOR TUNNEL CONSTRUCTION 3) INSTALL SOE FOR UTILITIES 4) INSTALL PRECAST BOX SEGMENTS FOR TUNNEL 5) INSTALL TUNNEL CONCRETE CLOSURE POURS 6) INSTALL PRECAST BACKWALL FOR TRACK 4 AND 5 7) INSTALL CASING AND CARRIER PIPES FOR UTILITIES 8) MOVE SUPERSTRUCTURES OF WEST BRIDGES ONTO SUBSTRUCTURES 9) BACKFILL TUNNEL AND UTILITIES 10) COMPLETE PLATFORM CONSTRUCTION AT THE TUNNEL 11) COMPLETE CONSTRUCTION OF EAST AND WEST ELEVATORS 12) CONSTRUCT CANOPIES, LIGHTING, SECURITY, AND PIMS ON WEST PLATFORM 13) COMPLETE SUPERSTRUCTURE CONSTRUCTION 14) COMPLETE SITE DRAINAGE AND UTILITY CONSTRUCTION 15) INSTALL 6" OF BALLAST ON SUPERSTRUCTURES AND TO RAISED TRACK LIMITS INDICATED 16) CSX INSTALLS TRACKS 4 AND 5 TO FINAL ALIGNMENT AND PROFILE
PHASE 5	PHASE 3	

OPERATION / STATUS	TRACK (BEFORE STAGE)	STATION (BEFORE STAGE)
IN SERVICE	1) PROPOSED TRACK 3 2) PROPOSED TRACK 2	1) SOUTH END OF EAST PLATFORM 2) TEMPORARY PLATFORM 3) EAST BRIDGE
OUT OF SERVICE	1) PROPOSED TRACK 4 2) PROPOSED TRACK 5	1) NORTH ENDS OF WEST AND EAST PLATFORMS 2) WEST BRIDGE 3) NORTH STAIRS TO EAST PLATFORM 4) CENTER STAIRS TO EAST PLATFORM 5) PLATFORM TUNNEL
CONSTRUCTION ACTIVITIES	1) TEMPORARY OUTAGES OF TRACKS 3, 4, AND 5 TO MOVE EAST BRIDGE SUPERSTRUCTURE IN PLACE 2) TEMPORARY OUTAGE OF ROADWAY UNDERNEATH BRIDGES WHILE DISASSEMBLING EXISTING EAST BRIDGE	

OPERATION / STATUS	TRACK (BEFORE STAGE)	STATION (BEFORE STAGE)
IN SERVICE	1) PROPOSED TRACK 3 2) PROPOSED TRACK 2	1) SOUTH END OF EAST PLATFORM 2) TEMPORARY PLATFORM 3) EAST BRIDGE
OUT OF SERVICE	1) PROPOSED TRACK 4 2) PROPOSED TRACK 5	1) NORTH ENDS OF WEST AND EAST PLATFORMS 2) WEST BRIDGE 3) NORTH STAIRS TO EAST PLATFORM 4) CENTER STAIRS TO EAST PLATFORM 5) PLATFORM TUNNEL

LEGEND:

- ASPHALT UNDERLAY
- AT-GRADE CROSSING
- CONSTRUCTION LAYDOWN AREA
- DRAINAGE
- ELEVATOR
- GENERATOR ENCLOSURE
- TUNNEL & UTILITIES
- JUMP SPAN
- PLATFORM
- SUBSTRUCTURE
- SUPERSTRUCTURE
- TEMPORARY PLATFORM
- (1) CSX ACTIVITY
- [1] VRE ACTIVITY
- TRACK IN SERVICE
- TRACK OUT OF SERVICE

NOTE:

1) THIS IS A SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES AND IS NOT A DIVISION OF WORK.
2) DIAGRAM DOES NOT CONVEY FINAL CONDITIONS.
3) TRACK NUMBERING WILL CHANGE AT SOME TIME DURING CONSTRUCTION AS FOLLOW:

CURRENT NO.	PROPOSED NO.
0	2
1	3
2	4
3	5

0 30' 60' 120'
HORIZONTAL SCALE 1"=60'

ALEXANDRIA STATION AND BRIDGE IMPROVEMENTS

PHASE 2
STAGE 2

DATE: 05/22/2025

SCALE: 1" = 60'

SHEET NO: 06 OF 07

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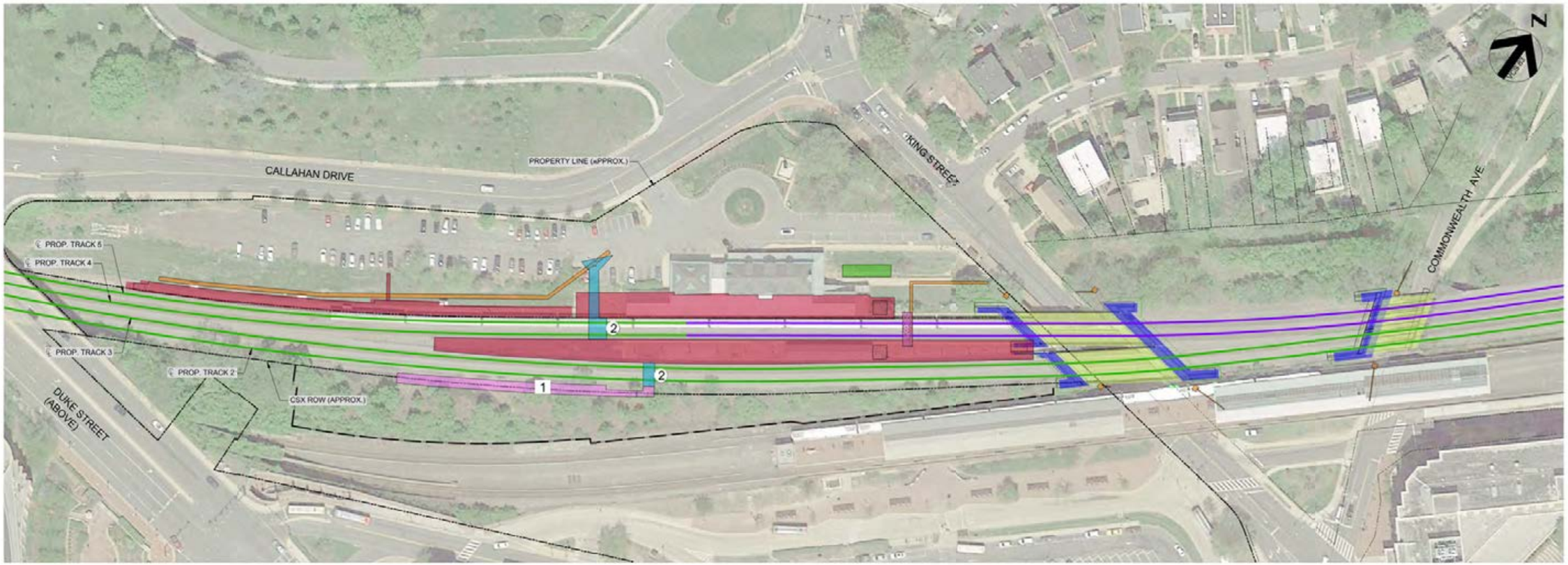

SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES

1"=60'-0"

SCHEDULING SEQUENCE		SEQUENCE ACTIVITIES
CSX	VRE	
PHASE 5	PHASE 3	1) REMOVE TEMPORARY EAST PLATFORM 2) CSX REMOVES ALL OF THE REMAINING AT-GRADE CROSSINGS WITHIN PROJECT LIMITS

OPERATION STATUS	TRACK (BEFORE STAGE)	STATION (BEFORE STAGE)
IN SERVICE	1) PROPOSED TRACK 3 2) PROPOSED TRACK 2	1) SOUTH ENDS OF EAST 2) TEMPORARY PLATFORM 3) EAST BRIDGE
OUT OF SERVICE	1) PROPOSED TRACK 4 2) PROPOSED TRACK 5	1) NORTH ENDS OF WEST AND EAST PLATFORM 2) WEST BRIDGE 3) NORTH STAIRS AT EAST PLATFORM 4) CENTER STAIRS AT EAST PLATFORM 5) PLATFORM TUNNEL
CONSTRUCTION ACTIVITIES		

OPERATION STATUS	TRACK (BEFORE STAGE)	STATION (BEFORE STAGE)
IN SERVICE	1) PROPOSED TRACK 2 2) PROPOSED TRACK 3 3) PROPOSED TRACK 4 4) PROPOSED TRACK 5	1) EAST PLATFORM 2) WEST PLATFORM 3) EAST BRIDGE 4) WEST BRIDGE 3) ALL STAIRS TO PLATFORMS 4) BOTH ELEVATORS 5) PLATFORM TUNNEL
OUT OF SERVICE		1) TEMPORARY PLATFORM

LEGEND:

- ASPHALT UNDERLAY
- AT-GRADE CROSSING
- CONSTRUCTION LAYDOWN AREA
- DRAINAGE
- ELEVATOR
- GENERATOR ENCLOSURE
- TUNNEL & UTILITIES
- JUMP SPAN
- PLATFORM
- SUBSTRUCTURE
- SUPERSTRUCTURE
- TEMPORARY PLATFORM
- (1) CSX ACTIVITY
- [1] VRE ACTIVITY
- TRACK IN SERVICE
- SHIFTED TRACK

NOTE:

1) THIS IS A SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES AND IS NOT A DIVISION OF WORK.
2) DIAGRAM DOES NOT CONVEY FINAL CONDITIONS.
3) TRACK NUMBERING WILL CHANGE AT SOME TIME DURING CONSTRUCTION AS FOLLOW:

CURRENT NO.	PROPOSED NO.
0	2
1	3
2	4
3	5

0 30' 60' 120'
HORIZONTAL SCALE 1"=60'

ALEXANDRIA STATION AND BRIDGE IMPROVEMENTS

PHASE 3

DATE: 05/22/2025

SCALE: 1" = 60'

SHEET NO: 07 OF 07

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Exhibit C

VRE Crystal City Station Suggested Phasing Diagrams

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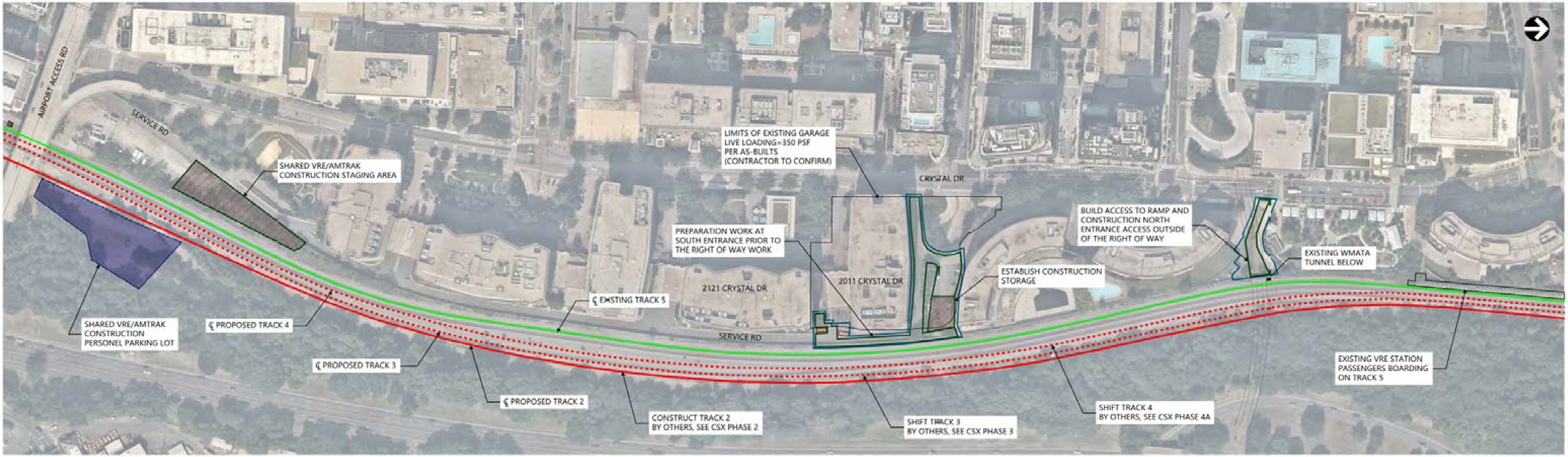

SUGGESTED CONSTRUCTION SEQUENCE PLAN - PHASE 1

SCALE: 1" = 120'-0"

SCHEDULING SEQUENCE CSX	SCHEDULING SEQUENCE VRE	SEQUENCE ACTIVITIES
PHASES 2-4A		1) ALEXANDRIA 4TH TRACK WORK BEGINS; TRACK 1 (FUTURE TRACK 2) INSTALLED, TRACKS 1 AND 2 (FUTURE TRACKS 3 AND 4) SHIFTED (BY CSX AND A4T PROJECT)
	PHASE 1	2) VRE CCV PROJECT MOBILIZATION BEGINS. 3) NORTH AND SOUTH ENTRANCE ROW CONSTRUCTION ACCESS CONSTRUCTED OUTSIDE OF THE RIGHT OF WAY

LEGEND

- TRACK UNDER CONSTRUCTION
- SHIFTED TRACK
- TRACK IN SERVICE
- LIMITS OF WORK (LOW)
- CONSTRUCTION ACCESS
- UNDERGROUND FUEL TANKS

NOTES

1. CONSTRUCTION SEQUENCING SHOWN IS NOT INTENDED TO DETAIL THE DIVISION OF WORK BETWEEN VRE AND CSXT.
2. SEE CSX DIAGRAMS FOR ACTUAL STAGING OF TRACKS 2, 3, & 4.

0 40 80 160 Feet

NOT FOR CONSTRUCTION

REV. NO.	DATE	BY	APP BY	DESCRIPTION

DESIGNED BY: D. KULAKOVA
DRAWN BY: D. KULAKOVA
CHECKED BY: A. MACPHERSON
DATE:

vhb

VRE

CRYSTAL CITY STATION IMPROVEMENTS

SUGGESTED CONSTRUCTION SEQUENCING (1 OF 5)

IFB NO.: XXX-XXX
DRAWING NO.: G-101
SCALE: 1" = 120'-0"
SHEET NO: 7 OF 214

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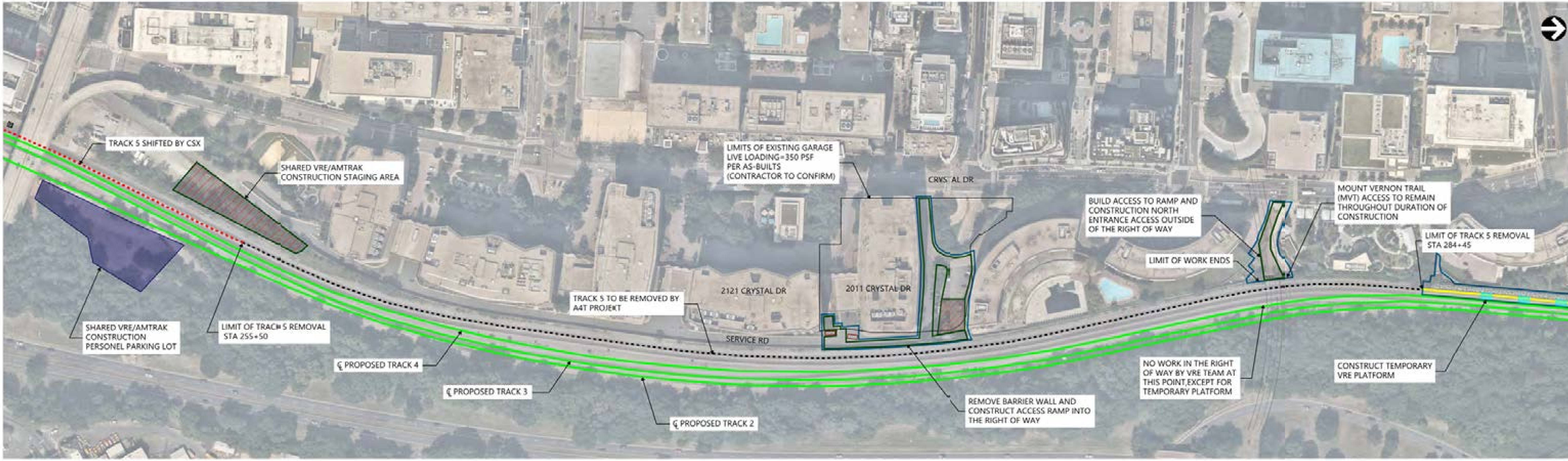


SUGGESTED CONSTRUCTION SEQUENCE PLAN - PHASE 2

SCALE: 1" = 120'-0"

SCHEDULING SEQUENCE		SEQUENCE ACTIVITIES
CSX	VRE	
PHASE 4B	PHASE 2	1) REMOVE/SHIFT TRACK 5 (BY CSX AND A4T PROJECT) 2) CONSTRUCT TEMPORARY PLATFORM 3) CONSTRUCTION OF THE TEMPORARY PLATFORM IS TO OCCUR STARTING AFTER THE LAST SCHEDULED VRE TRAIN LEAVES ON FRIDAY NIGHT AND PRIOR TO THE FIRST SCHEDULED TRAIN ON MONDAY MORNING 4) AFTER REMOVAL/SHIFTING OF TRACK 5 REMOVE BARRIER WALL FOR CONSTRUCTION ACCESS AND DEVELOP ACCESS AT SOUTHERN STAGING AREA.

NOTES

1. CONSTRUCTION SEQUENCING SHOWN IS NOT INTENDED TO DETAIL THE DIVISION OF WORK BETWEEN VRE AND CSXT.
2. SEE CSX DIAGRAMS FOR ACTUAL STAGING OF TRACKS 2, 3, & 4.

LEGEND

- TRACK IN SERVICE
- REMOVE TRACK
- SHIFT TRACK AS NEEDED
- TRACK OUT OF SERVICE
- LIMITS OF WORK (LOW)
- CONSTRUCTION ACCESS
- TEMPORARY PLATFORM (IN USE)
- UNDERGROUND FUEL TANKS

NOT FOR CONSTRUCTION

REV. NO.	DATE	BY	APP BY	DESCRIPTION

DESIGNED BY: D. KULAKOVA
DRAWN BY: D. KULAKOVA
CHECKED BY: A. MACPHERSON
DATE:

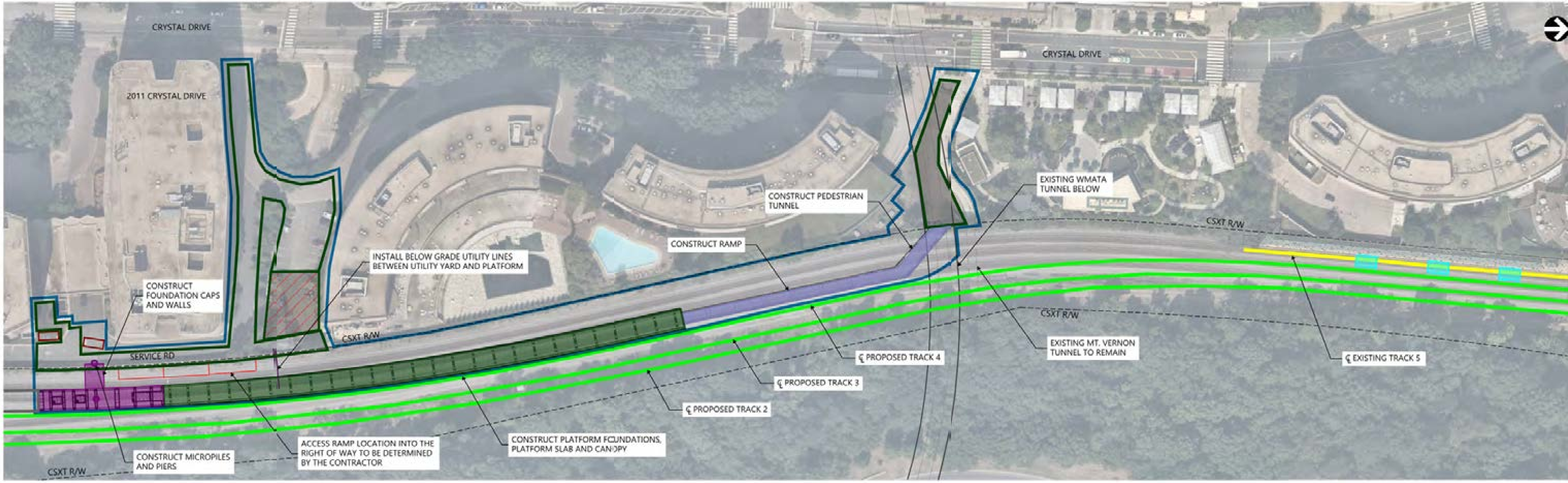
vhb

VRE

CRYSTAL CITY STATION IMPROVEMENTS

SUGGESTED CONSTRUCTION SEQUENCING (2 OF 5)

IFB NO.: XXX-XXX
DRAWING NO.: G-102
SCALE: 1" = 120'-0"
SHEET NO: 8 OF 214



SUGGESTED CONSTRUCTION SEQUENCE PLAN - PHASE 3

SCALE: 1" = 60'-0"

SCHEDULING SEQUENCE CSX	SCHEDULING SEQUENCE VRE	SEQUENCE ACTIVITIES
PHASE 4C-5	PHASE 3	1) SITE PREPARATION WORK AND LEVELING
PHASE 4C-5	PHASE 3	2) ESTABLISH CONSTRUCTION ACCESS INTO THE RIGHT OF WAY
PHASE 4C-5	PHASE 3	3A) INSTALL SHORING AND EXCAVATE TUNNEL AND RAMP
PHASE 4C-5	PHASE 3	3B) CONSTRUCT MEZZANINE AND BRIDGE FOUNDATIONS
PHASE 4C-5	PHASE 3	3C) INSTALL BELOW GRADE UTILITY CONDUITS BETWEEN UTILITY YARD AND PLATFORM
PHASE 4C-5	PHASE 3	4) CONSTRUCT RAMP AND TUNNEL
PHASE 4C-5	PHASE 3	5) CONSTRUCT MEZZANINE LEVEL AND PEDESTRIAN BRIDGE
A4T PROJECT COMPLETE	PHASE 3	6) CONSTRUCT PLATFORM AND CANOPIES
A4T PROJECT COMPLETE	PHASE 3	7) INSTALL MEP, COMMS AND FINISHES

LEGEND

- TRACK IN SERVICE
- TRACK OUT OF SERVICE
- LIMITS OF WORK (LOW)
- TEMPORARY PLATFORM (IN USE)
- PLATFORM CONSTRUCTION
- RAMP/TUNNEL CONSTRUCTION
- MEZZANINE/BRIDGE CONSTRUCTION
- CONSTRUCTION ACCESS
- CONSTRUCTION STORAGE
- UNDERGROUND FUEL TANKS

NOTES

1. CONSTRUCTION SEQUENCING SHOWN IS NOT INTENDED TO DETAIL THE DIVISION OF WORK BETWEEN VRE AND CSXT.
2. ALL ACTIVITY IN THE RIGHT OF WAY SHALL BE COORDINATED WITH THE POTENTIAL AMTRAK STATION.

0 40 80 160 Feet

NOT FOR CONSTRUCTION

REV. NO.	DATE	BY	APP BY	DESCRIPTION

DESIGNED BY: D. KULAKOVA
DRAWN BY: D. KULAKOVA
CHECKED BY: A. MACPHERSON
DATE:

vhb

VRE

CRYSTAL CITY STATION IMPROVEMENTS

SUGGESTED CONSTRUCTION SEQUENCING (3 OF 5)

IFB NO.: XXX-XXX
DRAWING NO.: G-103
SCALE: 1" = 60'-0"
SHEET NO: 9 OF 214

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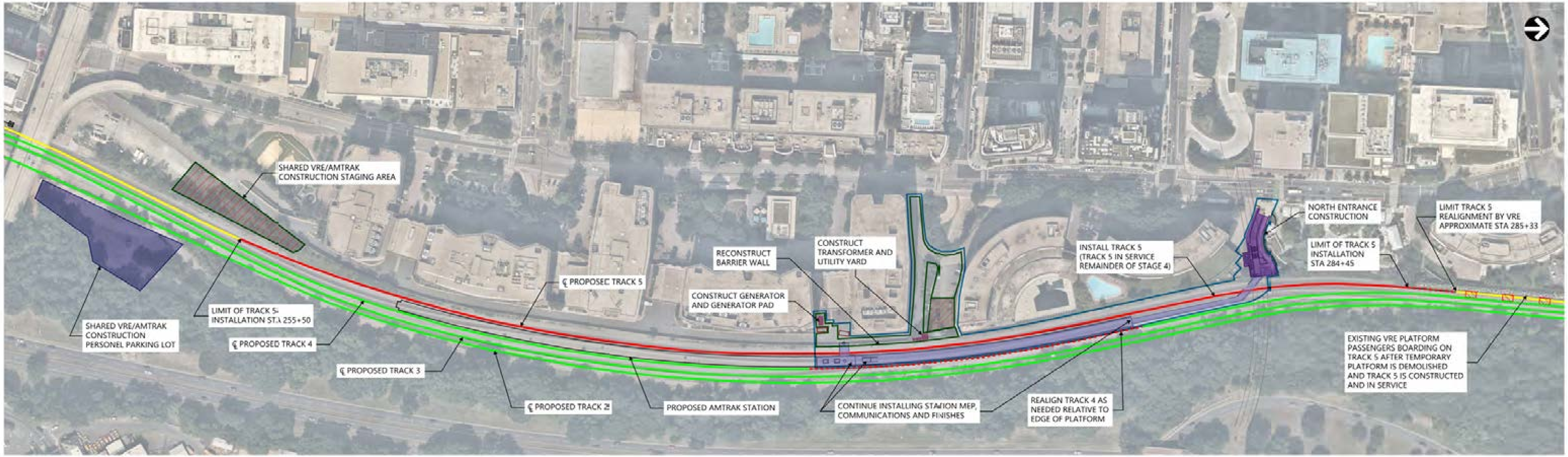

SUGGESTED CONSTRUCTION SEQUENCE PLAN - PHASE 4

SCALE: 1" = 120'-0"

SCHEDULING SEQUENCE		SEQUENCE ACTIVITIES
CSX	VRE	
A4T PROJECT COMPLETE	PHASE 4	1A) DEMOLISH TEMPORARY PLATFORM 1B) INSTALL, GRADE AND COMPACT SUB-BALLAST AND 8" BALLAST MAT FOR THE TIES 1C) INSTALL TRACK 5 UTILIZING CSX FORCES (COORDINATED AND FUNDED BY VRE CCV PROJECT) 1D) REALIGN TRACK 4 AS NEEDED RELATIVE TO EDGE OF PLATFORM. 1E) ACTIVITIES 1A -1D SHALL BE COORDINATED TO MAINTAIN VRE OPERATIONS WHETHER VIA TEMPORARY PLATFORM OR EXISTING PLATFORM. PLATFORM REMOVAL TO OCCUR EITHER OVERNIGHT OF OVER WEEKEND 2) CONTINUE INSTALLING MEP, COMMS AND FINISHES (WORK BEING DONE BETWEEN ACTIVE TRACKS) 3) RECONSTRUCT BARRIER WALL 4) CONSTRUCT TRANSFORMER PAD AND TRANSFORMER 5) CONSTRUCT GENERATOR PAD AND GENERATOR 6) INSTALL NORTH ENTRANCE

LEGEND

- TRACK OUT OF SERVICE
- TRACK UNDER CONSTRUCTION
- REALIGN TRACK AS NEEDED
- TRACK IN SERVICE
- TEMPORARY PLATFORM DEMOLITION
- CONSTRUCT STAIRS AND ELEVATOR
- CONSTRUCT GENERATOR AND TRANSFORMER
- NORTH ENTRANCE CONSTRUCTION
- LIMITS OF WORK (LOW)
- CONSTRUCTION ACCESS
- CONSTRUCTION STORAGE
- UNDERGROUND FUEL TANKS

0 40 80 160 Feet

NOT FOR CONSTRUCTION

NOTES

1. CONSTRUCTION SEQUENCING SHOWN IS NOT INTENDED TO DETAIL THE DIVISION OF WORK BETWEEN VRE AND CSXT.
2. ALL ACTIVITY IN THE RIGHT OF WAY SHALL BE COORDINATED WITH THE POTENTIAL AMTRAK STATION.

REV. NO.	DATE	BY	APP BY	DESCRIPTION

DESIGNED BY: D. KULAKOVA
DRAWN BY: D. KULAKOVA
CHECKED BY: A. MACPHERSON
DATE:

vhb

VRE

CRYSTAL CITY STATION IMPROVEMENTS

SUGGESTED CONSTRUCTION SEQUENCING (4 OF 5)

IFB NO.: XXX-XXX
DRAWING NO.: G-104
SCALE: 1" = 120'-0"
SHEET NO: 10 OF 214

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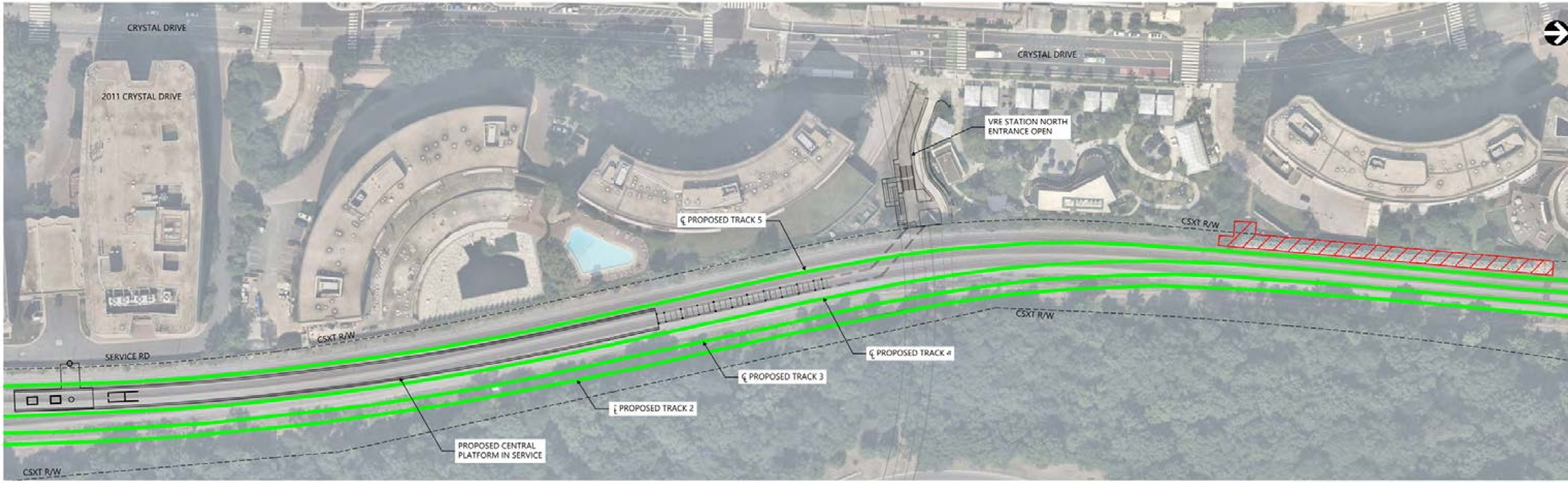

SUGGESTED CONSTRUCTION SEQUENCE PLAN - PHASE 5

SCALE: 1" = 60'-0"

SCHEDULING SEQUENCE CSX	SCHEDULING SEQUENCE VRE	SEQUENCE ACTIVITIES
A4T PROJECT COMPLETE	PHASE 5	1) PLATFORM IN SERVICE ON TRACKS 4 & 5 2) PERFORM PLATFORM FINISH WORK (CLOSE OUT ITEMS): WORK BEING DONE BETWEEN TWO ACTIVE TRACKS 3) DEMOLISH EXISTING PLATFORM 4) DEMOBILIZE THE SITE

LEGEND

- TRACK IN SERVICE
- EXISTING PLATFORM DEMOLITION

NOTES

1. CONSTRUCTION SEQUENCING SHOWN IS NOT INTENDED TO DETAIL THE DIVISION OF WORK BETWEEN VRE AND CSXT

0 40 80 160 Feet

NOT FOR CONSTRUCTION

REV. NO.	DATE	BY	APP BY	DESCRIPTION

DESIGNED BY: D. KULAKOVA
DRAWN BY: D. KULAKOVA
CHECKED BY: A. MACPHERSON
DATE:

vhb | VRE

CRYSTAL CITY STATION IMPROVEMENTS

SUGGESTED CONSTRUCTION SEQUENCING (5 OF 5)

IFB NO.: XXX-XXX
DRAWING NO.: G-105
SCALE: 1" = 60'-0"
SHEET NO: 11 OF 214

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Exhibit D

CSX Standard Specification Section 010010 Part 1.1.B

B. Flagging will be provided by RAILROAD at no expense to CONTRACTOR on track time arranged by ENGINEER. Rail traffic scheduling takes precedence over any and all work. Work may be interrupted at any time for rail traffic. No Additional payment will be made to CONTRACTOR for wait time due to rail traffic.

SECTION 03 09 00

CONCRETE

~~PART 1 – GENERAL~~

~~1.1 SUMMARY~~

~~A. Section Includes:~~

~~1. Cast-in-place concrete and grout.~~

~~B. Related Specification Sections include but are not necessarily limited to:~~

~~1. Division 00 - Procurement and Contracting Requirements.~~

~~2. Division 01 - General Requirements.~~

~~3. Section 03 35 00 - Concrete Finishing and Repair of Surface Defects.~~

~~4. Section 03 15 19 - Anchorage to Concrete.~~

~~5. Section 03 41 33 - Precast and Prestressed Concrete.~~

~~1.2 QUALITY ASSURANCE~~

~~A. Referenced Standards:~~

~~1. American Concrete Institute (ACI):~~

~~a. 117, Specification for Tolerances for Concrete Construction and Materials.~~

~~b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.~~

~~c. 212.3R, Chemical Admixtures for Concrete.~~

~~d. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.~~

~~e. 304.2R, Placing Concrete by Pumping Methods.~~

~~f. 305.1, Hot Weather Concreting.~~

~~g. 306.1, Cold Weather Concreting.~~

~~h. 318, Building Code Requirements for Structural Concrete.~~

~~i. 347, Guide to Formwork for Concrete.~~

~~j. CT-13, Concrete Terminology.~~

~~2. ASTM International (ASTM):~~

~~a. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.~~

~~b. A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.~~

~~c. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.~~

~~d. A1064, Standard Specification for Steel Wire and Welded Wire Replacement, Plain and Deformed, for Concrete.~~

~~e. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.~~

f. ~~C33, Standard Specification for Concrete Aggregates.~~

g. ~~C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.~~

h. ~~C94/C94M, Standard Specification for Ready-Mixed Concrete.~~

i. ~~C138, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.~~

j. ~~C143, Standard Test Method for Slump of Hydraulic Cement Concrete.~~

k. ~~C150, Standard Specification for Portland Cement.~~

l. ~~C172, Standard Practice for Sampling Freshly Mixed Concrete.~~

m. ~~C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.~~

n. ~~C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.~~

o. ~~C260, Standard Specification for Air-Entraining Admixtures for Concrete.~~

p. ~~C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.~~

q. ~~C494, Standard Specification for Chemical Admixtures for Concrete.~~

r. ~~C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.~~

s. ~~C1293, Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.~~

t. ~~C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.~~

u. ~~D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.~~

v. ~~D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).~~

w. ~~D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.~~

x. ~~D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.~~

y. ~~D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).~~

z. ~~E96, Standard Test Methods for Water Vapor Transmission of Materials.~~

aa. ~~E329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.~~

3. ~~Corps of Engineers (COE):~~

a. ~~CRD-C621, Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Non-shrink).~~

4. National Ready Mixed Concrete Association (NRMCA).
5. National Sanitation Foundation (NSF):
   a. 61, Drinking Water System Components - Health Effects.
6. American Association of State Highway and Transportation Officials (AASHTO).
7. American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering.

B. Quality Control:
1. Concrete testing agency:
   a. Contractor to employ and pay for services of a testing laboratory to:
      1) Perform materials evaluation.
      2) Design concrete mixes.
   b. Concrete testing agency to meet requirements of ASTM E329.
2. Do not begin concrete production until proposed concrete mix design has been approved by Engineer.
   a. Approval of concrete mix design by Engineer does not relieve Contractor of his responsibility to provide concrete that meets the requirements of this Specification.
3. Adjust concrete mix designs when material characteristics, job conditions, weather, strength test results or other circumstances warrant.
   a. Do not use revised concrete mixes until submitted to and approved by Engineer.
4. Perform structural calculations as required to prove that all portions of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its own weight plus the loads placed thereon.

C. Qualifications:
1. Ready mixed concrete batch plant certified by NRMCA.
2. Formwork, shoring and reshoring for slabs and beams except where cast on ground to be designed by a professional engineer currently registered in the state where the Project is located.

1.3 DEFINITIONS

A. Per ACI CT-13 except as modified herein:
1. Concrete fill: Non-structural concrete.
2. Concrete Testing Agency: Testing agency employed to perform materials evaluation, design of concrete mixes or testing of concrete placed during construction.
3. Exposed concrete: Exposed to view after construction is complete.
4. Indicated: Indicated by Contract Documents.
5. Nonexposed concrete: Not exposed to view after construction is complete.

6. Required: Required by Contract Documents.

7. Specified strength: Specified compressive strength at 28 days.

8. Submitted: Submitted to Engineer.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

2. Concrete mix designs proposed for use.

a. Concrete mix design submittal to include the following information:

1) Sieve analysis and source of fine and coarse aggregates.

2) Test for aggregate organic impurities.

3) Resistance to abrasion.

4) Soundness.

5) Clay lumps in aggregates.

6) Specific gravity and absorption of coarse aggregate.

7) Potential alkali reactivity.

8) Test for deleterious aggregate per ASTM C1293.

9) Proportioning of all materials.

10) Type of cement with mill certificate for cement.

11) Type of fly ash with certificate of conformance to specification requirements.

12) Slump.

13) Air content.

14) Brand, type, ASTM designation, and quantity of each admixture proposed for use.

15) 28-day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.

3. Product technical data including:

a. Acknowledgement that products submitted meet requirements of standards referenced.

b. Manufacturer's installation instructions.

c. Manufacturers and types:

1) Joint fillers.

2) Curing agents.

3) Chemical sealer.

4) Bonding and patching mortar.

~~5) Construction joint bonding adhesive.~~

~~6) Non-shrink grout with cure/seal compound.~~

~~4. Reinforcing steel:~~

~~a. Show grade, sizes, number, configuration, spacing, location and all fabrication and placement details.~~

~~b. In sufficient detail to permit installation of reinforcing without having to make reference to Contract Drawings.~~

~~c. Obtain approval of Shop Drawings by Engineer before fabrication.~~

~~d. Mill certificates.~~

~~5. Scaled (minimum 1/8 IN per foot) drawings showing proposed locations of construction joints, control joints, expansion joints (as applicable) and joint dimensions.~~

~~6. Strength test results of in place concrete including slump, air content and concrete temperature.~~

~~7. Certifications:~~

~~a. Certification of standard deviation value in psi for ready mix plant supplying the concrete.~~

~~b. Certification that the material and sources submitted in the mix design will be used in the concrete for this project.~~

~~8. Test reports:~~

~~a. Cement mill reports for all cement to be supplied.~~

~~1.5 DELIVERY, STORAGE, AND HANDLING~~

~~A. Storage of Material:~~

~~1. Cement and pozzolan:~~

~~a. Store in moisture-proof, weathertight enclosures.~~

~~b. Do not use if caked or lumpy.~~

~~2. Aggregate:~~

~~a. Store to prevent segregation and contamination with other sizes or foreign materials.~~

~~b. Obtain samples for testing from aggregates at point of batching.~~

~~c. Do not use frozen or partially frozen aggregates.~~

~~d. Do not use bottom 6 IN of stockpiles in contact with ground.~~

~~e. Allow sand to drain until moisture content is uniform prior to use.~~

~~3. Admixtures:~~

~~a. Protect from contamination, evaporation, freezing, or damage.~~

~~b. Maintain within temperature range recommended by manufacturer.~~

~~c. Completely mix solutions and suspensions prior to use.~~

~~4. Reinforcing steel:~~

a. Support and store all rebars above ground, avoiding any contact with the ground.

b. If reinforcement is to remain on the site for more than one month, it shall be covered to protect it from the weather.

c. If reinforcement accumulates heavy rust, dirt, mud, loose scale, paint, oil, or any other foreign substance during storage, it shall be cleaned before being used.

d. Severe deterioration may be a basis for rejection.

B. Delivery:

1. Concrete:

a. Prepare a delivery ticket for each load for ready-mixed concrete.

b. Truck operator shall hand ticket to Owner's Representative at the time of delivery.

c. Ticket to show:

1) Mix identification mark.

2) Quantity delivered.

3) Amount of each material in batch.

4) Outdoor temp in the shade.

5) Time at which cement was added.

6) Numerical sequence of the delivery.

7) Amount of water added.

2. Reinforcing steel:

a. Ship to jobsite with attached plastic or metal tags with permanent mark numbers.

b. Mark numbers to match Shop Drawing mark number.

3. Handling of Epoxy-Coated Rebar:

a. Use padded or nonmetallic slings and padded straps to protect coated reinforcement from damage.

b. Handle bundled bars to prevent sagging that could damage the coating.

c. Do not drop or drag rebars.

d. Store on wooden cribbing.

e. Coated rebars subject to rejection by Engineer if rebar coating has been damaged.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:

1. Non-shrink, nonmetallic grout:

a. Sika "SikaGrout 212."

b. Euclid Chemial "NS Grout."

c. BASF Admixtures, Inc. "Masterflow 713."

2. Expansion joint fillers:

a. Permaglaze Co.

b. Rubatex Corp.

c. Williams Products, Inc.

3. Form coating:

a. Richmond "Rich Cote."

b. Industrial Lubricants "Nox-Crete Form Coating."

c. Euclid Chemical "Kurez DR VOX."

4. Cementitious concrete coating:

a. Aquafin International.

b. BASF Building Systems.

c. Euclid Chemical Company.

5. Chemical sealer:

a. L&M Construction Chemicals, Inc.

b. Euclid Chemical Company.

c. Dayton Superior.

6. Bonding agent:

a. Euclid Chemical Co.

b. BASF Admixtures, Inc.

c. L&M Construction Chemicals Inc.

B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MATERIALS

A. Portland Cement: Conform to ASTM C150Type IA, Type I/II.

B. Portland Cement: Conform to ASTM C595 -

C. Fly Ash:

1. The use of fly ash as a substitute for Portland cement is prohibited in all concrete for use in railway bridges.

2. ASTM C618, Class F or Class C.

3. Non-staining.

a. Hardened concrete containing fly ash to be uniform light gray color.

4. Maximum loss on ignition: 6 PCT.

5. Compatible with other concrete ingredients.

6. Obtain proposed fly ash from a source approved by the State Highway Department in the state where the Project is located for use in concrete for bridges.

~~D. Admixtures:~~

~~1. Air entraining admixtures: ASTM C260.~~

~~2. Water reducing, retarding, and accelerating admixtures:~~

~~a. ASTM C494 Type A through E.~~

~~b. Conform to provisions of ACI 212.3R.~~

~~c. Do not use retarding or accelerating admixtures unless specifically approved in writing by Engineer and at no cost to Owner.~~

~~d. Follow manufacturer's instructions.~~

~~e. Use chloride free admixtures only.~~

~~3. Maximum total water soluble chloride ion content contributed from all ingredients of concrete including water, aggregates, cementitious materials and admixtures by weight percent of cement:~~

~~a. 0.10 all concrete.~~

~~4. Do not use calcium chloride.~~

~~5. Pozzolanic admixtures: ASTM C618.~~

~~6. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.~~

~~E. Water: Potable, clean, free of oils, acids, and organic matter.~~

~~F. Aggregates:~~

~~1. Normal weight concrete: ASTM C33, except as modified below.~~

~~2. Fine aggregate:~~

~~a. Clean natural sand.~~

~~b. No manufactured or artificial sand.~~

~~3. Coarse aggregate:~~

~~a. Crushed rock, natural gravel, or other inert granular material.~~

~~b. Maximum amount of clay or shale particles: 1 PCT.~~

~~4. Gradation of coarse aggregate:~~

~~a. Lean concrete and concrete topping: Size #7.~~

~~b. All other concrete: Size #57 or #67.~~

~~G. Concrete Grout:~~

~~1. Non-shrink, nonmetallic grout:~~

~~a. Nonmetallic, noncorrosive, non-staining, premixed with only water to be added.~~

~~b. Grout to produce a positive but controlled expansion.~~

~~c. Mass expansion not to be created by gas liberation.~~

~~d. Minimum compressive strength of non-shrink grout at 28 days: 6500 PSI.~~

~~c. In accordance with COE CRD-C621.~~

~~H. Reinforcing Steel:~~

~~1. Reinforcing bars: ASTM A615, Grade 60.~~

~~a. Provide with epoxy coating per ASTM A775.~~

~~b. Galvanized reinforcing steel bars shall conform to the requirements of ASTM A1094.~~

~~2. Welded wire reinforcement:~~

~~a. ASTM A185 or ASTM A1064.~~

~~b. Minimum yield strength: 60,000 PSI.~~

~~3. Tie wire and bar supports:~~

~~a. ASTM A510.~~

~~b. Tied connections shall be made in accordance with CRSI Manual of Standard Practice and the CRSI publication "Reinforcing Bar Placing"~~

~~c. Supports for reinforcing steel bars and welded wire fabric shall conform to the requirements of ANSI/CRSI RB4.1, Supports for Reinforcement Used in Concrete.~~

~~4. Column spirals: ASTM A82 or ASTM A1064.~~

~~I. Forms:~~

~~1. Prefabricated or job built.~~

~~2. Wood forms:~~

~~a. 5/8 or 3/4 IN 5-ply structural plywood of concrete form grade.~~

~~b. Built-in-place or prefabricated type panel.~~

~~3. Metal forms:~~

~~a. Metal forms may be used except for aluminum in contact with concrete.~~

~~b. Forms to be tight to prevent leakage, free of rust and straight without dents to provide members of uniform thickness.~~

~~4. Chamfer strips: Clear white pine, surface against concrete planed.~~

~~J. Form Ties:~~

~~1. Commercially fabricated for use in form construction.~~

~~a. Field fabricated ties are unacceptable.~~

~~2. Constructed so that ends or end fasteners can be removed without causing spalling at surfaces of the concrete.~~

~~3. 3/4 IN minimum to 1 IN maximum diameter cones on both ends.~~

~~4. Embedded portion of ties to be not less than 1-1/2 IN from face of concrete after ends have been removed.~~

~~5. Cone size:~~

~~a. 3/4 IN minimum diameter cones on both ends.~~

~~b. Depth of cone not to exceed the concrete reinforcing cover.~~

~~6. Form release: Non-staining and shall not prevent bonding of future finishes to concrete surface.~~

~~K. Chairs, Runners, Bolsters, Spacers, and Hangers:~~

~~1. Stainless steel, epoxy coated, or plastic-coated metal.~~

~~a. Plastic coated: Rebar support tips in contact with the forms only.~~

~~L. Cementitious Concrete Coating:~~

~~1. Polymer modified Portland cement-based coating for concrete and masonry.~~

~~a. Waterproof.~~

~~b. Resistant to both positive and negative hydrostatic pressure.~~

~~c. Breathable.~~

~~2. BASF "Masterseal 581 Thoroseal".~~

~~a. Color:~~

~~1) Interior surfaces: Standard gray.~~

~~2) Exterior surfaces: Custom color to match concrete surface.~~

~~3) Texture: Fine.~~

~~M. Membrane Curing Compound:~~

~~1. ASTM C309, Type 1D, Class A or B.~~

~~2. Fugitive dye shall dissipate over time and exposure.~~

~~3. Curing compound shall not prevent bonding of any future coverings, coatings or finishes.~~

~~N. Bonding Agent:~~

~~1. High solids acrylic latex base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.~~

~~2. Euclid Chemical Co. "Flex-Con."~~

~~3. BASF Admixtures, Inc. "Acryl-Set."~~

~~4. L&M Construction Chemicals "Everbond."~~

~~O. Expansion Joint Filler:~~

~~1. In contact with water or sewage:~~

~~a. Closed cell neoprene.~~

~~b. ASTM D1056, Class SC (oil resistant and medium swell) of 2 to 5 PSI compression deflection (Grade SCE41).~~

~~2. Exterior driveways, curbs, and sidewalks:~~

~~a. Asphalt expansion joint filler.~~

~~b. ASTM D994.~~

~~3. Other use:~~

a. Fiber expansion joint filler.

b. ASTM D1751.

2.3 CONCRETE MIXES

A. General:

1. All concrete to be ready mixed concrete conforming to ASTM C94/C94M.
2. Provide concrete of specified quality capable of being placed without segregation and, when cured, of developing all properties required.
3. All concrete to be normal weight concrete.
4. Provide pozzolan content for all cast-in-place construction.

B. Strength:

1. Provide specified strength and type of concrete for each use in structure(s) as follows:

TYPE	WEIGHT	SPECIFIED STRENGTH*
All other general use concrete	Normal weight	4000 PSI

* Minimum 28-day compressive strength.

C. Air Entrainment:

1. Provide air entrainment in all concrete resulting in a total air content percent by volume as follows:

MAX AGGREGATE SIZE	TOTAL AIR CONTENT PERCENT
1 IN or 3/4 IN	6 ±1-1/2
<3/4 IN	6-1/2 ±1-1/2

2. Air content to be measured in accordance with ASTM C231, ASTM C173, or ASTM C138.

D. Slump - 4 IN maximum, 1 IN minimum:

1. Measured at point of discharge of the concrete into the concrete construction member.
2. 8 IN maximum after addition of superplasticizer (if used).
3. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
4. Pumped concrete:
   a. Provide additional water at batch plant to allow for slump loss due to pumping.
   b. Provide only enough additional water so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified and the maximum specified water-cement ratio is not exceeded.
5. Slump may be adjusted in the field through the use of water reducers.
   a. Coordinate dosage and mixing requirements with concrete supplier.

6. Determine slump per ASTM C143.

E. Selection of Proportions:

1. General:

a. Proportion ingredients to:

1) Produce proper workability, durability, strength, and other required properties.

2) Prevent segregation and collection of excessive free water on surface.

2. Minimum cement contents and maximum water cement ratios for concrete to be as follows:

SPECIFIED STRENGTH	MINIMUM CEMENT, MAXIMUM AGGREGATE SIZE			MAXIMUM WATER CEMENT RATIO BY WEIGHT
	1/2 IN	3/4 IN	1 IN	
4000	564	564	564	0.45
4500	611	611	–	0.42

3. Fly ash:

a. For cast-in-pace concrete only, a maximum of 25 PCT by weight of Portland cement content per cubic yard may be replaced with fly ash at rate of 1 LB fly ash for 1 LB of cement.

b. The use of fly ash as a substitute for Portland cement is prohibited in all concrete for use in railway bridges.

c. When fly ash is used, the water to cementitious materials ratio shall not exceed the maximum value specified herein.

4. Concrete mix proportioning methods for normal weight concrete:

a. Proportion mixture to provide desired characteristics using one of methods described below:

1) Method 1 (Trial Mix):

a) Per ACI 318, Chapter 5, except as modified herein.

b) Air content within range specified above.

c) Record and report temperature of trial mixes.

d) Proportion trial mixes per ACI 211.1.

2) Method 2 (Field Experience):

a) Per ACI 318, Chapter 5, except as modified herein:

b) Field test records must be acceptable to Engineer to use this method.

c) Test records shall represent materials, proportions, and conditions similar to those specified.

5. Required average strength to exceed the specified 28-day compressive strength by the amount determined or calculated in accordance with the requirements of Chapter 5 of ACI 318 using the standard deviation of the proposed concrete production facility.

PART 3 – EXECUTION

3.1 FORMING AND PLACING CONCRETE

A. Formwork:

1. Contractor is responsible for design and erection of formwork.
2. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
   a. Allowable tolerances: As recommended in ACI 347.
3. Provide slabs and beams of minimum indicated depth when sloping foundation base slabs or elevated floor slabs to drains.
   a. For slabs on grade, slope top of subgrade to provide floor slabs of minimum uniform indicated depth.
   b. Do not place floor drains through beams.
4. Openings:
   a. Provide openings in formwork to accommodate work of other trades.
   b. Accurately place and securely support items built into forms.
5. Chamfer strips: Place 3/4 IN chamfer strips in forms to produce 3/4 IN wide beveled edges on permanently exposed corners of members.
6. Clean and adjust forms prior to concrete placement.
7. Tighten forms to prevent mortar leakage.
8. Coat form surfaces with form release agents prior to placing reinforcing bars in forms.

B. Reinforcement:

1. Position, support, and secure reinforcement against displacement.
2. Locate and support with chairs, runners, bolsters, spacers, and hangers, as required.
3. Set wire ties so ends do not touch forms and are directed into concrete, not toward exposed concrete surfaces.
4. Lap splice lengths: ACI 318 Class B top bar tension splices unless indicated otherwise on the Drawings.
5. Extend reinforcement to within 2 IN of concrete perimeter edges.
   a. If perimeter edge is earth formed, extend reinforcement to within 3 IN of the edge.
6. Minimum concrete protective covering for reinforcement: As shown on Drawings.
7. Do not weld reinforcing bars.
8. Welded wire reinforcement:
   a. Install welded wire reinforcement in maximum practical sizes.

b. Splice sides and ends with a splice lap length measured between outermost cross wires of each fabric sheet not less than:

1) One spacing of cross wires plus 2 IN.

2) 1.5 x development length.

3) 6 IN.

c. Development length: ACI 318 basic development length for the specified fabric yield strength.

C. Construction, Expansion, and Contraction Joints:

1. Locate joints as indicated on Contract Drawings or as shown on approved Shop Drawings.

a. Where construction joint spacing shown on Drawings exceeds the joint spacing indicated in Paragraph below, submit proposed construction joint location in conformance with this Specification Section.

2. Unplanned construction joints will not be allowed.

3. Locate wall vertical construction joints at 30 FT maximum.

4. Locate construction joints in floor slabs and foundation base slabs so that concrete placements are approximately square and do not exceed 2500 SQFT.

5. Locate construction joints in columns and walls:

a. At the underside of beams, girders, haunches, drop panels, column capitals, and at floor panels.

b. Haunches, drop panels, and column capitals are considered part of the supported floor or roof and shall be placed monolithically therewith.

c. Column based need not be placed monolithically with the floor below.

6. Install construction joints perpendicular to main reinforcement with all reinforcement continued across construction joints.

7. At least 72 HRS shall elapse between placing of adjoining concrete construction.

8. Thoroughly clean and remove all laitance and loose and foreign particles from construction joints.

9. Before new concrete is placed, dampen concrete surfaces.

D. Embedments:

1. Set and build in anchorage devices and other embedded items required for other work that is attached to, or supported by concrete.

2. See Specification Section 03 15 19 - Anchorage to Concrete.

3. Use setting diagrams, templates, and instructions for locating and setting.

E. Placing Concrete:

1. Place concrete in compliance with ACI 304R and ACI 304.2R.

2. Place in a continuous operation within planned joints or sections.

3. Begin placement when work of other trades affecting concrete is completed.
4. Place concrete by methods which prevent aggregate segregation.
5. Do not allow concrete to free fall more than 4 FT.
6. Where free fall of concrete will exceed 4 FT, place concrete by means of tremie pipe or chute.

F. Consolidation: Consolidate all concrete using mechanical vibrators supplemented with hand rodding and tamping, so that concrete is worked around reinforcement and embedded items into all parts of forms.

G. Protection:

1. Protect concrete from physical damage or reduced strength due to weather extremes.
2. In cold weather comply with ACI 306.1 except as modified herein.
   a. Do not place concrete on frozen ground or in contact with forms or reinforcing bars coated with frost, ice, or snow.
   b. Do not place heated concrete that is warmer than 80 DEGF.
   c. If freezing temperatures are expected during curing, maintain the concrete temperature at or above 50 DEGF for seven days or 70 DEGF for 3 days.
   d. Do not allow concrete to cool suddenly.
3. In hot weather comply with ACI 305.1 except as modified herein.
   a. At air temperature of 90 DEGF and above, keep concrete as cool as possible during placement and curing.
   b. Do not allow concrete temperature to exceed 90 DEGF at placement.
   c. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.
   d. Do not place concrete when the actual or anticipated evaporation rate equals or exceeds 0.2 LBS/SF/HR as determined from ACI 305.1, Figure 2.1.5.

H. Curing:

1. Begin curing concrete as soon as free water has disappeared from exposed surfaces.
2. Cure concrete by use of moisture retaining cover, burlap kept continuously wet or by membrane curing compound.
3. Provide protection as required to prevent damage to concrete and to prevent moisture loss from concrete during curing period.
4. Provide curing for minimum of 14 days.
5. Form materials left in place may be considered as curing materials for surfaces in contact with the form materials except in periods of hot weather.
6. In hot weather follow curing procedures outlined in ACI 305.1.
7. In cold weather follow curing procedures outlined in ACI 306.1.
8. Curing vertical surfaces with a curing compound:

a. Cover vertical surfaces with a minimum of two coats of the curing compound.

b. Allow the preceding coat to completely dry prior to applying the next coat.

c. Apply the first coat of curing compound immediately after form removal.

d. Vertical surface at the time of receiving the first coat shall be damp with no free water on the surface.

e. A vertical surface is defined as any surface steeper than 1 vertical to 4 horizontal.

I. Form Removal:

1. Remove forms after concrete has hardened sufficiently to resist damage from removal operations or lack of support.

2. Where no reshoring is planned, leave forms and shoring used to support concrete until it has reached its specified 28-day compressive strength.

3.2 CONCRETE FINISHES

A. Tolerances:

1. Class A: 1/8 IN in 10 FT.

2. Class B: 1/4 IN in 10 FT.

B. Surfaces Exposed to View:

1. Provide a smooth finish for exposed concrete surfaces and surfaces that are:

a. To be covered with a coating or covering material applied directly to concrete.

b. Scheduled for grout cleaned finish.

2. Remove fins and projections, and patch voids, air pockets, and honeycomb areas with cement grout.

3. Cementitious concrete coating:

a. Form facing material shall produce a smooth, hard, uniform texture.

1) Use forms specified for surfaces exposed to view.

b. Prepare the surface in accordance with manufactures printed installation instructions.

c. Brush on coating to entire surface.

1) As a mixing liquid for the coating, use bonding agent and water mixture as recommended by the manufacture.

2) Apply two (2) coats at 2 LB/SQYD per coat.

d. When second coat is set, float to a uniform texture with a sponge coat.

e. Provide this finish at the following locations:

1) Walls, columns, exposed to view.

C. Surfaces Not Exposed to View:

1. Patch voids, air pockets and honeycomb areas with cement grout.

2. Fill tie holes with non-shrink, nonmetallic grout.

D. Slab Float Finish:

1. After concrete has been placed, consolidated, struck off, and leveled, do no further work until ready for floating.
2. Do not use water to aid in finishing.
3. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit operation.
4. During or after first floating, check planeness of entire surface with a 10 FT straightedge applied at not less than two different angles.
5. Cut down all high spots and fill all low spots during this procedure to produce a surface within Class B tolerance throughout.
6. Refloat slab immediately to a uniform sandy texture.

E. Troweled Finish:

1. Float finish surface.
2. Next power trowel, and finally hand trowel.
3. Do not use water to aid in finishing.
4. Produce a smooth surface which is relatively free of defects with firsthand troweling.
5. Perform additional trowelings by hand after surface has hardened sufficiently.
6. Final trowel when a ringing sound is produced as trowel is moved over surface.
7. Thoroughly consolidate surface by hand troweling.
8. Leave finished surface essentially free of trowel marks, uniform in texture and appearance and plane to a Class A tolerance.
9. On surfaces intended to support floor coverings remove any defects of sufficient magnitude that would show through floor covering by grinding.

F. Broom Finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom across surface.

3.3 GROUT

A. Preparation:

1. Non-shrinking, nonmetallic grout:
   a. Clean concrete surface to receive grout.
   b. Saturate concrete with water for 24 HRS prior to grouting.

B. Application:

1. Non-shrinking, nonmetallic grout:
   a. Mix in a mechanical mixer.
   b. Use no more water than necessary to produce flowable grout.
   c. Place in accordance with manufacturer's instructions.
   d. Completely fill all spaces and cavities below the bottom of baseplates.

e. Provide forms where baseplates and bedplates do not confine grout.

f. Where exposed to view, finish grout edges smooth.

g. Except where a slope is indicated on Drawings, finish edges flush at the baseplate, bedplate, member, or piece of equipment.

h. Protect against rapid moisture loss by covering with wet rags or polyethylene sheets.

i. Wet cure grout for seven days, minimum.

2. Epoxy grout:

a. Mix and place in accordance with manufacturer's instructions.

b. Completely fill all cavities and spaces around dowels and anchors without voids.

c. Obtain manufacturer's field technical assistance as required to ensure proper placement.

3.4 FIELD QUALITY CONTROL

A. Employ and pay for services of a concrete testing laboratory to perform testing of concrete placed during construction.

B. Concrete Quality Control During Construction:

1. Strength tests:

a. Secure concrete samples in accordance with ASTM C172.

b. Obtain each sample from a different batch of concrete on a random basis.

c. For each strength test mold and cure three cylinders from each sample in accordance with ASTM C31.

1) Record any deviations from requirements on test report.

d. Test cylinders in accordance with ASTM C39.

e. Test one cylinder at seven days.

f. Test two cylinders at 28 days.

2. Provide strength tests as follows:

a. One strength test consisting of 6 IN DIA x 12 IN high cylinders shall be taken:

1) Not less than one test each day concrete placed.

2) Not less than one test for each 50 CUYD or fraction thereof placed in 1 day.

3) Not less than one test for each type of concrete poured.

4) Not less than one test for each concrete structure exceeding 2 CUYD in volume.

3. Determine slump of concrete sample for each strength test.

a. Additional slump tests shall be taken if consistency of concrete appears to vary.

b. Determine slump in accordance with ASTM C143.

4. Determine air content of concrete sample for each strength test in accordance with either ASTM C231, ASTM C173, or ASTM C138.

~~5. Determine temperature of concrete sample for each strength test.~~

~~6. Determine unit weight (LB/CUFT) of fresh lightweight concrete at point of discharge into construction member for each strength test.~~

~~7. Submit results of all concrete strength tests to Engineer in writing as soon as tests are completed.~~

~~C. Evaluation of Tests:~~

~~1. Strength test results:~~

~~a. Average of 28-day strength of two cylinders from each sample.~~

~~1) If one cylinder manifests evidence of improper sampling, molding, handling, curing or testing, strength of remaining cylinder will be tested for results.~~

~~2) If both cylinders show any of above defects, test will be discarded.~~

~~D. Acceptance of Concrete:~~

~~1. Strength level of each type of concrete shall be considered satisfactory if both of the following requirements are met:~~

~~a. Average of all sets of three consecutive strength tests equals or exceeds the required specified 28-day compressive strength.~~

~~b. No individual strength test falls below the required specified 28-day compressive strength by more than 500 PSI.~~

~~2. If tests fail to indicate satisfactory strength level, perform additional tests and/or corrective measures as directed by Engineer.~~

~~a. Perform additional tests and/or corrective measures at no additional cost to Owner.~~

~~E. Concrete tolerances per ACI 117.~~

~~3.5 SCHEDULES~~

~~A. Form Types:~~

~~1. Surfaces exposed to view:~~

~~a. Prefabricated or job-built wood forms.~~

~~b. Laid out in a regular and uniform pattern with long dimensions vertical and joints aligned.~~

~~c. Produce finished surfaces free from offsets, ridges, waves, and concave or convex areas.~~

~~d. Construct forms sufficiently tight to prevent leakage of mortar.~~

~~2. Surfaces normally submerged or not normally exposed to view: Wood or steel forms sufficiently tight to prevent leakage of mortar.~~

~~3. Other types of forms may be used:~~

~~a. For surfaces not restricted to plywood or lined forms.~~

~~b. As backing for form lining.~~

~~B. Grout:~~

~~1. Non-shrinking, nonmetallic grout: General use.~~

~~C. Concrete:~~

~~1. Normal weight concrete: All concrete.~~

~~2. General use concrete: All other locations.~~

~~D. Concrete Finishes:~~

~~1. Slab finishes:~~

~~a. Use following finishes as applicable, unless otherwise indicated:~~

~~1) Floated finish: Surfaces intended to receive roofing, concrete topping, lean concrete, concrete fill, and waterproofing.~~

~~2) Troweled finish: Interior floor slabs, exposed roof slabs and base slabs of structures, equipment bases, and column bases.~~

~~3) Broom finish: Sidewalks, docks, concrete stairs, and ramps.~~

~~END OF SECTION~~

SECTION 03 21 00

REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Reinforcing bar requirements for concrete construction.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Procurement and Contracting Requirements.
2. Division 01 - General Requirements.
3. Section 03 05 05 - Concrete Testing and Inspection.
4. Section 03 15 19 - Anchorage to Concrete.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Concrete Institute (ACI):
   a. SP 66, ACI Detailing Manual.
   b. 117, Specification for Tolerances for Concrete Construction and Materials.
   c. 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures.
   d. 318, Building Code Requirements for Structural Concrete.
2. ASTM International (ASTM):
   a. A36, Standard Specification for Carbon Structural Steel.
   b. A276, Standard Specification for Stainless Steel Bars and Shapes.
   c. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
   d. A706, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
   e. A970, Standard Specification for Headed Steel Bars for Concrete Reinforcement.
   f. A1022, Standard Specification for Deformed and Plain Stainless-Steel Wire and Welded Wire for Concrete Reinforcement.
   g. A1064, Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
3. Concrete Reinforcing Steel Institute (CRSI):
   a. Manual of Standard Practice.
4. American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering.

1.3 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
    a. Acknowledgement that products submitted meet requirements of standards referenced.
    b. Manufacturer's installation instructions.
    c. Mill certificates for all reinforcing.
    d. Manufacturer and type of proprietary reinforcing mechanical splices.
3. Qualifications of welding operators, welding processes and procedures.
4. Reinforcing number, sizes, spacing, dimensions, configurations, locations, mark numbers, lap splice lengths and locations, concrete cover and reinforcing supports.
5. Sufficient reinforcing details to permit installation of reinforcing.
6. Reinforcing details in accordance with ACI SP 66 and ACI 315.
7. Locations where proprietary reinforcing mechanical splices are required or proposed for use.
8. Shop Drawings shall be in sufficient detail to permit installation of reinforcing without reference to Contract Drawings.
    a. Shop Drawings shall not be prepared by reproducing the plans and details indicated on the Contract Drawings but shall consist of completely redrawn plans and details as necessary to indicate complete fabrication and installation of all reinforcing steel.
    b. Where multiple types of supports for reinforcing steel (such as chairs, runners, bolsters, and other types of supports) will be used in the Work, clearly indicate on the Shop Drawings the support types and materials of supports.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Storage of Material:

1. ~~A.~~ Support and store all reinforcing above ground, avoiding any contact with the ground.

2. ~~B.~~ If reinforcement is to remain on the site for more than one month, it shall be covered to protect it from the weather.

3. ~~C.~~ If reinforcement accumulates heavy rust, dirt, mud, loose scale, paint, oil, or any other foreign substance during storage, it shall be cleaned before being used.

4. Severe deterioration may be a basis for rejection.

B. ~~D.~~ ***Delivery:***

1. Ship to jobsite with attached plastic or metal tags with permanent mark numbers which match the Shop Drawing mark numbers.

2. Handling of Epoxy-Coated Rebar:

a. Use padded or nonmetallic slings and padded straps to protect coated reinforcement from damage.

b. Handle bundled bars to prevent sagging that could damage the coating.

c. Do not drop or drag rebars. d. Store on wooden cribbing.

d. ~~E.~~ ***Coated rebars subject to rejection by Engineer if rebar coating has been damaged.***

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURES

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Reinforcing adhesive anchors:
    a. See Specification Section 03 15 19.
2. Reinforcing mechanical splices:
    a. Lenton Rebar Splicing by Erico, Inc.
    b. Richmond dowel bar splicer system by Richmond Screw and Anchor Co., Inc.
    c. Bar-Grip Systems by Barsplice Products, Inc.

B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MATERIALS

A. Reinforcing Bars: ASTM A615, grade 60, deformed.

B. Reinforcing Bars to be Welded: ASTM A706, Grade 60, deformed bars of new billet.

C. Welded Wire Reinforcement: ASTM A1064 or ASTM A1022 where noted on Drawings.

D. Smooth Dowel Bars:

1. Water containing structures: ASTM A276, Type 316.
2. All other locations: ASTM A36, with metal end cap to allow longitudinal movement equal to joint width plus 1 IN.

E. Proprietary Reinforcing Mechanical Splices: To develop in tension and compression a minimum of 125 PCT of the yield strength of the reinforcing bars being spliced.

F. Headed Deformed Bars:

1. ASTM A970, Class B.

G. Reinforcing Adhesive Anchors:

1. See Specification 03 15 19.

H. Galvanized reinforcing steel bars shall conform to the requirements of ASTM A1094.

I. ~~H.~~ ***Provide with epoxy coating per ASTM A775.***

2.3 ACCESSORIES

A. Chairs, Runners, Bolsters, Spacers, Hangers, Tie wire, and Other Reinforcing Supports:

1. The reinforcing bars shall be connected using wire ties conforming to ASTM A510.
2. Metal fabrications with plastic-coated tips in contact with forms.
    a. Plastic coating meeting requirements of CRSI Manual of Standard Practice.
3. All plastic construction meeting the requirements of CRSI Manual of Standard Practice.
    a. 100 PCT non-metallic, non-corrosive.
    b. Required for all walls and elevated construction exposed to liquid containing structures.

B. Protective plastic caps at mechanical splices.

2.4 FABRICATION

A. Tolerances:
1. Conforms to ACI 117, expect as modified herein.
2. Sheared lengths: +1 IN.
3. Overall dimensions of stirrups, ties, and spirals: +1/2 IN.
4. All other bends: +0 IN, -1/2 IN.

B. Minimum diameter of bends measured on the inside of the reinforcing bar to be as indicated in ACI 318 Paragraph 7.2.

C. Ship reinforcing to jobsite with attached plastic or metal tags.
1. Place on each tag the mark number of the reinforcing corresponding to the mark number indicated on the Shop Drawing.
2. Mark numbers on tags to be so placed that the numbers cannot be removed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Tolerances:
1. Conform to ACI 117, except as modified herein.
2. Reinforcing placement:
    a. Clear distance to formed surfaces: +1/4 IN.
    b. Minimum spacing between bars: -1/4 IN.
    c. Top bars in slabs and beams:
        1) Members 8 IN deep or less: +1/4 IN.
        2) Members between 8 IN and 2 FT deep: -1/4 IN, +1/2 IN.
        3) Members more than 2 FT deep: -1/4 IN, +1 IN.
    d. Crosswise of members: Spaced evenly within +1 IN.
    e. Lengthwise of members: +2 IN.
3. Minimum clear distances between reinforcing bars:
    a. Beams, walls and slabs: Distance equal to bar diameter or 1 IN, whichever is greater.

b. Columns: Distance equal to 1-1/2 times the bar diameter or 1-1/2 IN, whichever is greater.

c. Beam and slab reinforcing shall be threaded through the column vertical rebars without displacing the column vertical bars and still maintaining the clear distances required for the beam and slab reinforcing bars.

B. Minimum concrete protective covering for reinforcement: As shown on Drawings.

C. Unless indicated otherwise on Drawings, provide splice lengths for reinforcing as follows:

1. For reinforcing: Class B splice meeting the requirements of ACI 318.

2. For welded wire reinforcement:

a. Splice lap length measured between outermost cross wires of each fabric sheet shall not be less than one spacing of cross wires plus 2 IN, nor less than 1.5 x development length nor less than 6 IN.

b. Development length shall be as required for the yield strength of the welded wire reinforcement in accordance with ACI 318.

3. Provide splices of reinforcing not specifically indicated or specified subject to approval of Engineer.

a. Mechanical proprietary splice connectors may only be used when approved or indicated on the Contract Drawings.

D. Welding:

1. Welding reinforcing is not permitted.

E. Placing Reinforcing:

1. Assure that reinforcement at time concrete is placed is free of mud, oil or other materials that may affect or reduce bond.

2. Reinforcement with rust, mill scale or a combination of both will be accepted as being satisfactory without cleaning or brushing provided dimensions and weights including heights of deformations on a cleaned sample is not less than required by applicable ASTM specification that governs for the reinforcing supplied.

3. Reinforcement shall be placed accurately in the position indicated on the Plans and shall be firmly held in place during the deposition and vibration of the concrete. This shall be accomplished by fastening the bars at all intersections and splices by wires or approved clips, by the use of bars or other suitable spacers, or as otherwise approved by the Engineer.

4. Reinforcing support:

a. Uncoated reinforcing:

1) Support reinforcing and fasten together to prevent displacement by construction operations.

a) Locate and support reinforcement with bar supports to maintain minimum concrete cover.

b) Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

c) Reinforcement shown on the Contract Documents may not be repositioned for use a support for reinforcement. Additional drop bars may be provided for support of reinforcing,

2) Reinforcing supported on ground:

a) Slab on grade and other members with only one mat of reinforcing:

(1) Provide metal bar supports with bottom plate.

(2) Do not use concrete blocks to support slab-on-grade reinforcing.

b) All other members: Provide supporting concrete blocks or metal bar supports with bottom plate.

3) Reinforcing supported on formwork:

a) Concrete surfaces in contact with or over process liquid: All-Plastic chairs, runners and bar supports.

b) All other formed surfaces:

(1) Provide plastic-coated metal chairs, runners, bolsters, spacers, hangers, and other reinforcing support.

(2) Only tips in contact with the forms need to be plastic coated.

5. Support reinforcing over cardboard void forms by means of concrete supports which will not puncture or damage the void forms during construction nor impair the strength of the concrete members in any way.

6. Where parallel horizontal reinforcement in beams is indicated to be placed in two or more layers, bars in the upper layers shall be placed directly above bars in the bottom layer with clear distance between layers to be 1 IN.

a. Place spacer bars at 3 FT maximum centers to maintain the required 1 IN clear distance between layers.

7. Extend reinforcement to within 2 IN of concrete perimeter edges.

a. If perimeter edge is formed by earth or stay-in-place forms, extend reinforcement to within 3 IN of the edge.

8. To assure proper placement, furnish templates for all column vertical bars and dowels.

9. Do not bend reinforcement after embedding in hardened concrete unless approved by Engineer.

a. Do not bend reinforcing by means of heat.

10. Do not tack weld reinforcing.

11. Embed reinforcing into hardened concrete utilizing adhesive anchor system specifically manufactured for such installation:

a. See Specification Section 03 15 19.

3.2 FIELD QUALITY CONTROL

A. Reinforcement Congestion and Interferences:

1. Notify Engineer whenever the specified clearances between bars cannot be met.

2. Do not place any concrete until the Engineer submits a solution to reinforcing congestion problem.
3. Reinforcing may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items.
4. If bars are moved more than one bar diameter, obtain Engineer's approval of resulting arrangement of reinforcing.
5. No cutting of reinforcing shall be done without written approval of Engineer.

B. Special Inspection:

1. Special inspections shall comply with the City of Alexandria requirements for Special Inspections.
2. See Section 03 05 05.

END OF SECTION

NO TEXT ON THIS PAGE.

SECTION 03 31 31

CONCRETE MIXING, PLACING, JOINTING, AND CURING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mixing, placing, jointing, and curing of concrete construction.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Procurement and Contracting Requirements.
2. Division 01 - General Requirements.
3. Section 01 45 00 – Quality Assurance and Quality Control.
4. Section 03 05 05 - Concrete Testing and Inspection.
5. Section 03 11 13 - Formwork.
6. Section 03 21 00 - Reinforcement.
7. Section 03 31 30 - Concrete, Materials and Proportioning.
8. Section 03 35 00 - Concrete Finishing and Repair of Surface Defects.
9. Section 07 92 13 – Exterior Joint Sealants.
10. Section 07 92 16 – Interior Joint Sealants.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Concrete Institute (ACI):
   a. CT-13, Concrete Terminology.
   b. 117, Specification for Tolerances for Concrete Construction and Materials.
   c. ***ACI PRC-207.1, Mass Concrete—Guide***
   d. 304R, Guide for Measuring, Mixing, Transporting and Placing Concrete.
   e. 304.2R, Placing Concrete by Pumping Methods.
   f. 305R, Guide to Hot Weather Concreting.
   g. 305.1, Specification for Hot Weather Concreting.
   h. 306R, Guide to Cold Weather Concreting.
   i. 306.1, Standard Specification for Cold Weather Concreting.
   j. 308.1, Specification for Curing Concrete.
   k. 309R, Guide for Consolidation of Concrete.
   l. 318, Building Code Requirements for Structural Concrete and Commentary.
   m. 360R, Guide to Design of Slabs-on-Ground.

2. ASTM International (ASTM):
    a. C94/C94M, Standard Specification for Ready-Mixed Concrete.
    b. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
    c. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
    d. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
    e. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
    f. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
3. Corps of Engineers (COE):
    a. CRD-C572, Specifications for Polyvinylchloride Waterstop.
4. National Ready Mixed Concrete Association (NRMCA):
    a. Checklist for Certification of Ready Mixed Concrete Production Facilities.
5. American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering.

B. Qualifications:
1. Ready Mixed Concrete Batch Plant: Certified by NRMCA.
2. Waterstop manufacturer's representative shall provide on-site training of waterstop installation, field splicing, welding and inspection procedures prior to construction, and at no additional cost to Owner.

C. Pre-Concreting Conference:
1. A meeting to review the detailed requirements of the Contractor's proposed concrete design mixes, to determine the procedures for producing proper concrete construction, and to clarify the roles of the parties involved shall be held no later than 30 days after the Notice to Proceed.
    a. Schedule the meeting to occur no later than five days in advance of the first scheduled date of concrete placement.
2. All parties involved in the concrete work shall attend the conference, including:
    a. Contractor's representative.
    b. Testing laboratory representative/inspectors.
    c. Concrete subcontractor.
    d. Reinforcing steel installer.
    e. Concrete supplier.
    f. Owner.

g. Resident Engineer or Project Representative.

h. Design Engineer.

i. Building Code Official.

3. The conference shall be held at a mutually agreed upon time and location.

4. The agenda shall include but not be limited to the following:

a. Scheduling, sequence and notification of concrete placements.

b. Contractor's concrete pre-placement plan checklist.

c. Delivery time from batch plant, maximum time in truck, and approved exceptions to the limits.

d. Review of approved design mix including the limits of water that can be added and who is authorized to add water if water has been withheld at the plant.

e. Additional test cylinders to be made for any load in which water exceeding the water/cement ratio of the approved mix design has been added on site.

1) Review and discuss Field Quality Control requirements.

5. Additional test cylinders for structural elements the Contractor intends to subject to live loads earlier than 28 days.

6. Duties and authority of testing and inspection agency.

7. Curing procedures.

8. Temperature/weather issues.

9. Test cylinder storage and protection.

10. Approval and rejection of work.

11. Mock-up panels as the standard.

12. ***Mass concrete pertinent requirements and procedures.***

1.3 DEFINITIONS

A. Words and terms used in this Specification Section are defined in ACI CT-13.

B. ***Mass Concrete: Any concrete member or pour that is greater than 48 IN thick in the smallest direction.***

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

2. Product technical data including:

a. Acknowledgement that products submitted meet requirements of standards referenced.

b. Manufacturer's installation instructions.

1) Procedure for adding high-range water reducer at the jobsite.

c. Scaled (minimum 1/8 IN per foot) drawings showing proposed locations of construction joints, control joints, expansion joints (as applicable) and joint profile dimensions for each joint type.

d. Manufacturers and types:

1) Joint fillers.

2) Curing agents.

3) Construction joint bonding adhesive.

4) Waterstops.

e. Thermal monitoring control plan for mass concrete.

3. Certifications:

a. Ready mix concrete plant certification.

B. Informational Submittals:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

2. Cold weather placement plan.

3. Hot weather placement plan.

4. Copies of concrete delivery tickets.

5. Description of proposed curing methods.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Concrete Delivery:

1. Prepare a delivery ticket for each load of ready mixed concrete.

2. Truck operator shall hand ticket to Contractor at the time of delivery.

3. Ticket to show:

a. Mix identification.

b. Quantity delivered.

c. Amount of material in each batch.

d. Outdoor temperature in the shade.

e. Time at which cement was added.

f. Time of delivery.

g. Time of discharge.

h. Amount of water that may be added at the site without exceeding the specified water-cement ratio.

i. Amount of any approved water added at the site.

1.6 PROJECT CONDITIONS

A. Adjust concrete mix design when material characteristics, job conditions, weather, strength test results or other circumstances warrant.

1. Do not use revised concrete mixes until submitted to and approved by Engineer.

1.7 SEQUENCING AND SCHEDULING

A. Do not begin concrete production until proposed concrete mix design has been approved by Engineer.

1. Approval of concrete mix design does not relieve Contractor of his responsibility to provide concrete that meets the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Subject to compliance with the Contract Documents, the manufacturers listed in this article are acceptable.

B. Neoprene Expansion Joint Fillers:

1. Acceptable manufacturers:

a. Permaglaze.

b. Rubatex.

c. Williams Products.

2. Materials:

a. Closed cell neoprene.

b. ASTM D1056, Type 2, Class A or C.

c. Grade: Compression deflection as required to limit deflection to 25 PCT of joint thickness under pressure from concrete pour height.

C. Asphalt Expansion Joint Fillers:

1. Acceptable manufacturers:

a. W.R Meadows.

b. J and P Petroleum Products.

2. Materials: ASTM D994.

D. Fiber Expansion Joint Fillers:

1. Materials: ASTM D1751.

E. Waterstops, PVC Type:

1. Acceptable manufacturers:

a. Sika Greenstreak Plastic Products.

b. W.R Meadows.

c. Vinylex Corporation.

d. Bometals, Inc.

2. Materials:

a. Virgin polyvinyl chloride compound not containing any scrap or reclaimed materials or pigment.

b. Cast-in-place type: COE CRD-572.

3. Approved profiles as listed.

a. Construction joints:

1) Ribbed: 6 IN wide by 3/8 IN.

2) Sika Greenstreak Plastic Products Style #679, or equal.

b. Control joints:

1) 6 IN wide by 3/8 IN thick with ribs and center bulb.

2) Sika Greenstreak Plastic Products Style #705, or equal.

c. Expansion joint:

1) 9 IN wide by 3/8 IN thick center bulb 2 inch OD.

2) Sika Greenstreak Plastic Products Style #739, or equal.

4. Provide factory-made waterstop fabrications at all changes in direction, intersections and transitions, leaving only straight butt splices for the field. Butt welds to be a minimum 6 IN clear of the intersection.

5. Factory prepunched (less than 18 IN centers, each edge, staggered) for wire supports.

a. Provide hog rings or grommets at all punched holes along the length of the waterstop.

6. See Drawings for application and other requirements.

F. Waterstops, Preformed Strip Type:

1. Acceptable manufacturers:

a. Sika Greenstreak Plastics, Inc. (Hydrotite).

b. Adeka Ultra Seal USA (MC-2010MN).

c. DeNeef (Swellseal 2010).

2. Hydrophilic, non-bentonite composition.

3. Manufactured solely for the purpose of preventing water from traveling through construction joints.

4. Volumetric expansion limited to 3 times maximum.

5. See Drawings for application and other requirements.

G. Water Swelling Sealant:

1. Required adhesive for use with strip-type waterstop.

2. Compatible with strip-type waterstop.

3. Single component, gun applied.

4. Moisture cured.
5. Minimum 70 PCT volumetric expansion swelling capability.

H. Curing Products to conform to one or more of the following:

1. Absorbent Covers.
2. Moisture Retaining Covers.
   a. Moisture Retaining Fabric.
3. Dissipating curing compound:
   a. Fugitive dye, waterborne, membrane-forming.
   b. ASTM C309, Type 1D, Class A or B, shall be composed of hydrocarbon resins, and dissipating agents that begin to break down upon exposure to UV light, and traffic, approximately four to six weeks after applications, providing a film that is removable with standard degreasing agents, and mechanized scrubbing actions so as to not impair the later addition and performance of applied finishes.
   c. Acceptable Products:
      1) Dayton Superior Corporation; Day Chem Rez Cure (J-11-WD).
      2) Euclid Chemical Company (The); Kurez DR VOX.
      3) L&M Construction Chemicals, Inc.; L&M Cure R.
4. Clear, solvent-borne, membrane-forming curing and sealing compound:
   a. ASTM C1315, Type 1, Class A.
   b. Moisture loss shall be not more than 0.40 KG/M^2 when applied at 300 SQFT/GAL.
   c. Manufacturer's certification is required.
   d. Subject to project requirements, provide one of the following products:
   e. Products:
      1) Euclid Chemical Company; Super Diamond Clear, Luster Seal 300 (exterior), Super Rez-Seal (interior).
      2) L&M Construction Chemicals, Inc.; Lumiseal Plus.
      3) Meadows, W.R., Inc.; CS-309/30.
      4) Euclid Chemical Company; Super Diamond Clear VOX.
      5) L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
      6) Meadows, W.R., Inc.; Vocomp-30.

I. Sand cement grout, non-shrink grout and epoxy grout: See Specification Section 03 31 30 for this non-structural material and use.

2.2 SOURCE QUALITY CONTROL

A. The concrete plant shall conform to the Checklist for Certification of Ready Mixed Concrete Production Facilities of the NRMCA.

PART 3 - EXECUTION

3.1 PREPARATION

A. General:

1. All materials and construction shall conform to the tolerances as specified in ACI 117.
2. Complete formwork.
    a. See Specification Section 03 11 13.
3. Remove earth, snow, ice, water, and other extraneous/foreign materials from areas that will receive concrete.
4. Secure reinforcement in place.
    a. See Specification Section 03 21 00.
5. Position expansion joint material, anchors and other embedded items.
6. Obtain approval of formwork, reinforcement installation and placement prior to placing concrete.
7. Do not place concrete during rain, sleet, or snow, unless adequate protection is provided and prior Engineer approval is obtained.
    a. Plan size of crews with due regard for effects of concrete temperature and atmospheric conditions on rate of hardening of concrete as required to obtain good surfaces and avoid unplanned cold joints.
    b. Do not allow rainwater to increase mixing water nor to damage surface finish.
8. Remove hardened concrete and foreign materials from inner surfaces of conveying equipment and formwork.
9. Provide slabs and beams of minimum indicated required depth when sloping structural foundation base slabs and elevated slabs to drains.
    a. For floor slabs on grade, slope top of subgrade to provide slab of required uniform thickness.

B. Preparation of Subgrade for Slabs on Ground:

1. Subgrade to be wetted without standing water immediately prior to placing concrete.
2. Obtain approval of subgrade compaction density prior to placing slabs on ground.

C. Edge Forms and Screeds:

1. Set accurately to produce designated elevations and contours of finished surface.
2. Sufficiently strong to support vibrating screeds or roller pipe screeds, if required.
3. Use strike off templates, or approved vibrating type screeds, to align concrete surfaces to contours of screed strips.

3.2 CONCRETE MIXING

A. General:

1. Provide all concrete from a central plant conforming to Checklist for Certification of Ready Mixed Concrete Production Facilities of the NRMCA.

2. Batch, mix, and transport in accordance with ASTM C94/C94M.

B. Control of Admixtures:

1. Control at the batch plant:

a. All admixtures to be introduced at the batch plant in accordance with manufacturer's recommendations.

b. Charge admixtures into mixer as solutions.

1) Measure by means of an approved mechanical dispensing device.

2) Liquid considered a part of mixing water.

3) Admixtures that cannot be added in solution may be weighed or measured by volume if so recommended by manufacturer.

c. Add separately, when two or more admixtures are used in concrete, to avoid possible interaction that might interfere with efficiency of either admixture, or adversely affect concrete.

d. Complete addition of retarding admixtures within one minute after addition of water to cement has been completed, or prior to beginning of last three quarters of required mixing, whichever occurs first.

2. Control of Admixtures in the field:

a. Additional quantities of admixtures (with the exception of retarders) may be added in the field provided:

1) Addition of admixtures shall be under the supervision of the ready mix quality control representative.

2) Addition of each admixture to be documented on the delivery ticket.

3) Provide additional mixing per ASTM C94.

C. Tempering and Control of Mixing Water:

1. Mix concrete only in quantities for immediate use.

2. Discard concrete which has set.

3. Discharge concrete from ready mix trucks within time limit stated in ASTM C94.

4. Addition of water at the jobsite:

a. See Specification Section 03 31 30 for specified water cement ratio and slump.

b. Do not exceed maximum specified water cement ratio or slump.

c. Incorporate water by additional mixing equal to at least half of total mixing required.

3.3 PLACING OF CONCRETE

A. General:

1. Place concrete as such a rate that concrete, which is being integrated with fresh concrete, is still workable.

a. Select placement equipment and manpower in order to assure timely delivery of concrete into forms to avoid unintended cold joints and placement consolidation issues.

2. Provide additional equipment to place mass concrete if deemed required to avoid placement issues.

3. Comply with ACI 304R and ACI 304.2R.
4. Do not begin placing concrete during rain, sleet, or snow.
   a. Protect fresh concrete from ensuing inclement weather.
5. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials.
6. Begin work only when work of other trades affecting concrete is complete.
7. Do not use excess grout or mortar to lubricate lines when pumping concrete.
8. Do not use excess water for workability or any reason when placing concrete by freefall.
9. Deposit concrete continuously to avoid cold joints.
10. Locate construction joints at locations specified or approved by Engineer.
    a. Plan size of crews with due regard for effects of concrete temperature and atmosphere conditions to avoid unplanned cold joints.
11. Spreaders:
    a. Temporary: Remove as soon as concrete placing renders their function unnecessary.
    b. Embedded:
       1) Obtain approval of Engineer for their use.
       2) Materials: Concrete or metal.
       3) Ends of metal spreaders coated with plastic coating 2 IN from each end.
12. Deposit concrete as nearly as practicable in its final position to avoid segregation.
    a. Maximum free fall: 4 FT.
    b. Place concrete by means of hopper, elephant trunk or tremie pipe extending down to within 4 FT of surface.
13. Perform the following operations before bleeding water has an opportunity to collect on surface:
    a. Spread.
    b. Consolidate.
    c. Straightedge.
    d. Darby or bull float.
14. No water shall be added to the concrete surface to ease finishing operation.
15. Do not discharge water into forms.
16. Consider use of form vibrators for certain placement situations.

B. Cold Weather Concrete Placement:

1. Comply with ACI 306.1.
2. Do not place concrete on forms or subgrades that are below 32 DEGF or contain frozen material.
3. Maintain all materials, forms, reinforcement, subgrade and any other items which concrete will come in contact with free of frost, ice or snow at time of concrete placement.
4. Temperature of concrete when discharged at site: Per ACI 306.1.
5. Heat subgrade forms, embedments and reinforcement to between 50 and 70 DEGF, when temperature of surrounding air is 40 DEGF or below at time concrete is placed.
   a. Remove all frost from subgrade, forms and reinforcement before concrete is placed.
6. Combine water with aggregate in mixer before cement is added, if water or aggregate is heated above 90 DEGF.
7. Do not mix cement with water or with mixtures of water and aggregate having a temperature greater than 90 DEGF.
8. Follow ACI 306R for specific requirements dealing with elevated steel troweled slabs that will be exposed to freeze-thaw cycles.

C. Hot Weather Concrete Placement:

1. Comply with ACI 305.1.
2. Cool ingredients before mixing or add flake ice or well crushed ice of a size that will melt completely during mixing for all or part of mixing water if high temperature, low slump, flash set, cold joints, or shrinkage cracks are encountered.
3. Temperature of concrete at point of delivery (i.e. truck discharge) when placed:
   a. ~~Not to exceed 90 DEGF.~~***Not to exceed:***

Section Thickness (Least Dimension, FT)	***Maximum Temperature (DEGF)***	***Concrete Placement Size (Volume, CU YD limit)***
Up to 2.0	***90***	***Unlimited***
2.0 to 3.0	***76***	***Unlimited***
3.0 to 6.0	***72***	***250***
Greater than 6.0	***72***	***Review by Engineer***

   b. Not so high as to cause:
      1) Shrinkage cracks.
      2) Difficulty in placement due to loss of slump.
      3) Flash set.
4. Temperature of forms and reinforcing when placing concrete:

a. Not to exceed 90 DEGF.

b. May be reduced by spraying with water to cool below 90 DEGF.

1) Leave no standing water to contact concrete being placed.

5. Prevent plastic shrinkage cracking and/or slab curling due to evaporation.

D. Layering:

1. Mass concrete or large volume placements shall be placed in horizontal layers, the thickness of which generally shall not exceed ten (10) to twelve (12) inches.

2. The placing of concrete shall be continuous until completion of the substructure unit.

3. In any given layer, the separate batches shall follow each so closely that each one shall be placed and compacted before the preceding one has taken initial set, in order that the green concrete shall not be injured and that there shall be no line of separation between batches.

4. Each layer of concrete shall have an amplitude of 3/8" to secure efficient bonding with the next layer above.

5. A succeeding layer placed before the underlying layer has become set shall be compacted in a manner that will entirely break up and obliterate the tendency to produce a construction joint between the layers.

6. Layers completing a day's work or placed just prior to temporarily discontinuing operations shall generally be cleaned of all objectionable material as soon as the surface has become sufficiently firm to retain its form.

7. ***To avoid, as far as possible, visible joints upon exposed faces, the top of the concrete adjacent to the forms shall be finished by being smoothed with a plasterer's trowel.***

E. Consolidating:

1. Consolidate in accordance with ACI 309R except as modified herein.

2. Consolidate by vibration so that concrete is thoroughly worked around reinforcement, embedded items and into corners of forms.

a. Ensure no displacement of reinforcing or other embeds from final position.

b. Eliminate:

1) Air or stone pockets.

2) Honeycombing or pitting.

3) Planes of weakness.

3. Use suitable form vibrators located just below top surface of concrete, where internal vibrators cannot be used in areas of congested reinforcing.

a. Size and coordinate external vibrators to specifically match forming system used.

4. Internal vibrators:

a. Minimum frequency of 8000 vibrations per minute.

b. Insert and withdraw at points approximately 18 IN apart.

1) Allow sufficient duration at each insertion to consolidate concrete but not sufficient to cause segregation.

c. Use in:

1) Beams and girders of framed slabs.

2) Columns and walls.

3) Vibrating concrete around all waterstops.

d. Size of vibrators shall be in accordance with ACI 309R, Table 5.1.5.

e. Vibrators shall not be applied to forms or reinforcing steel.

5. Obtain consolidation of slabs with internal vibrators, vibrating screeds, roller pipe screeds, or other approved means.

6. Do not use vibrators to transport concrete within forms.

7. When placing self-consolidating concrete, the use of form or pencil vibrators is acceptable, provided such methods do not cause aggregate segregation, or otherwise adversely affect the quality of the work.

8. Provide sufficient spare vibrators on jobsite during all concrete placing operations to assure continuous vibration.

9. Bring a full surface of mortar against form by vibration supplemented if necessary, by spading to work coarse aggregate back from formed surface, where concrete is to have an as-cast finish.

10. Prevent construction equipment, construction operations, and personnel from introducing vibrations into freshly placed concrete after the concrete has been placed and consolidated.

F. Handle concrete from mixer to place of final deposit by methods which will prevent segregation or loss of ingredients and in a manner which will assure that required quality of concrete is maintained.

1. Use truck mixers, agitators, and non-agitating units in accordance with ASTM C94.

2. Horizontal belt conveyors:

a. Mount at a slope which will not cause segregation or loss of ingredients.

b. Protect concrete against undue drying or rise in temperature.

c. Use an arrangement at discharge end to prevent segregation.

d. Do not allow mortar to adhere to return length of belt.

e. Discharge conveyor runs into equipment specially designed for spreading concrete.

3. Metal or metal lined chutes:

a. Slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal.

b. Chutes more than 20 FT long and chutes not meeting slope requirements may be used provided they discharge into a hopper before distribution.

c. Provide end of each chute with a device to prevent segregation.

4. Pumping or pneumatic conveying equipment:
    a. Designed for concrete application and having adequate pumping capacity.
    b. Control pneumatic placement so segregation is avoided in discharged concrete.
    c. Loss of slump in pumping or pneumatic conveying equipment shall not exceed 1-1/2 IN.
    d. Do not convey concrete through pipe made of aluminum or aluminum alloy.
    e. Provide pumping equipment without Y sections.

G. Placing of Concrete on Metal Deck:
1. Prior to concrete placement, the metal deck shall be free of soil, debris, standing water, loose mill scale, and all other foreign matter.
2. Care shall be exercised when placing concrete so that the deck will not be subject to construction loads or impact that exceed the design capacity of the deck.
3. Concrete shall be placed in a uniform manner and spread toward the center of the deck span.
4. If buggies are used to place concrete, runways shall be planked, and the buggies shall only operate on planking.
    a. Planks shall be of adequate stiffness to transfer loads to the steel supports without damaging the deck.
5. Deck damage caused by careless placement of concrete shall be repaired or replaced.
6. Pour concrete to the thickness noted on Drawings.

3.4 JOINTS AND EMBEDDED ITEMS

A. Construction Joints - General:
1. Locate joints as indicated on Contract Drawings or as shown on approved Shop Drawings.
    a. Where construction joint spacing shown on Drawings exceeds the joint spacing indicated in Paragraph B. below, submit proposed construction joint location in conformance with this Specification Section.
2. Unplanned construction joints will not be allowed.
    a. If concrete cannot be completely placed between planned construction joints, then it must be removed.
3. In general, locate joints near middle of spans of slabs, beams and girders unless a beam intersects a girder at this point, in which case, offset joint in girder a distance equal to twice the width of the beam.
4. Locate joints in walls and columns at underside of floors, slabs, beams, or girders, and at tops of foundations or floor slabs, unless shown otherwise.
    a. At Contractor's option, beam pockets may be formed into concrete walls.
    b. Size pockets to allow beam reinforcing to be placed as detailed on Drawings.
5. Place beams, girders, column capitals and drop panels at same time as slabs.

6. Place corbels monolithically with their supporting members.
    a. Locate wall vertical construction joints midway between corbels.
    b. Where only a single corbel is located, place it also monolithically with wall and locate wall vertical construction joint a minimum of 3 FT from face of corbel.
7. Make joints perpendicular to main reinforcement with all reinforcement continuous across joints.
8. Provide the following joints unless noted otherwise on Drawings:
    a. Roughen joints: horizontal construction joints.
    b. Keyed joints: vertical construction joints.
9. Roughen construction joints:
    a. Clean the previously hardened concrete interface and remove all laitance.
    b. Intentionally roughen the interface to a full amplitude of 1/4 IN.
10. Keyways:
    a. Construction joint keyways shall have the following dimensions, unless shown otherwise on Drawings or as directed by Engineer.
    b. Wall keys:
        1) Keyway width, not less than 1/3 and not more than 1/2 the wall thickness measured perpendicular to wall faces.
        2) Keyway depth to be not less than 1-1/2 IN.
        3) Continuous along length of wall.
        4) Place keyway in wall center unless shown otherwise on Drawings.
    c. Keyways in footings, foundations, base slabs, and structural or elevated slabs:
        1) Keyway height not less than 1/3 and not more than 1/2 the footing or slab thickness.
        2) Keyway depth not less than 1-1/2 IN.
        3) Continuous along footing or slab.
        4) Keyway in footing or slab center unless shown otherwise on Drawings.
    d. Beam keyways:
        1) Full width of beam.
        2) Keyway height not less than 5-1/2 IN.
        3) Keyway depth not less than 1-1/2 IN.
        4) Keyway located in initial beam pour, directly above the bottom reinforcing, unless shown otherwise on Drawings.
11. Minimum time before placement of adjoining concrete construction:
    a. All concrete: 60 HRS, unless otherwise noted.

b. ***Mass concrete: Seven days or at the completion of the monitoring period, whichever is longer.***

B. Construction Joints - Spacing Unless Otherwise Specified:

1. Structures not intended to contain liquid:

a. Wall vertical construction joints:

1) 50 FT maximum centers.

2) At wall intersections, 4 FT minimum from corner.

b. Base slab, floor, and roof slab construction joints:

1) Placements to be approximately square and not to exceed 2500 SQFT.

2) Maximum side dimension of a slab pour to be 70 FT.

c. the following requirements are satisfied:

1) A test wall of similar size, height and thickness will be poured to demonstrate the quality of the concrete work.

2) The test wall will be located as a portion of a non-water retaining wall.

a) The test wall will include a waterstop at the bottom of the wall.

b) Alternatively, a separate test wall, not part of the final work, may be constructed.

3) The concrete placement and concrete quality of the test wall will be observed by the Engineer.

a) Concrete will be judged on the following:

(1) Ability to keep bottom of the pour clean and free from trash and debris.

(2) Ability to protect the waterstop from folding over due to the force of falling concrete.

(3) Ability to properly consolidate all concrete in the wall pour, including below formed openings.

4) Engineer will evaluate the Contractor’s work and may recommend taller concrete wall pours if concrete quality is acceptable.

5) Preparation for all subsequent wall pours over 18 FT tall must be the same as the preparation of the test wall.

6) Should the quality of concrete work on subsequent wall pours be judged inadequate, when compared to the original accepted test wall, the Contractor may be directed to limit wall pour heights to 18 FT as originally specified.

7) Should the quality of concrete work on the test wall be judged inadequate, additional test walls will not be observed and judged to allow pour heights greater than 18 FT unless approved by Engineer.

d. Floor slab, construction joints:

1) Placements to be approximately square and not to exceed 2000 SQFT.

2) Maximum side dimension of a slab pour to be less than:

a) Twice the length of the short side.

b) 60 FT.

e. Elevated slab construction joints:

1) Placements to be approximately square and not to exceed 4000 SQFT.

2) Maximum side dimension of a slab pour to be less than:

a) Twice the length of the short side.

b) 70 FT.

C. Construction Joints - Bonding:

1. Obtain bond between concrete pours at construction joints by thoroughly cleaning and removing all laitance from construction joints.

2. Before new concrete is placed, all construction joints shall be coated with cement grout, or dampened, as outlined below:

3. Roughen construction joints:

a. Roughen the surface of the concrete to expose the coarse aggregate uniformly with 1/4 IN minimum amplitude.

1) Remove laitance, loosened particles of aggregate or damaged concrete at the surface.

4. Keyed construction joints:

a. Thoroughly clean construction joints and remove all laitance.

b. Dampen the hardened concrete immediately prior to placing of fresh concrete.

D. Slab On Grade Joints:

1. Locate construction and control joints in slabs on grade as indicated on Drawings.

2. Time cutting properly with set of concrete, if saw cut joints are required or permitted.

a. Start cutting as soon as concrete has hardened sufficiently to prevent aggregates being dislodged by saw.

b. Complete before shrinkage stresses become sufficient to produce cracking.

E. Expansion Joints:

1. Do not permit reinforcement or other embedded metal items bonded to concrete (except smooth dowels bonded on only one side of joint) to extend continuously through an expansion joint.

2. Use neoprene expansion joint fillers, unless noted otherwise on Drawings.

3. Seal expansion joints as shown on Drawings.

a. See Specification Sections 07 92 13 and 07 92 16 for requirements.

F. Waterstops - General:

1. Waterstop to be continuous with splices in accordance with manufacturer's instructions and create water tight joints.

2. Do not mix different types of waterstop materials in the same structure without specific approval from the Engineer unless shown on Drawings.
3. Preformed strip type:
    a. Locate waterstop at center of wall, unless noted otherwise on Drawings.
        1) Maintain at least 3 IN from edge of concrete or as recommended by manufacturer.
    b. Install in a bed of swelling sealant on smooth surface of hardened concrete by use of nails, adhesive or other means as recommended by manufacturer to prevent movement of waterstop during placement of concrete.
    c. Roughened joints shall be especially prepared during concrete placement to provide smooth surface for proper water stop installation.
    d. Use in joints against existing concrete where indicated on Drawings.
4. PVC waterstops:
    a. Pre-position waterstop accurately in joints, with adequate clearance from all reinforcing. Do not push waterstop into wet concrete.
    b. Secure waterstops in correct position using hog rings or grommets spaced no more than 18 IN maximum staggered along each edge full length and passed through the edge of the waterstop.
        1) Tie wire to adjacent reinforcing.
    c. Hold horizontal waterstops in place with continuous supports.
    d. Install according to manufacturer's instructions.
        1) Do not displace reinforcement from required location.
    e. Splice ends and intersections with perpendicular butt splice using electrical splicing iron in accordance with manufacturer's instructions.
        1) Use factory fabricated "T" and corner intersection fittings.
        2) Field splice straight runs of material.
    f. Unless otherwise noted, use for all construction joints in new construction for all structures indicated on Drawings.

G. Other Embedded Items:
1. Place sleeves, inserts, anchors, and embedded items required for adjoining work or for its support, prior to initiating concreting.
    a. Give Contractor whose work is related or integral to concrete, or supported by it, ample notice and opportunity to furnish and install items before placing concrete.
2. Do not route electrical conduit, drains, or pipes in concrete slabs, walls, columns, foundations, beams or other structural members unless approved by Engineer.

H. Placing Embedded Items:
1. Support against displacement.

2. Fill voids in sleeves, inserts and anchor slots temporarily with readily removable material to prevent entry of concrete into voids.
3. Provide adequate means for anchoring waterstop in concrete.
    a. Provide means to prevent waterstops in the forms from being folded over by the concrete as it is placed.

3.5 FINISHING

A. See Specification Section 03 35 00.

B. Coordinate mixing and placing with finishing.

3.6 INSTALLATION OF GROUT

A. Grout Schedule:
1. Sand cement grout:
    a. Fill keyways in precast HCU.
    b. Construction joint bedding (base of wall pours with comparable compressive strength to wall).
    c. General use.
    d. As noted on Drawings.
2. Non-shrinking non-metallic grout:
    a. Filling form tie holes.
    b. Under column and beam base plates.
    c. Other uses indicated on the Drawings.
3. Epoxy grout:
    a. Patching cavities in concrete.
    b. Grouting of dowels and anchor bolts into existing concrete.
    c. Grouting of rotating or oscillating equipment base plates where driving motor is 500 HP and above.
    d. As noted on the Drawings.

B. Grout Installation:
1. Sand cement grout:
    a. Fill wetted keyways between precast concrete hollow core slabs with sand cement grout.
    b. Consolidate grout by rodding or by other means to assure complete filling of keyways.
    c. Cure grout by one of methods specified.
2. Non-shrink non-metallic grout:
    a. Clean concrete surface to receive grout.
    b. Saturate concrete with water for 24 HRS prior to grouting.

c. Mix in a mechanical mixer.

d. Use no more water than necessary to produce flowable grout.

e. Dry-pack grouting may be appropriate in certain situations.

f. Place in accordance with manufacturer's instructions.

g. Provide under beam, column, and equipment base plates, in joints between precast concrete and cast slabs, and in other locations indicated on the Drawings.

h. Completely fill all spaces and cavities below the top of base plates.

i. Provide forms where base plates and bed plates do not confine grout.

j. Where exposed to view, finish grout edges smooth.

k. Except where a slope is indicated on the Drawings, finish edges flush at the base plate, bed plate, member or piece of equipment.

l. Coat exposed edges of grout with cure or seal compound recommended by the grout manufacturer.

3. Epoxy grout:

a. Mix and place in accordance with manufacturer's instructions.

b. Apply only to clean, dry, sound surface.

c. Completely fill all cavities and spaces around dowels and anchors without voids.

d. Grout base and bed plates as specified for non-shrinking, non-metallic grout.

e. Obtain manufacturer's field technical assistance as required to assure proper placement.

3.7 CURING AND PROTECTION

A. Protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury immediately after placement, and maintain with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement, hardening, and compressive strength gain.

1. Follow recommendations of ACI 308.1 except as modified herein.

2. All traffic shall be kept from the surface as necessary to protect the concrete but not less than the first 48 HRS of curing.

B. For surfaces of non-water bearing structures, apply one of the following curing procedures immediately after completion of placement and finishing (surfaces not in contact with forms).

1. Ponding or continuous sprinkling. Take care to avoid eroding the surface of freshly placed concrete.

2. Application of wet Absorbent Covers:

a. Minimum lap: 12 IN.

b. Provide continuous uniform supply of moisture, such as sprinklers or soaker hoses as required to keep concrete surface continuously wet.

c. Monitor Absorbent Covers as required to prevent cover materials or concrete surface from drying out.

3. Continuous application of steam (not exceeding 150 DEGF) or mist spray.
4. Application of Moisture Retaining Cover sheet materials.
    a. Place as soon as possible after final finishing and without marring the surface.
    b. Minimum lap: 12 IN.
    c. Seal all edges to make water-tight.
    d. Place Moisture Retaining Cover in intimate contact with the concrete surface, without wrinkles and weighted to hold in place.
    e. Hold cover and edges in place as required to prevent wind from displacing the cover.
    f. Moisture Retaining Fabric:
        1) Install in accordance with manufacturer's written recommendations.
        2) Saturate concrete surface and fabric side of cover immediately prior to placing.
    g. Monitor continuously during the curing period:
        1) Repair any holes, tears or displaced cover.
        2) Rewet as required to keep concrete moist under cover.
5. Application of other moisture retaining covering as approved by Engineer.
6. Water used for curing shall be within 20 DEGF of the concrete temperature.
7. Application of a curing compound.
    a. Apply curing compound in accordance with manufacturer's recommendations immediately after any water sheen, which may develop after finishing, has disappeared from concrete surface.
    b. Do not use on any surface against which additional concrete or other material is to be bonded unless it is proven that curing compound will not prevent bond.
    c. Where a vertical surface is cured with a curing compound, the vertical surface shall be covered with a minimum of two coats of the curing compound.
        1) Apply the first coat of curing compound to a vertical surface immediately after form removal.
        2) The vertical concrete surface at the time of receiving the first coat shall be damp with no free water on the surface.
        3) Allow the preceding coat to completely dry prior to applying the next coat.
        4) A vertical surface: Any surface steeper than 1 vertical to 4 horizontal.
8. Surfaces In Contact with Forms:
    a. Formed surfaces: Cure formed concrete surfaces utilizing final curing methods per ACI 308.1, including underside of beams, supported slabs, and other similar surfaces,
        1) See Section 03 11 13.
    b. Minimize moisture loss from and temperature gain of concrete placed in forms exposed to heating by sun by keeping forms wet and cool until they can be safely removed.

c. Make provisions to keep concrete wall moist while stripping forms and until curing measures are in place.

d. After form removal, cure concrete until end of time prescribed.

e. Use one of the methods listed above.

f. Forms left in place shall not be used as a method of curing in hot weather.

g. The term "hot weather", where used in these specifications, is defined in ACI 305.1.

h. In hot weather, remove forms from vertical surfaces as soon as concrete has gained sufficient strength so that the formwork is no longer required to support the concrete.

C. Curing Period:

1. Continue curing for at least seven days for all concrete except Type III, high early strength concrete for which period shall be at least three days.

a. If one of curing procedures indicated above is used initially, it may be replaced by one of other procedures indicated any time after concrete is two days old, provided concrete is not permitted to become surface dry during transition.

D. Cold Weather:

1. Follow recommendations of ACI 306.1.

2. Maintain temperature of concrete per ACI 306.1 for a minimum of 72 HRs after concrete is placed, when outdoor temperature is 40 DEGF, or less.

a. Maximum temperature rate of decrease: Per ACI 306.1.

3. Use heating, covering, insulating, or housing of the concrete work to maintain required temperature without injury due to concentration of heat.

4. Do not use combustion heaters unless precautions are taken to prevent exposure of concrete to exhaust gases which contain carbon dioxide.

5. Interior slabs in areas intended to be heated shall be adequately protected so that frost does not develop in the supporting subgrade.

6. When freezing temperatures are forecast, facilities meeting the approval of the Engineer shall be provided, prior to beginning concrete placement, capable of maintaining the ambient air temperature at the surface of the concrete or forms at not less than 50º F for five (5) days or 70º F for three (3) days. Protective measures shall be maintained for at least four (4) days beyond the period specified above. During this period, the concrete temperature shall not be allowed to drop below 40º F. Sudden cooling (in excess of 20º F temperature change in any 24-hour period) of ambient air temperature at the surface of the concrete or forms will not be permitted.

E. Hot Weather:

1. Follow recommendations of ACI 305.1 and ACI 308.1.

2. Make provision for cooling forms, reinforcement and concrete, windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering with a light colored material.

3. Provide protective measures as quickly as concrete hardening and finishing operations will allow.

4. Maximum temperature rate of decrease: Per ACI 305.1.

5. If, in the opinion of the Engineer, proper protection is not being provided, the Engineer may order concrete operations to be suspended until adequate protective measures are provided. Concrete shall be kept cool and moist during the specified curing period. When air temperature exceeds 90º F and soon as practicable, without damage to the surface finish, all exposed concrete shall be kept continuously moist by means of fog sprays, wet burlap, cotton mats or other effective means.

F. Rate of Temperature Change:

1. Keep changes in temperature of air immediately adjacent to concrete as uniform as possible, during and immediately following curing period.

G. Mass Concrete:

1. Curing: Method of curing shall be as described above.

2. Curing and insulating period:

a. All formed and unformed exposed concrete surfaces shall be insulated during the curing.

b. The insulation monitoring period shall last a minimum of seven days or longer as required as described in the "Monitoring Period" paragraph below.

c. Insulation requirements shall be based on the air temperature surrounding the concrete.

1) A minimum of one layer of commercially available concrete insulating blanket with a minimum R-value of 5 will be used.

2) Other materials of similar R-value may be approved by the Engineer.

3. Monitoring period:

a. Surface Temperature:

1) During the curing and insulating period the surface temperature of the concrete will be monitored a minimum of twice per day until the surface temperature of the mass concrete falls to within 30 DEGF of the ambient air temperature surrounding the mass concrete.

2) During this monitoring period, the surface temperature of he mass concrete shall not be permitted to drop more than 15 DEGF over a 24 HR period.

a) If the temperature drop is exceeded while insulation is in place, increase insulation for remainder of the monitoring period.

b) If the temperature drop is exceeded at the end of the monitoring period, insulation shall be reinstalled and left in place for a period of 24 HRS.

3) Do not artificially cool the surface of the mass concrete with water or other means during the monitoring period.

b. Core temperature:

1) Insulation of the concrete surfaces(s) shall continue until the temperature differential between the concrete section core temperature and the concrete section surface temperature is less than 35 DEGF for longer than three days.

2) The maximum temperature in concrete after placement shall not exceed 158 DEGF.

c. Provide all necessary thermometers and temperature measuring equipment necessary of monitoring concrete and ambient air temperature during the Monitoring Period.

1) Record all times and temperatures during the Monitoring Period.

2) Allow Engineer and/or Special Inspector to witness the results of each temperature reading.

H. Protection from Mechanical Injury:

1. Protect concrete from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration.
2. Protect finished concrete surfaces from damage by construction equipment, materials, or methods, and by rain or running water.
3. Do not load self-supporting structures in such a way as to overstress concrete.

3.8 FIELD QUALITY CONTROL

A. Special Inspections per Building Code:

1. See Section 01 45 00 and 03 05 05.

B. Mass Concrete Thermal Monitoring:

1. Submit a thermal monitoring control plan for each mass concrete placement, meeting the following requirements:

a. Concrete mix used.

b. Calculated upper limit for concrete temperature at the time of each placement.

c. Drawings showing location for temperature sensors in each concrete placement.

d. A sample of the format and frequency of temperature data presentation. This shall include the identification of the time when the maximum core temperature is reached and when all surface/core temperature differentials are exceeded.

e. Description of the curing procedures including material and methods, and curing duration.

f. Description of formwork removal procedures to ensure that the temperature difference along the temporarily exposed surface does not exceed the established temperature differential limit as well as how the curing process will be maintained.

2. See ACI 301, Section 8.3 for temperature sensor location(s) and sensor requirements.

3. Thermal monitoring shall continue for the duration the concrete is insulated (See Article 3.7) or unless otherwise directed by Engineer.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel, including the fabrication and erection of support and bracing members, including connections.
2. Connection detail design as required.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Procurement and Contracting Requirements.
2. Division 01 - General Requirements.
3. Section 03 15 19 - Anchorage to Concrete.
4. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Institute of Steel Construction (AISC):
   a. 303, Code of Standard Practice for Steel Buildings and Bridges.
   b. 360, Specifications for Structural Steel Buildings.
   c. Quality Certification Program for Fabricators.
2. American Society of Mechanical Engineers (ASME):
   a. B18.21.1, Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series).
3. ASTM International (ASTM):
   a. A2, Standard Specification for Carbon Steel Girder Rails of Plain, Grooved, and Guard Types.
   b. A6/A6M, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
   c. A36/A36M, Standard Specification for Carbon Structural Steel.
   d. A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
   e. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
   f. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
   g. A500/A500M, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
   h. A563, Standard Specification for Carbon and Alloy Steel Nuts.

i. A992/A992M, Standard Specification for Structural Steel Shapes.

j. A1064/A1064M, Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

k. F436, Standard Specification for Hardened Steel Washers.

l. F959, Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.

m. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

n. F3125, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

4. American Welding Society (AWS):

a. A5.1/A5.1M, Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.

b. A5.5/A5.5M, Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding.

c. A5.17/A5.17M, Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.

d. A5.18/A5.18M, Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding.

e. A5.20/A5.20M, Specification for Carbon Steel Electrodes for Flux Cored Arc Welding.

f. A5.23/A5.23M, Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding.

g. A5.28/A5.28M, Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding.

h. A5.29/A5.29M, Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding.

i. D1.1/D1.1M, Structural Welding Code - Steel.

1) Steel stud connectors and their installation to comply with requirements of AWS D1.1/D1.1M.

5. American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering.

6. National Institute of Steel Detailing (NISD).

7. Research Council on Structural Connections (RCSC):

a. Specification for Structural Joints Using High-Strength Bolts.

8. Building code:

a. International Code Council (ICC):

1) International Building Code and associated standards, 2021 Edition including all amendments, referred to herein as Building Code.

B. Qualifications:

1. Steel fabricator:

a. Minimum of 10 years of experience in fabrication of structural steel and participate in the AISC Certification program and is designated an AISC Certified Plant, Category ***BU, IBR*** at time of bid.

b. Fabricator plant quality control and inspection program: Meet requirements of the Building Code and/or be an Approved Fabricator.

c. Plants that are not an Approved Fabricator may be acceptable, provided:

1) Plant meets all remaining qualifications.

2) Contractor reimburses the Owner the cost of required Special Inspection services.

2. Steel erector:

a. Minimum of 10 years of experience in erection of structural steel similar in the scope of this project.

b. With an active and enforced quality assurance program in place, as described in the applicable Codes.

3. Bridge erector:

a. Erector QMS Certification with Bridge Endorsement

4. Qualify welding procedures and welding operators in accordance with AWS.

1.3 DEFINITIONS

A. Owner: May mean the Owner's Designated Representative for Construction as defined by the AISC 303.

B. Approved Fabricator: Approved by the Building Official to perform the Building Code required Special Inspections.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

2. Product technical data including:

a. Acknowledgement that products submitted meet requirements of standards referenced.

b. Manufacturer's installation instructions.

c. Detailed supplemental specification relating to load indicator washers or high-strength bolts.

1) Alternate design for Engineer approval (submitted at Contractor's option if desired by Contractor for use).

d. Source and certification of quality for high-strength bolts, nuts and washers.

3. Material Cut Sheets Fabrication and/or layout drawings:
    a. Prepare Shop Drawings under NISD Quality Procedures Program certification.
    b. By approving and submitting shop drawings, the CONTRACTOR thereby represents that all field measurements, field construction criteria, materials, catalog numbers and similar data have been determined and verified and that the shop drawings have been checked and coordinated with the requirements of the work and of the contract documents.
    c. Complete Shop Drawings for all of the work showing clearly all pieces, sizes, dimensions, details, connections materials and shop coatings.
        1) All Shop Drawings must be checked and signed "approved" before submittal.
        2) Show all cuts, copes, and holes.
        3) Indicate all shop and field bolts.
        4) Indicate all shop and field welds using AWS symbols.
    d. Prepare complete erection drawings showing the location and marks of all pieces.
        1) Copies of up-to-date erection drawings shall accompany the Shop Drawings.
        2) Use match marks on the erection drawings to indicate the sheet number on which each particular member is detailed.
    e. Correct any incorrect or unacceptable material or fabrication due to incorrect detailing, shop work, or erection, without additional charge.
    f. Fabricator Quality Control Plan
    g. Element Loading diagram
    h. FCM handling procedures
    i. Erection Plan
    j. Heat straightening procedures, in accordance with FHWA-IF-99-004, including but not limited to: Identification of heating region for repair, heating patterns and parameters, constraint plan and jacking configuration design, and estimate of number of heating cycles required.
4. Certifications:
    a. Certificates of compliance with standards specified for all major components and fasteners incorporated into work.
    b. Copies of current welding certificates for each welder assigned to perform welding indicating compliance with testing specified by AWS.
    c. Welder qualification data and prequalified procedures.
    d. Special Inspections reports.
    e. Source Quality Control Documentation, including certificate of compliance stating that the work performed in the fabrication shop was done in accordance with the approved construction documents.
        1) Certification is required only if the fabricator is fabricator approved by the Building Official.

f. Fabricator shall be certified under the AISC Quality Certification Program as follows:

1) Welded Plate Girders Category III

2) Certified Bridge Fabricator – Intermediate (or) Advanced

3) Certified Bridge Fabricator Advanced (CBF-A) certification with Fracture Control Endorsement (FCE)

5. Test reports:

a. Certified copies of mill tests.

b. Manufacturer's load test and temperature sensitivity data for post-installed anchor bolts.

c. Test reports for all structural steel work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle and store steel members above ground on level platforms, skids or other supports.

1. Keep free of dirt and other foreign material and protect against corrosion.

2. Girders and beams shall be supported on skids placed near enough together to prevent damage from deflection.

3. Contractor is responsible for safely transporting, storing, and handling all materials. All materials shall be protected from damage, weather, theft and vandalism during all phases of construction.

B. All material shall be handled in a manner which will prevent members from being distorted or damaged.

C. All small parts such as rivets, bolts, pins, washers, and small connection plates shall be packed in containers of adequate strength. The contents of each unit shall be plainly marked on the top of each container.

D. Tag miscellaneous steel (including anchor bolts/rods), concrete anchors, sleeve, and bases, or otherwise mark for ease of identification at the project site.

E. Fracture Critical Members: For those members designated as fracture critical members (FCMs), the following shall apply:

1. Extraordinary care shall be taken in the handling of FCMs. Lifting dogs, tongs, grips, chains, cables, or other lifting devices placed in direct contact with the FCM which may gouge, scratch, score, scrape, or otherwise damage the surface, edges or corners of FCMs shall not be used.

2. Procedures for handling FCMs using lifting straps, timber cushions or other protective devices shall be developed, submitted to the ENGINEER, and receive written approval by the ENGINEER before handling any material for or members designated as FCM.

F. Shipping: All materials shall be carefully loaded so as to avoid damage in transit, and in accordance with the following:

1. Girders shall be shipped in an upright position and adequately blocked and braced to prevent damage during shipping. The Fabricator shall submit girder loading diagrams to the ENGINEER for approval well in advance of the anticipated shipping date. These

diagrams shall include proposed blocking, bracing and tie-down details. VRE shall not be liable for damage to the steel during shipment or any other property during transport.

2. Members weighing more than 3 tons shall have the weight marked thereon.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. High-strength bolts:
   a. Portland Bolt and Manufacturing Company.
   b. Lewis Bolt & Nut Company.
   c. Nucor Fasteners.
   d. St. Louis Screw and Bolt Company.
2. Load indicator washers for high-strength bolts:
   a. Portland Bolt and Manufacturing Company.
   b. Mid-South Bolt and Screw Co., Inc.
   c. J and M Turner, Inc.
3. Alternate design high-strength bolts:
   a. T. C. Bolt Corporation.
   b. Construction Fastener Systems Division of Bristol Machine Company.
   c. LeJuene Bolt Co.
4. Headed studs and deformed bar anchors:
   a. Nelson Stud Welding Division, TRW, Inc.
   b. Stud Welding Products, Inc.
5. Mechanical anchor bolts:
   a. See Section 03 15 19.
6. Adhesive anchors bolts:
   a. See Section 03 15 19.
7. Anchor bolt sleeves:
   a. Sinco/Wilson.

B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MATERIALS

A. Steel, Structural Shapes and Plate (unless noted otherwise on Drawings):

1. All W-shapes and WT-shapes: ASTM A992/A992M.
2. All other plates, bars and rolled shapes: ASTM A36/A36M.

3. Rolled Steel and Built-Up Steel members for girders, floor beams and stringers shall be ASTM A709, Grade 50.
    a. Toughness – Shall be T2 for non-fracture critical members or F2 for fracture critical members.
    b. Plate flanges shall not exceed 3 inches thickness, unless otherwise noted.

B. Piles:
1. Pipe Pile steel shall be ASTM A252, Grade 3 (Modified 50 ksi).
2. H-Pile steel shall be ASTM A690.
3. Sheet Pile steel shall be ASTM A572, Grade 50.

C. Pile Splices:
1. H-Pile splices shall conform to ASTM A992 or ASTM A572, Grade 50.
2. Pipe Pile backing rings shall conform to ASTM A109.

D. Pile Tips:
1. H-Pile Points shall be fabricated from cast steel conforming to ASTM A27, Grade 65.
2. Pipe Pile Conical Points shall conform to ASTM A148 (90/60), with a minimum yield stress of 60 ksi.
3. Cutting shoes shall be fabricated from cast steel conforming to ASTM A148 (90/60), Grade 60.

E. Pipe: ASTM A53/A53M, Grade B (Type E or S) (Fy=35).

F. Hollow Structural Sections (HSS):
1. Round: ASTM A500/A500M, Grade B (Fy=42).
2. Square or rectangular: ASTM A500/A500M, Grade B (Fy=46).

G. High-Strength Bolts, Nuts and Washers:
1. ASTM F3125, Grade A325 with ASTM A563 nuts:
2. High-strength bolts:
    a. Provide two ASTM F436 washers for all bolts.
    b. Provide beveled washers at connections of sloped/tapered sections.
3. High-strength bolts with compressible washer type direct tension indicators (DTI), ASTM F959.
    a. Provide at Contractor's option and subject to approval of Engineer.
4. Alternate high-strength design: Provide at Contractor's option and subject to approval of Engineer.

H. Bolts, Non-high Strength: ASTM A307, Grade A.

I. Threaded Rod: ASTM F1554, Grade 36.

J. Washers, Plain (for Non-high Strength Bolts): ASME B18.22.1, Type B.

K. Welding Electrodes:

1. Shielded metal arc: AWS A5.1/A5.1M or AWS A5.5/A5.5M, E70XX or E801X-X.
2. Submerged arc: AWS A5.17/A5.17M or AWS A5.23/A5.23M, F7XX-EXXX or F8XX-EXXX-XX.
3. Gas metal arc: AWS A5.18/A5.18M, E70S-X or E70U-1 or AWS A5.28/A5.28M, ER80S-XX, E80C-XXX.
4. Flux cored arc: AWS A5.20/A5.20M, E7XT-X (except 2, 3, 10, GS), AWS A5.29/A5.29M, E7XT-X or E8XTX-X, E8XTX-XM.

L. Anchor Rods and Bolts:

1. See Section 03 15 19.

M. Headed Studs and Deformed Bar Anchors:

1. Headed studs:
   a. ASTM A108, complying with AWS D1.1/D1.1M, Section 7, Type B; minimum yield strength 50,000 PSI, minimum tensile strength 60,000 PSI.
   b. Uniform diameter.
   c. Heads: Concentric and normal to shaft.
   d. Weld end: Chamfered and solid flux.
2. Deformed bar anchor:
   a. ASTM A1064/A1064M, complying with AWS D1.1/D1.1M, Section 7, Type C.
   b. Minimum yield strength: 70,000 PSI.
   c. Minimum tensile strength: 80,000 PSI.
   d. Straight, unless indicated otherwise.
   e. Solid flux.
3. After welding, remove ceramic ferrules and maintain free from any substance which would interfere with function, or prevent bonding to concrete.

N. Non-shrink Grout: See Specification Section 03 09 00.

O. Crane Rails:

1. Controlled-cooled, open-hearth carbon steel ASCE (American Society of Civil Engineers) rails per ASTM A2, Class A, #1 rails, unless noted otherwise, of size and weight indicated.
   a. Furnish rails with milled tight end joints suitable for crane service, with standard drilling, removable end stops and all related accessories required, including:
      1) Joint bars: Match rail section and properties, drilled to match rail drilling.
      2) Joint bar bolts and nuts: High strength.
      3) Hardened washer: ASTM F436 for bar bolts.
      4) Except as indicated otherwise, two-bolt type fixed or floating rail clamps to suit the conditions, of forged or pressed steel, complete with Grade A325 bolts, reversible fillers, and self-locking nut or nut and lock washer.

P. Mechanical and Adhesive Anchor Bolts for Fastening to Concrete:

1. See Specification Section 03 15 19.

2.3 FABRICATION

A. Comply with requirements of applicable Building Code, AISC 360 and AREMA recommendations with modifications and additional requirements specified herein.

1. Identify high-strength steel material in fabricated members in accordance with ASTM A6/A6M.

B. The Fabricator shall notify the ENGINEER and its inspector of the scheduled date for beginning fabrication, and shall not begin fabrication until the ENGINEER's Inspector is present, if applicable.

C. The ENGINEER may arrange for inspection by an independent inspection firm under a separate contract. The CONTRACTOR shall submit, to the ENGINEER, a Fabricator's Quality Control Program.

D. Minimize the amount of field welding.

1. Shop assemble components into largest size possible commensurate with transportation and handling limitations.

2. Shop connections: Bolted with high-strength bolts or welded.

E. Connection Details:

1. Provide as a minimum, two, 3/4 IN DIA, high-strength bolts for all bolted connections unless otherwise specified.

F. Provide bearing type connections for all bolted connections, unless otherwise noted.

G. Field Connections:

1. Provide bolts for all field connections except where shown otherwise on the Drawings.

2. Use high-strength bolts unless shown or specified otherwise.

3. Use of high-strength bolts: Conform to RCSC Specification for Structural Joints Using High-Strength Bolts.

4. Unfinished bolts may be used for attaching stair treads to stringers.

5. If structural steel details (field welds versus shop welds, etc.) shown on design Drawings are not compatible with selected erection procedures, submit proposed modifications for review.

6. Connections to structural steel provided by others: Provide all connectors and coordinate location of bolt holes to match connection holes in steel provided by others.

7. Connections shall be accurately fitted up before high strength bolts are placed. A sufficient number of the holes at a connection point shall be filled with erection pins to "fair-up" all holes. Light drifting will be permitted, but drifting to match unfair holes will not be permitted. Such holes shall be reamed or drilled under the direction of the ENGINEER. All material within the grip of the bolt shall be steel. There shall be no compressible material such as gaskets or insulation within the grip. Unless otherwise indicated on the plans, bolts oriented vertically shall be installed with the heads on top of the connected pieces.

H. Accurately mill column end bearing surfaces to true plane.

I. Fabricate and erect beams with non-specified camber in accordance with AISC 360, Chapter L1.

J. Cut, drill, or punch holes at right angles to surface of metal.

1. Do not make or enlarge holes by burning.
2. Make holes clean cut, without torn or ragged edges.
3. Remove outside burrs resulting from drilling or reaming operations with tool making 1/16 IN bevel.
4. Provide holes in members to permit connection of work of other trades or contractors.

K. Make allowance for draw in all cross bracing to provide small amount of initial tension in members.

L. Make splices only where indicated or where approved.

M. Wall Girts:

1. Extend past columns and miter ends unless noted otherwise.
2. Connect girts to each other at corners unless noted otherwise.

N. Cope at 45 DEG, corners of stiffener plates at junction of member flanges with webs.

O. Flame cut bevels for welds, provided such cutting is done automatically.

1. Leave free of burrs and slag by grinding or planing the cut edges.

P. Grind smooth all rough welds and sharp steel edges shall be ground to approximately 1/8 IN radius.

Q. Tolerances (unless noted otherwise on Drawings):

1. When material received from the mill does not satisfy ASTM A6/A6M tolerances for camber, profile, flatness or sweep, Contractor is permitted to perform corrective work by the use of controlled heating, and mechanical straightening, subject to the limitations of the AISC 360.
2. Fabrication tolerance:
    a. Member length:
        1) Both ends finished for contact bearing: 1/32 IN.
        2) Framing members: 30 FT or less: 1/16 IN.
    b. Member straightness:
        1) Compression members: 1/1000 of axial length between points laterally supported.
        2) Non-compression members: ASTM A6/A6M tolerance for wide flange shapes.
    c. Specified member camber (except compression members):
        1) 50 FT or less: -0/+1/2 IN.
        2) Over 50 FT: -0/+1/2 IN (+1/8 IN per 10 FT over 50 FT).
        3) Members received from mill with 75 PCT of specified camber require no further cambering.

4) Fabricate beams/trusses without specified camber so after erection, camber is upward.

5) Measure camber in fabrication shop in unstressed condition.

d. Use filler plates at bolted splices to take up depth deviation.

1) At welded joints, adjust weld profile to conform to variation in depth.

2) Slope weld surface per AWS requirements.

e. Free finished members from twists, bends and open joints.

1) Sharp kinks, bends and deviation from the above tolerances are cause for rejection of material.

R. Pin Connections: All packing washers, if any, must be in place when the work is assembled. While pins are being driven into place, threads shall be protected by pilot and driving nuts supplied by the CONTRACTOR. After nuts are tightened, the threads adjacent to the nut shall be burred a minimum of two threads at two locations opposite of each other.

S. Handling and storage of bolts and nuts:

1. Bolts and nuts shall be protected from dirt and moisture at the job site. Only as many fasteners as are anticipated to be installed and tightened during a work day shall be taken from protected storage;

2. Fasteners not used shall be returned to protected storage at the end of the day. Fasteners shall not be cleaned of lubricant that is present in the as-delivered condition;

3. Fasteners that show signs of rust or dirt shall be cleaned and lubricated prior to installation. Any additional lubrication required must be applied prior to installing bolts in the holes;

4. Bolts and associated nuts and washers shall be identified by rotational-capacity lot number and stored in a manner that will retain this identification.

T. Installation: Bolt installation shall be in accordance with AREMA recommendations for railway bridges.

2.4 WELDING

A. Comply with AWS D1.1/D1.1M, and other requirements indicated herein, for all welding, techniques of welding employed, appearance and quality of welds, and methods used to correct defective work.

1. Qualify joint welding procedures or test in accordance with AWS qualification procedures.

2. All welds shall be inspected visually and by use of nondestructive testing.

3. Copies of all weld inspections and nondestructive testing reports shall be submitted to the Engineer.

4. Welds and welding procedures shall be in accordance with the American Welding Society (AWS) Bridge Welding Code, current edition and all addenda to it.

B. Test and qualify welders, welding operators and tackers in compliance with AWS D1.1/D1.1M for position and type of welding to which they will be assigned.

1. Conduct tests in presence of approved testing agency.

2. Certification within previous 12 months will be acceptable, provided samples of the welder's work are satisfactory.

C. Before Starting Welding:

1. Carefully plumb and align members in compliance with specified requirements.
2. Fully tighten all bolts.
3. Comply with AWS D1.1/D1.1M, Section 5 for assembly and surface preparation.
4. Preheat base metal to temperature stated in AWS D1.1/D1.1M.
    a. When no preheat temperature is given in AWS D1.1/D1.1M and base metal is below 50 DEGF, preheat base metal to at least 70 DEGF.
    b. Maintain temperature during welding.
    c. Preheat surface of all base metal within distance from point of welding equal to thickness of thicker part being welded or 3 IN, whichever is greater, to specified preheat temperature.
    d. Maintain this temperature during welding.
5. Mark welds with an identifying mark unique to each welder.

D. Make flange welds before making web welds.

E. Where groove welds have back-up plates, make first three passes with 1/8 IN round electrodes.

1. Use backup plates in accordance with AWS D1.1/D1.1M, extending minimum of 1 IN either side of joint.

F. Flame cut edges of stiffener plates at shop or field butt weld.

1. Do not shear.

G. Grind flush web fillets at webs notched to receive backup plates for flange groove welds.

H. Low Hydrogen Electrodes: Dry and store electrodes in compliance with AWS D1.1/D1.1M.

I. Do not perform welding when ambient temperature is lower than 0 DEGF or where surfaces are wet or exposed to rain, snow, or high wind, or when welders are exposed to inclement conditions.

J. Headed Studs and Deformed Bar Anchors:

1. Automatically end welded in accordance with the AWS D1.1/D1.1M and manufacturer's recommendations.
2. Fillet welding of headed studs and deformed bar anchors is not allowed unless approved by Engineer.

K. Test in-place studs in accordance with requirements of AWS D1.1/D1.1M to ensure satisfactory welding of studs to members.

1. Replace studs failing this test.

L. When headed stud-type shear connectors are to be applied, clean top surface of members to receive studs in shop to remove oil, scale, rust, dirt, and other materials injurious to satisfactory welding.

1. Do not shop paint or galvanize metal surfaces to receive field applied studs.

M. Welded Connections (Railway Bridges):

1. Only submerged arc welding (SAW), shielded metal arc welding (SMAW), or flux core arc welding (FCAW) may be used. If FCAW is used, it shall be gas shielded with 71-T1 electrodes unless otherwise approved. Any other process must be approved by the ENGINEER.

2. Welding electrodes for arc welding shall meet the current requirements of the AWS Bridge Welding Code. As noted above, if FCAW is used, the electrodes shall be 71-T1.

N. Critical Repair Welding:

1. All critical repairs of welds shall be approved by ENGINEER prior to beginning the repair even if the initial repair is deemed critical. Prior to performing any critical repair welding, CONTRACTOR shall submit Written Repair Procedures to ENGINEER for review and approval. The repair procedures shall meet the minimum provisions of AWS D1.5 12.17.6 which includes adequately describing the deficiency and the proposed method of repair. The repair procedures shall detail the location(s) of the discontinuity in the member. The submission shall also include a Welding Procedure Specification (WPS) that shall be based on AWS D1.5 Section 3 and acceptable Procedure Qualification Record (PQR). The WPS shall include at a minimum the following:

   a. Type of material and Weld process

   b. Joint detail

   c. Position of the weld

   d. Filler metal specification AWS

   e. Electrode and manufacturer

   f. Single or multiple pass

2. ENGINEER shall

   a. Approve both repair by welding and the repair WPS prior to start of the welding as per AWS D 1.5

   b. Verify the repair weld soundness by Ultrasonic Testing (UT), Magnetic Particle Testing (MT), or other testing as required by the ENGINEER.

   c. For 1st weld repair, the TSE will perform UT as 100% of non-critical and critical full penetration welds on all fracture critical weld repairs. The TSE will perform at a minimum 25% MT on all welds.

   d. If after the first weld repair an unacceptable weld is still found through testing as noted above and The CONTRACTOR elects to repair said weld, the CONTRACTOR will be required to submit written weld procedures as defined above. A second weld repair will be automatically deemed as a critical repair.

   e. If after the second weld repair an unacceptable weld still exists, the CONTRACTOR will be required to

      1) Complete all submissions as noted above. ENGINEER will be required to approve

      2) A third repair (second critical). 100% UT and MT testing will be required. In addition, due to the amount of times the section has been heated, Hardness testing will be required per AWS D1.5 4.10.4.1.

3) If after a third weld repair, if UT or Hardness testing fail to provide an acceptable result, then said girder shall be rejected and a new girder shall be fabricated.

2.5 SHOP COATING

A. Refer to Specification Section 09 96 00 and coordinate shop primer, surface preparation and coating with field applied primers and coatings where specified.

B. Provide suitable methods of handling and transporting painted steel to avoid damage to coating.

C. Do not coat following surfaces:

1. Machined surfaces, surfaces adjacent to field welds, and surfaces fully embedded in concrete.

2. All other members for which no coating is specified.

3. Contact surfaces at bolted slip-critical connections, unless surface condition conforms to the RCSC Specification for Structural Joints Using High-Strength Bolts, Part 3.2.2.

4. All joint surfaces, including those adjacent to the bolt heads, nuts or washers, shall be free of dirt, loose rust, loose scale, burrs and other matter that will prevent solid seating of the parts. Unless otherwise shown on the plans, faying surfaces of all non-galvanized joints, including splice plates, shall be given a blast cleaning, in accordance with the requirements of the Steel Structures Painting Council Specifications SSPC-SP7 Brush-Off Blast Cleaning, and shall be free of loose rust prior to final bolting. Galvanized faying surfaces shall be roughened by hand wire brushing prior to final bolting. When shown on the plans, faying surfaces shall be blast cleaned and coated with a paint that provides the specified mean slip coefficient as determined by the "Test Method to Determine the Slip Coefficient for Coatings Used in Bolted Joints" as adopted by the Research Council on Structural Connections. Coated joints shall not be assembled before the coating has cured for the minimum time used in the qualifying test.

D. Clean thoroughly all surfaces not coated before shipping.

1. Remove loose mill scale, rust, dirt, oil and grease.

2. Protect machined surfaces.

2.6 SOURCE QUALITY CONTROL

A. Special Inspection and Testing:

1. Special inspections shall comply with the City of Alexandria requirements for Special Inspections.

2. If the fabricator is not an Approved Fabricator, Owner will employ the services of an independent testing agency to inspect and test structural steel shop work for compliance with Specifications.

a. Contractor provides sufficient notification and access so inspection and testing can be accomplished.

3. Contractor responsible for testing to qualify shop welders and as needed for Contractor's own quality control to ensure compliance with Contract Documents.

B. Approved Fabricator or Testing Agency Responsibilities:

1. Inspect shop and field welding in accordance with AWS D1.1/D1.1M, Section 6 including the following non-destructive testing:
    a. Visually inspect all welds.
    b. In addition to visual inspection, test 50 PCT of full penetration welds and 20 PCT of fillet welds with liquid dye penetrant.
    c. Test 20 PCT of liquid dye penetrant tested full penetration welds with ultrasonic (UT) or radiographic (RT) testing.
    d. All transverse tension groove welds in FCM members, when allowed by the ENGINEER, shall be radiograph tested and ultrasonically tested 100%. In non-FCM components of FCM's all transverse groove welds shall be RT and UT tested 100%.
    e. Butt welds in both girder flanges and girder webs shall be 100% radiographed.
    f. 50% of flange to web welds shall be inspected by ultrasonic inspection method.
    g. 10% of all other welds shall be inspected by ultrasonic or magnetic particle procedures.
    h. Deck plate to floor beam or longitudinal girder welds may be visually inspected.
2. Inspect high-strength bolting in accordance with the RCSC Specification for Structural Joints Using High-Strength Bolts, Section 9.
    a. Verify proper pretension for slip-critical bolted connection only.
    b. Verify direct tension indicator gaps for slip-critical bolted connection only.
3. Inspect stud welding in accordance with AWS D1.1/D1.1M, Section 7.8.
4. Prepare and submit inspection and test reports to Engineer.

2.7 GENERAL

A. Contractor is solely responsible for safety.
    1. Construction means and methods and sequencing of work is the prerogative of the Contractor.
    2. Take into consideration that full structural capacity of many structural members is not realized until structural assembly is complete; e.g., until slabs, decks, bracing or rigid connections are installed.
    3. Partially complete structural members shall not be loaded without an investigation by the Contractor.
    4. Until all elements of the permanent structure and lateral bracing system are complete, provide temporary bracing designed, furnished, and installed by the Contractor for the partially complete structure.

B. Adequate temporary bracing to provide safety, stability and to resist all loads to which the partially complete structure may be subjected, including wind, construction activities, and operation of equipment, is the responsibility of the Contractor.
    1. Use temporary guys, braces, shoring, connections, etc., necessary to maintain the structural framing plumb and in proper alignment until permanent connections are made, the succeeding work is in place, and temporary work is no longer necessary.

2. Use temporary guys, bracing, shoring, and other work to prevent injury or damage to adjacent work or construction from stresses due to erection procedures and operation of erection equipment, construction loads, and wind.

3. Design of the temporary bracing system and consideration of the sequence and schedule of placement of such elements and effects of loads imposed on the structural steel members by partially or completely installed work, including work of all other trades, is the Contractor's responsibility.

    a. If not obvious from experience or from the Drawings, confer with the Engineer to identify those structural steel elements that must be complete before the temporary bracing system is removed.

4. Remove and dispose of all temporary work and facilities off-site.

C. Examine work-in-place on which specified work is in any way dependent to ensure that conditions are satisfactory for the installation of the work.

1. Report defects in work-in-place which may influence satisfactory completion of the work.

2. Absence of such notification will be construed as acceptance of work-in-place.

D. Field Measurement:

1. Take field measurements as necessary to verify or supplement dimensions indicated on the Drawings.

2. Contractor is responsible for the accurate fit of the work.

E. Check the elevations of all finished footings or foundations and the location and alignment of all anchor bolts before starting erection.

1. Notify Engineer of any errors or deviations found by such checking.

PART 3 - EXECUTION

3.1 <u>ERECTION</u>

A. Before starting work, the CONTRACTOR shall submit an erection plan consisting of proposed methods, equipment, etc. which shall be subject to the review and approval of the Engineer.

B. Framing member location tolerances after erection shall not exceed the framing tolerances listed in the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section.

C. Erect plumb and level; introduce temporary bracing required to support erection loads.

D. Use light drifting necessary to draw holes together.

1. Drifting to match unfair holes is not allowed.

E. Welding:

1. Conform to AWS D1.1/D1/1M and requirements of this Specification Section.

2. Join two (2) sections of steel of different ASTM designations using welding techniques in accordance with a qualified AWS D1.1/D1.1M procedure.

3. No field welding or flame cutting will be allowed on the steel spans unless shown on the Plans or authorized in writing by the ENGINEER;

4. Tack welding, for the purpose of eliminating field erection bolts or for holding steel parts together while bolting, will not be permitted;

F. Shore existing members when unbolting of common connections is required.

1. Use new bolts for rebolting connections.

G. Falsework:

1. The CONTRACTOR shall provide the falsework, erecting devices, all tools, and machinery work. Drift pins sufficient to fill at least ¼ of the bolt holes for main field connections shall be provided;

2. The falsework shall be designed by a Professional Engineer, licensed in the Commonwealth of Virginia, constructed in accordance with the CONTRACTOR's plans, approved by the ENGINEER, and shall be properly maintained. Equipment for removing falsework shall not be supported on or attached to any portion of the new structure;

H. Girder Placement:

1. All steel beams or girders placed shall be securely tied and/or braced to prevent overturning immediately after erection, and until diaphragms, floor beams or cross frames are permanently in place. The methods to be used shall be submitted on the erection drawing;

2. When railroad or roadway traffic must be maintained beneath girders or beams already placed, traffic shall be protected against falling objects during the erection of any structural members, during the placing of cast-in-place concrete and during the erection and dismantling of forms. The protection shall consist of nets and/or flooring with no larger than 1-inch openings;

I. Clean stored material of all foreign matter accumulated during erection period.

J. Clean bearing and contact surfaces before assembly.

K. Set beam and column base and bearing plates accurately, as indicated, on nonshrink grout.

1. Set and anchor each base plate to proper line and elevation.

2. Use metal wedges, shims or setting nuts as required and tighten anchor bolts.

a. Use same metal as base plate.

b. Cut off protrusions of wedges and shims flush with edge of base plate.

3. Fill sleeves around anchor bolts with nonshrink grout.

4. Pack grout solidly between bottom of plate and bearing surface.

5. Refer to Specification Section 03 09 00 for non-shrink grout requirements.

L. Cast-in-place Anchor Bolts:

1. See Specification Section 03 15 19.

M. Install high strength bolts with hardened washers.

1. Install and tighten in accordance with the RCSC Specification for Structural Joints Using High-Strength Bolts, Section 8.

2. Coordinate installation with inspection.

a. Do not start installation until coordination with Testing Agency is complete.

3. Bearing-type connections: High-strength bolts shall be tightened to snug-tight condition.
4. Slip-critical connections:
    a. Perform calibration testing for all methods of installation of high-strength bolts in accordance with RCSC Specification for Structural Joints Using High-Strength Bolts, Section 8.2.
    b. Turn-of-nut tightening:
        1) Inspector shall observe the pre-installation verification testing.
        2) Subsequently, ensure by routine observation that the bolting crew properly rotates the turned element relative to the unturned element by the amount specified.
        3) Alternatively, when fastener assemblies are match-marked after the initial fitup of the joint but prior to pretensioning, visual inspection after pretensioning is permitted in lieu of routine observation.
    c. Calibrated wrench tightening: Calibrate on a daily basis.
    d. Direct tension indicator tightening: If previously approved by Engineer.
    e. Installation of alternate design bolts: If previously approved by Engineer.
5. In the event any bolt in a connection is found to be defective, check and retighten all bolts in the connection.

N. Do not use gas cutting to correct fabrication errors.
1. In case members do not fit or holes do not match, ream out the holes and insert the next larger size bolt.
    a. Drill new holes if the connections require new holes.
    b. Make no such corrections without prior approval of the Engineer.
2. Burning of holes is not permitted.

O. Prior to making field connections to existing structural steel, remove completely all paint from existing steel which will be in contact with new steel and new welds.

P. All joint surfaces, including those adjacent to the bolt heads, nuts or washers, shall be free of dirt, loose rust, loose scale, burrs and other matter that will prevent solid seating of the parts. Unless otherwise shown on the plans, faying surfaces of all non-galvanized joints, including splice plates, shall be given a blast cleaning, in accordance with the requirements of the Steel Structures Painting Council Specifications SSPC-SP7 Brush-Off Blast Cleaning, and shall be free of loose rust prior to final bolting.

Q. Tighten and leave in place erection bolts used in welded construction.

R. Provide beveled washers to give full bearing to bolt head or nut where bolts are to be used on surfaces having slopes greater than 1 in 20 with a plane normal to bolt axis.

S. After bolts are tightened, upset threads of non-high strength bolts and anchor bolts to prevent nuts from backing off.

T. After Erection:
1. Grind smooth all sharp surface irregularities resulting from field cutting or welding.

2. Power tool clean welds, bolts, washers and abrasions to shop coat removing all rust and foreign matter.

U. Mechanical Anchor Bolts and Adhesive Anchor Bolts:

1. See Specification Section 03 15 19.

3.2 ASSEMBLING STEEL

A. Accuracy: All parts shall be accurately assembled as shown on the plans and any match marks carefully followed. The material shall be carefully handled so that no parts will be bent, broken or otherwise damaged. Hammering which will damage or distort the members will not be permitted. Drifting done during erection shall be only such as required to bring the parts into position and enlarging the holes or distorting the metal will not be permitted.

B. Bolts: Fitting up bolts shall be 1⁄16 inch less in diameter than the hole, and cylindrical erection pins shall be 1⁄32 inch less in diameter than the hole.

C. Sole Plates: Where the sole plates have been shop-welded to these elements, the sole plates on beams and girders shall be in full contact with bearings before diaphragm, cross frame, or floor beam connections are made. Connections shall be adjusted as necessary, under the direction of the ENGINEER, to obtain full contact. Shim plates shall be used, as necessary, to obtain such full contact.

3.3 MISFITS AND STRAIGHTENING OF BENT MATERIAL

A. Corrections: The correction of minor misfits involving reaming bolt holes which does not change the slip critical category of the connection, or cutting which does not infringe on bolt edge distance requirements, and the straightening of minor cases of bent bars, plates, and the outstanding legs of angles, etc. which have not fractured, kinked, or yielded, shall be considered a legitimate part of the erection and shall be done by the CONTRACTOR at his expense. However, any error in the shop fabrication, or deformation resulting from handling and transportation which prevents the proper assembling and fitting up of parts by the moderate use of drift pins, or by a moderate amount of reaming, slight chipping or cutting, shall be reported immediately to the ENGINEER who will specify the method of correction to be used by the CONTRACTOR. The correction shall be made in the ENGINEER's presence.

B. Straightening: The straightening of bent materials, when permitted by the ENGINEER, shall be done by methods that will not produce fracture or other damage. Distorted members shall be straightened by mechanical means or, if approved by the ENGINEER, by the carefully planned and supervised application of a limited amount of localized heat in accordance with the guidelines presented in AWS D1.7 Clause 7 - Heat Straightening. Prior to heat straightening operations, the base metal and weld metal in the area shall be inspected for existing cracks or tears that might propagate during the straightening process. Cracks can be removed by grinding, repaired by welding, or the ends of cracks blunted by drilling arresting holes. The temperature of the heated area shall not exceed 1200º F (a dull red which may not be visible in bright sunlight) as controlled by temperature indicating crayons, liquids or bimetal thermometers. Heat straightening procedures shall only be performed under dead load conditions. Parts to be heat straightened shall be substantially free of stress and from external forces, except stresses resulting from mechanical means used in conjunction with the application of heat. After heating and straightening, the metal shall be cooled as slowly as possible. Following the straightening of a bend or buckle, the surface of the metal shall be carefully inspected for evidence of fracture. CONTRACTOR shall coordinate with CSXT representative after the repairs are completed to ensure through additional inspection that no

damage to adjacent components has occurred as a result of the repair. A satisfactory report of this inspection is required prior to resuming operations over the structure.

C. C. Tolerances: The tolerances for heat straightening repairs shall be in accordance with FHWA-IF-99-004 as shown below.

Member Type	Recommended Minimum Tolerance [1,2]
Beams, Truss members, or Columns	
Overall	½ in over 20ft
at impact point	¾ in over 20 ft
Local Web Deviations	d/100 but not less than ¼ in
Local Flange Deviations	b/100 but not less than ¼ in

[1] Units of member depth, d, and flange width, b, are inches.

[2] Tolerance for curved or cambered members should account for the original shape of the member

3.4 CONNECTIONS

A. Pin Connections: All packing washers, if any, must be in place when the work is assembled. While pins are being driven into place, threads shall be protected by pilot and driving nuts supplied by the CONTRACTOR. After nuts are tightened, the threads adjacent to the nut shall be burred a minimum of two threads at two locations opposite of each other.

B. High Strength Bolted Connections: Connections shall be accurately fitted up before high strength bolts are placed. A sufficient number of the holes at a connection point shall be filled with erection pins to "fair-up" all holes. Light drifting will be permitted, but drifting to match unfair holes will not be permitted. Such holes shall be reamed or drilled under the direction of the ENGINEER. All material within the grip of the bolt shall be steel. There shall be no compressible material such as gaskets or insulation within the grip. Unless otherwise indicated on the plans, bolts oriented vertically shall be installed with the heads on top of the connected pieces.

C. Surface Conditions: All joint surfaces, including those adjacent to the bolt heads, nuts or washers, shall be free of dirt, loose rust, loose scale, burrs and other matter that will prevent solid seating of the parts. Unless otherwise shown on the plans, faying surfaces of all non-galvanized joints, including splice plates, shall be given a blast cleaning, in accordance with the requirements of the Steel Structures Painting Council Specifications SSPC-SP7 Brush-Off Blast Cleaning, and shall be free of loose rust prior to final bolting. Galvanized faying surfaces shall be roughened by hand wire brushing prior to final bolting. When shown on the plans, faying surfaces shall be blast cleaned and coated with a paint that provides the specified mean slip coefficient as determined by the "Test Method to Determine the Slip Coefficient for Coatings Used in Bolted Joints" as adopted by the Research Council on Structural Connections. Coated joints shall not be assembled before the coating has cured for the minimum time used in the qualifying test.

3.5 FASTENERS

A. Handling and storage of bolts and nuts:

1. Bolts and nuts shall be protected from dirt and moisture at the job site. Only as many fasteners as are anticipated to be installed and tightened during a work day shall be taken from protected storage;
2. Fasteners not used shall be returned to protected storage at the end of the day. Fasteners shall not be cleaned of lubricant that is present in the as-delivered condition;
3. Fasteners that show signs of rust or dirt shall be cleaned and lubricated prior to installation. Any additional lubrication required must be applied prior to installing bolts in the holes;
4. Bolts and associated nuts and washers shall be identified by rotational-capacity lot number and stored in a manner that will retain this identification.

B. Bolt installation shall be in accordance with AREMA recommendations.

3.6 FIELD QUALITY CONTROL

A. Special Inspection and Testing:

1. Special inspections shall comply with the City of Alexandria requirements for Special Inspections.
2. Special Inspection to be in accordance with the Building Code.
3. Special Inspection is required for:
    a. Material verification of high-strength bolts, nuts, and washers.
        1) Frequency: All high-strength bolts, prior to being covered up or substantial completion.
    b. Inspection of high-strength boltings:
        1) Frequency:
            a) All high-strength bolts, prior to being covered up or substantial completion.
            b) Pretensioned and slip-critical joints using turn-of-nut without match marking or calibrated wrench methods of installation require continuous inspection.
    c. Material verification of structural steel.
        1) Frequency: Prior to being covered up or substantial completion,
    d. Material verification of weld filler materials.
        1) Frequency:
            a) Prior to welding on site.
            b) Randomly therafter.
    e. Inspection of welding.
        1) Frequency:
            a) Visually inspect all welds.

b) In addition to visual inspection, test 50 PCT of full penetration welds and 20 PCT of fillet welds with liquid dye penetrant or magnetic particle.

c) Test 20 PCT of liquid dye penetrant tested full penetration welds with ultrasonic or radiographic testing.

f. Inspect structural steel which has been erected.

1) Frequency: Prior to members being covered up or substantial completion.

g. Inspect stud welding in accordance with AWS D1.1/D1.1M, Section 7.8.

B. Erected Framing Tolerance, unless noted otherwise on the Drawings:

1. Do not exceed cumulative effect of rolling, fabrication and erection tolerance for overall finished dimensions.

2. Erection tolerances are defined relative to member working points and working lines as follows:

a. Actual centerline of top flange or surface at each end for horizontal members.

b. Actual center of member at each end for all other members.

c. Other points may be used, providing they are based on these definitions.

d. Working line is straight line connecting member working points.

3. Tolerances on position and alignment are as specified in the Code, unless otherwise modified.

a. Provide "adjustable items" such as lintels, wall supports, curb angles, window mullions and similar members with adjustable connections to supporting structural framing.

4. Certification by steel erector:

a. Certify the location of erected structural steel is acceptable for plumbness, level and aligned within tolerances specified.

b. Provide certification upon completion of any part of work.

c. Provide certification prior to start of work by other trades that may be supported; attach to structural steel work.

3.7 CLEANING AND REPAIR OF SHOP PRIMER PAINT

A. After erection, clean all steel of mud or other foreign materials, and repair any damage.

1. Touchup coatings to comply with Specification Section 09 96 00.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC, DUCTWORK, PIPING AND HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. *Nameplates.*
2. *Tags.*
3. *Stencils.*
4. *Pipe markers.*
5. *Labels.*
6. *Lockout devices.*

B. Related Sections include but are not necessarily limited to:

1. *Section 09 96 00 - High Performance Industrial Coatings.*

1.2 QUALITY ASSURANCE

A. Reference Standards:

1. *American Society of Mechanical Engineers (ASME):*
   a. *A13.1, Scheme for the Identification of Piping Systems.*

B. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

C. Maintain one copy of each document on site.

1.3 SUBMITTALS

A. Product Data: Submit manufacturers catalog literature for each product required.

B. Shop Drawings: Submit Identification Register including list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

D. Contract Closeout Information:

1. *Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.*

1.4 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTUERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Nameplates, Tags and Stencils:

a. Brady Corporation.

b. Panduit.

c. Seton by Brady Corporation.

d. National Band and Tag Company.

e. Carlton Industries, LP.

2.2 NAMEPLATES

A. Laminated two-layer phenolic or DR (high impact) acrylic with engraved black letters on light contrasting background color.

1. Thickness: Minimum 1/16 inches.

2. Color: Manufacturer standard or as specified.

B. Alternate: Laminated three-layer plastic with engraved black letters on light contrasting background color.

1. Thickness: Minimum 60 mils.

2. Color: Manufacturer standard or as specified.

2.3 TAGS

A. Nonmetallic Tags:

1. Fiberglass reinforced engraved black letters on light contrasting background color.

a. Tag size: Minimum 1-1/2 inches diameter.

b. Thickness: Minimum 100 mils.

c. Color: Manufacturer standard or as specified.

B. Metal Tags:

1. Aluminum or stainless steel disc with stamped letters and finished edges.

a. Tag size: Minimum 1-1/2 inches diameter.

b. Thickness: Minimum 0.035 inches (20 Ga).

c. Color: Black color filled into stamped text with natural metal background.

C. Tag Chart: Typewritten letter size list of applied tags and location [in anodized aluminum frame] [plastic laminated].

2.4 STENCILS

A. With clean cut symbols and letters of following size:

1. Up to 2 inches Outside Diameter of Insulation or Pipe: 1/2 inches high letters.

2. 2-1/2 to 6 inches Outside Diameter of Insulation or Pipe: 1 inch high letters.

B. Stencil Paint: As specified in Section 09 96 00, colors and lettering size conforming to ASME A13.1.

2.5 SELF ADHESIVE PIPE MARKERS

A. Color and Lettering: Conform to ASME A13.1.

B. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

1. Thickness: Minimum 5 mils.

2. Letter Height:

a. Up to 2 inches Outside Diameter of Insulation or Pipe: 1/2 inches high letters.

b. 2-1/2 to 6 inches Outside Diameter of Insulation or Pipe: 1 inch high letters.

3. Indoor/outdoor grade.

4. Weather and UV resistant inks.

5. Permanent adhesive.

2.6 UNDERGROUND WARNING TAPE

A. Description: Polyethylene tape with metallic core for detection and location of piping with metal detector resistant to acids, alkalis and other soil components.

1. Size: 0.004 inches thick; 6 inches wide.

2. Color: As selected.

3. Service Marking: Printed text as selected by Architect/Engineer in contrasting color and repeated at maximum 40 inches intervals.

2.7 TRACER WIRE

A. 12 GA AWG.

B. Solid.

C. Waterproof type wire nuts.

D. Brass split bolts.

2.8 LOCKOUT DEVICES

A. Lockout Hasps:

1. Anodized aluminum hasp with erasable label surface; size minimum 7-1/4 x 3 inches.

B. Valve Lockout Devices:

1. Manufacturers:

a. Brady Corporation.

b. Master Lock Company, LLC.

2. Steel device preventing access to valve operator, accepting lock shackle.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Section 09 96 00 for stencil painting.

3.2 INSTALLATION

A. Apply stencil painting in accordance with Section 09 96 00.

B. Install identifying devices after completion of coverings and painting.

C. All identification devices to be printed by mechanical process. Hand printing is not acceptable.

D. Install nameplates with adhesive where equipment has sufficient surface area and texture.

1. Attach tags with 1/8 inches flat head screws where adhesive application is not suitable.

2. Attach tabs with plastic strap where screws should not or cannot penetrate substrate.

E. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer.

F. Install tags using corrosion resistant chain. Number tags consecutively by location.

G. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

H. Tag single items of equipment enclosed in a housing or compartment on outside of housing.

1. Tag multiple items mounted inside a housing or compartment individually inside the housing.

I. Identify control panels and major control components outside panels with plastic nameplates.

J. Identify valves in main and branch piping with tags.

K. Identify air terminal units and radiator valves with numbered tags.

L. Tag automatic controls, instruments, and relays. Key to control schematic.

M. Identify piping, concealed or exposed, with pipe markers or stenciled painting. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

N. For exposed natural gas lines other than steel pipe, attach yellow pipe labels with "GAS" in black lettering, at maximum 5 feet spacing.

3.3 SCHEDULES

A. Above Grade Piping:

1. Install labels on all piping in accordance with Article 3.2.

a. Stencils or self-adhesive lablels.

2. Color Coding: Per ASME A13.1.

a. Black lettering on yellow background:

1) Hazardous, flammable or high temperature fluids:

a) Natural Gas.

b) Refrigerant.

B. Below Grade Piping

1. Use underground warning tape in accordance with Article 3.2.

a. Lettering: Mimimum: 1-1/4 inches.

b. Wording:

1) First line: "CAUTION CAUTION CAUTION"

2) Second line: "BURIED (Pipe Descriptor) LINE BELOW"

c. Pipe Descriptors and color coding:

1) Natural Gas: Black lettering on yellow background.

2) Refrigerant: Black lettering on yellow background.

C. Valves:

1. Install on all manual valves:

a. Number and schedule all valves utilized on project.

2. Utilize nonmetallic or metal tags.

a. Use stainless steel metal tags only for corrosive areas.

D. Equipment:

1. Provide nameplate or stencil as warranted per Article 3.2.

2. Label with equipment tag as shown on the Drawings.

a. Black lettering on white background.

3. Provide OSHA warning sign for equipment that starts automatically.

4. Label all equipment control panels located remote from unit.

5. Label all thermostats with self-adhesive markers with tag of equipment served.

END OF SECTION

NO TEXT ON THIS PAGE.

SECTION 23 74 36

REFRIGERANT PIPING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Refrigeration piping system.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):

a. 15, Safety Code for Mechanical Refrigeration.

2. ASTM International (ASTM):

a. B280, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

3. Federal Specification (FS):

a. WW-T-799, Tube, Copper, Seamless, Water (For Use With Solder-Flared or Compression-Type Fittings).

1.3 SUBMITTALS

A. Shop Drawings:

1. Product technical data including:

a. Acknowledgement that products submitted meet requirements of standards referenced.

b. Manufacturer's installation instructions.

2. Test reports:

a. A dated declaration of the test of the refrigerant piping for each system shall be provided.

1) The dated declaration shall include the information outlined in Article 12.3 of ASHRAE 15.

b. Test reports of the refrigerant piping leak tests for all refrigerant piping systems installed.

c. The test reports shall contain the following information:

1) System refrigerant and high and low side pressure used.

2) Listing of the necessary repairs made before the refrigerant piping system passed the leak test.

3) Identification of specific system by referencing specific equipment identification numbers.

4) Leak testing media used.

5) Suction and discharge refrigerant gas pressures and temperatures taken after the refrigerant system has been charged.

1.4 WARRANTY

A. The completed refrigerant piping system shall be guaranteed to be sufficiently free from leaks so that the loss of refrigerant for 18 months from the date of final payment shall not exceed 5 percent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Refrigerant piping specialties:

a. Sporlan.

2. Expansion valves:

a. Sporlan.

b. Alcoa.

3. Silver solder - "Easy-Flow 45 inches:

a. Harman.

4. Moisture indicator - "SEE-ALL":

a. Sporlan.

2.2 REFRIGERANT PIPING AND FITTINGS

A. Refrigerant Piping:

1. Copper tubing conforming to ASTM B280 and/or FS WW-T-799, dehydrated for refrigerant use, with high-temperature soldered joints and wrought copper (400 psiG) fittings.

a. For underground use: Type K.

b. For aboveground use: Type L.

B. Piping Joints:

1. Joints between copper tubing and fittings to be high temperature soldered (melting point not less than 1000 degrees F, but less than that of the metal being joined) with phos-copper alloys.

2. Joints between copper and brass, steel, etc., shall be silver soldered only.

a. Silver solder to be Handy Harmon "Easy-Flow 45."

C. Precharged Line Sets: Size per manufacturer's recommendations.

D. Field Assembled Units:

1. Size refrigeration lines according to manufacturer's published tables using pressure or temperature drops as follows:

a. Suction lines: 2 degrees F.

b. Liquid lines: 1 degree F or 2 psi.

c. Hot gas lines: 1 degree F or 3.6 psi.

d. Size discharge and hot gas risers for positive oil return to compressors.

E. Hangers: As specified in Specification Section 40 05 07.

2.3 REFRIGERANT PIPING SPECIALTIES

A. Refrigerant Dryer:

1. Sporlan material "CATCH-ALL" filter-drier with aluminum molded core:

2. In each liquid line.

3. A three-valve bypass around filter-drier.

4. Install so core can be removed without cutting or breaking any refrigerant line.

B. Moisture Indicator:

1. Show presence of moisture in system by change of color.

2. Install full size in the main liquid line adjacent to the filter-drier.

3. Use Sporlan "SEE-ALL."

C. Strainers:

1. Design to permit removing screen without removing strainer from piping system.

2. Screens not larger than 80 mesh.

3. Strainers on liquid line serving each thermostatic expansion valve and in suction line serving each refrigerant compressor not equipped with integral strainer.

D. Oil Traps: Provide in lines as indicated.

2.4 VALVES

A. All Valves:

1. All bronze.

2. 2 inches and less: Solder ends.

3. 3 inches and over: Four bolt union ends.

B. Shut-Off Valves:

1. Packed type with gas-tight cap seal and hard metal seats and shoulders which permit packing stuffing boxes wide open under pressure; or sealed diaphragm type.

2. Wheel, globe, angle or "T" handle.

C. Check Valves:

1. In liquid lines 5/8 inches and less: Lift check type.

2. In lines 3/4 to 2 inches: Swing check type.

3. In lines 3 inches and over: Wafer type swing check with bronze disc.

D. Expansion Valves:

1. Sized by manufacturer for refrigerant used.

2. Provide one in each circuit with liquid distributor connection immediately after.

E. Vent and Test Valves: Angle cap type with seal and outlet caps.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Precharged Line Sets: Install per manufacturer's recommendations.

B. Field Assembled Lines:

1. Refrigerant piping:

a. Purge refrigerant piping of all air while connections of refrigerant piping are being made.

1) Shut-off valves.

2) Connect tank of dry nitrogen to line on back side of valve.

3) Introduce dry nitrogen into line as refrigerant piping joints are successively made up from valve to each condenser.

2. Testing:

a. Refrigerant piping systems: Follow general testing guidelines of ASHRAE 15, except as modified herein.

b. Pressurize the high and low pressure sides of the piping system after completion of the refrigerant piping.

1) Pressurize at the test pressures specified in ASHRAE 15 for the refrigerant type to be used in the system.

c. Repair any leaks and repeat tests until no further leaks are found and the system passes a static leak test at test pressure for a duration of 24 hours.

3. Cleaning:

a. Disconnect suction and discharge lines from compressor for clean up after complete system is tested.

b. Valve or blank off system into three separate systems for purpose of cleanup.

1) Suction side including cooling coils.

2) Discharge side including air cooled condenser.

3) Hot gas reheat side including heating DX coils.

c. Thoroughly clean each system using pumped refrigerant until system is proven clean to satisfaction of refrigeration compressor serviceman.

d. Notify Engineer for a visual inspection of both cleaning process and completely cleaned system.

4. Evacuation and Drying:

a. After tests and cleaning have been completed and system proved tight, charge each circuit with dry clean refrigerant to gas pressure as recommended by the equipment manufacturer.

b. Evacuate to 100 micron Hg and hold for 72 hours.

1) Use laboratory type vacuum pump capable of holding absolute pressure of 50 micron Hg.

2) Check the vacuum with a suitable mercury column gage.

c. Admit another drying charge of refrigerant and allow 4 to 6 hours to absorb moisture and install dryer cores.

d. Use second evacuation to remove all refrigerant and moisture.

e. After second evacuation, charge system with refrigerant.

Charge the system with refrigerant as required after final evacuation.

END OF SECTION

NO TEXT ON THIS PAGE.

SECTION 23 80 00

HVAC - EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Heating, ventilating, and cooling equipment.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Air Movement and Control Association (AMCA).

2. Air Conditioning and Refrigeration Institute (ARI).

3. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):

a. HVAC Applications Handbook, Chapter entitled "Sound and Vibration Control."

b. 20, Methods of Testing for Rating Remote Mechanical-Draft Air-Cooled Refrigerant Condensers.

c. 52.2, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

4. Canadian Standards Association (CSA).

5. National Electrical Manufacturers Association (NEMA):

a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

6. National Fire Protection Association (NFPA):

a. 70, National Electrical Code (NEC).

7. National Roofing Contractors Association (NRCA).

8. Underwriters Laboratories, Inc. (UL):

a. 507, Standard for Electric Fans.

B. Miscellaneous:

1. Gage thickness specified herein shall be manufacturer's standard gage for steel and Brown and Sharpe gage for non-ferrous metals.

2. Corrosion protection of equipment to be as specified herein.

1.3 SUBMITTALS

A. Shop Drawings:

1. Fabrication and/or layout drawings.

2. Product technical data including:

a. Acknowledgement that products submitted meet requirements of standards referenced.

b. Manufacturer's installation instructions.

c. Wiring diagrams.

d. Control diagrams.

e. Manufacturer's catalog cuts and technical data.

f. Corrosion-protection information.

g. Fan curves.

h. Sound data.

i. Vibration isolation.

j. Control description.

k. Performance data on all equipment.

3. Certifications:

a. Provide certification of thickness of corrosion-protection coating.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Unitary split system:

a. Mitsubishi.

b. Carrier.

c. Daikin Applied.

2.2 GENERAL

A. All Manufactured Units:

1. Factory wired and assembled.

2. Use fasteners made of same material as unit.

2.3 MANUFACTURED UNITS

A. Unitary Split System:

1. Outdoor Unit:

a. Casing and frame:

1) Material: Heavy gage galvanized steel, factory painted.

2) Insulation: 1 inch thick neoprene-coated glass fiber.

3) Installation: Base equipped with lifting brackets with lifting holes.

4) Removable end panel for access to components and connections.

5) Coated with Brine Spray.

b. Compressors:

1) variable speed, dual rotary type, with five-year non-prorated warranty.

2) Suction and discharge service valves.

3) Crankcase heater.

4) Thermal overload protection.

c. Refrigeration circuit:

1) Sight glass.

2) Filter dryer.

3) Manual shut-off valve.

4) High pressure relief valve.

d. Compressor isolators.

e. Condenser coils:

1) Nominal 3/8 inches OD seamless copper mechanically bonded to corrugated aluminum fins.

2) Factory leak tested at 315 psiG under water.

f. Condenser fans:

1) Propeller type.

g. Condenser fan motors:

1) Heavy duty, inherently protected, non-reversing.

2) Permanently lubricated bearings.

3) Integral rain shield.

h. Defrost control: Defrost cycles at a preselected time interval when the outdoor coil is below a preset initiation temperature.

i. Expansion valve: Designed and sized specifically for heat pump service.

j. Reversing valve: Four-way interchange reversing valve, operates on pressure differential between the outdoor unit and indoor unit.

2. Indoor unit:

a. Materials:

1) Casing: Provide white finish.

2) Pan insulation: Foam-in-place insulation.

3) Casing insulation: 1 inch, 3/4 pound fiberglass blanket.

b. Casing:

1) Sectionalized construction.

2) Removable access panels.

3) Insulated weatherproof casing.

4) Separate back plate which secures the unit firmly to the wall.

c. Fan motors:

1) Single motor with permanently lubricated bearings.

2) Variable pitch sheave.

3) Adjustable base.

d. V-belts and drives sized for 150% motor capacity.

e. Isolated fan assembly.

f. Filter section:

1) Access doors for filter removal.

2) Washable filter.

g. Evaporator coils:

1) Nonferrous construction with smooth plate fins on copper tubing.

2) All tube joins shall be brazed with silver alloy.

3) The coils shall be pressure tested at the factory.

h. Evaporator coil circuiting:

1) Adjustable thermal expansion valve per circuit with external equalizer.

2) Combination row/split face circuiting.

i. Drain pan:

1) Sloped with drain and provided under the coil.

2) Mastic-coated.

3) Threaded drain connections.

j. Size and capacity as scheduled on Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

END OF SECTION

MOISTURE, ACIDS, ALKALIS, AND OTHER SOIL SUBSTANCES. ALL DUWT TAPES SHALL BE PRINTED IN BLACK INK ON AMERICAN PUBLIC WORKS ASSOCIATION (APWA) APPROVED COLORS TO MEET OR EXCEED INDUSTRY STANDARDS.

COLOR	CODES
RED	CAUTION BURIED ELECTRIC POWER LINES, CABLES, CONDUITS, AND LIGHTING CABLES
YELLOW	CAUTION GAS, OIL, STEAM, PETROLEUM, OR GASEOUS MATERIALS
ORANGE	CAUTION COMMUNICATIONS, ALARM OR SIGNAL LINES, CABLES, OR CONDUITS
BLUE	CAUTION POTABLE WATER
PURPLE	CAUTION RECLAIMED WATER, IRRIGATION AND SLURRY LINES
GREEN	CAUTION SEWER, DRAIN LINES, AND FORCE MAIN

SOLID WASTE MANAGEMENT

1. IN COMPLIANCE WITH TITLE 5: TRANSPORTATION AND ENVIRONMENTAL SERVICES, SECTION 5-1-31 OF THE CITY CHARTER AND CODE, THE CITY OF ALEXANDRIA WILL PROVIDE SOLID WASTE COLLECTION SERVICES TO EVERY USER PROPERTY, DEFINED IN SECTION 5-1-2 (12B) AS CONTAINING FOUR OR FEWER DWELLING UNITS EXCLUDING CONDOMINIUM DWELLINGS.

   SINCE THE CITY OF ALEXANDRIA IS PROVIDING SOLID WASTE COLLECTION AND DISPOSAL SERVICES, THE PLAN DEMONSTRATES THAT THE DEVELOPMENT MEETS ALL THE MINIMUM STREET STANDARDS, INCLUDING ALL STANDARD CUL-DE-SAC TURNAROUNDS, IF APPLICABLE. THE TRASH TRUCK TURNING MOVEMENTS DEMONSTRATE THAT THE TRASH TRUCK IS ABLE TO PICK UP SOLID WASTE FROM PRIVATE STREETS WITHOUT BACKING UP.

   SINCE THE CITY OF ALEXANDRIA WILL PROVIDE THE SOLID WASTE COLLECTION AND DISPOSAL SERVICES; ALL TRASH AND RECYCLING RECEPTACLES ARE SHOWN LOCATED AT THE CITY'S RIGHT-OF-WAY.

2. IN THE EVENT SECTION 5-1-2(12B) OF THE CITY CHARTER AND CODE TITLE 5: TRANSPORTATION AND ENVIRONMENTAL SERVICES IS AMENDED TO DESIGNATE MULTI-FAMILY DWELLINGS IN GENERAL, OR MULTI-FAMILY DWELLINGS WHEN SO PROVIDED BY SPECIAL USE PERMIT (SUP), AS REQUIRED USER PROPERTY [AS DEFINED IN 5-1-2(12B) OF THE CITY CHARTER AND CODE], THEN REFUSE COLLECTION SHALL BE PROVIDED BY THE CITY FOR THE TOWNHOME CONDOMINIUM PORTION OF THIS PLAN.

SIGN CONSTRUCTION

A SEPARATE PERMIT IS REQUIRED FOR SIGN CONSTRUCTION.

LANDSCAPE NOTES

1. ALL PROTECTION AND PRESERVATION MEASURES FOR EXISTING VEGETATION, INCLUDING MAINTENANCE AND PENALTIES SHALL BE PREPARED IN COMPLIANCE WITH LANDSCAPE GUIDELINES OF THE CITY OF ALEXANDRIA AND APPROVED BY THE CITY ARBORIST IN-FIELD PRIOR TO COMMENCEMENT OF ANY SITE DISTURBING AND CONSTRUCTION ACTIVITIES.

2. ALL VEGETATION PRESERVATION AND PROTECTION METHODS SHALL BE APPROVED / VERIFIED IN FIELD BY THE CITY ARBORIST PRIOR TO COMMENCEMENT OF ANY GROUND DISTURBING ACTIVITY.

3. LOCATION AND METHOD FOR PROTECTION AND PRESERVATION OF EXISTING TREES WILL BE SHOWN ON DEMOLITION, SEDIMENT AND EROSION CONTROL, AND LANDSCAPE PLAN SHEETS.

4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE SURE THAT ANY EXISTING LANDSCAPING WHICH IS TO BE RELOCATED ON THE SITE WILL BE CAREFULLY STORED IN A DESIGNATED AREA BEFORE BEING REPLANTED. COORDINATION WITH THE OWNER FOR MUTUALLY AGREEABLE STORAGE LOCATIONS FOR LANDSCAPE MATERIAL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPLACEMENT OF PLANT MATERIAL THAT DOES NOT SURVIVE STORAGE AND REPLANTING.

5. APPLICANT MUST INCLUDE ON THE PLAN DOCUMENTATION OF COMMUNICATION WITH THE ADJACENT PROPERTY OWNER(S) VERIFYING NOTIFICATION OF AND AGREEMENT WITH CONSTRUCTION IMPACT, POTENTIAL FOR LOSS, AND AGREED UPON REMEDIAL MEASURES PERTAINING TO THE EXISTING TREE(S) ON ADJACENT PROPERTIES THAT WILL BE AFFECTED BY PROJECT WORK.

6. INCLUDE SPECIFIC CONSTRUCTION STAGING INFORMATION ON THE PLAN THAT INDICATES THE METHODS, AND PROCEDURES TO BE IMPLEMENTED FOR PROTECTION OF EXISTING ON-SITE AND OFF-SITE VEGETATION.

7. PROPOSED PLANTING SHALL BE PROVIDED IN COMPLIANCE WITH LANDSCAPE GUIDELINES OF THE CITY OF ALEXANDRIA.

8. SPECIFICATION FOR ALL PLANTINGS SHALL BE IN ACCORDANCE WITH THE CURRENT AND MOST UP TO DATE EDITION OF ANSI-Z60.1, THE AMERICAN STANDARD FOR NURSERY STOCK AS PRODUCED BY THE AMERICAN ASSOCIATION OF NURSERYMEN; WASHINGTON, D.C.

9. THE APPLICANT SHALL MAKE SUITABLE ARRANGEMENTS FOR PRE-SELECTION TAGGING, PRE-CONTRACT GROWING, OR IS UNDERTAKING SPECIALIZED PLANTING STOCK DEVELOPMENT WITH A NURSERY OR GROWER THAT IS CONVENIENTLY LOCATED TO THE PROJECT SITE, OR UTILIZING OTHER PROCEDURES THAT WILL ENSURE AVAILABILITY OF SPECIFIED MATERIALS. IN THE EVENT THAT SHORTAGES AND/OR INABILITY TO OBTAIN SPECIFIED PLANTINGS OCCURS, REMEDIAL EFFORTS INCLUDING SPECIES CHANGES, ADDITIONAL PLANTINGS AND MODIFICATION TO THE LANDSCAPE PLAN SHALL BE UNDERTAKEN BY THE APPLICANT. ALL REMEDIAL EFFORTS SHALL, WITH PRIOR APPROVAL BY THE CITY, BE PERFORMED TO THE SATISFACTION OF THE DIRECTORS OF PLANNING & ZONING, RECREATION, PARKS & CULTURAL ACTIVITIES AND TRANSPORTATION & ENVIRONMENTAL SERVICES.

10. IN LIEU OF MORE STRENUOUS SPECIFICATIONS, ALL LANDSCAPE RELATED WORK SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE CURRENT AND MOST UP-TO-DATE EDITION (AT TIME OF CONSTRUCTION) OF LANDSCAPE SPECIFICATION GUIDELINES AS PRODUCED BY THE LANDSCAPE CONTRACTORS ASSOCIATION OF MARYLAND, DISTRICT OF COLUMBIA AND VIRGINIA; GAITHERSBURG, MARYLAND.

11. PRIOR TO COMMENCEMENT OF LANDSCAPE INSTALLATION/PLANTING OPERATIONS, A PRE-INSTALLATION/CONSTRUCTION MEETING WILL BE SCHEDULED WITH THE CITY'S ARBORIST AND LANDSCAPE ARCHITECTS TO REVIEW THE SCOPE OF INSTALLATION PROCEDURES AND PROCESSES.

12. MAINTENANCE FOR THIS PROJECT SHALL BE PERFORMED IN PERPETUITY BY THE APPLICANT/OWNER/SUCCESSOR, IN COMPLIANCE WITH CITY OF ALEXANDRIA LANDSCAPE GUIDELINES AND/OR AS CONDITIONED BY PROJECT APPROVAL.

13. A CERTIFICATION LETTER FOR TREE WELLS, TREE TRENCHES AND PLANTINGS ABOVE STRUCTURE SHALL BE PROVIDED BY THE PROJECT'S LANDSCAPE ARCHITECT. THE LETTER SHALL CERTIFY THAT ALL BELOW GRADE CONSTRUCTION IS IN COMPLIANCE WITH APPROVED DRAWINGS AND SPECIFICATIONS. THE LETTER SHALL BE SUBMITTED TO THE CITY ARBORIST AND APPROVED PRIOR TO APPROVAL OF THE LAST AND FINAL CERTIFICATE OF OCCUPANCY FOR THE PROJECT. THE LETTER SHALL BE SUBMITTED BY THE OWNER/APPLICANT/SUCCESSOR AND SEALED AND DATED AS APPROVED BY THE PROJECT'S LANDSCAPE ARCHITECT.

14. AS-BUILT DRAWINGS FOR THIS LANDSCAPE PLAN AND/OR IRRIGATION/WATER MANAGEMENT SYSTEM WILL BE PROVIDED IN COMPLIANCE WITH CITY OF ALEXANDRIA LANDSCAPE GUIDELINES. AS-BUILT DRAWINGS SHALL INCLUDE CLEAR IDENTIFICATION OF ALL VARIATION(S) AND CHANGES FROM APPROVED DRAWINGS INCLUDING LOCATION, QUANTITY AND SPECIFICATION OF ALL PROJECT ELEMENTS.

DEMOLITION NOTES

1. A SEPARATE PERMIT IS REQUIRED FOR DEMOLITION; HOWEVER, NO DEMOLITION SHALL BEGIN UNTIL ALL EROSION AND SEDIMENT AND TREE PROTECTION CONTROLS ARE IN PLACE AND ARE APPROVED BY AN EROSION AND SEDIMENT CONTROL INSPECTOR OF THE DEPARTMENT OF TRANSPORTATION AND ENVIRONMENTAL SERVICES.

2. ALL WORK SHALL BE PERFORMED IN STRICT COMPLIANCE WITH THE MOST CURRENT APPLICABLE FEDERAL, STATE , AND LOCAL LAWS AND REGULATIONS, INCLUDING BUT NOT LIMITED, TO ENVIRONMENTAL PROTECTION AGENCY (EPA), OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA), VIRGINIA OCCUPATIONAL AND SAFETY HELATH COMPLIANCE PROGRAM (VOSH ENFORCEMENT), VIRGINIA OVERHEAD HIGH VOLTAGE LINE SAFETY ACT, NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS), AND NATIONAL INSTITUTUE OF OCCUPATIONAL SAFETY AND HEALTH (NIOSH).

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF WORK WITH REPRESENTATIVE UTILITY COMPANIES AND FOR THE IMPLEMENTATION OF REQUIRED UTILITY-RELATED WORK.

4. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER'S REPRESENTATIVE UPON ENCOUNTERING ANY HAZARDOUS MATERIALS DURING DEMOLITION AND/OR CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL DOCUMENT SAME TO THE OWNER'S REPRESENTATIVE AND OBTAIN DIRECTION AS TO THE APPROPRIATE ACTION(S) TO BE TAKEN.

5. DISCONNECTION OF SERVICES AND SYSTEMS SUPPLYING UTILITIES TO BE ABANDONED OR DEMOLISHED SHALL BE COMPLETED PRIOR TO OTHER SITE DEMOLITION IN FULL COMPLIANCE WITH APPLICABLE CODES, REGULATIONS, AND THE REQUIREMENTS OF UTILITY PURVEYORS HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE UTILITY PURVEYORS, PAYMENT OF ASSOCIATED FEES AND PROCUREMENT OF ALL NECESSARY PERMITS.

6. PRIOR TO REMOVAL OF MATERIALS OVER EXISTING UTILITY SYSTEMS, THE CONTRACTOR SHALL DOCUMENT EXISTING CONDITIONS AND, IF AT VARIANCE WITH CONDITIONS AS REPRESENTED ON THE PLANS, NOTIFY THE OWNER'S REPRESENTATIVE AND OBTAIN DIRECTIONS AS TO THE APPROPRIATE ACTION(S) TO BE TAKEN.

7. THE CONTRACTOR SHALL BACKFILL EXCAVATED AREAS WITH APPROVED MATERIALS / CLEAN FILL AS PER THE REQUIREMENTS OF VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT).

8. THE CONTRACTOR SHALL PROTECT AND PREVENT DAMAGE TO EXISTING ON-SITE UTILITY DISTRIBUTION FACILITIESTHAT ARE TO REMAIN. ACTIVE UTILITY DISTRIBUTION FACILITIES ENCOUNTERED DURING DEMOLITION AND/OR CONSTRUCTION ACTIVITIES SHALL BE SHUT OFF AT THE SERVICE MAIN WITH THE APROVAL OF THE OWNER'S REPRESENTATIVE.

9. DURING DEMOLITION AND/OR CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER'S REPRESENTATIVE UPON ENCOUNTERING ANY EXISTING UTILITIES AND/OR UTILITY SYSTEM STRUCTURES NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL DOCUMENT THE SAME AND FORWARD THE INFORMATION TO THE RESIDENT ENGINEER / OWNER'S REPRESENTATIVE, AND OBTAIN DIRECTION AS TO THE APPROPRIATE ACTION(S) TO BE TAKEN.

10. THE CONTRACTOR OR APPLICANT SHALL WORK WITH THE CITY STAFF TO REUSE THE EXISTING, LEFTOVER, UNUSED, AND/OR DISCARDED BUILDING MATERIALS AS PART OF THE DEMOLITION PROCESS OR THE CONSTRUCTION DEBRIS MUST BE REMOVED TO AN APPROVED LANDFILL WITH ADEQUATE FREQUENCY IN ACCORDANCE WITH THE VIRGINIA STATE LITTER CONTROL ACT.

CONSTRUCTION NOTES

1. THE EXISTING UNDERGROUND UTILITIES SHOWN HEREON ARE BASED UPON AVAILABLE INFORMATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL UTILITIES BEFORE COMMENCING WORK AND FOR ANY DAMAGES WHICH MAY OCCUR BY HIS FAILURE TO LOCATE OR PRESERVE THESE UNDERGROUND UTILITIES. IF DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR SHOULD ENCOUNTER UTILITIES OTHER THAN THOSE SHOWN ON THE PLANS, HE SHALL IMMEDIATELY NOTIFY THE ENGINEER AND TAKE NECESSARY ACTION AND PROPER STEPS TO PROTECT THE FACILITY AND ASSURE THE CONTINUATION OF SERVICE.

2. THE CONTRACTOR SHALL DIG TEST PITS AS REQUIRED FOLLOWING NOTIFICATION AND MARKING OF ALL EXISTING UTILITIES TO VERIFY THE LOCATION AND DEPTH OF EXISTING UTILITIES TEST HOLES TO BE PERFORMED AT LEAST 30 DAYS PRIOR TO START OF CONSTRUCTION. ANY DISCREPANCIES ARE TO BE REPORTED IMMEDIATELY TO THE OWNER AND ENGINEER. REDEISGN AND APPROVAL BY REVIEWING AGENCIES SHALL BE OBTAINED, IF REQUIRED.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE OWNER AND THE ENGINEER OF ANY CHANGES OR CONDITIONS ATTACHED TO PERMITS OBTAINED FROM ANY AUTHORITY ISSUING PERMITS.

4. THE CONTRACTOR SHALL VISIT THE SITE AND SHALL VERIFY EXISTING CONDITIONS PRIOR TO STARTING CONSTRUCTION.

5. THE CONTRACTOR SHALL CLEAR THE SITE OF ALL TREES, BUILDINGS, FOUNDATIONS, ETC., WITHIN THE LIMITS OF CONSTRUCTION UNLESS OTHERWISE SPECIFIED, AND SHALL BE RESPONSIBLE FOR ENSURING THAT EXISTING UTILITIES ARE DISCONNECTED.

6. THE DEVELOPER SHALL PROVIDE OVER-LOT GRADING TO PROVIDE POSITIVE DRAINAGE AND PRECLUDE PONDING OF WATER.

7. ALL AREAS, ON OR OFF-SITE, WHICH ARE DISTURBED BY THIS CONSTRUCTION AND WHICH ARE NOT PAVED OR BUILT UPON, SHALL BE ADEQUATELY STABILIZED TO CONTROL EROSION AND SEDIMENTATION. THE MINIMUM ACCEPTABLE STABILIZATION SHALL CONSIST OF PERMANENT GRASS, SEED MIXTURE TO BE AS RECOMMENDED BY THE CITY AGENT. ALL SLOPES 3:1 AND GREATER SHALL BE SODDED AND PEGGED OF OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY OF ALEXANDRIA.

8. EXISTING SEPTIC FIELDS, IF APPLICABLE, SHALL BE ABANDONED IN ACCORDANCE WITH VIRGINIA HEALTH DEPARTMENT STANDARDS AND SPECIFICATIONS.

9. ALL ABOVE GROUND UTILITIES SERVING THE SITE SHALL BE RELOCATED AS REQUIRED BY THE OWNING UTILITY COMPANIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING ALL ARRANGEMENTS AND COORDINATING ALL WORK REQUIRED FOR THE NECESSARY RELOCATIONS.

10. PRIOR TO BEGINNING OF CONSTRUCTION, CONTRACTOR SHALL VERIFY FROM THE ARCHITECTURAL DRAWINGS ALL DIMENSIONS, DETAILS, AND TREATMENTS FOR THE PROPOSED BUILDINGS, WALKWAYS, AND OTHER PROPOSED CONSTRUCTION WHERE INDICATED ON THE PLANS.

11. THE CONTRACTOR IS TO VERIFY INVERT, SIZE, AND LOCATION OF BUILDING UTILITY CONNECTIONS WITH THE MECHANICAL PLANS PRIOR TO PLACEMENT OF UNDERGROUND UTILITIES.

12. EXISTING BUILDINGS, FENCES AND OTHER EXISTING PHYSICAL FEATURES ARE TO BE REMOVED AS REQUIRED BY THE CONSTRUCTION.

13. EXISTING CONSTRUCTION SHALL BE REMOVED TO NEARESTJOINT. NEW CONSTRUCTION SHALL BE PROVIDED AS SHOWN AND ANY DAMAGED AREA SHALL BE REPAIRED TO MATCH CONDITIONS EXISTING PRIOR TO CONSTRUCTION OR TO THE SATISFACTION OF DIRECTOR, TRANSPORTATION AND ENVIRONMENTAL SERVICES.

14. ALL PRIVATE BUILDING CONNECTIONS ARE TO BE INSTALLED IN ACCORDANCE WITH THE CURRENT PLUMBING CODE.

15. TOPS OF EXISTING STRUCTURES WHICH REMAIN IN USE ARE TO BE ADJUSTED IN ACCORDANCE WITH THE GRADING PLAN. ALL PROPOSED STRUCTURE TOP ELEVATIONS ARE TO BE VERIFIED BY THE CONTRACTOR WITH THE SITE GRADING PLANS. IN CASE OF CONFLICT, THE GRADING PLAN SHALL SUPERSEDE PROFILE ELEVATIONS. MINOR ADJUSTMENTS TO MEET FINISHED GRADE ELEVATIONS, IF REQUIRED, SHALL BE MADE IN THE FIELD WITH THE APPROVAL OF SITE INSPECTOR OF THE DEPARTMENT OF TRANSPORTATION AND ENVIRONMENTAL SERVICES.

16. THE DESIGN, CONSTRUCTION, FIELD PRACTICES, AND METHODS SHALL CONFORM TO THE REQUIREMENTS SET FORTH BY THE CITY OF ALEXANDRIA ZONING ORDINANCE AND DESIGN AND CONSTRUCTION STANDARDS MANUAL. FAILURE TO COMPLY WITH THE CODE, APPLICABLE MANUALS, AND PROVISIONS OF THE CONSTRUCTION AND ESCROW AGREEMENTS OR THE PERMITS SHALL BE DEEMED A VIOLATION.

17. THE APPROVAL OF THESE PLANS SHALL IN NO WAY RELIEVE THE OWNER/DEVELOPER OR HIS AGENT OF ANY LEGAL RESPONSIBILITIES WHICH MAY BE REQUIRED BY THE CODE OF VIRGINIA OR ANY ORDINANCE ENACTED BY THE CITY OF ALEXANDRIA.

18. CONSTRUCTION STAKEOUT SHALL BE UNDER THE DIRECT SUPERVISION OF A LICENSED LAND SURVEYOR IN THE COMMONWEALTH OF VIRGINIA.

19. THE CONTRACTOR IS REFFRRED TO STRUCTURAL, GEOTECHNICAL, MECHANICAL, AND ARCHITECTURAL PLANS FOR FOUNDATION TREATMENT INCLUDING, BUT NOT LIMITED TO, SHEETING AND SHORING FOR BUILDING EXCAVATION, WATERPROFFING FOR FILL AGAINST BUILDINGS, LOCATION OF MECHANICAL EQUIPMENT, AND CONNECTIONS AT THE FACES OF BUILDINGS.

20. SMOOTH GRADE SHALL BE MAINTAINED FROM THE CENTERLINE OF THE EXISTING ROAD TO THE PROPOSED ENTRANCE AND/OR CURB & GUTTER TO PRECLUDE THE FORMING OF FALSE GUTTER AND/OR PONDING OF WATER ON THE ROADWAY.

21. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING A SMOOTH TRANSITION TO EXISTING CURB AND SIDEWALKS, IF APPLICABLE.

22. THE CALIFORNIA BEARING RATIO (CBR) VALUES OF IN-SITU MATERIALS SHALL BE DETERMINED BY FIELD AND/OR LABORATORY TESTS FOR ACTUAL DETERMINATION OF REQUIRED THICKNESSES OF SURFACE, BASE, SUB-BASE, AND SUB GRADE MATERIALS. THE PAVEMENT SECTION SHALL BE DESIGNED BY A GEOTECHNICAL /LICENSED PROPOFESSIONAL ENGINEER TO THE SATISFACTION OF DIRECTOR, TRANSPORTATION AND ENVIRONMENTAL SERVICES FOR ALL PAVEMENTS INCLUDING EMERGENCY VEHICLE EASEMENT (EVE) TO SUPPORT H-20 LOADING. IN THE CASE OF PAVEMENT PATCHES, PAVEMENT SECTION MUST MEET OR EXCEED EXISTING SECTION.

23. THE THICKNESSES OF SUB-BASE, BASE, AND WEARING COURSE SHALL BE DESIGNED USING "CALIFORNIA METHOD" AS SET FORTH ON PAGE 3-76 OF THE SECOND EDITION OF A BOOK ENTITLED, "DATA BOOK FOR CIVIL ENGINEERS, VOLUME ONE, DESIGN" WRITTEN BY ELWYN E. SEELYE. AN ALTERNATE PAVEMENT SECTION DESIGNED TO THE SATISFACTION OF DIRECTOR, TRANSPORTATION AND ENVIRONMENTAL SERVICES FOR ALL PAVEMENTS INCLUDING EMERGENCY VEHICLE EASEMENT (EVE) TO SUPPORT H-20 LOADING BASED ON CBR AND VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT) METHOD (VASWANI METHOD) AND STANDARD MATERIAL SPECIFICATIONS SHALL BE ACCEPTABLE.

24. EMERGENCY VEHICLE EASEMENTS (EVE) AND AMERICAN WITH DISTABILITY (ADA) ACCESSIBLE PARKING SPACES MUST BE DELINEATED WITH PAVEMENT MARKINGS PER THE CITY OF ALEXANDRIA STANDARD SIGNAGE AND AMERICAN WITH DISABILITIES (ADA) REQUIREMENTS.

25. ALL STRIPING SHALL MEET THE REQUIRMENTS OF MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) STANDARDS (LATEST EDITION) AND SHALL BE THERMOPLASTIC UNLESS OTHERWISE SPECIFIED.

1

26. ALL EARTHWORK OPERATIONS ARE TO BE PERFORMED UNDER THE SUPERVISION OF A REGISTERED GEOTECHNICAL ENGINEER WITH GEOTECHNICAL TESTING IN ACCORDANCE WITH CONSTRUCTION SPECIFICATIONS AND GEOTECHNICAL REPORT REQUIREMENTS.

27. THE CONTRACTORS SHALL NOT CAUSE OR PERMIT VEHICLES TO IDLE FOR MORE THAN 10 MINUTES WHEN PARKED.

28. UNLESS OTHERWISE APPROVED THE CONTRACTOR SHALL PROVIDE THERMOPLASTIC LADDER STYLE / STANDARD PEDESTRIAN CROSS WALKS AT ALL CROSSINGS AT THE PROPOSED DEVELOPMENT, WHICH MUST BE DESIGNED TO THE SATISFACTION OF THE DIRECTOR, TRANSPORTATION AND ENVIRONMENTAL SERVICES. THE DESIGN OF LADDER STYLE OR STANDARD PEDESTRIAN CROSS WALK SHALL BE EVALUATED ON A CASE BY CASE BASIS AND SHALL COMPLY WITH THE REQUIREMENTS OF POLICY MANUAL SECTION 30.18, PEDESTRIAN CROSSWALKS, JULY 13, 2006. A COPY OF THE POLICY MANUAL CAN BE OBTAINED FROM YON LAMBERT, BICYCLE AND PEDESTRIAN COORDINATOR / TRANSPORTATION PLANNER, TELEPHONE (703) 746-4081.

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	08/01/2025	ADDENDUM NO. 5

DESIGNED BY: RMB
DRAWN BY: JP
CHECKED BY: KKM
DATE: 5/30/2025

COMMONWEALTH OF VIRGINIA
CHARLES WAYNE HYATT, JR.
Lic. No. 0402057665
PROFESSIONAL ENGINEER
5/30/2025

HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

CITY OF ALEXANDRIA CIVIL NOTES 2 OF 3

IFB NO: 025-013
DRAWING NO: C-004
SCALE: N/A
SHEET NO: 23 OF 426

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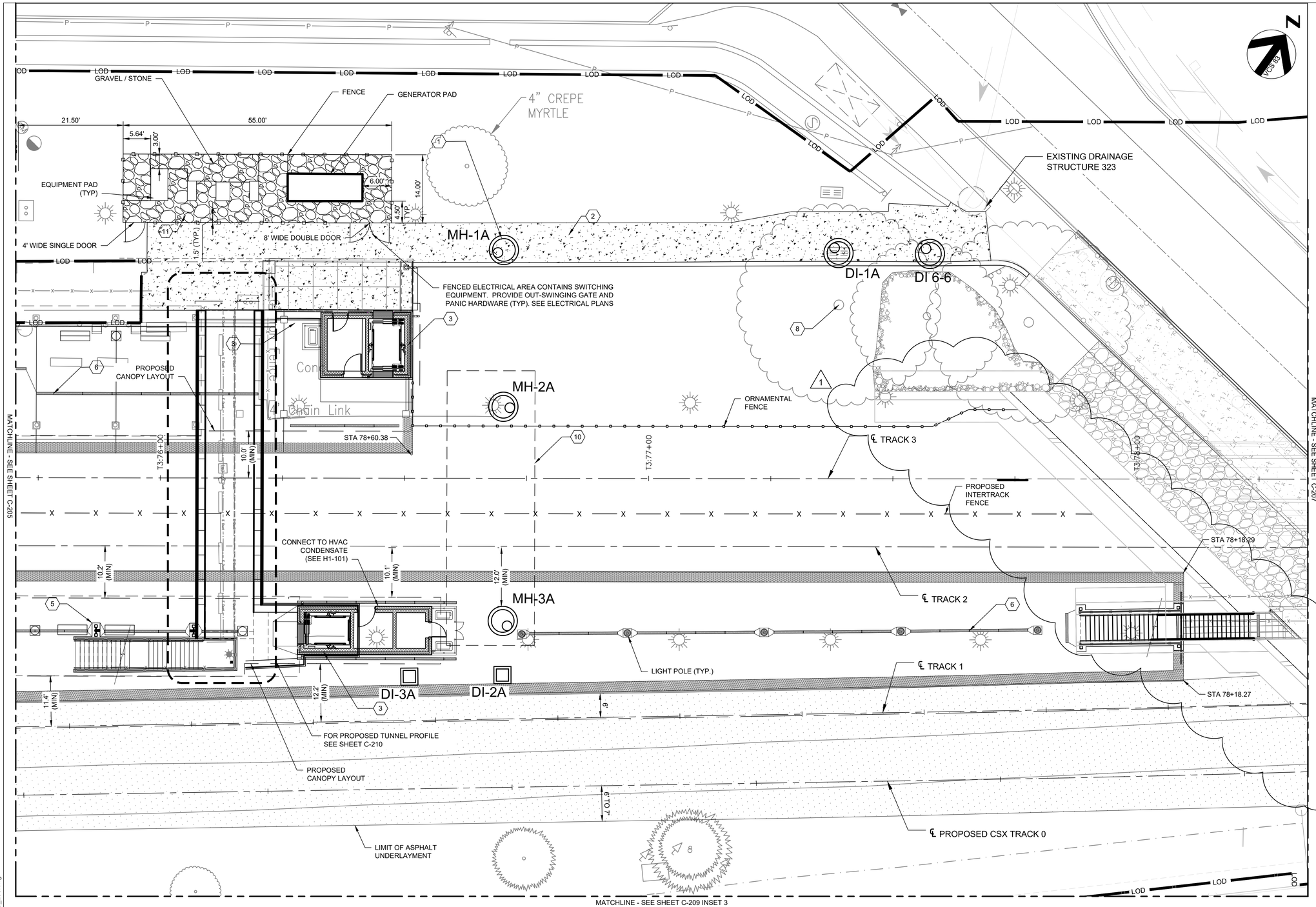


GENERAL NOTES:

1. SEE CIVIL LEGEND ON SHEET C-002.
2. SEE EROSION CONTROL SHEETS C-300 TO C-307.
3. ALL ON-SITE STORMWATER CURB INLETS AND PUBLIC CURB INLETS WITHIN 50 FEET OF THE PROPERTY LINE SHALL BE MARKED USING CITY STANDARD MARKERS (HOOFFS RUN). SEE DETAIL 4/C-501.
4. SEE GRADING AND UTILITY SHEETS C-220 TO C-228.

SITE NOTES:

1. ALL STATIONING THROUGHOUT THE SITE PLANS ARE BASED ON TRACK 2 CENTERLINE.

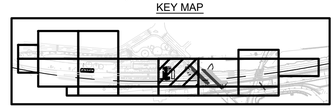
(#) KEY NOTES:

1. REFER TO SHEET C-235 AND C-236 FOR STORM DRAINAGE PROFILES AND SCHEDULE.
2. REPLACE SIDEWALK TO SAME GRADES AS PRE-CONSTRUCTION.
3. SEE STRUCTURAL DRAWINGS FOR SHORING AND EXCAVATION OF ELEVATOR SHAFTS.
4. DRY SWALE BMP. SEE STORMWATER MANAGEMENT SHEETS C-500 TO C-507.
5. CONTRACTOR IS TO LOCATE ROOF DRAIN PRIOR TO INSTALLATION OF TRENCH DRAIN AND NOTIFY ENGINEER IF CONFLICTS MAY ARISE.
6. TRENCH DRAIN. SEE DETAIL 6/C-237.
7. STORM STRUCTURES AND PIPES TO BE PRIVATELY OWNED AND MAINTAINED.
8. REFER TO LP-101 FOR PLANTING INFORMATION.
9. PIPE SEGMENTS UPSTREAM OF THIS POINT WITHIN CSX RIGHT OF WAY ARE NOT TO BE MAINTAINED BY THE CITY OF ALEXANDRIA.
10. SUPPORT OF EXCAVATION LIMIT FOR OPEN CUT INSTALLATION

ARCHAEOLOGY NOTES

1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAEOLOGIST COMES TO THE SITE AND RECORDS THE FINDS.
2. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION AND/OR ARTIFACT COLLECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY. FAILURE TO COMPLY SHALL RESULT IN PROJECT DELAYS.
3. ALL REQUIRED ARCHAEOLOGICAL PRESERVATION MEASURES SHALL BE COMPLETED PRIOR TO GROUND-DISTURBING ACTIVITIES (SUCH AS CORING, GRADING, FILLING, VEGETATION REMOVAL, UNDERGROUNDING OF UTILITIES, PILE DRIVING, LANDSCAPING AND OTHER EXCAVATIONS AS DEFINED IN SECTION 2-151 OF THE ZONING ORDINANCE) OR A RESOURCE MANAGEMENT PLAN MUST BE IN PLACE TO RECOVER SIGNIFICANT RESOURCES IN CONCERT WITH CONSTRUCTION ACTIVITIES. TO CONFIRM, CALL ALEXANDRIA ARCHAEOLOGY AT (703) 746-4399.

KEY MAP



0 5' 10' 20'
HORIZONTAL SCALE 1"=10'

APPROVED
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DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	08/01/2025	ADDENDUM NO. 5

DESIGNED BY: RMB
DRAWN BY: JP
CHECKED BY: KK/BM
DATE: 5/30/2025

CHARLES WAYNE HYATT, JR.
Lic. No. 0402057665
5/30/2025
COMMONWEALTH OF VIRGINIA
PROFESSIONAL ENGINEER

HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
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(571) 327-5800
www.hdrinc.com

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

SITE PLAN
6 OF 8

IFB NO: 025-013
DRAWING NO: C-206
SCALE: 1" = 10'
SHEET NO: 41 OF 426

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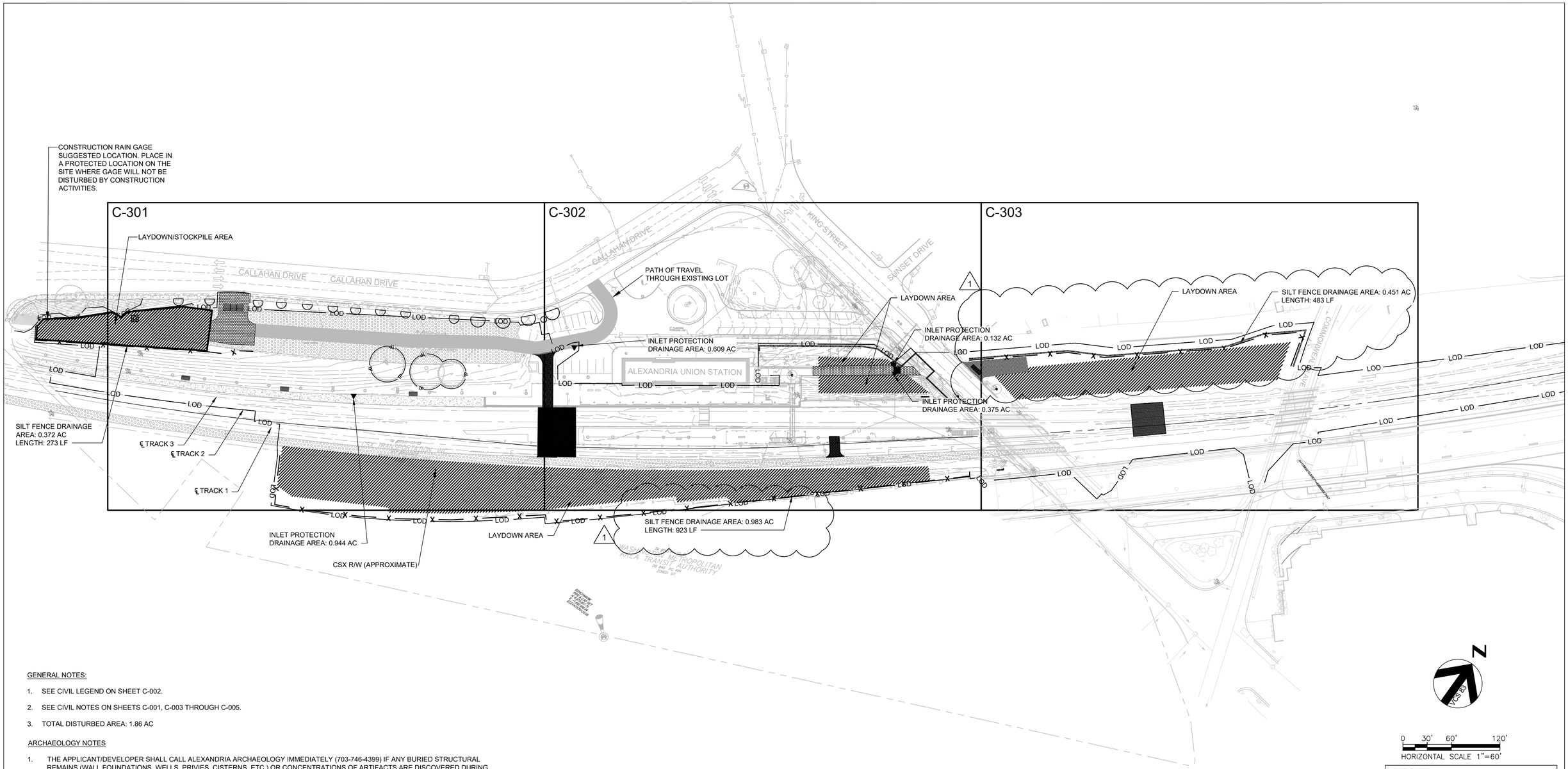

GENERAL NOTES:

1. SEE CIVIL LEGEND ON SHEET C-002.
2. SEE CIVIL NOTES ON SHEETS C-001, C-003 THROUGH C-005.
3. TOTAL DISTURBED AREA: 1.86 AC

ARCHAEOLOGY NOTES

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3. ALL REQUIRED ARCHAEOLOGICAL PRESERVATION MEASURES SHALL BE COMPLETED PRIOR TO GROUND-DISTURBING ACTIVITIES (SUCH AS CORING, GRADING, FILLING, VEGETATION REMOVAL, UNDERGROUNDING OF UTILITIES, PILE DRIVING, LANDSCAPING AND OTHER EXCAVATIONS AS DEFINED IN SECTION 2-151 OF THE ZONING ORDINANCE) OR A RESOURCE MANAGEMENT PLAN MUST BE IN PLACE TO RECOVER SIGNIFICANT RESOURCES IN CONCERT WITH CONSTRUCTION ACTIVITIES. TO CONFIRM, CALL ALEXANDRIA ARCHAEOLOGY AT (703) 746-4399.

N (VCRS 83)

0 30' 60' 120'
HORIZONTAL SCALE 1"=60'

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DIRECTOR DATE
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INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

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1	08/01/2025	ADDENDUM NO. 5

DESIGNED BY: RMB
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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

EROSION AND SEDIMENT CONTROL PHASE 1 - OVERALL

IFB NO: 025-013
DRAWING NO: C-300
SCALE: 1" = 60'
SHEET NO: 75 OF 426

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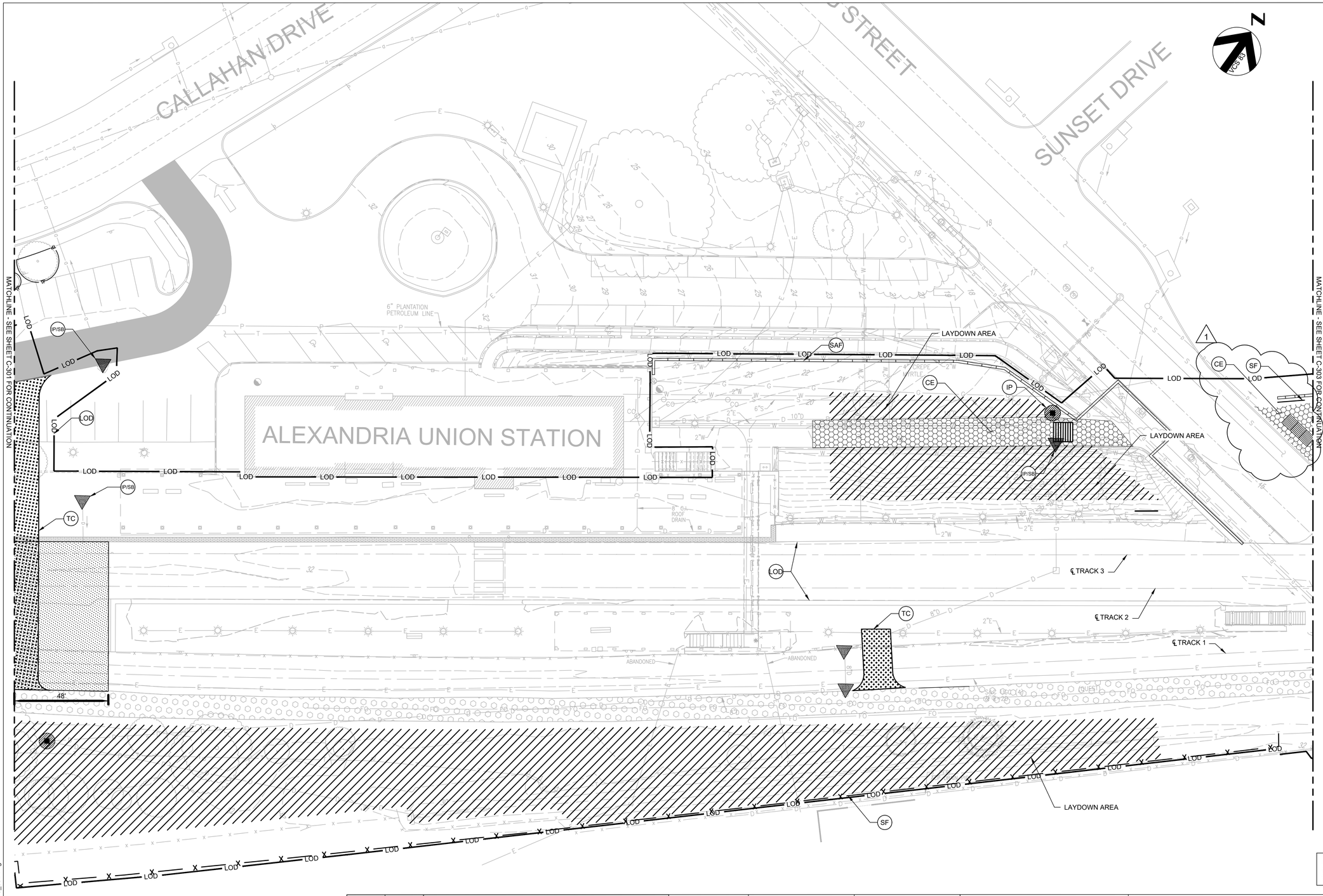

GENERAL NOTES:

1. SEE CIVIL LEGEND ON SHEET C-002.
2. SEE DEMOLITION SHEETS C-104 TO C-107.
3. SEE SHEET C-308 FOR EROSION CONTROL NOTES AND SHEETS C-309 THROUGH C-311 FOR EROSION CONTROL DETAILS.
4. NO WASH WATER SOURCE IS AVAILABLE ON SITE. CONTRACTOR TO PROVIDE WATER SOURCE FOR CONSTRUCTION ENTRANCE WASH RACK (IF WASH RACK IS REQUIRED).
5. TOTAL DISTURBED AREA: 1.86 AC

ARCHAEOLOGY NOTES

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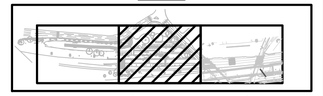
KEY NOTES:

- (IP/SB) SILT BAG INLET PROTECTION. SEE DETAIL 2/C-309
- (TP) TREE PROTECTION (TYP). SEE DETAIL 4/C-310
- (CE) CONSTRUCTION ENTRANCE. SEE DETAIL 2/C-310
- (LOD) LIMITS OF DISTURBANCE (TYP)
- (IP) BLOCK & GRAVEL INLET PROTECTION. SEE DETAIL 2/C-311
- (SAF) SAFETY FENCE
- (TC) TEMPORARY ASPHALT TRACK CROSSING BY CSX. SEE DETAIL 2535/C-239
- (SF) SILT FENCE. SEE DETAIL 1/C-309

KEY MAP



0 10' 20' 40'
HORIZONTAL SCALE 1"=20'

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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

EROSION AND SEDIMENT CONTROL PHASE 1 - 2 OF 3

IFB NO: 025-013
DRAWING NO: C-302
SCALE: 1" = 20'
SHEET NO: 77 OF 426

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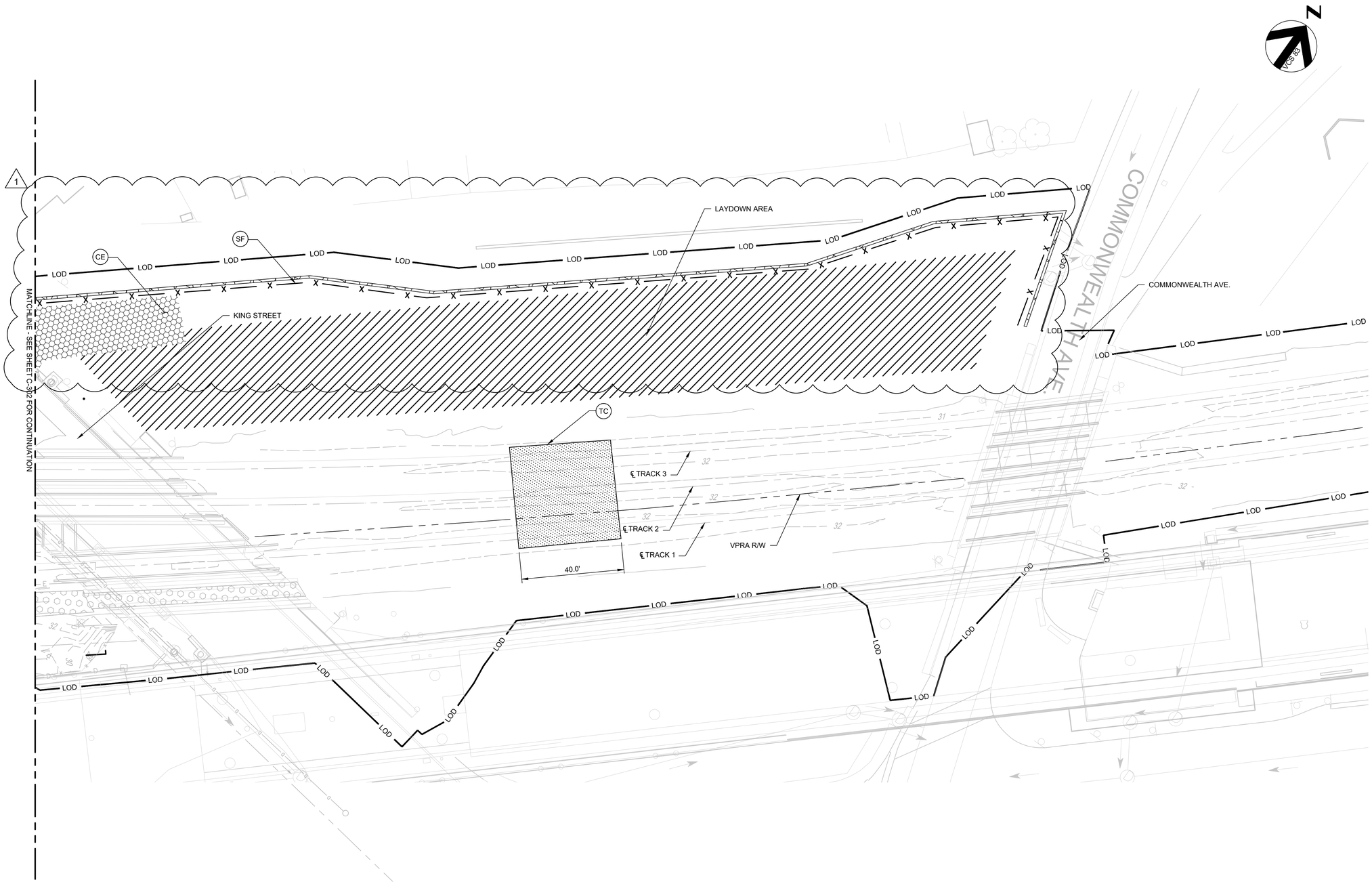

GENERAL NOTES:

1. SEE CIVIL LEGEND ON SHEET C-002.
2. SEE DEMOLITION SHEETS C-104 TO C-107.
3. SEE SHEET C-308 FOR EROSION CONTROL NOTES AND SHEETS C-309 THROUGH C-311 FOR EROSION CONTROL DETAILS.
4. NO WASH WATER SOURCE IS AVAILABLE ON SITE. CONTRACTOR TO PROVIDE WATER SOURCE FOR CONSTRUCTION ENTRANCE WASH RACK (IF WASH RACK IS REQUIRED).
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ARCHAEOLOGY NOTES

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2. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION AND/OR ARTIFACT COLLECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY. FAILURE TO COMPLY SHALL RESULT IN PROJECT DELAYS.
3. ALL REQUIRED ARCHAEOLOGICAL PRESERVATION MEASURES SHALL BE COMPLETED PRIOR TO GROUND-DISTURBING ACTIVITIES (SUCH AS CORING, GRADING, FILLING, VEGETATION REMOVAL, UNDERGROUNDING OF UTILITIES, PILE DRIVING, LANDSCAPING AND OTHER EXCAVATIONS AS DEFINED IN SECTION 2-151 OF THE ZONING ORDINANCE) OR A RESOURCE MANAGEMENT PLAN MUST BE IN PLACE TO RECOVER SIGNIFICANT RESOURCES IN CONCERT WITH CONSTRUCTION ACTIVITIES. TO CONFIRM, CALL ALEXANDRIA ARCHAEOLOGY AT (703) 746-4399.

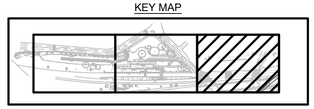
KEY NOTES:

(TC) TEMPORARY ASPHALT TRACK CROSSING BY CSX. SEE DETAIL 2535/C-239

(CE) CONSTRUCTION ENTRANCE. SEE DETAIL 2/C-310

(SF) SILT FENCE. SEE DETAIL 1/C-309

KEY MAP



0 10' 20' 40'
HORIZONTAL SCALE 1"=20'

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	08/01/2025	ADDENDUM NO. 5

DESIGNED BY: RMB
DRAWN BY: JP
CHECKED BY: KK/BM
DATE: 5/30/2025

COMMONWEALTH OF VIRGINIA
CHARLES WAYNE HYATT, JR.
Lic. No. 0402057665
PROFESSIONAL ENGINEER
5/30/2025

HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
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(571) 327-5800
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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

EROSION AND SEDIMENT CONTROL PHASE 1- 3 OF 3

IFB NO: 025-013
DRAWING NO: C-303
SCALE: 1" = 20'
SHEET NO: 78 OF 426

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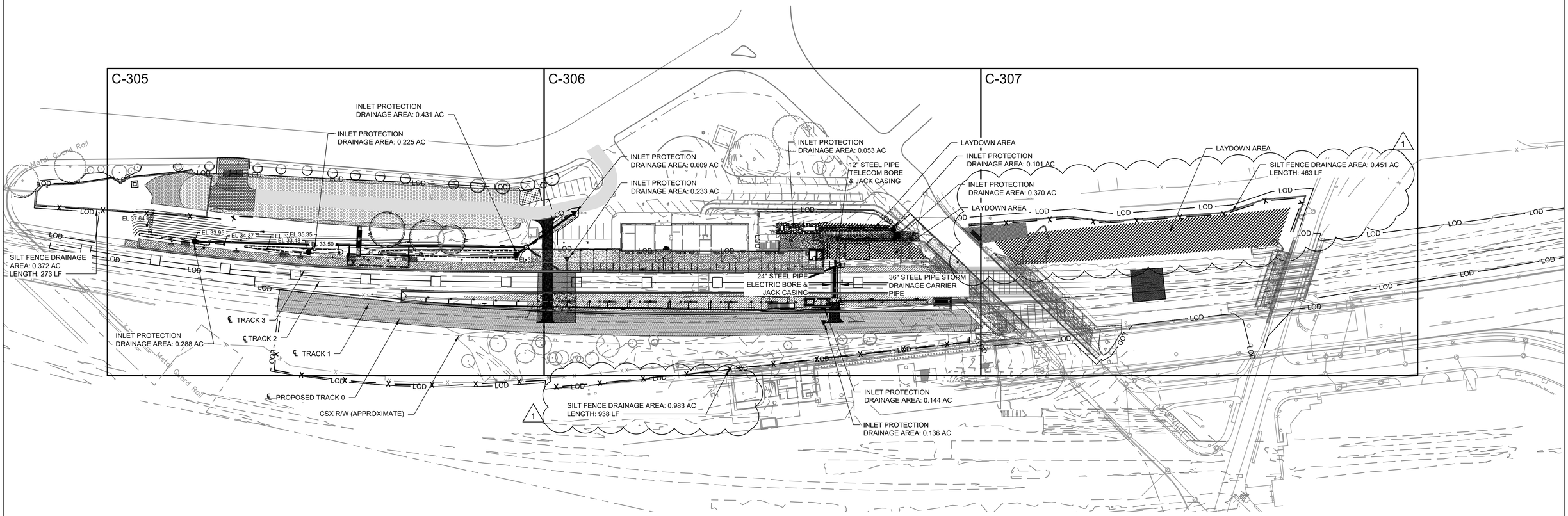

GENERAL NOTES:

1. SEE CIVIL LEGEND ON SHEET C-002.
2. SEE CIVIL NOTES ON SHEETS C-001, C-003 THROUGH C-005.
3. TOTAL DISTURBED AREA: 1.86 AC

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N

VCS 85

0 30' 60' 120'
HORIZONTAL SCALE 1"=60'

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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

EROSION AND SEDIMENT CONTROL PHASE 2 - OVERALL

IFB NO: 025-013
DRAWING NO: C-304
SCALE: 1" = 60'
SHEET NO: 79 OF 426

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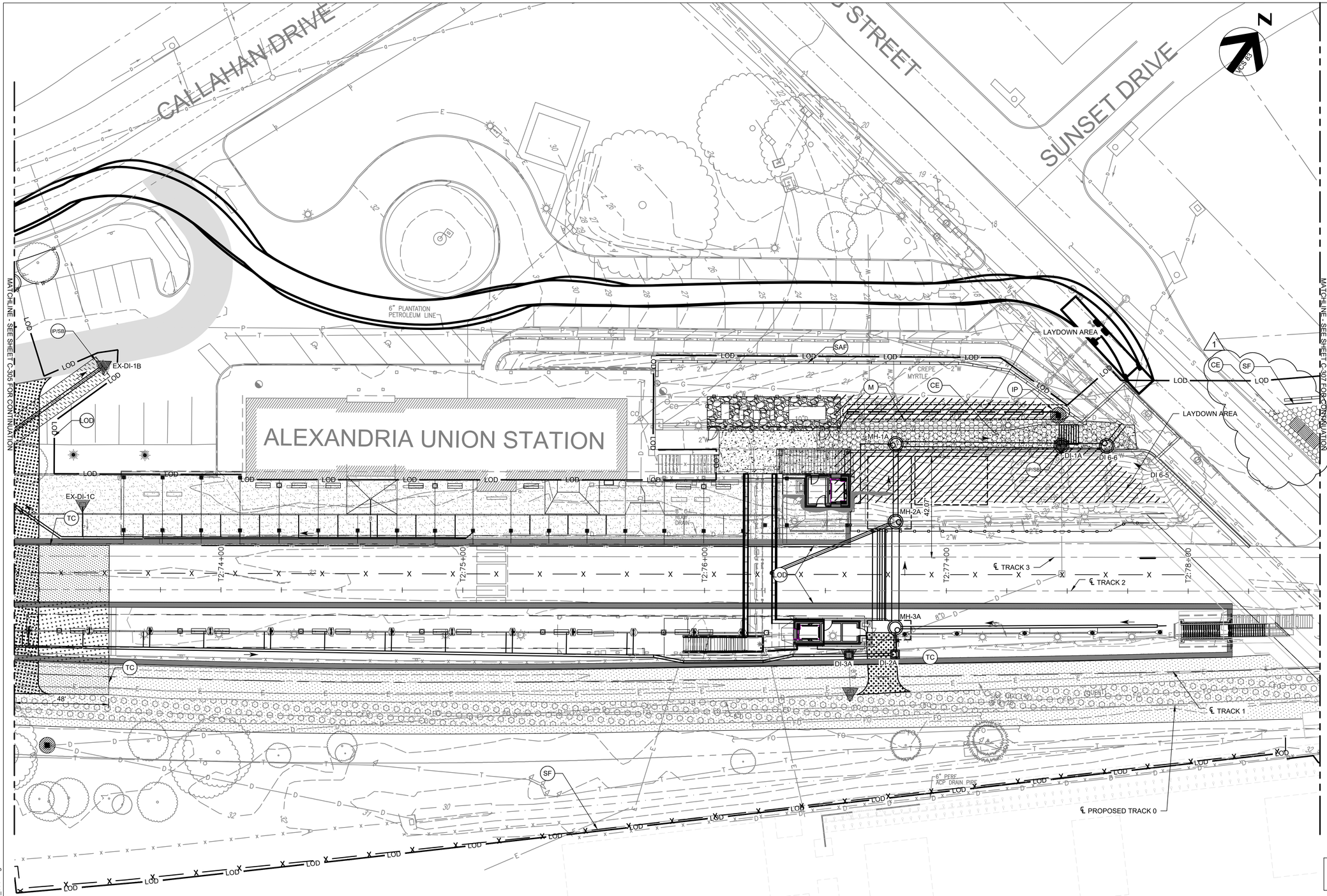

GENERAL NOTES:

1. SEE CIVIL LEGEND ON SHEET C-002.
2. SEE DEMOLITION SHEETS C-104 TO C-107.
3. SEE SHEET C-308 FOR EROSION CONTROL NOTES AND SHEETS C-309 THROUGH C-311 FOR EROSION CONTROL DETAILS.
4. NO WASH WATER SOURCE IS AVAILABLE ON SITE. CONTRACTOR TO PROVIDE WATER SOURCE FOR CONSTRUCTION ENTRANCE WASH RACK (IF WASH RACK IS REQUIRED).
5. TOTAL DISTURBED AREA: 1.86 AC

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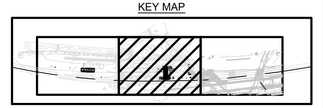
KEY NOTES:

- (IP/SB) SILT BAG INLET PROTECTION. SEE DETAIL 2/C-309
- (TP) TREE PROTECTION (TYP). SEE DETAIL 4/C-310
- (CE) CONSTRUCTION ENTRANCE. SEE DETAIL 2/C-310
- (LOD) LIMITS OF DISTURBANCE (TYP)
- (IP) BLOCK & GRAVEL INLET PROTECTION. SEE DETAIL 2/C-311
- (SAF) SAFETY FENCE
- (TC) TEMPORARY ASPHALT TRACK CROSSING. SEE DETAIL 2535/C-239
- (SF) SILT FENCE. SEE DETAIL 1/C-309.
- (M) MATTING IN SWALES. SEE DETAIL 1/C-311

KEY MAP



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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

EROSION AND SEDIMENT CONTROL PHASE 2 - 2 OF 3

IFB NO: 025-013
DRAWING NO: C-306
SCALE: 1" = 20'
SHEET NO: 81 OF 426

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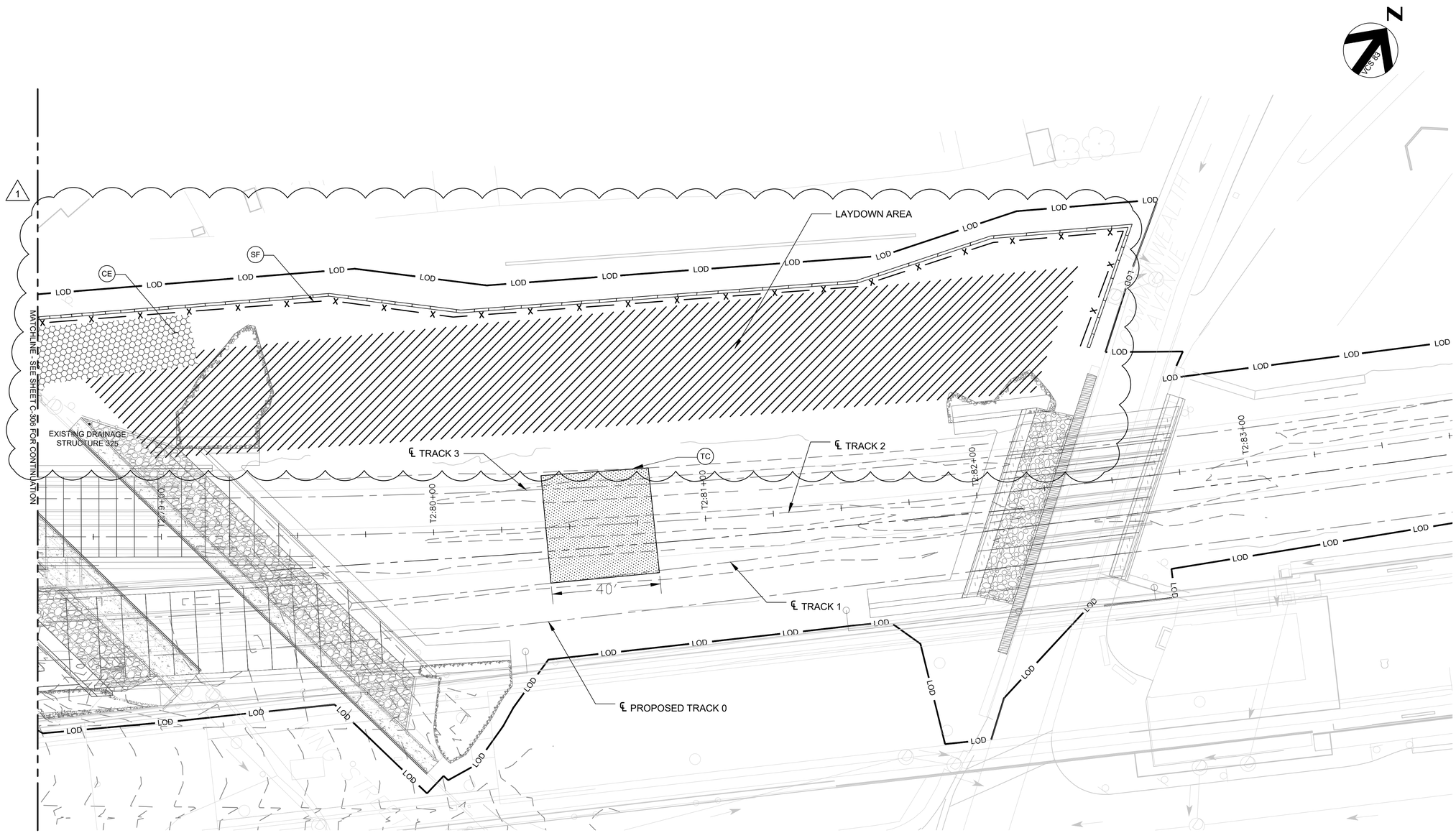

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2. SEE DEMOLITION SHEETS C-104 TO C-107.
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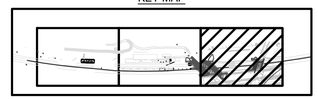
(CE) CONSTRUCTION ENTRANCE. SEE DETAIL 2/C-310

(SF) SILT FENCE. SEE DETAIL 1/C-309

KEY MAP



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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

EROSION AND SEDIMENT CONTROL PHASE 2 - 3 OF 3

IFB NO: 025-013
DRAWING NO: C-307
SCALE: 1" = 20'
SHEET NO: 82 OF 426

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SPECIFICATIONS

CONSTRUCTION:

PROJECT TECHNICAL SPECIFICATIONS.

DIMENSIONS:

THESE CONTRACT DRAWINGS ARE BASED UPON AVAILABLE DESIGN DRAWINGS OF THE EXISTING BRIDGE SUPERSTRUCTURE. NO DESIGN DRAWINGS FOR EXISTING SUBSTRUCTURE ARE AVAILABLE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL DIMENSIONS IN THE FIELD BEFORE FABRICATION TO ENSURE PROPER FIT OF NEW MATERIAL.

DESIGN:

CURRENT EDITION OF THE AMERICAL RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION (AREMA) "MANUAL FOR RAILWAY ENGINEERING" CHAPTER 15 – STEEL STRUCTURES, CHAPTER 8 – CONCRETE STRUCTURES AND FOUNDATIONS.
CSX PUBLIC PROJECT INFORMATION FOR CONSTRUCTION AND IMPROVEMENT PROJECTS THAT MAY INVOLVE THE RAILROAD, 2022

DESIGN CRITERIA:

DEAD LOAD:	WEIGHT OF RAIL, OTHER TRACK MATERIALS, TIES, BALLAST (INCLUDING 6" FUTURE BALLAST), STEEL DECK, WATERPROOFING, WALKWAY, UTILITIES, AND OTHER MISCELLANEOUS FIXTURES
LIVE LOAD:	SUPERSTRUCTURE: COOPER E-80/ALTERNATE LOADING SUBSTRUCTURE: COOPER E-90 WALKWAY LIVE LOAD: PER AREMA 15-8.5.3
IMPACT:	APPLICAPLE PERCENTAGE OFR ROLLING EQUIPMENT WITHOUT HAMMER BLOW.
FATIGUE:	PER AREMA 15-1.3.13 FATIGUE
WIND LOAD:	PER AREMA 8-2.2.3, 15-1.3.7 AND 15-1.3.8 AS REQUIRED.
SUBSTRUCTURE:	CONCRETE SUBSTRUCTURE DESIGNED BY LOAD FACTOR METHOD.

CONSTRUCTION NOTES

EXISTING RIGHT-OF-WAY:

SEE SITE PLAN (DRAWING NO. G-017)

CONTROL OF WORK:

ALL WORK INVOLVED IN THE CONSTRUCTION OF THE RAILWAY STRUCTURE SHALL BE PERFORMED TO THE SATISFACTION OF THE ENGINEER AND VRE. ALL METHODS OF HANDLING WORK AFFECTING THE SAFETY OF RAIL OPERATIONS MUST BE APPROVED BY THE RAILWAY ENGINEER BEFORE PROCEEDING WITH THAT PORTION OF THE WORK. RAIL TRAFFIC SHALL AT ALL TIMES BE MAINTAINED AND PROTECTED.

CONSTRUCTION REQUIREMENTS:

ALL WORK SHALL BE IN ACCORDANCE WITH CURRENT EDITION AREMA "MANUAL FOR RAILWAY ENGINEERING" AND THE SPECIFICATIONS FOR THIS CONTRACT. CONTRACTOR SHALL SUBMIT SYSTEM SAFETY WORK PLAN FOR APPROVAL PRIOR TO THE START OF CONSTRUCTION ACTIVITIES.

THE CONTRACTOR SHALL NOT INTERFERE WITH OR PERFORM ANY CONSTRUCTION ON OR NEAR OPERATING TRACKS WITHOUT THE HOST RAILROAD'S PERMISSION. WHEN THE CONTRACTOR IS WORKING NEAR ANY TRACK, HE WILL BE REQUIRED TO HAVE A FLAGMAN FROM THE HOST RAILROAD ON DUTY.

CONTRACTOR SHALL NOT SCALE DIMENSIONS FROM THE CONTRACT PLANS FOR CONSTRUCTION PURPOSES. SCALES ARE SHOWN FOR INFORMATION ONLY. NO CONSTRUCTION JOINTS, EXCEPT THOSE SHOWN ON THE PLANS, WILL BE ALLOWED UNLESS APPROVED BY THE ENGINEER.

CONTRACTOR RESPONSIBILITY

1. COORDINATE ALL CONSTRUCTION ACTIVITIES WITH VRE AND THE HOST RAILROAD.
2. BEFORE ORDERING ANY MATERIAL, THE CONTRACTOR SHALL MAKE A DETAILED FIELD INSPECTION OF THE SITE VERIFYING ALL PERTINENT DIMENSIONS AND ELEVATIONS AND LOCATION OF PROPOSED BRIDGE. ANY VARIATIONS IN DIMENSIONS OR ELEVATIONS FROM THOSE SHOWN ON THE PLANS SHALL BE REPORTED IMMEDIATELY TO VRE.
3. VERIFY THE LOCATION, RELOCATION, ABANDONMENT, AND/OR TEMPORARY SUPPORT OF ALL UTILITIES AFFECTED BY THE CONSTRUCTION OF THE STRUCTURE AND EMBANKMENT AND COORDINATE THESE ACTIVITIES WITH THE APPROPRIATE UTILITY COMPANIES, AGENCIES, AND/OR AUTHORITIES. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE WHICH MIGHT OCCUR DUE TO CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE ANY AND ALL UTILITIES.
4. APPLY FOR AND OBTAIN ANY CONSTRUCTION PERMITS NECESSARY TO PERFORM THE WORK.
5. PROVIDE VRE AND THE HOST RAILROAD WITH A DETAILED CONSTRUCTION PLAN DETAILING THE ACTIVITY, SCHEDULE AND PROCEDURE FOR EACH ASPECT OF THE WORK. CONSTRUCTION SHALL NOT BEGIN UNTIL THE CONSTRUCTION PLAN HAS BEEN APPROVED BY VRE AND THE HOST RAILROAD.
6. MONITOR THE EXISTING STRUCTURE DURING THE WORK AND SUBMIT THE MONITORING PLAN FOR REVIEW.
7. CONSTRUCT THE BRIDGE IN ITS ENTIRETY.
8. PROVIDE ALL TEMPORARY SHORING AND/OR BRACING AS REQUIRED TO SUPPORT AND PROTECT THE EXISTING AND PROPOSED EMBANKMENTS AND BRIDGE ABUTMENTS AFFECTED BY THE WORK. PROVIDE THE VRE PROJECT MANAGER WITH DETAILS, DESIGN AND PROCEDURES FOR ALL TEMPORARY SHORING AND/OR BRACING.
9. COORDINATE WITH TRACK CONTRACTOR ON INSTALLATION OF THE BALLAST, TIES, RAIL AND OTM FOR PROPOSED TRACK.
10. PROVIDE AND REPLACE ALL FILL MATERIAL PER SPECIFICATIONS FOR EARTHWORK.
11. RESTORE ALL AREAS THROUGHOUT THE LENGTH OF THE BRIDGE TO ORIGINAL CONDITION OR BETTER, AND AS REQUIRED BY RELEVANT PERMITS.
12. FOR CONSTRUCTION ADJACENT TO WMATA FACILITIES, THE CONTRACTOR SHALL COMPLY WITH WMATA'S "ADJACENT CONSTRUCTION PROJECT MANUAL".

FIELD WELDING:

WELDING MUST BE IN COMPLIANCE WITH REQUIREMENTS SPECIFIED IN AWS D1.5, CURRENT EDITION. WELDING MUST BE ACCOMPLISHED WITH THE SMAW PROCESS. WELDING ELECTRODES MUST BE E7018. WELDERS MUST POSSESS VALID CERTIFICATION. FIELD WELDING WILL ONLY BE PERMITTED AS INDICATED IN THE PLANS OR AS APPROVED BY THE VRE PROJECT MANAGER. CONTRACTOR SHALL POST FIRE WATCH DURING FIELD WELDING OPERATION.

STEEL BRIDGE ERECTION:

BRIDGE ERECTION SHALL COMPLY WITH AREMA CHAPTER 15, PART: 4 "ERECTION". THE CONTRACTOR SHALL SUBMIT THREE (3) COPIES OF CONSTRUCTION SEQUENCE AND PROCEDURES FOR APPROVAL.

CONSTRUCTION TOLERANCE:

TOLERANCE FOR CONCRETE CONSTRUCTION SHALL CONFORM TO ALL REQUIREMENTS OF ACI 117, EXCEPT AS MODIFIED BELOW, IN THE SPECIAL PROVISIONS AND BY THE REQUIREMENTS OF THESE DRAWINGS. MAXIMUM ALLOWABLE DEVIATIONS FROM DIMENSIONS, ELEVATIONS, AND POSITIONS SHOWN ON THE DRAWINGS SHALL BE AS FOLLOWS.

1. VERTICAL ALIGNMENT OF MICROPILES: NOT MORE THAN 1/4" PER FOOT OF DEPTH.
2. LATERAL ALIGNMENT OF MICROPILES: 1/36 OF PILE DIAMETER BUT NOT MORE THAN 2".
3. MICROPILE CUT-OFF ELEVATIONS: PLUS 1"; MINUS 3".
4. TOP ELEVATION OF COLUMNS: AS NECESSARY TO JOIN BENT CAPS AND NOT MORE THAN PLUS OR MINUS 1/4".
5. PLUMB OF COLUMNS: 1/4" IN 30 FEET, NOT EXCEEDING 1/2" TOTAL.
6. CROSS SECTIONAL DIMENSION OF COLUMNS, STRUTS AND CAPS: PLUS OR MINUS 1/4".
7. SEE PRE-CAST NOTES FOR PRE-CAST CONSTRUCTION TOLERANCES.

STRUCTURAL STEEL NOTES

GENERAL:

PRIOR TO FABRICATION, CONTRACTOR/FABRICATOR SHALL SUBMIT THE FOLLOWING FOR APPROVAL BY THE ENGINEER:

1. SHOP DRAWINGS INDICATING MATERIALS, SIZES, CONNECTIONS, ANCHORS, AND PAINTING.
2. PRODUCT DATA, INCLUDING MANUFACTURER'S CATALOG SHEETS ON PRE-MANUFACTURED ITEMS.

FABRICATION:

1. FABRICATION OF ALL STEEL MEMBERS SHALL BE ACCORDING TO THE AREMA MANUAL FOR RAILWAY ENGINEERING, CHAPTER 15, PART 3 – FABRICATION.
2. SHOP ASSEMBLY OF ALL STRUCTURAL STEEL IS REQUIRED TO ENSURE PROPER FIT AND ALIGNMENT OF THE STEEL MEMBERS. ALL MEMBERS SHALL BE MATCH MARKED WITH THE USE OF STEEL PUNCHES.
3. ALL STEEL MATERIAL THAT REQUIRES CUTTING SHALL BE CUT WITH EITHER A MECHANICALLY GUIDED BURNER OR A CUT-OFF SAW. AT NO TIME WILL FREEHAND FLAME CUTTING OR FREEHAND SAWING WITH A HAND HELD SAW OR MECHANICALLY OPERATED HAND HELD SAW BE ALLOWED. THE SURFACES SHALL NOT BE ROUGHER THAN ANSI B46.1 SURFACE TEXTURE OF 1000.
4. PLUMB AND TRUE VERTICAL AND HORIZONTAL MEMBERS TO TOLERANCE OF +/- 1/8" IN 10 FT.

STRUCTURAL STEEL:

1. ALL STRUCTURAL STEEL SHAPES AND PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50 T2 OR A709 GRADE 50 F2.
2. FABRICATE DETAILS AND CONNECTION ASSEMBLIES IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS, WITH PROJECTING CORNERS CLIPPED AND FILLER PIECES WELDED FLUSH.
3. FIT WORK TOGETHER IN FABRICATION SHOP AND DELIVER COMPLETE OR IN PARTS, READY TO BE SET IN PLACE OR ASSEMBLED IN FIELD.
4. ALL MATERIAL SHALL BE STRAIGHT AND FREE FROM SHARP KINKS OR BENDS. ANY STEEL MATERIAL EXHIBITING SUCH DEFICIENCIES SHALL BE CAUSE FOR THE REJECTION OF THE MATERIAL. STRAIGHTENING OF THE MATERIAL SHALL NOT BE ACCEPTABLE.

GALVANIZING:

1. GALVANIZE MATERIAL AS NOTED IN THE PLANS.
2. GALVANIZE AFTER FABRICATION.
3. GALVANIZE BY HOT-DIP PROCESS CONFORMING WITH ASTM A123, A153 (AS APPLICABLE) AND AMERICAN HOT-DIPPED GALVANIZERS ASSOCIATION SPECIFICATIONS.
4. GALVANIZE IN PLANT HAVING FACILITIES TO PRODUCE QUALITY COATINGS AND CAPACITY FOR VOLUME OF WORK.
5. SHIP AND HANDLE IN MANNER TO AVOID DAMAGE TO ZINC COATING. REPAIR GALVANIZED SURFACES DAMAGED DURING SHIPPING OR ERECTION/CONSTRUCTION OPERATIONS USING ZINC-RICH PAINT REFER SPECIFICATIONS SECTION 09 96 00 HIGH PERFORMANCE INDUSTRIAL COATINGS.

BOLTS:

1. BOLTED CONNECTIONS SHALL BE MADE WITH 7/8" DIA. ASTM F3125, GRADE A325, HIGH STRENGTH, TYPE 1 BOLTS UNLESS NOTED OTHERWISE. ALL 7/8" DIA. BOLTS SHALL BE TIGHTENED TO A MINIMUM TENSION PER BOLT OF 39,000 LBS.
2. ASTM F3125, GRADE A490, (HIGH STRENGTH), TYPE 1 BOLTS WHERE SPECIFIED SHALL BE TIGHTENED TO A MINIMUM TENSION AS PER AREMA TABLE 15-1-12, "MINIMUM TENSION OF INSTALLED BOLTS".
3. ANY BOLTS THAT REQUIRE REMOVAL AFTER BEING TIGHTENED TO THEIR PROOF LOAD SHALL BE DISCARDED AND A NEW BOLT INSTALLED.

1

4. ALL SHOP BOLT HOLES TO BE SUB-PUNCHED AND REAMED OR PUNCHED FULL SIZE. ALL HOLES SHALL BE 1/16" LARGER THAN THE SPECIFIED BOLT SIZE UNLESS NOTED OTHERWISE.
5. ALL BOLT HOLES THAT REQUIRE FIELD DRILLING SHALL BE DRILLED FROM THE SOLID. AT NO TIME ARE HOLES TO BE TORCH CUT OR PRODUCED BY OTHER MEANS AND METHODS. OVERSIZING HOLES FOR FIELD FIT UP SHALL BE DONE BY REAMING USING A TAPERED SHANK, FLUTED REAMER. REAMER DIAMETER SHALL BE 1/16?LARGER THAN THE SPECIFIED BOLT DIAMETER. HOLES, NEW OR ENLARGING, MADE BY USE OF CUTTING TORCH IS CAUSE FOR REJECTION OF ENTIRE MEMBER.

WELDING

1. ALL FIELD WELDS TO BE MADE WITH E7018 LOW HYDROGEN ELECTRODES WITH ON-SITE PROTECTION AND USE OF ELECTRODE HEATING UNITS PER CURRENT A.W.S. SPECIFICATIONS.
2. ALL WELDS ARE TO BE SHOP WELDS UNLESS NOTED OTHERWISE. WELD SIZES SHALL BE AS SHOWN ON THE DRAWINGS.
3. THERE SHALL BE THOROUGH FUSION BETWEEN WELD METAL AND BASE METAL AND BETWEEN SUCCESSIVE PASSES OF THE WELD. ALL CRATERS SHALL BE FILLED TO THE FULL CROSS SECTION OF THE WELD.
4. ALL WELDING SHALL BE IN ACCORDANCE WITH CURRENT AREMA SPECIFICATIONS AND THE PROJECT SPECIFICATIONS. WELDING PRACTICES TO BE IN ACCORDANCE WITH AMERICAN WELDING SOCIETY STRUCTURAL WELDING CODE D1.5, CURRENT ISSUE. ALL WELDS TO BE CONTINUOUS UNLESS OTHERWISE SHOWN.
5. QUALIFY WELDING OPERATORS IN ACCORDANCE WITH AWS D1.1. QUALIFICATION TESTS SHALL BE RUN BY RECOGNIZED TESTING LABORATORY APPROVED BY THE ENGINEER AT THE CONTRACTOR'S EXPENSE. PRIOR TO WELDING, EACH WELDER SHALL HAVE BEEN CERTIFIED IN ACCORDANCE WITH AWS REQUIREMENTS DURING A PERIOD OF ONE (1) YEAR PRIOR TO WORK ON THE BRIDGE. THE FABRICATOR SHALL FURNISH THE VRE PROJECT MANAGER WITH AN AWS CERTIFICATE FOR EACH WELDER, COVERING THEIR ABILITY TO MAKE A COMPLETE AND SATISFACTORY WELD OF EACH KIND TO BE USED ON THE PROJECT.

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DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	08/01/2025	ADDENDUM NO. 5

DESIGNED BY: RCV
DRAWN BY: NME
CHECKED BY: JR
DATE: 5/30/2025

COMMONWEALTH OF VIRGINIA
KENNEDY KYEI-MENSAH
Lic. No. 0402051019
5/30/2025
PROFESSIONAL ENGINEER

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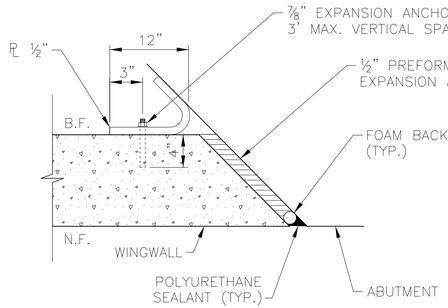
CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

BRIDGE GENERAL NOTES - 1 OF 3

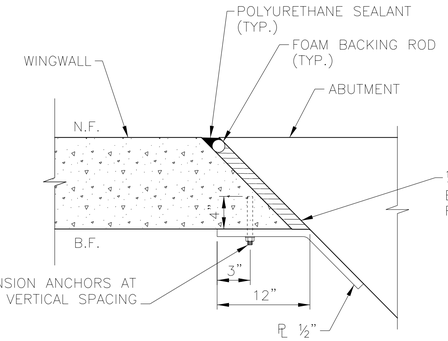
IFB NO: 025-013
DRAWING NO: S2-001
SCALE: AS SHOWN
SHEET NO: 165 OF 426

FILENAME: ...\CFP-105.30-GN01.dgn DATE: 7/21/2025



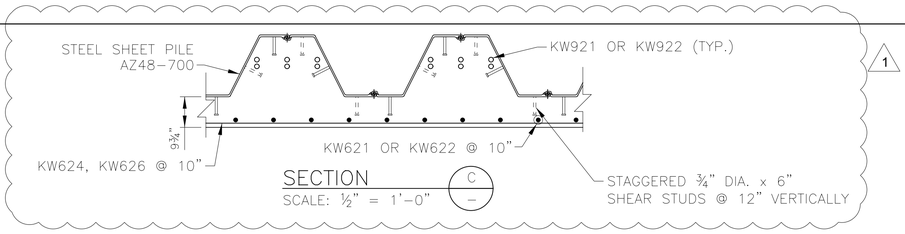
EXPANSION JOINT DETAILS – SOUTHWEST

SCALE: NOT TO SCALE



EXPANSION JOINT DETAILS – SOUTHEAST

SCALE: NOT TO SCALE

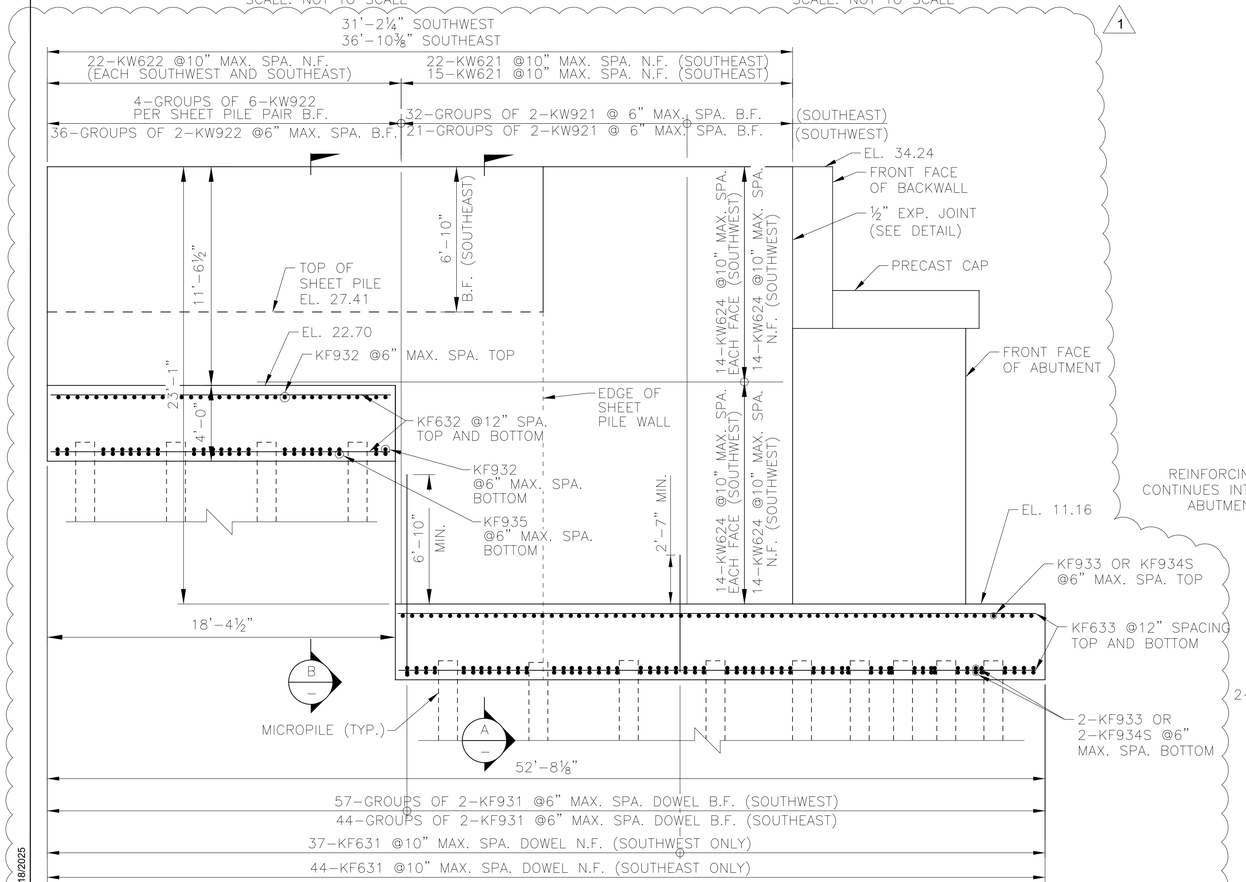


SECTION

SCALE: ½" = 1'-0"

NOTE

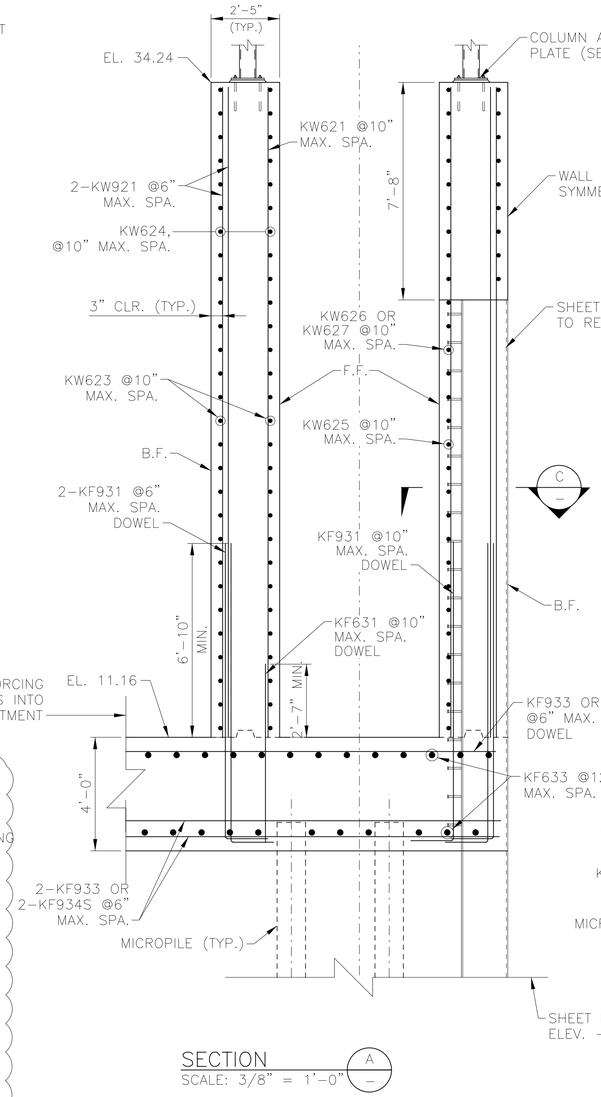
1. STAIRCASE SEE DWG. SERIES S1.
2. SEE S2-226 FOR FOOTING REINFORCING.



ELEVATION – LOOKING WEST

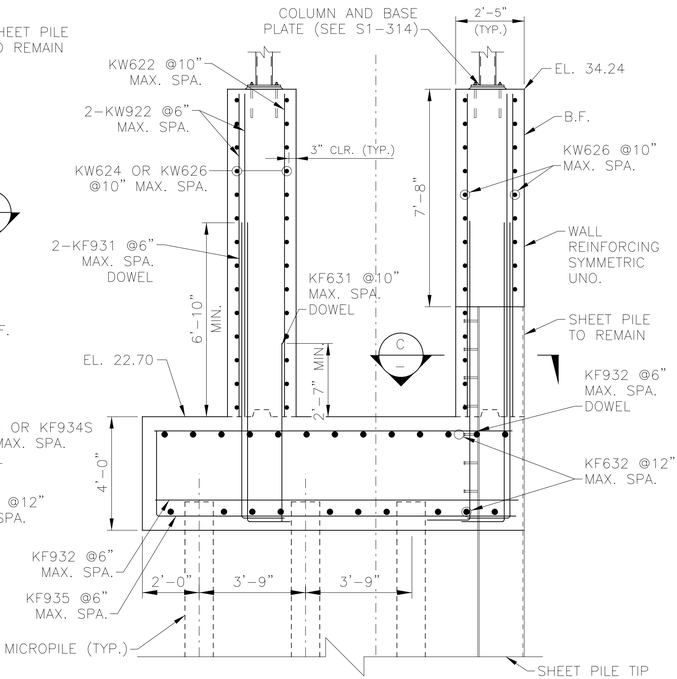
SCALE: 1/4" = 1'-0"

NOTE: SHEET PILE NOT SHOWN FOR CLARITY



SECTION

SCALE: 3/8" = 1'-0"



SECTION

SCALE: 3/8" = 1'-0"

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SITE PLAN NO. DSP 2019-0031

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DATUM:
(HZ) NAD 83
(VT) NAVD 88

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DESIGNED BY: DS
DRAWN BY: NME
CHECKED BY: YA
DATE: 5/30/2025

VRE™

COMMONWEALTH OF VIRGINIA
Kennedy Mensah
KENNEDY KYEI-MENSAH
Lic. No. 0402051019
5/30/2025
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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

KING ST STAIR WALL ELEVATION AND SECTION

IFB NO: 025-013
DRAWING NO: S2-304
SCALE: AS SHOWN
SHEET NO: 184 OF 426

DATE: 7/18/2025
FILENAME: ...\CFP-105.30-VW05.dgn

REINFORCING STEEL SCHEDULE

MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN	INCREMENT FT	INCREMENT IN	TYPE	LOCATION	WEIGHT (LBS.)
KF904S	#9		13	10	1	5	STR	TRANSVERSE – MAX	0
	#9		1	0			STR	TRANSVERSE – MIN.	0
	#9	20	7	5			STR	TRANSVERSE – AVG.	504
KF905S	#9		13	8	0	11	STR	TRANSVERSE – MAX	0
	#9		1	4			STR	TRANSVERSE – MIN.	0
	#9	22	7	6			STR	TRANSVERSE – AVG.	561
KF906S	#9		13	9	1	1	STR	TRANSVERSE – MAX	0
	#9		7	10			STR	TRANSVERSE – MIN.	0
	#9	10	10	10			STR	TRANSVERSE – AVG.	368
KF801S	#8		132	10	0	6	STR	HORIZONTAL – MAX	0
	#8		125	5			STR	HORIZONTAL – MIN.	0
	#8	30	129	2			STR	HORIZONTAL – AVG.	10,346
KF802S	#8		126	5	0	9	STR	HORIZONTAL – MAX	0
	#8		115	4			STR	HORIZONTAL – MIN.	0
	#8	30	120	11			STR	HORIZONTAL – AVG.	9,685
KF502	#5	3	132	10			STR	HORIZONTAL	416
KF503	#5	3	125	5			STR	HORIZONTAL	392
KF504	#5	3	115	4			STR	HORIZONTAL	361
KF505	#5	3	126	5			STR	HORIZONTAL	396
KF803	#8	5	8	6			⌟	HORIZONTAL	113
KF803-1	#8	5	8	6			⌟	HORIZONTAL	113
KF804	#8	5	5	0			⌟	HORIZONTAL	67
KF805	#8	5	4	11			⌟	HORIZONTAL	66
SOUTHWEST WINGWALL AND FOOTING									
KW601	#6	3	22	8			STR	VERTICAL	102
KW602S	#6		22	6	0	3	STR	VERTICAL – MAX	0
	#6		17	10			STR	VERTICAL – MIN.	0
	#6	23	20	2			STR	VERTICAL – AVG.	697
KW1001	#10	6	22	8			STR	VERTICAL	585
KW1002S	#10		22	6	0	3	STR	VERTICAL – MAX	0
	#10		17	10			STR	VERTICAL – MIN.	0
	#10	46	20	2			STR	VERTICAL – AVG.	3,992
KW501	#5	26	6	10			⊓	VERTICAL	185
KW502	#5	44	25	1			STR	HORIZONTAL	1,151
KW503S	#5		21	7	3	10	STR	HORIZONTAL – MAX	0
	#5		6	4			STR	HORIZONTAL – MIN.	0
	#5	10	14	0			STR	HORIZONTAL – AVG.	146
KW504	#5	2	25	6			⌟	HORIZONTAL	53
KF611	#6	26	6	4			STR	VERTICAL	247
KF1011	#10	52	12	7			⌟	VERTICAL	2,816
KF911	#9	68	10	0			STR	TRANSVERSE	2,312
KF811S	#8		35	5	0	7	STR	HORIZONTAL – MAX	0
	#8		29	2			STR	HORIZONTAL – MIN.	0
	#8	22	32	4			STR	HORIZONTAL – AVG.	1,899
KF511	#5	3	35	5			STR	HORIZONTAL	111
KF512	#5	3	29	2			STR	HORIZONTAL	91
SOUTHEAST WINGWALL AND FOOTING									
KW611	#6	3	23	0			STR	VERTICAL	104
KW612S	#6		22	10	0	1	STR	VERTICAL – MAX	0
	#6		21	4			STR	VERTICAL – MIN.	0
	#6	21	21	7			STR	VERTICAL – AVG.	681
KW911	#9	12	23	0			STR	VERTICAL	938
KW912S	#9		22	10	0	1	STR	VERTICAL – MAX	0
	#9		21	4			STR	VERTICAL – MIN.	0
	#9	84	21	7			STR	VERTICAL – AVG.	6,164
KW511	#5	24	6	10			⊓	VERTICAL	171
KW512	#5	52	23	2			STR	HORIZONTAL	1,256
KW513	#5	2	12	10			STR	HORIZONTAL	27
KW514	#5	2	23	2			⌟	HORIZONTAL	48
KF621	#6	24	6	4			STR	VERTICAL	228
KF1021	#10	96	12	7			⌟	VERTICAL	5,198
KF921	#9	42	10	0			STR	TRANSVERSE	1,428

MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN	INCREMENT FT	INCREMENT IN	TYPE	LOCATION	WEIGHT (LBS.)
KF821S	#8		37	5	2	2	STR	HORIZONTAL – MAX	0
	#8		13	8			STR	HORIZONTAL – MIN.	0
	#8	22	25	7			STR	HORIZONTAL – AVG.	1,503
KF521	#5	3	37	5			STR	HORIZONTAL	117
KF522	#5	3	13	8			STR	HORIZONTAL	43
								TOTAL	220,359
STAIRWALLS AND FOOTING									
KW621	#6	37	22	8			STR	VERTICAL	1,260
KW622	#6	44	11	0			STR	VERTICAL	727
KW921	#9	106	22	8			STR	VERTICAL	8,169
KW922	#9	96	11	0			STR	VERTICAL	3,590
KW623	#6	28	12	6			STR	HORIZONTAL	526
KW624	#6	28	20	5			STR	HORIZONTAL	859
KW625	#6	14	18	1			STR	HORIZONTAL	380
KW626	#6	23	26	0			STR	HORIZONTAL	898
KW627	#6	19	10	3			STR	HORIZONTAL	293
KF631	#6	81	6	4			STR	VERTICAL	771
KF931	#9	202	12	7			⌟	VERTICAL	8,642
KF932	#9	29	12	6			STR	TRANSVERSE	1,233
KF933	#9	40	12	11			STR	TRANSVERSE	1,757
KF934S	#9		17	2	0	2	STR	TRANSVERSE – MAX	0
	#9		12	11			STR	TRANSVERSE – MIN.	0
	#9	36	14	11			STR	TRANSVERSE – AVG.	1,826
KF935	#9	13	15	3			⌟	TRANSVERSE	674
KF831	#8	5	20	6			⌟	HORIZONTAL	274
KF632	#6	26	18	1			STR	HORIZONTAL	706
KF633	#6	26	11	2			STR	HORIZONTAL	436
NORTHWEST WINGWALL AND FOOTING									
KW631	#6	3	22	8			STR	VERTICAL	102
KW632S	#6		22	6	0	3	STR	VERTICAL – MAX	0
	#6		17	6			STR	VERTICAL – MIN.	0
	#6	18	20	0			STR	VERTICAL – AVG.	541
KW1031	#10	6	22	8			STR	VERTICAL	585
KW1032S	#10		22	6	0	3	STR	VERTICAL – MAX	0
	#10		17	6			STR	VERTICAL – MIN.	0
	#10	36	20	0			STR	VERTICAL – AVG.	3,098
KW531	#5	21	6	10			⊓	VERTICAL	150
KW532	#5	44	20	2			STR	HORIZONTAL	925
KW533S	#5		16	8	2	10	STR	HORIZONTAL – MAX	0
	#5		5	4			STR	HORIZONTAL – MIN.	0
	#5	10	11	0				HORIZONTAL – AVG.	115
KW534	#5	2	20	10			⌟	HORIZONTAL	43
KF641	#6	21	6	4			⌟	VERTICAL	200
KF1041	#10	42	12	7			1	VERTICAL	2,274
KF941	#9	34	10	0			STR	TRANSVERSE	1,156
KF841S	#8		38	2	2	7	STR	HORIZONTAL – MAX	0
	#8		11	8			STR	HORIZONTAL – MIN.	0
	#8	22	24	11			STR	HORIZONTAL – AVG.	1,464
KF541	#5	3	38	2			STR	HORIZONTAL	119
KF542	#5	3	11	8			STR	HORIZONTAL	37
NORTHEAST WINGWALL AND FOOTING									
KW641	#6	3	23	0			STR	VERTICAL	104
KW642S	#6		22	10	0	1	STR	VERTICAL – MAX	0
	#6		20	6			STR	VERTICAL – MIN.	0
	#6	28	21	8			STR	VERTICAL – AVG.	911
KW941	#9	12	23	0			STR	VERTICAL	938
KW942S	#9		22	10	0	1	STR	VERTICAL – MAX	0
	#9		20	6			STR	VERTICAL – MIN.	0
	#9	112	21	8			STR	VERTICAL – AVG.	8,251
KW541	#5	31	6	10			⊓	VERTICAL	221
KW542	#5	50	30	2			STR	HORIZONTAL	1,573

MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN	INCREMENT FT	INCREMENT IN	TYPE	LOCATION	WEIGHT (LBS.)
KW543S	#5		21	1	9	4	STR	HORIZONTAL – MAX	0
	#5		11	9			STR	HORIZONTAL – MIN.	0
	#5	4	16	5			STR	HORIZONTAL – AVG.	68
KW544	#5	2	30	3			⌟	HORIZONTAL	63
KF651	#6	31	6	4			STR	VERTICAL	295
KF1051	#10	124	12	7			⌟	VERTICAL	6,714
KF951	#9	80	10	0			STR	TRANSVERSE	2,720
KF851S	#8		40	2	0	6	STR	HORIZONTAL – MAX	0
	#8		34	10			STR	HORIZONTAL – MIN.	0
	#8	22	37	6			STR	HORIZONTAL – AVG.	2,203
KF551	#5	3	40	2			STR	HORIZONTAL	126
KF552	#5	3	34	10			STR	HORIZONTAL	109
KF553	#5	5	12	5			STR	HORIZONTAL	65
								TOTAL	68,126

1

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(HZ) NAD 83
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DESIGNED BY: RCV
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VRE™

COMMONWEALTH OF VIRGINIA
KENNEDY KYEI-MENSAH
Lic. No. 0402051019
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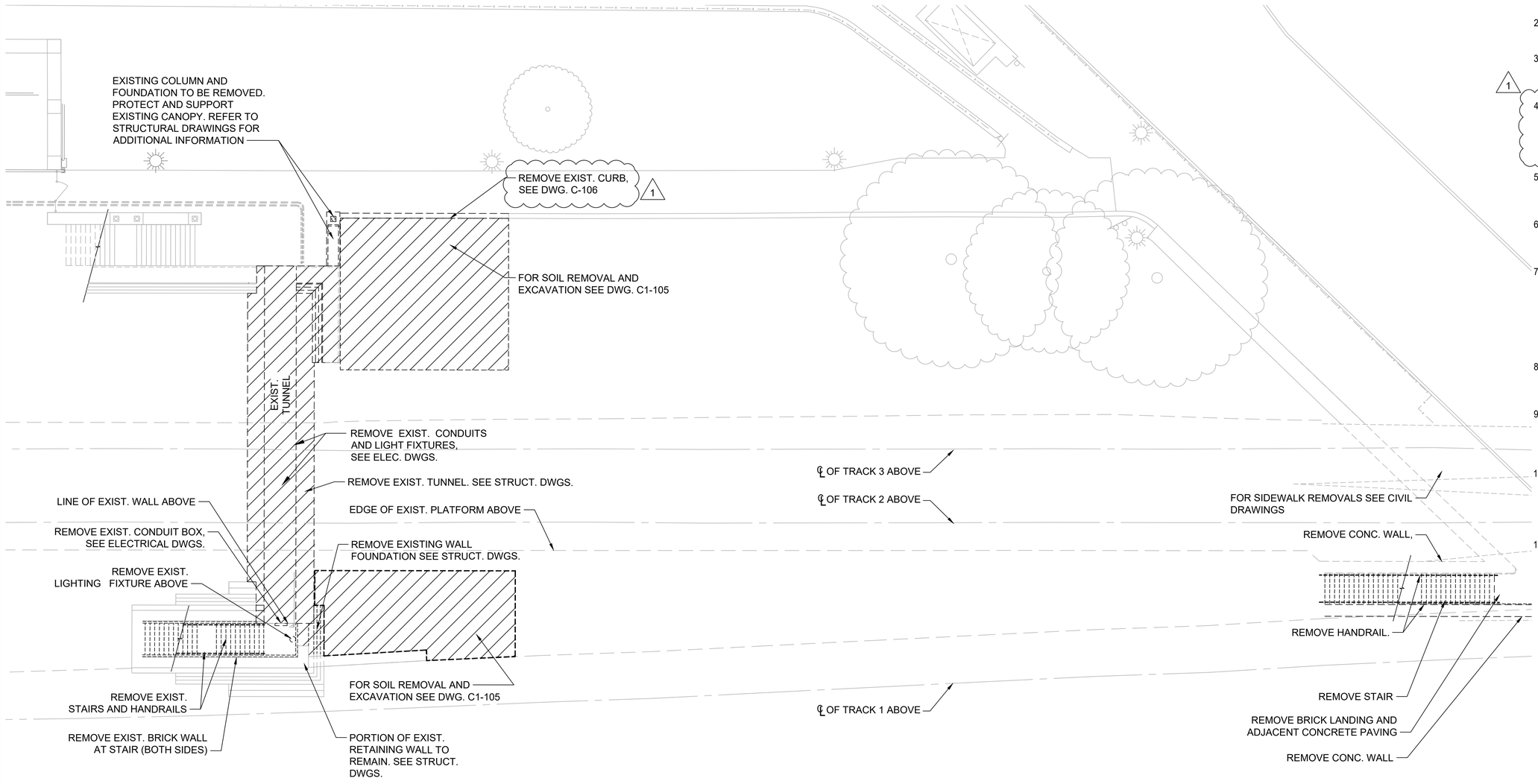
CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

KING ST REINFORCING SCHEDULE - 2 OF 2

IFB NO: 025-013
DRAWING NO: S2-531
SCALE: AS SHOWN
SHEET NO: 212 OF 426

FILENAME: ...\CFP-105.30-AD04.dgn DATE: 7/18/2025



1 XA-100 GROUND LEVEL DEMOLITION PLAN
SCALE 3/32" = 1'-0"

GENERAL DEMOLITION NOTES:

1. FOR DEMOLITION RELATED TO OTHER DISCIPLINES, SEE INDIVIDUAL DISCIPLINE DRAWINGS.
2. VERIFY EXISTING CONDITIONS AND FIELD CONDITIONS.
3. PRIOR TO DEMOLITION, VERIFY WITH THE AOR MATERIALS AND EQUIPMENT TO BE SALVAGED.
4. REMOVE ALL RUBBISH AND DEMOLITION DEBRIS FROM THE STATION PROPERTY AND DISPOSE OF IN A LAWFUL MANNER. COORDINATE EXCAVATED MATERIALS AND DEMOLITION DEBRIS DISPOSAL FROM THE RAILROAD RIGHT-OF-WAY WITH CSXT.
5. COORDINATE GENERAL CONSTRUCTION DEMOLITION WITH THE MECHANICAL, PLUMBING, AND ELECTRICAL DEMOLITION WORK.
6. PROVIDE TEMPORARY LINTELS OR STRUCTURAL SUPPORT FOR OPENINGS CREATED BY THE DEMOLITION.
7. WORK AND MAINTAIN SUCH SUPPORTS UNTIL PERMANENT STRUCTURAL SUPPORTS ARE INSTALLED. PROVIDE TEMPORARY STRUCTURAL SUPPORT FOR WALLS AND ROOFS AS REQUIRED DURING DEMOLITION WORK AND MAINTAIN SUCH SUPPORTS UNTIL PERMANENT STRUCTURAL SUPPORTS ARE INSTALLED.
8. REPAIR ALL EXISTING STRUCTURES, UTILITIES, AND EQUIPMENT, SCHEDULED TO REMAIN, WHICH ARE DAMAGED DURING DEMOLITION OPERATIONS.
9. ALL WORK SCHEDULED TO BE DEMOLISHED, WILL BE REMOVED COMPLETELY INCLUDING ALL FASTENERS, ATTACHMENTS, ACCESSORIES, OR ANY RELATED ITEMS.
10. DEMOLITION INCLUDES ALL ITEMS WHETHER OR NOT SHOWN ON THE DRAWINGS, THAT ARE REQUIRED TO BE REMOVED IN ORDER TO INSTALL THE NEW WORK SHOWN ON DRAWINGS AND OTHER PORTIONS OF THE CONTRACT DOCUMENTS.
11. IT IS THE CONTRACTOR RESPONSIBILITY TO COORDINATE DEMOLITION IN CONNECTION WITH NEW WORK. ANY DEMOLITION REMOVED AND NOT REQUIRED TO BE PART OF NEW CONSTRUCTION WILL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.

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VCS NAD 83

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DESIGNED BY: JA
DRAWN BY: KW
CHECKED BY: RK
DATE: 5/30/2025

VRE™

COMMONWEALTH OF VIRGINIA
RUTH LEAH KRIEGER
Lic. No. 015752
6/3/2025
ARCHITECT

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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

GROUND LEVEL DEMOLITION PLAN

IFB NO: 025-013
DRAWING NO: XA1-101
SCALE: AS NOTED
SHEET NO: 237 OF 426

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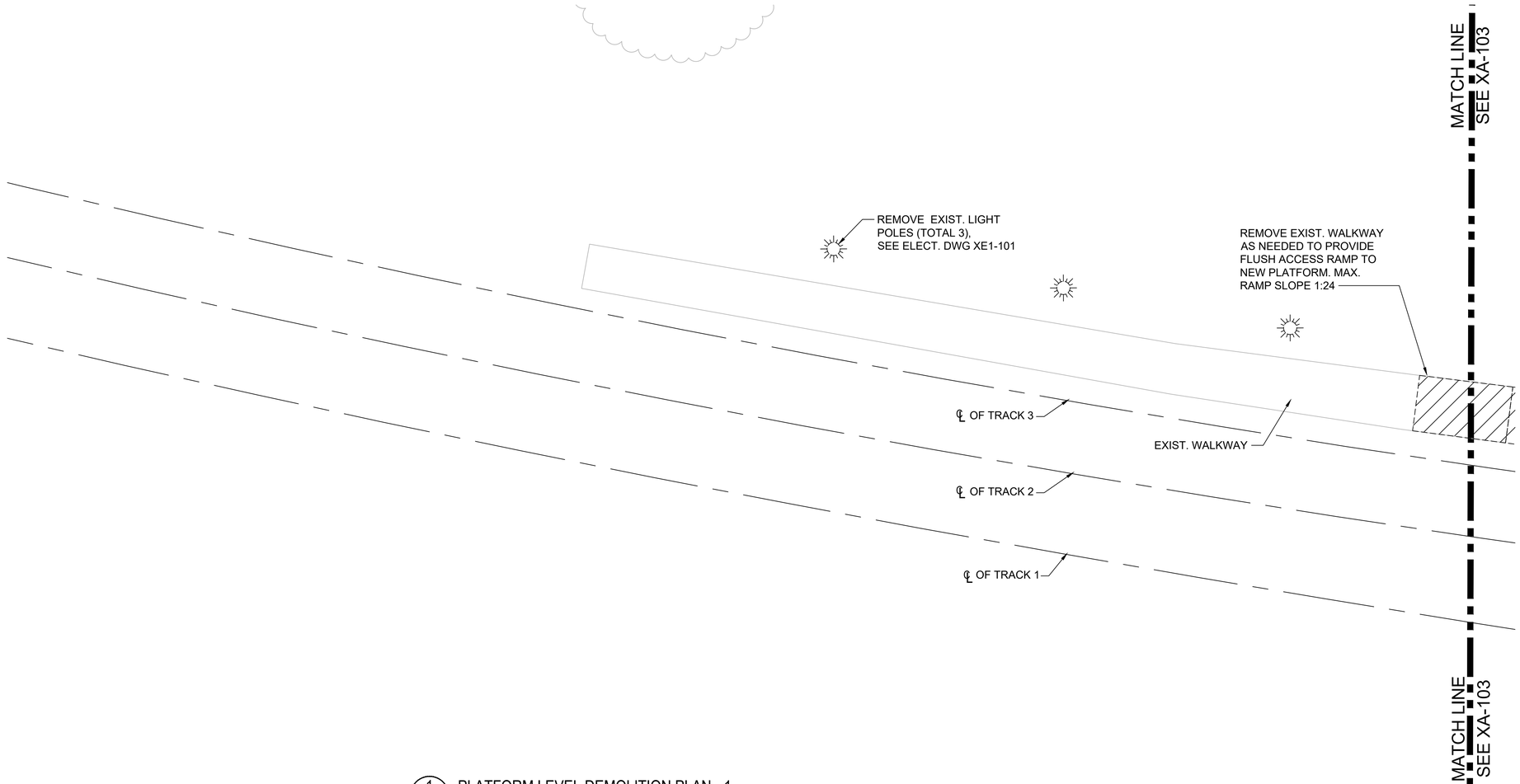
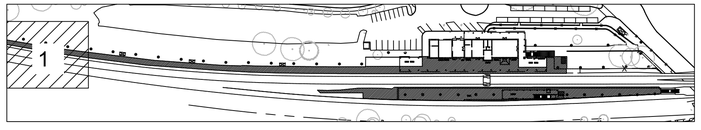


1 XA-100 PLATFORM LEVEL DEMOLITION PLAN - 1
SCALE 3/32" = 1'-0"

GENERAL DEMOLITION NOTES:

1. FOR DEMOLITION RELATED TO OTHER DISCIPLINES, SEE INDIVIDUAL DISCIPLINE DRAWINGS.
2. VERIFY EXISTING CONDITIONS AND FIELD CONDITIONS.
3. PRIOR TO DEMOLITION, VERIFY WITH THE AOR MATERIALS AND EQUIPMENT TO BE SALVAGED.
4. REMOVE ALL RUBBISH AND DEMOLITION DEBRIS FROM THE STATION PROPERTY AND DISPOSE OF IN A LAWFUL MANNER. COORDINATE EXCAVATED MATERIALS AND DEMOLITION DEBRIS DISPOSAL FROM THE RAILROAD RIGHT-OF-WAY WITH CSXT.
5. COORDINATE GENERAL CONSTRUCTION DEMOLITION WITH THE MECHANICAL, PLUMBING, AND ELECTRICAL DEMOLITION WORK.
6. PROVIDE TEMPORARY LINTELS OR STRUCTURAL SUPPORT FOR OPENINGS CREATED BY THE DEMOLITION.
7. WORK AND MAINTAIN SUCH SUPPORTS UNTIL PERMANENT STRUCTURAL SUPPORTS ARE INSTALLED. PROVIDE TEMPORARY STRUCTURAL SUPPORT FOR WALLS AND ROOFS AS REQUIRED DURING DEMOLITION WORK AND MAINTAIN SUCH SUPPORTS UNTIL PERMANENT STRUCTURAL SUPPORTS ARE INSTALLED.
8. REPAIR ALL EXISTING STRUCTURES, UTILITIES, AND EQUIPMENT, SCHEDULED TO REMAIN, WHICH ARE DAMAGED DURING DEMOLITION OPERATIONS.
9. ALL WORK SCHEDULED TO BE DEMOLISHED, WILL BE REMOVED COMPLETELY INCLUDING ALL FASTENERS, ATTACHMENTS, ACCESSORIES, OR ANY RELATED ITEMS.
10. DEMOLITION INCLUDES ALL ITEMS WHETHER OR NOT SHOWN ON THE DRAWINGS, THAT ARE REQUIRED TO BE REMOVED IN ORDER TO INSTALL THE NEW WORK SHOWN ON DRAWINGS AND OTHER PORTIONS OF THE CONTRACT DOCUMENTS.
11. IT IS THE CONTRACTOR RESPONSIBILITY TO COORDINATE DEMOLITION IN CONNECTION WITH NEW WORK. ANY DEMOLITION REMOVED AND NOT REQUIRED TO BE PART OF NEW CONSTRUCTION WILL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.



KEY PLAN

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VCS 83

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	08/01/2025	ADDENDUM NO. 5

DESIGNED BY: JA
DRAWN BY: KW
CHECKED BY: RK
DATE: 5/30/2025

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COMMONWEALTH OF VIRGINIA
RUTH LEAH KRIEGER
Lic. No. 015752
6/3/2025
ARCHITECT

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(571) 327-5800
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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PLATFORM LEVEL DEMOLITION PLAN - 1 OF 5

IFB NO: 025-013
DRAWING NO: XA1-102
SCALE: 3/32" = 1'-0"
SHEET NO: 256 OF 426

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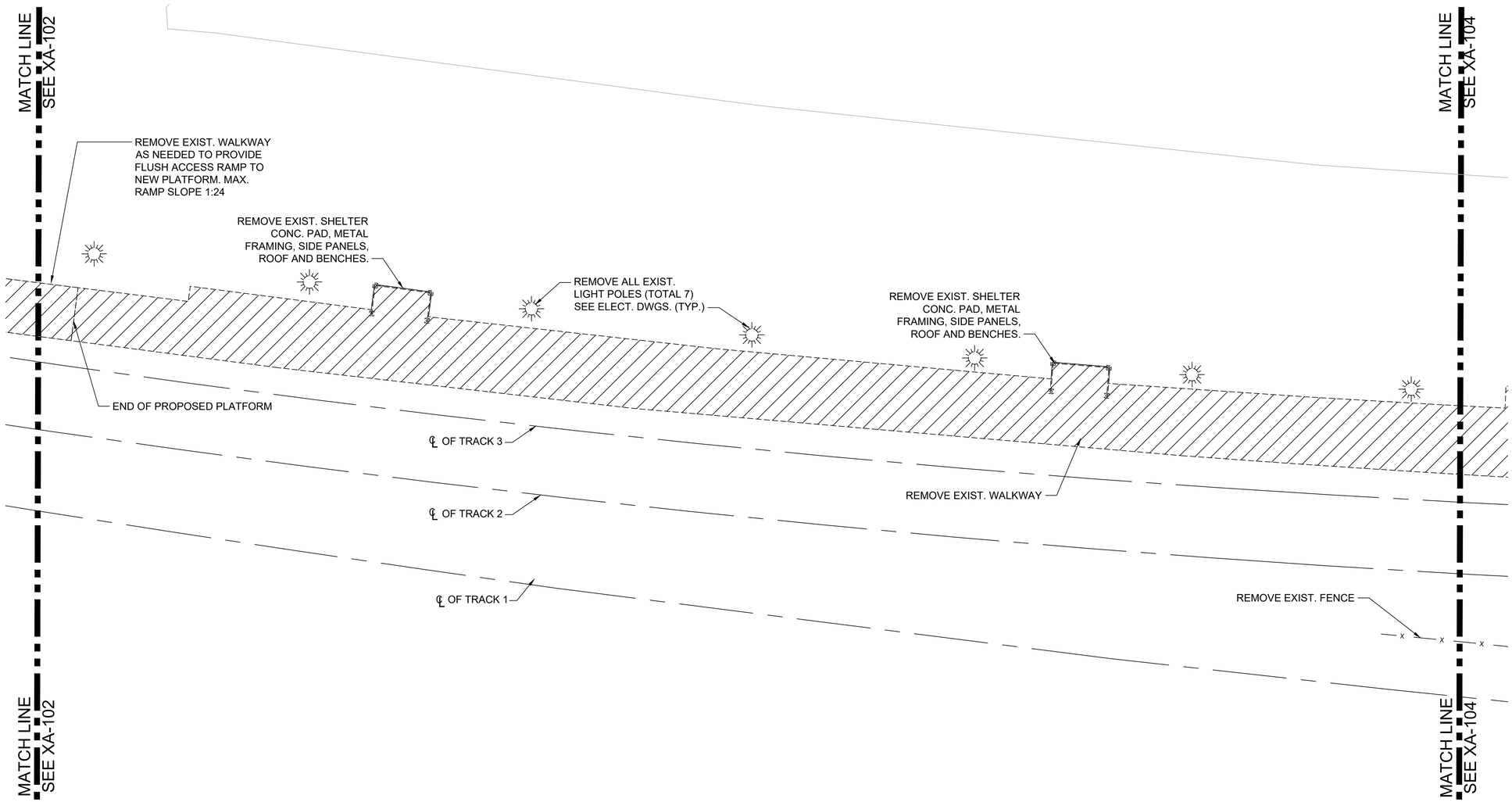

1 XA-100 PLATFORM LEVEL DEMOLITION PLAN - 2
SCALE 3/32" = 1'-0"

GENERAL DEMOLITON NOTES:

1. FOR DEMOLITION RELATED TO OTHER DISCIPLINES, SEE INDIVIDUAL DISCIPLINE DRAWINGS.
2. VERIFY EXISTING CONDITIONS AND FIELD CONDITIONS.
3. PRIOR TO DEMOLITION, VERIFY MATERIALS AND EQUIPMENT TO BE SALVAGED.
4. VERIFY AND MARK ALL UTILITIES PRIOR TO THE START OF WORK. 1
5. REMOVE ALL RUBBISH AND DEMOLITION DEBRIS FROM THE STATION PROPERTY AND DISPOSE OF IN A LAWFUL MANNER. COORDINATE EXCAVATED MATERIALS AND DEMOLITION DEBRIS DISPOSAL FROM THE RAILROAD RIGHT-OF-WAY WITH CSXT.
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8. WORK AND MAINTAIN SUCH SUPPORTS UNTIL PERMANENT STRUCTURAL SUPPORTS ARE INSTALLED.
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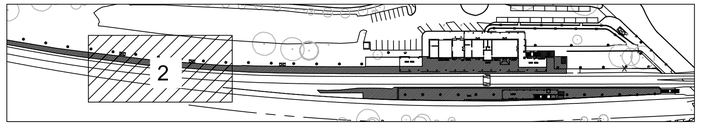

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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PLATFORM LEVEL DEMOLITION PLAN - 2 OF 5

IFB NO: 025-013
DRAWING NO: XA1-103
SCALE: 3/32" = 1'-0"
SHEET NO: 257 OF 426

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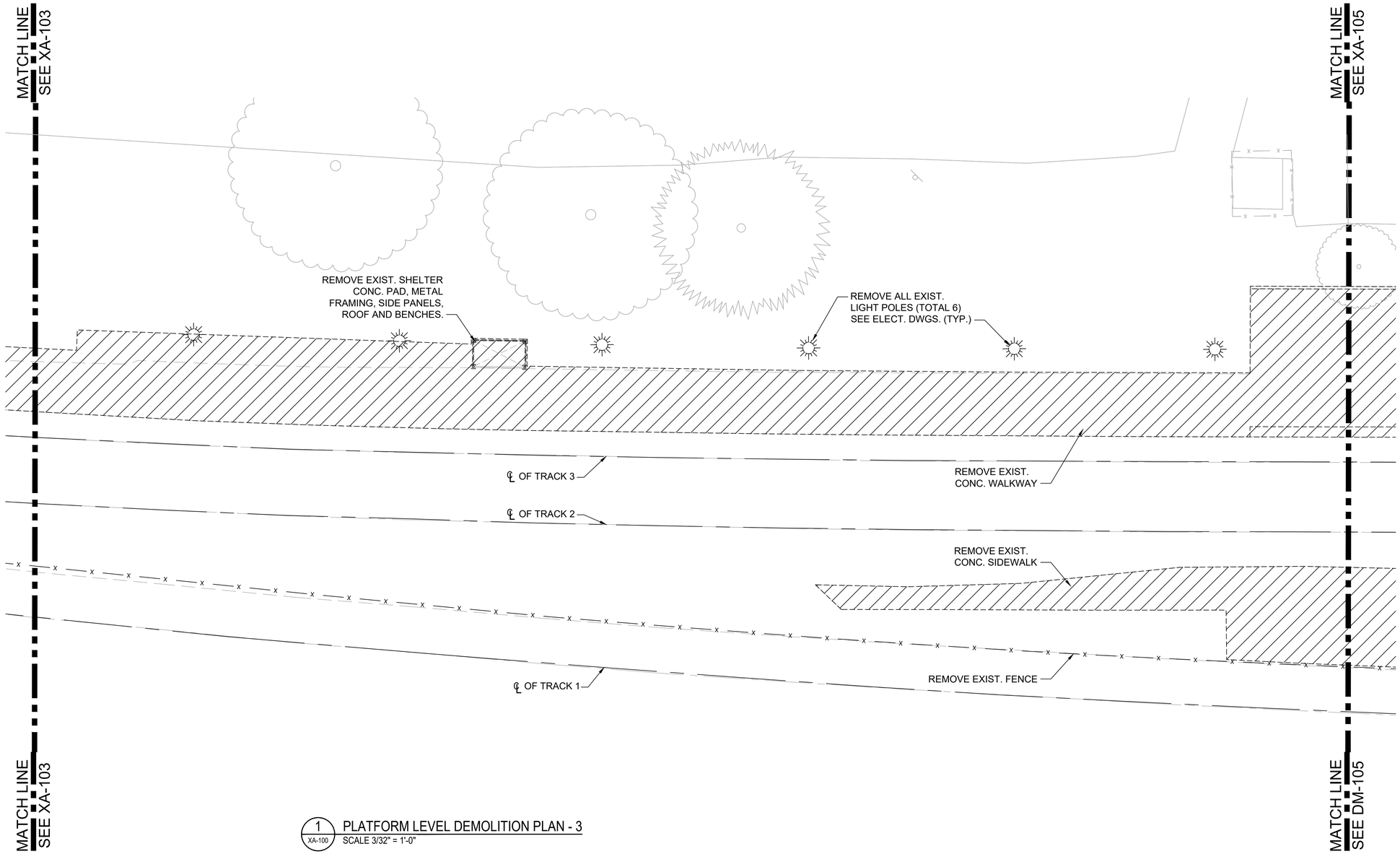

1 XA-100 PLATFORM LEVEL DEMOLITION PLAN - 3
SCALE 3/32" = 1'-0"

GENERAL DEMOLITION NOTES:

1. FOR DEMOLITION RELATED TO OTHER DISCIPLINES, SEE INDIVIDUAL DISCIPLINE DRAWINGS.
2. VERIFY EXISTING CONDITIONS AND FIELD CONDITIONS.
3. PRIOR TO DEMOLITION, VERIFY WITH THE AOR MATERIALS AND EQUIPMENT TO BE SALVAGED.
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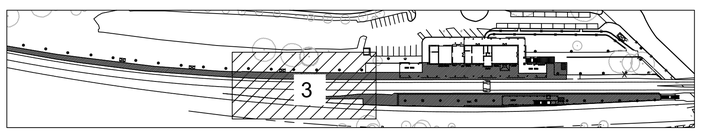

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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PLATFORM LEVEL DEMOLITION PLAN - 3 OF 5

IFB NO: 025-013
DRAWING NO: XA1-104
SCALE: 3/32" = 1'-0"
SHEET NO: 258 OF 426

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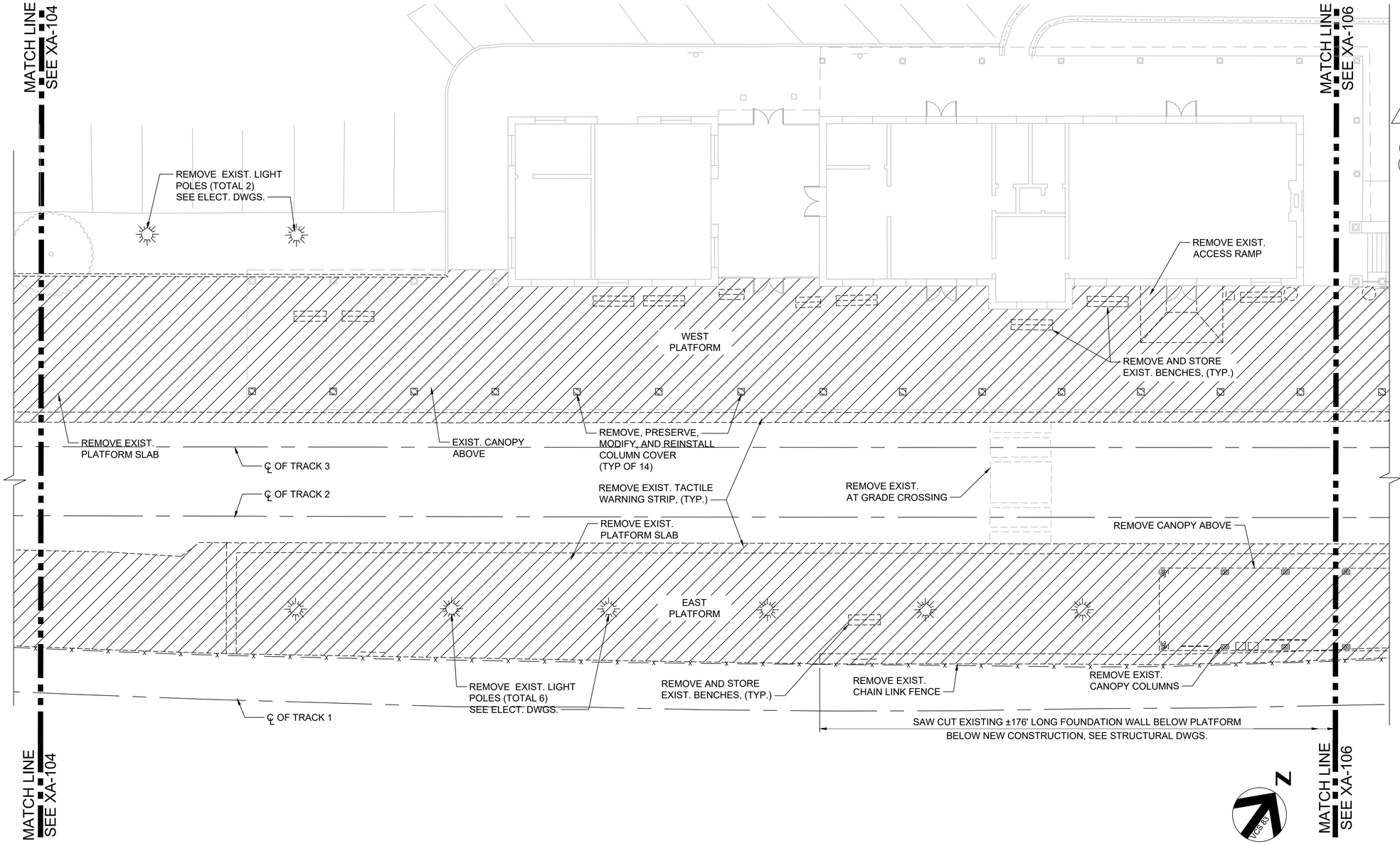

1 XA-100 PLATFORM LEVEL DEMOLITION PLAN - 4
SCALE 3/32" = 1'-0"

GENERAL DEMOLITION NOTES:

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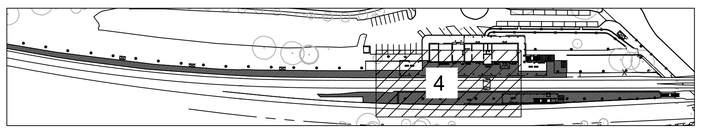
12. REMOVE, PRESERVE, AND MODIFY COLUMN COVER.



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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PLATFORM LEVEL DEMOLITION PLAN - 4 OF 5

IFB NO: 025-013
DRAWING NO: XA1-105
SCALE: 3/32" = 1'-0"
SHEET NO: 259 OF 426

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MATCH LINE SEE XA-105

EXIST. STAIR TO REMAIN

EXIST. TVM REMOVE AND RELOCATE, REFER TO SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION

3'-0"

REMOVE PART OF EXIST. IRON FENCE

FOR EXCAVATION OF THIS AREA REFER TO THE STRUCTURAL DRAWINGS

WEST PLATFORM

EXIST. COLUMNS TO REMAIN

REMOVE EXIST. FENCE

REMOVE EXIST. LIGHT POLES (TOTAL 5) SEE ELECT. DWGS.

KING STREET

REMOVE, PRESERVE, MODIFY, AND REINSTALL CANOPY COLUMN COVERS. TYP OF 3

REMOVE EXIST. TACTILE WARNING STRIP, (TYP.)

LINE OF EXIST. TUNNEL BELOW TO BE DEMOLISHED; REFER TO STRUCTURAL DRAWINGS

℄ OF TRACK 3

REMOVE EXIST. CANOPY ABOVE

REMOVE EXIST. FENCE

℄ OF TRACK 2

REMOVE EXIST. PLATFORM SLAB

DEMOLISH EXIST. CONC. WALL REFER TO S2 SERIES DRAWINGS

EAST PLATFORM

REMOVE EXIST. CANOPY COLUMNS

REMOVE EXIST. STAIRS

REMOVE EXIST. BRICK WALL AT STAIR (BOTH SIDES)

REMOVE EXIST. HANDRAIL

REMOVE EXIST. GUARDRAIL AND CONC. CURB

REMOVE AND RELOCATE EXIST. ELECT. BOX, SEE ELECTRICAL DWGS.

REMOVE EXIST. CHAIN LINK FENCE

℄ OF TRACK 1

REMOVE EXIST. LIGHT POLES (TOTAL 6) SEE ELECT. DWGS.

REMOVE EXIST. HANDRAIL

REMOVE EXIST. STAIRS

SAW CUT EXISTING 176' LONG FOUNDATION WALL BELOW PLATFORM BELOW NEW CONSTRUCTION,SEE STRUCTURAL DWGS.

MATCH LINE SEE XA-105

1 XA-100 PLATFORM DEMOLITION PLAN - 5
SCALE 3/32" = 1'-0"

GENERAL DEMOLITION NOTES:

1. FOR DEMOLITION RELATED TO OTHER DISCIPLINES, SEE INDIVIDUAL DISCIPLINE DRAWINGS.
2. VERIFY EXISTING CONDITIONS AND FIELD CONDITIONS.
3. PRIOR TO DEMOLITION, VERIFY WITH THE AOR MATERIALS AND EQUIPMENT TO BE SALVAGED.

1

4. REMOVE ALL RUBBISH AND DEMOLITION DEBRIS FROM THE STATION PROPERTY AND DISPOSE OF IN A LAWFUL MANNER. COORDINATE EXCAVATED MATERIALS AND DEMOLITION DEBRIS DISPOSAL FROM THE RAILROAD RIGHT-OF-WAY WITH CSXT.
5. COORDINATE GENERAL CONSTRUCTION DEMOLITION WITH THE MECHANICAL, PLUMBING, AND ELECTRICAL DEMOLITION WORK.
6. PROVIDE TEMPORARY LINTELS OR STRUCTURAL SUPPORT FOR OPENINGS CREATED BY THE DEMOLITION.
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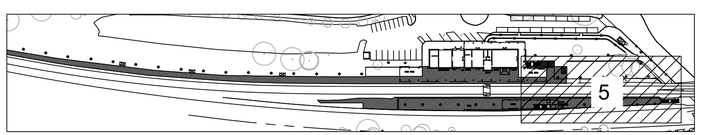
12. REMOVE, PRESERVE, AND MODIFY COLUMN COVER.
13. AFTER REMOVAL OF STAIR WALL FINISHES NOTIFY THE ENGINEER FOR ALL CRACKS AT EXISTING CONCRETE WALLS.

N

VCS 85



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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PLATFORM LEVEL DEMOLITION PLAN - 5 OF 5

IFB NO: 025-013
DRAWING NO: XA1-106
SCALE: 3/32" = 1'-0"
SHEET NO: 260 OF 426

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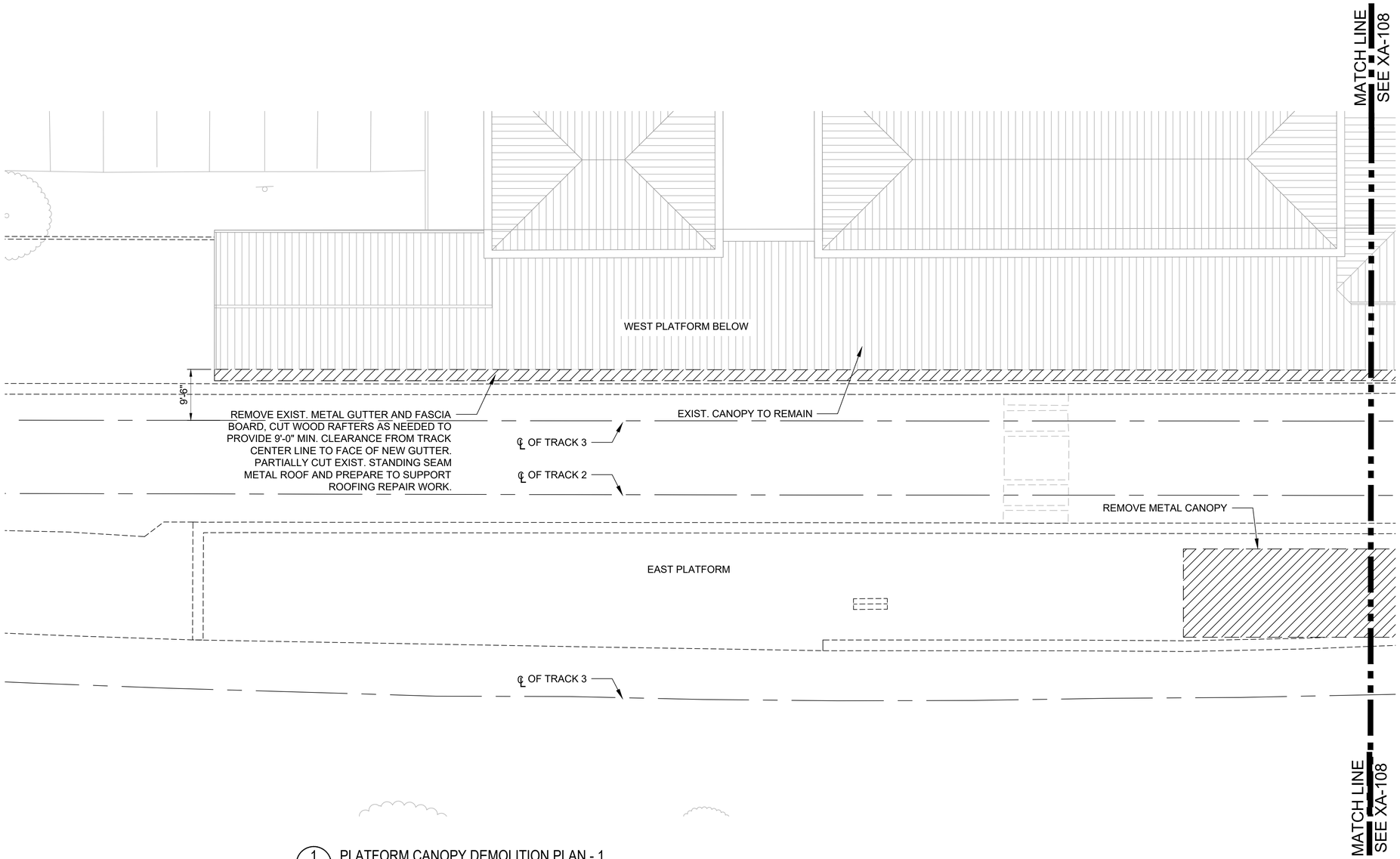

1 XA-100 PLATFORM CANOPY DEMOLITION PLAN - 1
SCALE 3/32" = 1'-0"

GENERAL DEMOLITION NOTES:

1. FOR DEMOLITION RELATED TO OTHER DISCIPLINES, SEE INDIVIDUAL DISCIPLINE DRAWINGS.
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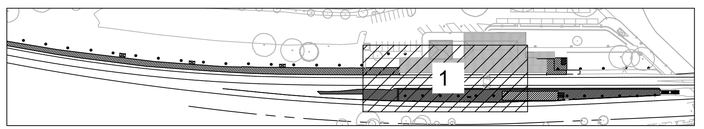

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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PLATFORM CANOPY DEMOLITION PLAN - 1 OF 2

IFB NO: 025-013
DRAWING NO: XA1-107
SCALE: 3/32" = 1'-0"
SHEET NO: 261 OF 426

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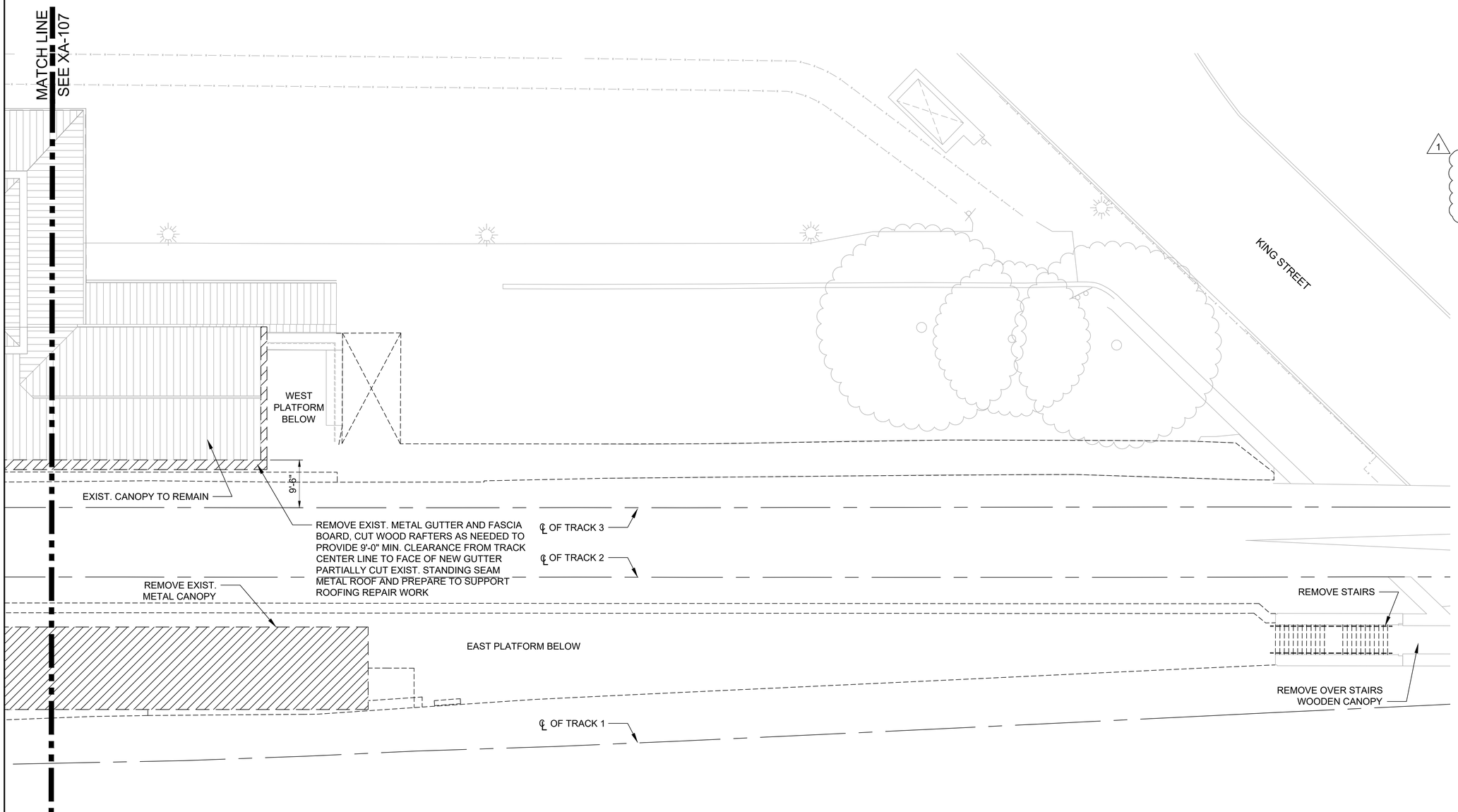

1 XA-100 PLATFORM CANOPY DEMOLITION PLAN - 2
SCALE 3/32" = 1'-0"

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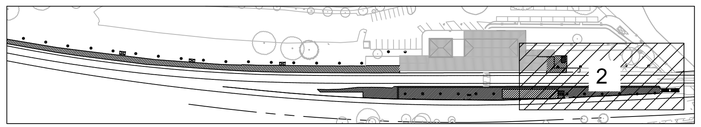
7. PROVIDE TEMPORARY LINTELS OR STRUCTURAL SUPPORT FOR OPENINGS CREATED BY THE DEMOLITION.
8. WORK AND MAINTAIN SUCH SUPPORTS UNTIL PERMANENT STRUCTURAL SUPPORTS ARE INSTALLED.
9. PROVIDE TEMPORARY STRUCTURAL SUPPORT FOR WALLS AND ROOFS AS REQUIRED DURING DEMOLITION WORK AND MAINTAIN SUCH SUPPORTS UNTIL PERMANENT STRUCTURAL SUPPORTS ARE INSTALLED.
10. REPAIR ALL EXISTING STRUCTURES, UTILITIES, AND EQUIPMENT, SCHEDULED TO REMAIN, WHICH ARE DAMAGED DURING DEMOLITION OPERATIONS.
11. ALL WORK SCHEDULED TO BE DEMOLISHED, WILL BE REMOVED COMPLETELY INCLUDING ALL FASTENERS, ATTACHMENTS, ACCESSORIES, OR ANY RELATED WORK.
12. DEMOLITION INCLUDES ALL ITEMS WHETHER OR NOT SHOWN ON THE DRAWINGS, THAT ARE REQUIRED TO BE REMOVED IN ORDER TO INSTALL THE NEW WORK SHOWN ON DRAWINGS AND OTHER PORTIONS OF THE CONTRACT DOCUMENTS.
13. IT IS THE CONTRACTOR RESPONSIBILITY TO COORDINATE DEMOLITION IN CONNECTION WITH NEW WORK. ANY DEMOLITION REMOVED AND NOT REQUIRED TO BE PART OF NEW CONSTRUCTION WILL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.



KEY PLAN

DATUM:
(HZ) NAD 83
(VT) NAVD 88

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DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
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INSTRUMENT NO. DEED BOOK NO. PAGE NO.

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	08/01/2025	ADDENDUM NO. 5

DESIGNED BY: JA
DRAWN BY: KW
CHECKED BY: RK
DATE: 5/30/2025

COMMONWEALTH OF VIRGINIA
RUTH LEAH KRIEGER
Lic. No. 015752
6/3/2025
ARCHITECT

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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PLATFORM CANOPY DEMOLITION PLAN - 2 OF 2

IFB NO: 025-013
DRAWING NO: XA1-108
SCALE: 3/32" = 1'-0"
SHEET NO: 262 OF 426

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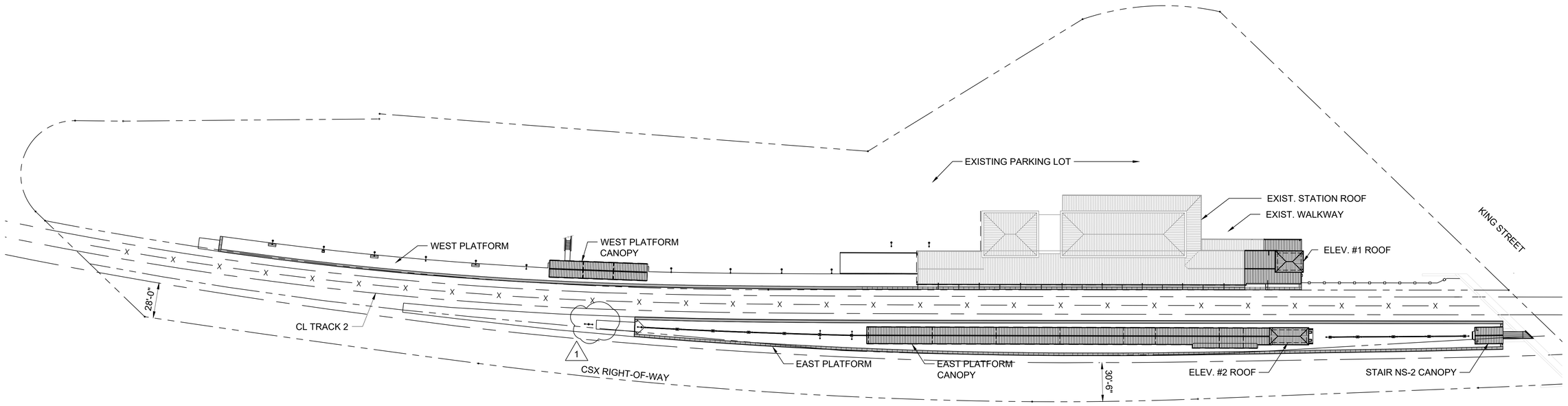

1 ARCHITECTURAL SITE PLAN
NTS

NCS 83

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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

ARCHITECTURAL SITE PLAN

IFB NO: 025-013
DRAWING NO: A1-100
SCALE: NTS
SHEET NO: 263 OF 426

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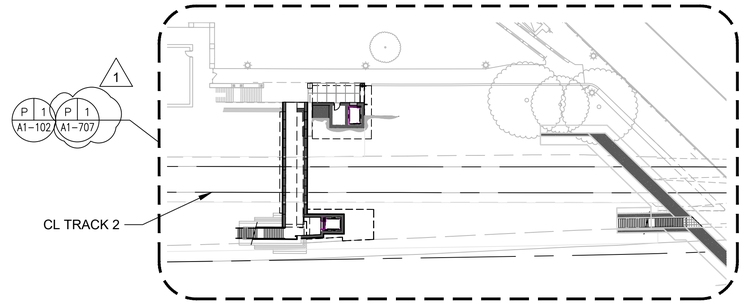

1 TUNNEL KEY PLAN
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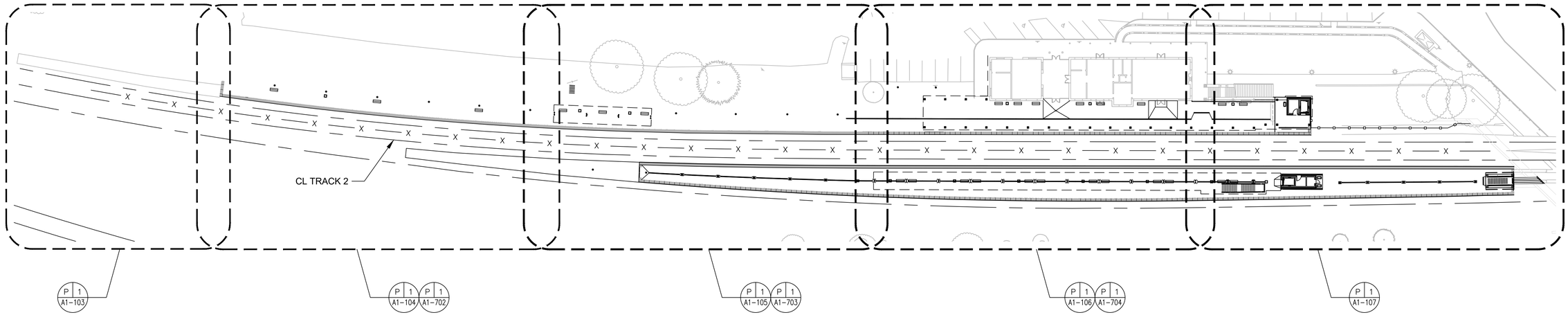
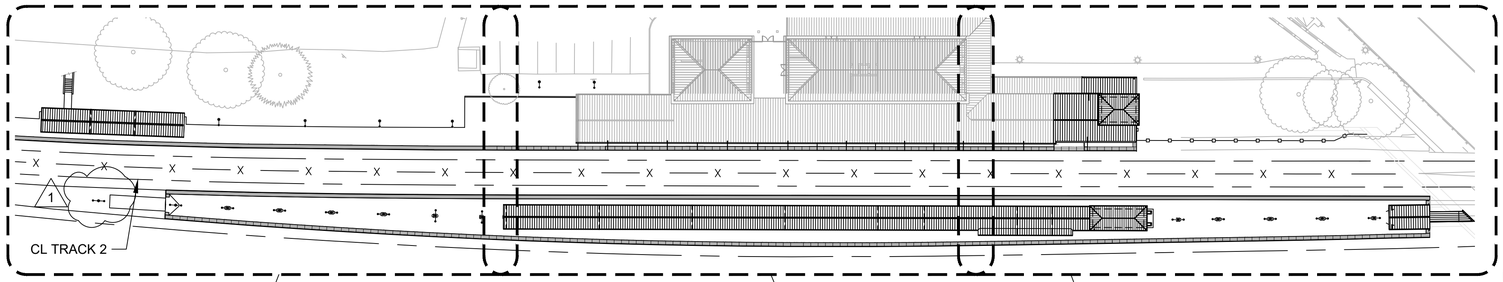


2 PLATFORM KEY PLAN
NTS



3 PLATFORM CANOPY/ CANOPY RC KEY PLAN
NTS

N
FCS 83

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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

CONSTRUCTION KEY PLANS

IFB NO: 025-013
DRAWING NO: A1-101
SCALE: NTS
SHEET NO: 264 OF 426

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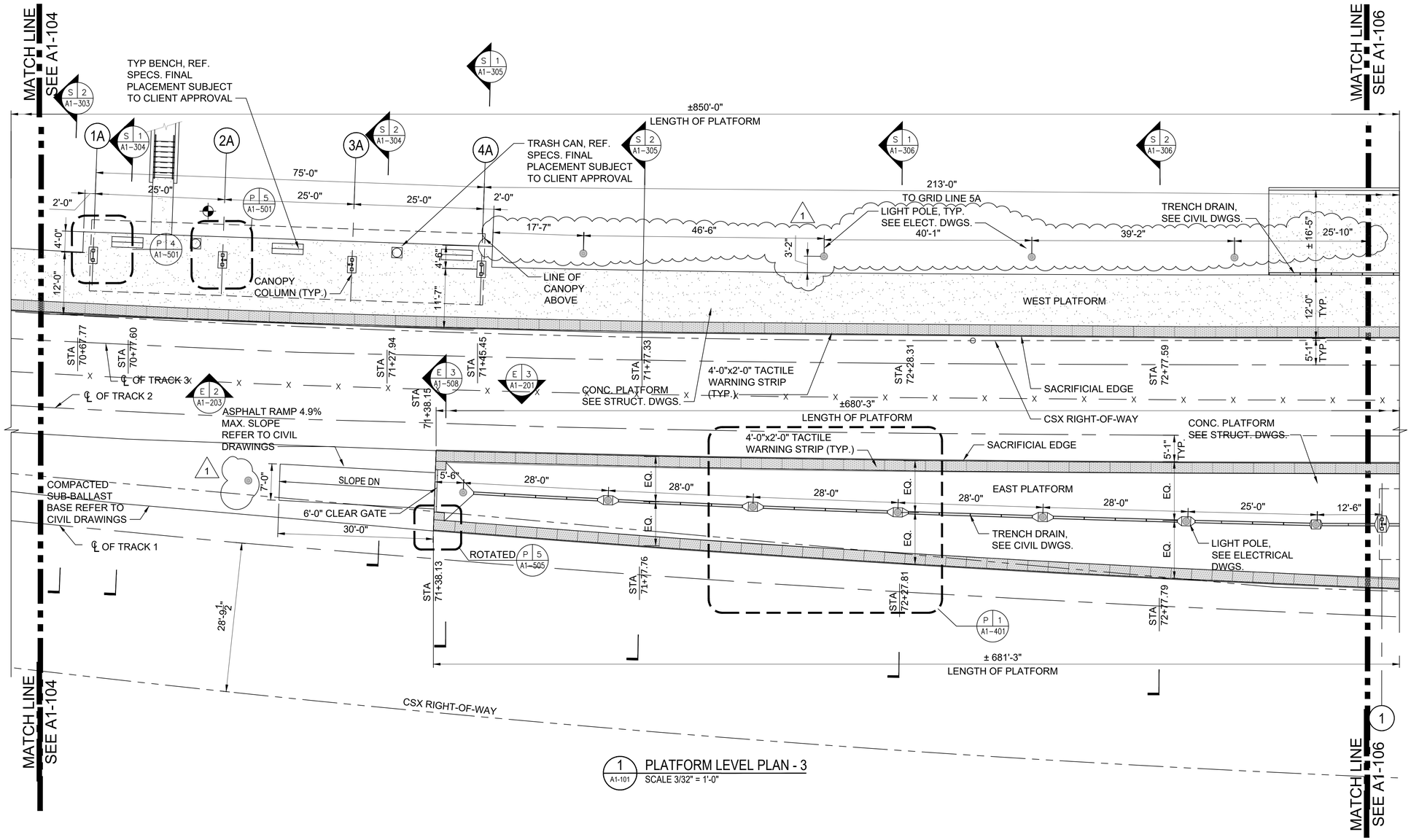
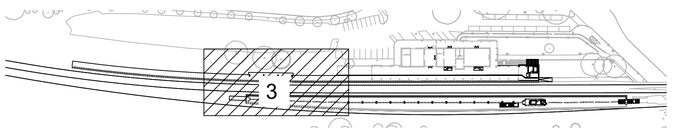


1 A1-101 PLATFORM LEVEL PLAN - 3
SCALE 3/32" = 1'-0"

NOTES:

1. PROVIDE TEMPORARY SUPPORT AND SHORING. SEE STRUCTURAL DRAWINGS.
2. SEE STRUCTURAL DRAWINGS FOR ALL STRUCTURAL REHABILITATION.
3. SEE CIVIL DRAWINGS FOR ALL CIVIL REHABILITATION.
4. SEE PLUMBING DWGS FOR ALL PLUMBING REHABILITATION.
5. SEE ELECTRICAL DRAWINGS FOR LIGHT FIXTURE LAYOUT, ELECTRICAL CONDUIT AND PANEL LOCATIONS.
6. SEE COMM. DRAWINGS FOR CAMERAS, SPEAKERS, AND EQUIPMENT.
7. PLATFORM EDGE ELEVATION ADJACENT TO TRAIN TRACK IS 8" ABOVE TOP OF RAIL. CONTRACTOR IS TO VERIFY TOP OF RAIL ELEVATION AFTER TRAIN TRACK REALIGNMENT.
8. REFER TO CIVIL DWGS FOR PLATFORM ELEVATIONS AND SLOPES.



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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PLATFORM LEVEL PLAN - 3 OF 5

IFB NO: 025-013
DRAWING NO: A1-105
SCALE: 3/32" = 1'-0"
SHEET NO: 268 OF 426

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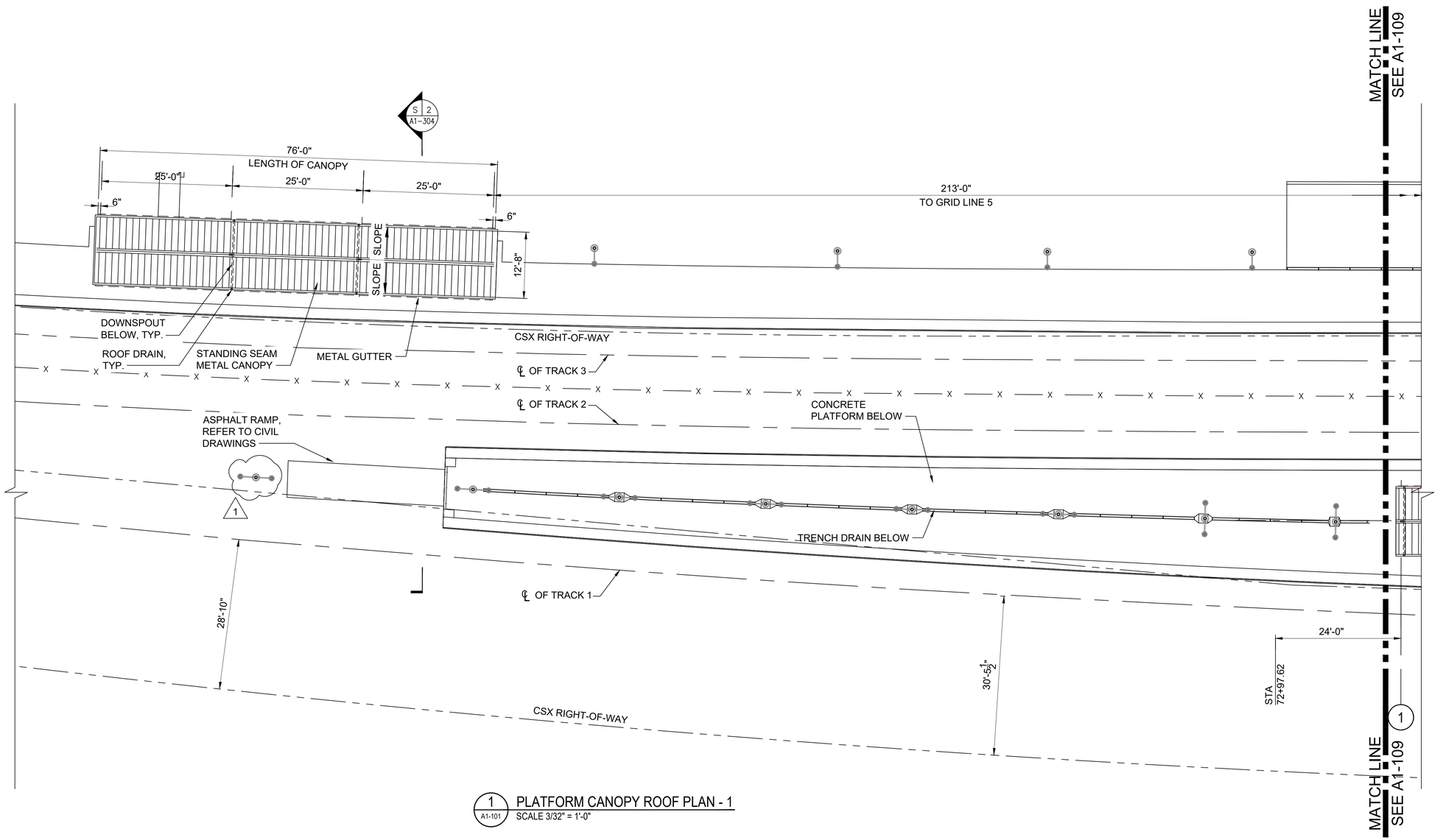
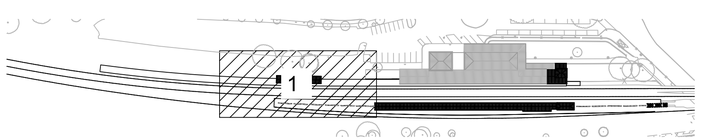


1 / A1-101 PLATFORM CANOPY ROOF PLAN - 1
SCALE 3/32" = 1'-0"



KEY PLAN

N
WCS 83

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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PLATFORM CANOPY ROOF PLAN - 1 OF 3

IFB NO: 025-013
DRAWING NO: A1-108
SCALE: 3/32" = 1'-0"
SHEET NO: 271 OF 426

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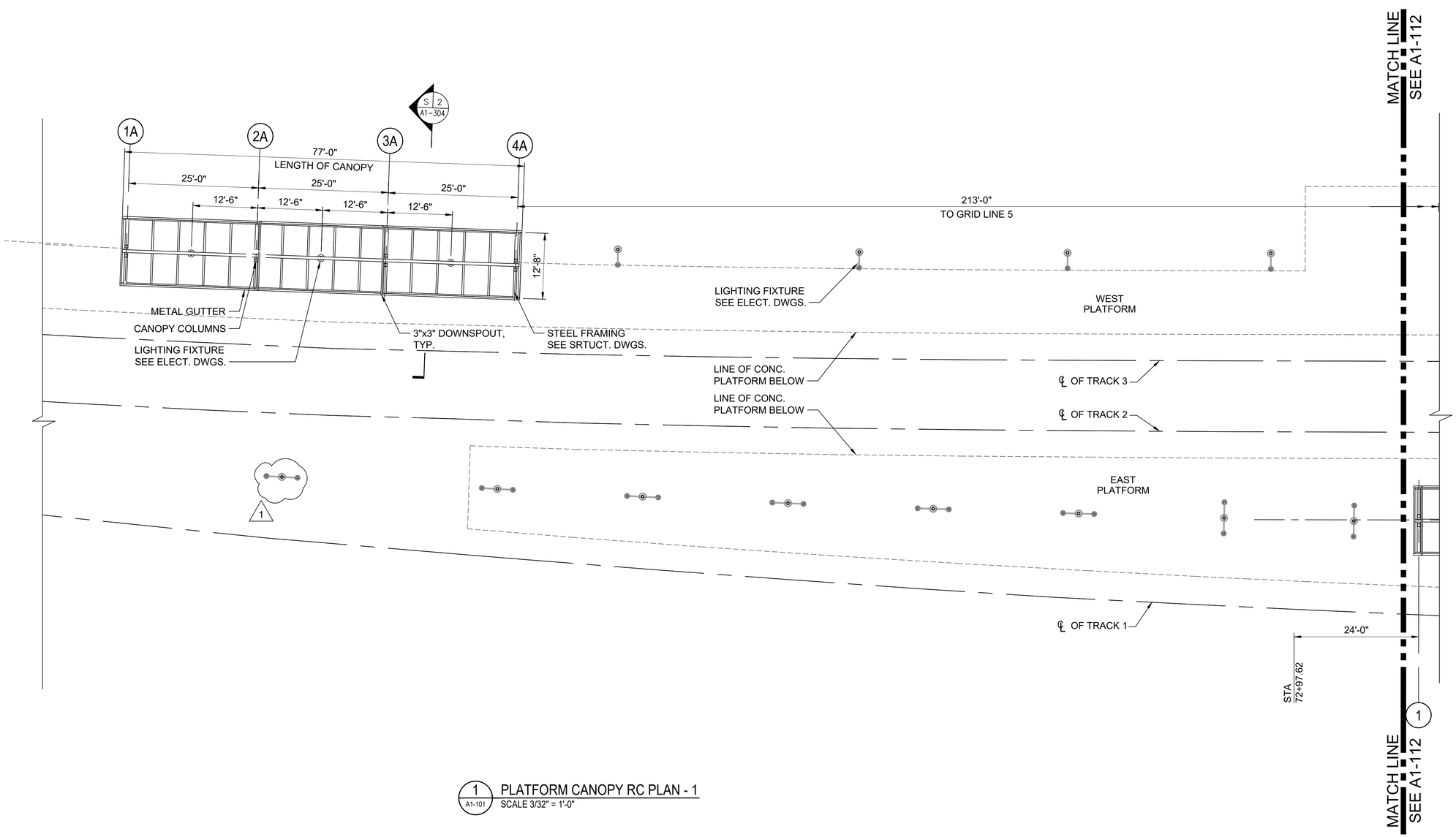
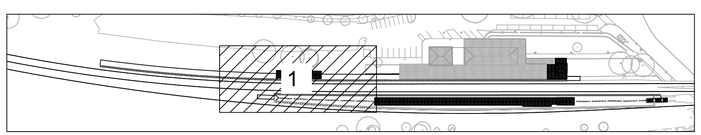


1 A1-101 PLATFORM CANOPY RC PLAN - 1
SCALE 3/32" = 1'-0"

REFLECTED CEILING PLAN SYMBOLS

- CANOPY PENDANT LIGHT FIXTRURE
- LIGHT POLE BASE
- SINGLE ARM LIGHT POLE
- DOUBLE ARM LIGHT POLE
- JB — JUNCTION BOX
- PA SPEAKER
- VMS SIGN
- SECURITY CAMERA
- PC — PHOTOCELL



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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PLATFORM CANOPY REFLECTED CEILING PLAN - 1 OF 3

IFB NO: 025-013
DRAWING NO: A1-111
SCALE: 3/32" = 1'-0"
SHEET NO: 274 OF 426

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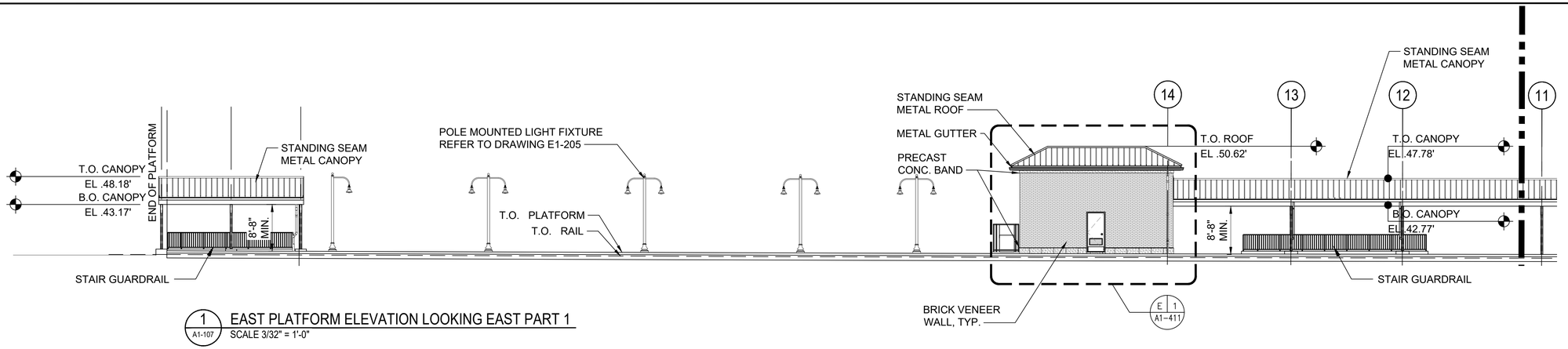
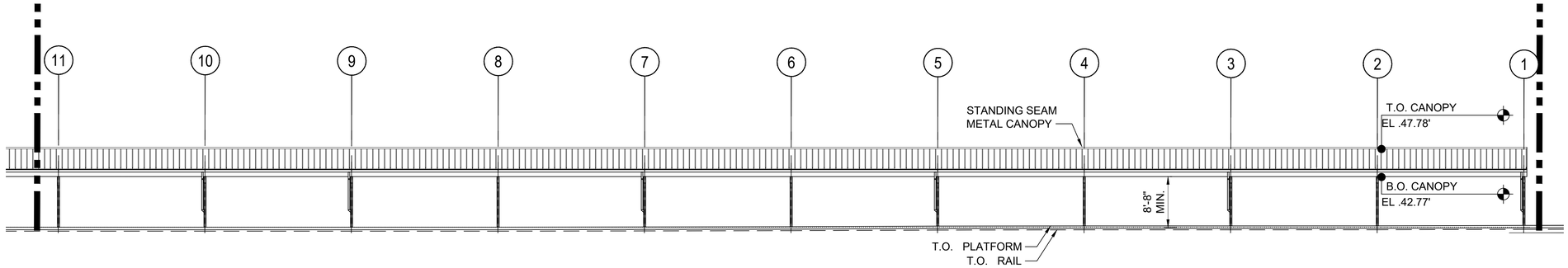
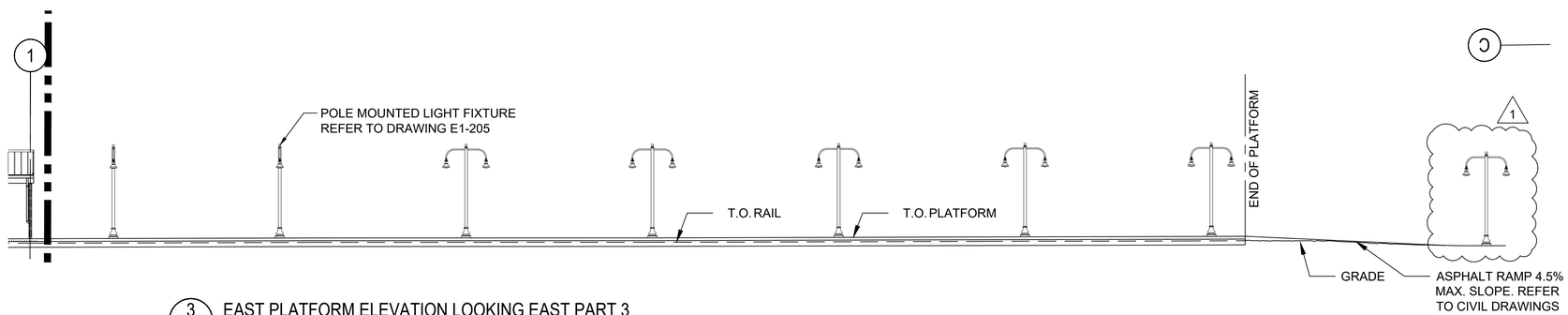


1 A1-107 EAST PLATFORM ELEVATION LOOKING EAST PART 1
SCALE 3/32" = 1'-0"



2 A1-106 EAST PLATFORM ELEVATION LOOKING EAST PART 2
SCALE 3/32" = 1'-0"



3 A1-105 EAST PLATFORM ELEVATION LOOKING EAST PART 3
SCALE 3/32" = 1'-0"

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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

EAST PLATFORM ELEVATIONS LOOKING EAST

IFB NO: 025-013
DRAWING NO: A1-201
SCALE: X" = 1'-0"
SHEET NO: 277 OF 426

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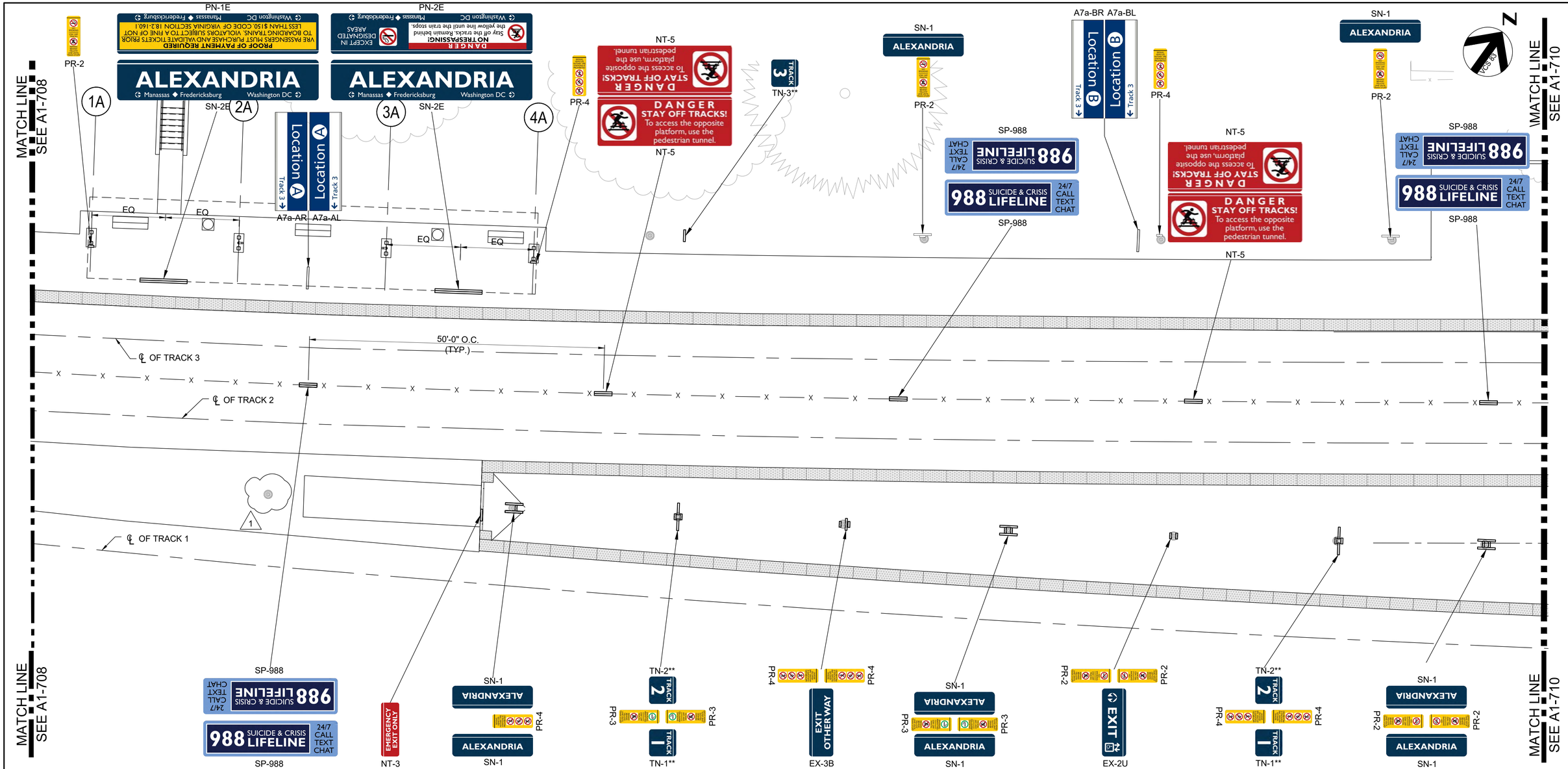
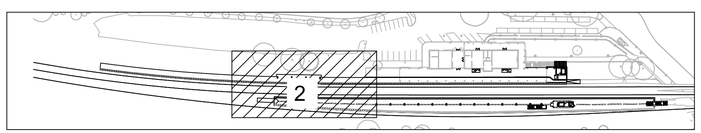


NOTES:

1. THE CONTRACTOR SHALL COORDINATE WITH VRE AND UPDATE ALL SIGNS INDICATING TRACK NUMBERS WITH NEW TRACK NUMBERS AS DIRECTED BY VRE. THE CONTRACTOR SHALL FURNISH AND INSTALL FINAL SIGNS WITH TRACK NUMBERS 2, 3, 4 OR 5 AND AFFIX A TEMPORARY TRACK NUMBER OVER THE PERMANENT NUMBER IF THE TRACK NUMBERS CHANGE AFTER THE SIGNS ARE INSTALLED.

SIGNS SHALL BE PROVIDED ALONG THE ROW FENCE WEST OF TRACK #3 WITHIN THE LIMITS OF BOTH PLATFORM AS SHOWN HERE AT 90' OC MAX

1 / A1-101 PLATFORM SIGNAGE PLAN - 2
SCALE 1" = 10'



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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PLATFORM SIGNAGE PLAN - 2 OF 4

IFB NO: 025-013
DRAWING NO: A1-709
SCALE: 1" = 10'
SHEET NO: 332 OF 426

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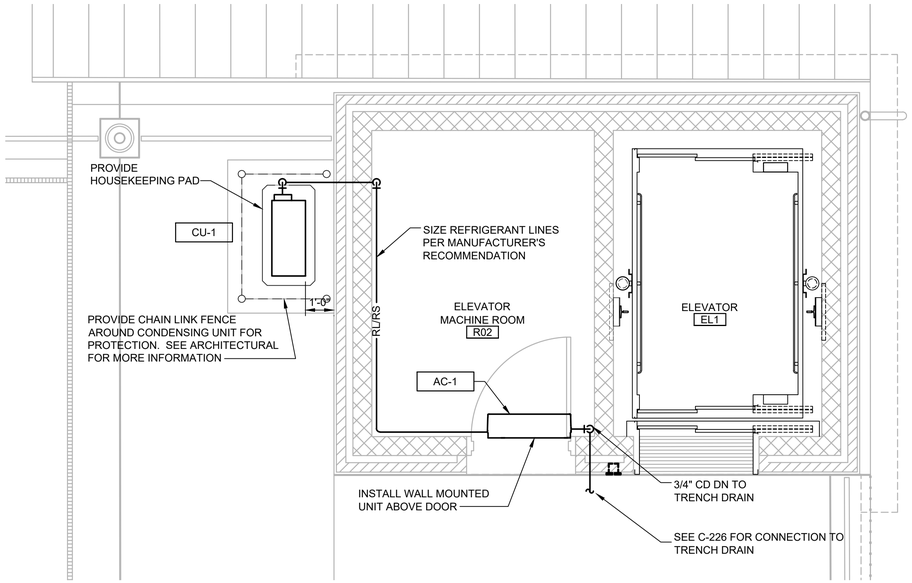
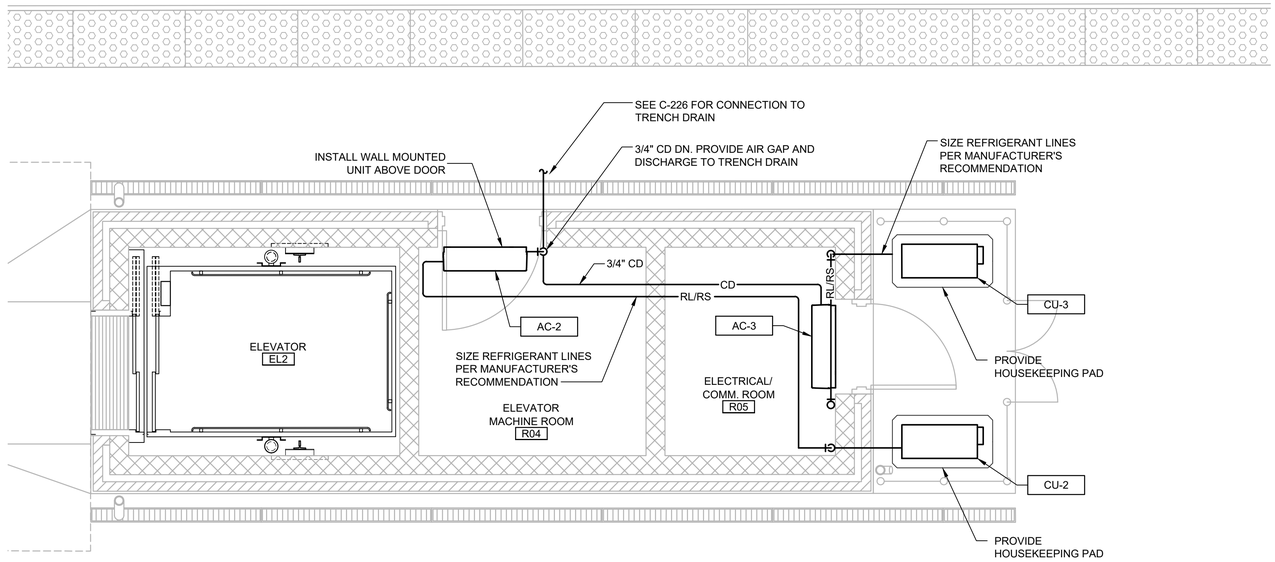


1 ELEVATOR 1 – ENLARGED HVAC FLOOR PLAN
3/8" = 1'-0"



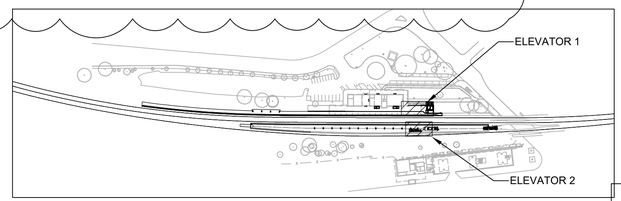
2 ELEVATOR 2 – ENLARGED HVAC FLOOR PLAN
3/8" = 1'-0"

1

DUCTLESS SPLIT SYSTEM SCHEDULE

MARK NO.	AREA SERVED	BASIS OF DESIGN	INDOOR UNIT			OUTDOOR UNIT									NOTES
								CAPACITY (MBH)			ELECTRICAL				
								COOLING							
			MODEL NO.	CFM	WEIGHT (LBS)	MODEL NO.	SEER	TOTAL	SENSIBLE	HEATING	MCA	MOCP	VOLTS / PH	WEIGHT (LBS)	
AC-1 / CU-1	ELEVATOR 1 MACHINE ROOM	MITSUBISHI	PKA-A18LA	320	28	PUY-A18NKA7-BS	19.8	18.0	13.1	N/A	11	28	208-230 / 1	99	1,2,3,4,5
AC-2 / CU-2	ELEVATOR 2 MACHINE ROOM	MITSUBISHI	PKA-A18LA	320	28	PUY-A18NKA7-BS	19.8	18.0	13.1	N/A	11	28	208-230 / 1	99	1,2,3,4,5
AC-3 / CU-3	ELEVATOR 2 MACHINE ROOM	MITSUBISHI	PKA-A18LA	320	28	PUY-A18NKA7-BS	19.8	18.0	13.1	N/A	11	28	208-230 / 1	99	1,2,3,4,5

NOTES:
1. COOLING CAPACITY BASED ON 95°F AMBIENT TEMPERATURE.
2. R-32 REFRIGERANT.
3. PROVIDE HARDWIRED WALL MOUNT THERMOSTAT.
4. INDOOR UNIT POWER BY OUTDOOR UNIT.
5. PROVIDE LOW AMBIENT AIR KIT WITH WIND BAFFLES FOR OPERATION DOWN -20°F.



KEY PLAN

N
VCS 83

DATUM:
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DRAWN BY: QZ
CHECKED BY: WH
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ANDREW T. VAN NESS
Lic. No. 66715
05/30/2025
PROFESSIONAL ENGINEER

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CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

ENLARGED ELEVATOR HVAC PLANS

IFB NO: 025-013
DRAWING NO: H1-101
SCALE: 3/8" = 1'-0"
SHEET NO: 354 OF 426

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