ADDENDUM NO. 1

For

Middle Georgia Regional Airport (MCN)

Middle Georgia Regional Airport
1000 Terminal Drive
Macon, GA 31297

PA PN 20202946.0003

Prepared By:

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Issued: June 16, 2023

The following items are clarifications, corrections, or additions to the contract documents. **THIS ADDENDUM TAKES PRECEDENCE OVER THE ORIGINAL PARTS OF THE CONTRACT DOCUMENTS.**

All the parts of the contract documents, not specifically modified by this or other addenda, remain in full force and effect.

Bidders shall thoroughly familiarize themselves with the contents of this Addendum before submitting bid proposals. **IT SHALL BE THE BIDDER'S RESPONSIBILITY TO INFORM THE SUBCONTRACTORS, SUPPLIERS, MANUFACTURERS AND OTHER PARTIES PARTICIPATING IN THE WORK OF APPLICABLE REQUIREMENTS IN THIS ADDENDUM.**

Bidders shall acknowledge receipt of this addendum, identified by number and date, on the Addenda Receipt form included in the Proposal Section of the Contract Documents and submitted as part of their Proposal. Failure to acknowledge receipt of Addendum may be grounds for rejection of the bid proposal.

I. GENERAL CLARIFICATIONS:

1. Bids are to be submitted to the Macon-Bibb Procurement Department no later than 12 noon on June 29, 2023. No bids will be accepted after 12 noon, local time, on June 29th. The bid opening will be held at 2 P.M. on June 29, 2023, in the conference room across the hall from the Procurement office. **No extension to the bid opening is granted.**
2. As noted in the Advertisement for Bids, bid prices are required to remain open for acceptance or rejection for **one hundred twenty (120) calendar days** after the date of opening of bids.
3. The geotechnical report for the project is attached.
4. The decision has been made to close the runway for the duration of the contract instead of the runway being open during Phase II. As discussed at the pre-bid meeting, at certain times during the project, tenants of the airport may have larger planes landing that require the use of Runway 5-23. During these times, the Contractor will be required to open the runway. A minimum of 24-hours' notice will be provided to the Contractor prior to the opening of the runway.

II. CONTRACT DOCUMENTS:

1. Revised Bid Forms are attached, Pages PD-23 through PD-31.
2. Last day for questions is revised from 5:00 PM, June 19, 2023, to **June 22, 2023**.
3. Final Addendum date is revised from June 21, 2023, to **June 23, 2023**.

III. TECHNICAL SPECIFICATIONS:

INSERT the following technical specification sections into the Bid Documents:

1. GDOT-627

REPLACE the following technical specification sections below with the attached revised specifications in the Bid Documents:

Items P-152, L-105, L108, L-110, L-125, 13 34 23, 26 27 26, and 26 05 00.

IV. GENERAL CLARIFICATIONS REGARDING REVISED P-152:

1. There is only one contract pay item for earthwork – "P-152-4.1 Embankment in Place – per cubic yard". This item shall include all work required to complete the earthwork to the lines and grades established on the plans, including full compensation for obtaining material, moving material, placing material to grade, compaction, and furnishing all materials, labor, equipment, tools, and incidentals.
2. The Contractor shall not be directly paid to handle earthwork twice.
3. After the embankment in place is complete, the Contractor shall provide a full topographic survey of the project area per Item C-103-8.1.
4. The Contractor shall pay Macon-Bibb County $1.50 per cubic yard for any onsite excavation used from the onsite borrow area..
5. The cost of $1.50 per cubic yard for any onsite excavation shall be included in the price of P-152-4.1 Embankment in Place – per cubic yard.

V. CONTRACT DRAWINGS:

REPLACE electrical sheets with revised, attached sheets, EA-001, EA-101 through 103, EA-203, EA-204, and EA-301 through EA-304.

VI. ATTACHMENTS:

1. Bid Form: Pages PD-23 - Addendum No. 1 – PD-31 - Addendum No. 1
2. Bid Form in Excel format
3. Revised Electrical Contract Drawings
4. Revised and Additional Technical Specifications
5. Geotechnical Report

VII. QUESTIONS FROM BIDDERS & RESPONSES:

Questions in black font, Responses in blue font.
NOTE: Some of the below questions were submitted prior to the pre-bid meeting.

1. Is the "Prime Contractors DBE and Subcontractor Commitment" form on page PD-48 of the specifications due with the bid?

   As indicated on the bottom of PD-48, "This sheet only needs to be filled out at beginning of contract unless a sub is added or removed." This form is not required to be submitted with the bid.

2. Other than the specified "Topsoil Stockpile, Staging and Port-A-John Area", is there another area available for the Contractor to establish a yard with office trailers?

   As discussed at the pre-bid, an area along Sardis Church Road can be made available for office trailers.

3. Is there any geotechnical information available for the borrow area?

Geotechnical report is a part of Addendum 1.

4. Several of the Pay Items are showing negative quantities (L-125-08, L-125-11, L-125-13, L-125-16). Is this correct?

   Yes. As discussed at the pre-bid, the Plans and Specifications are designed as if the Base Bid and Alternate 1 will be awarded. Based upon this premise, negative quantities for some electrical items are shown in Alternate 2. These are items that are shown as required for Alternate 1 but will not be required if Alternate 2 is awarded, so are shown as deductions (negative quantities) in Alternate 2.

5. The specifications indicate that ALL permits are to be obtained and paid for by the Contractor. Can you advise as to which permits will be required and the approximate cost? Alternatively, could an Allowance Account be established for Permits?

   A permit allowance has been added to the Bid Form in the amount of $75,000. The Contractor shall be reimbursed the actual costs of the permit fees when a permit receipt of payment is submitted with a pay request.

6. Specification P-152-4.1 states that the Contractor is to purchase the fill material from Macon-Bibb County. If this is correct, what is the purchase price per CY?

   Price of material ($1.50/CY in place) is outlined in P-152. Please see revised Specification P-152. The wording has been changed to allow the Contractor to purchase fill material elsewhere if desired.

7. Pay Item D-701-5.1 is for the 10'x10' Precast Box Culvert, however the drawings appear to indicate a Cast-in-Place Box Culvert. Can the Box Culvert be constructed using either method (Precast or Cast-in-Place)?

   With the decision to keep the runway closed for the duration of the project, the 10'x10' box culverts may be either pre-cast concrete or cast in place concrete. If pre-cast is the chosen option by the Contractor, the pre-cast shall be equivalent to the GDOT cast-in-place details shown in the plans.

8. During Ph. 1 of the project for the installation of the proposed precast box culvert, will there be any height restrictions relative to the use of cranes for this work?

   Runway 5-23 will be closed during that phase, so we do not anticipate height restrictions for cranes used in the construction of the box culverts. However, the FAA will examine this subject during the airspace study portion of the project. If the FAA requires changes, we will inform the Contractor.

9. Within the Instructions to Bidders – Prequalification of Bidder; you are requesting that the contract provide Evidence of Financial Responsibility including Certified Financial Statements. As a Privately held corporation we have a policy not to share this information. GDOT has a Prequalification process that certifies all Prequalified Contractor and provides a Maximum Capacity Limits. Instead of providing Financial Statements can we provide our GDOT Prequalification Certificate instead? Please confirm that this will be allowed as "Evidence of Competency"?

   From the Instructions to Bidders – Prequalification of Bidder section, second paragraph....."Unless otherwise specified, a bidder may submit evidence that he is

prequalified with the Georgia DOT and is on the current "bidder's list" of the state in which the proposed work is located. Such evidence of Georgia DOT prequalification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports hereinbefore specified."

10. Will you please provide the Letter of Intent forms that you want us to fill out and submit with our bid? (See Example file)

    Any Letter of Intent form that provides the bidder's name and address, along with the DBE firm's name, address, and telephone number, a description of the DBE's proposed work, the value of the proposed work, and affirmation from the DBE firm that they will perform the work will be acceptable.

11. Would it be possible for you to provide the Bid Form in an Excel format to make it easier to fill out?

    Yes, however the use, content, and accuracy of the bid submission is 100% the responsibility of the Bidder.

12. It looks like under the Contractor's Required Submission you want a list of Minority and Women Subs, would you consider using the GDOT DBE Participation Schedule? (see Example File)

    The GDOT DBE Participation Schedule form or form with the same information is acceptable for use. Just write "See attached" in that section of Page PD-46.

13. Would you please consider allowing a two-three week delay in the bid submission due date so that we can have more time for prepare our bids for this project? More time will allow for better pricing.

    As discussed at the pre-bid meeting, no. Grant funding schedule will not allow a delay in the bid opening phase.

14. Would you please release the CAD files for the Contractor to use to quantify the Earthwork? Please bid the earthwork quantities as shown on the Bid Form. A digital terrain model will be provided for the construction phase of the project.

15. Several bid items have ALLOWANCE in the Item Number Column, we can only assume that these are going to be preset Dollar Value Allowances. Can you please provide the amount for each Allowance? Also, Shouldn't the bid form reflect this for all bidders?

    Yes, revised bid forms are a part of this Addendum that show the allowance amount for each of these. The amounts were inadvertently left off the bid forms.

16. Bid Item C-109-3.1 Engineer Field Office says it is Fixed with a quantity of 12 Months. Are we to bid this item for the Fixed Price of $900 Per Month, as called out in C-109-1? If so shouldn't the bid form reflect this for all bidders?

    Yes, revised bid forms will be issued that will show the amount. The amount was inadvertently left off the bid forms.

17. Are we to include the EMAS Materials in our bid or has these Materials already been purchased by the Airport?

Yes, as discussed at the pre-bid, include EMAS materials and installation in Bid Alternate 2.

18. The EMAS will be shipped in many many Tractor Trailers loads, is there a Storage Space Available either on site or nearby to accommodate all of these Trailers? Our Past experience with EMAS was some 40-50 Trailer Loads for each one.

    Yes, there is an available area nearby, on site, to store the blocks and trailers.

19. Our experience with installing EMAS was slower that what is described in P-555 and took more support than described, will the Airport compensate the Contractor via Change Order if the installation process takes longer that what is described in Section P-155?

    The installation times and manpower shown in P-555 are only suggested amounts provided by RunwaySafe, the supplier of the EMAS components. You should bid the amount you think it will take you to build the EMAS. There will be no additional compensation if you use RunwaySafe's suggested timeframes and manpower, and the actual work exceeds their suggested timeframes..

20. Will the GDOT Asphalt Cement Index be used on this project? Or will it be a Non Indexed Project? No. This is a non-indexed project.

21. Since we are not sure (Pre-Bid) if Additive Alternate 1 and or Additive Alternate 2 will be used alone or together, how would you like us to cover the cost of P-401 Test Sections? If both Additive Alternates are used then this cost will be doubled up since we have to cover it in both options to be safe. At this time we have no choice but to include it in the cost of the mixes for each Additive Alternate. Our suggestion would be to have a bid item (Per Each) within both Additive Alternates for P-401 Test Sections then if both Additives are chosen you simply don't pay but for 1 of them.

    As discussed at the pre-bid meeting, one mix design and test section should be sufficient for all paving.

22. On page PD-32 you call for us to list Subcontractors, Suppliers & Others.

    a. What is the purpose for listing Suppliers, is the Airport going to dictate who we can or cannot use as a Supplier for this project?

       No, the airport is not going to dictate what suppliers the Contractor uses, but the list is a required element of the bid.

    b. If so, then can you please provide a list of Allowable Suppliers for this project so that we choose from the list that will be approved and or allowed?

       See Item a above.

    c. What is do you mean by Others?

       Others is a catch all phrase for any firm engaged for the project that may not exactly fit as a subcontractor or supplier.

    d. This list provided will very likely not have enough spaces for All of the Sub needed, much less the list of Suppliers. Can a formal form be provided with adequate spaces?

Attach a list on another sheet of paper and note PD-32 to "See Attached".

23. We have not been able to find any Geotech and or Soil Survey Information within the documents.

    Geotechnical report is a part of Addendum 1.

24. Will you please provide a Wall Foundation Investigation (WFI) for the MSE Wall? We need this in order to do a "Contractor Design MSE Wall" prior to the bid submission.

    Geotechnical report is a part of Addendum 1.

25. Has the MSE Wall backfill material been deducted from the Earthwork Quantities since it is considered incidental to the MSE Wall cost according to GDOT Specs? This will lessen the Fill Requirement for the project substantially.

26. Do you have a place on site for the placement of the soils excavated under Bid Item P-152-4.3 Unsuitable Excavation? Or does it need to be removed from the project and disposed of off site? Unsuitable material shall be properly disposed of off airport property.

27. It is our assumption that Unsuitable Excavation is for undercutting bad areas, what materials do you plan to use to backfill these undercuts (Unsuitable Excavation areas) with? How will the backfill material be paid for?

    Correct. If unsuitable material is excavated, fill material from the same source used for the runway extension may be placed and compacted in the unsuitable excavation area. The replacement material will be paid for under P-152-4.2, Embankment in Place.

28. Will you please provide the MSE Wall Spec that will be used for this project? We don't see it in the documents provided and it is typically a Special Provision in projects like this.

    Wall specification is a part of Addendum 1.

29. You stated that the Unclassified Excavation bid item is only to include the $1.50 per CY Fee to purchase the dirt from Macon Bibb Co and that all other grading costs are to be included in the Embankment in Place bid item.

    a. Please confirm that this is correct as stated?

    b. If this is correct, then why not set the Bid Unit Price as $1.50 per CY for all bidders, like an allowance?

    Please see revised Bid Forms and Specification P-152.

30. After visiting the site it looks like a lot of dirt will need to be excavated in order to remove the 3 Corrugated Metal Pipes and Prepare for the New Box Culverts.

    a. Is this excavated dirt supposed to be stockpiled and then moved again so it can be used to backfill both the vacated Metal Pipe Trench and the new Box Culverts? If so how will both of these dirt movements be paid for?

       With the decision to close the runway for the duration of the contract, the excavated soil, if suitable, may be placed in final position in the embankment area

and borrow material used to backfill the areas indicated. Or, the excavated material may be stockpiled and used for backfill.

b. When the excavation is made for the Corrugated Pipe Removal and new Box Culvert is there a set distance that the top of the excavation must stay off of the end of the existing runway?

No, provided there is no damage to the runway or taxiway.

c. If a safe and legal excavation cannot be made for the Corrugated Pipe Removal and New Box Culvert and not impact the existing runway, will shoring need to be installed so not to impact the end of the runway? If so how will the shoring be paid for?

Per the Contract Documents, responsibility for project safety resides with the Contractor, so we have no comment on the use of shoring, if the Contractor chooses to use such.

We have performed a preliminary review of this specific excavation operation, specifically using 2.5:1 side slopes and a 10-foot wide overexcavation at the bottom of the CMPs and box culverts. Based upon that analysis, the top of slope of the excavation for removing the CMPs will be a minimum of slightly over 100 feet from the runway and taxiway pavement end.

A similar analysis was performed for the installation of the box culverts utilizing the same criteria, and the top of slope was 42 feet from the runway pavement end and 8 feet from the taxiway pavement. Based upon this analysis, we have included additional quantities in case rebuilding a portion of the taxiway is required. We do not anticipate the runway pavement to be affected.

See attached Excavation Slope drawing.

d. Is it possible to excavate for the Corrugated Pipe Removal and new Box Culvert and place that dirt directly into a final Fill? Or does it need to be stockpiled and then moved a second time to use as Backfill?

Yes. See Item a above. Stockpiling is no longer required.

31. If the Soils beneath the MSE Wall is not adequate to support the weight/mass of the new MSE Wall will the Wall Footprint be undercut and filled back with either MSE Wall backfill or #57 Stone to improve the influence zone? If so how will this be paid for?

(typically GDOT will establish and undercut and MSE Backfill specifically for this kind of foundation improvement. Just so you know the MSE Wall built on Sardis Church Road required the foundation underneath them to improved using this manner, my guess is that this wall will need to same treatment)

If this situation is encountered, Bid Item GDOT-627-5.7, Additional MSE backfill, will be used to pay the Contractor for this work.

32. The Clearing & Grubbing Acreage (8 AC) in the Bid Item, is this just the areas with actual trees on them or is this cover the entire area of the site, trees or no trees?

Clearing and grubbing areas with acreage are shown on the plans.

33. It seems like there is a lot of dirt that will need to be moved that wont be picked up by the Original Ground to Final Ground measurements/calculations, how will this dirt movement be paid for?

    Please see revised Bid Forms and Specification P-152. All earthwork shall be paid for under Bid Item P-152-4.1, Embankment in Place – per cubic yard.

34. When we excavate for the bottom of the new MSE Wall installation, how will you pay for this dirt movement?

    Please see revised Bid Forms and Specification P-152. All earthwork shall be paid for under Bid Item P-152-4.1, Embankment in Place – per cubic yard.

35. If the MSE Wall excavation is too close to Sardis Church Road and Shoring is needed, how will this shoring be paid for?

    We do not anticipate shoring being needed along Sardis Church Road. If shoring becomes necessary, it will be handled in a Change Order during construction.

36. Do you plan to use Foundation Backfill Material Type II under and along the sides of the new Box Culvert? Is so how will this be paid for? Typically GDOT will have a bid item for Foundation Backfill Matl Type II, paid by the CY.

    Yes. The cost for Foundation Material, Type II, shall be included in Item D-701-5.1, 10' x 10' Precast Box Culvert with Type II Foundation Material.

37. While on the Site tour there was a lot of discussion about the many thousand of CY that will have to be excavated to remove the existing Corrugated metal pipes and install the new box culvert. Our concern is that this earthwork movement will not be picked up in Original Ground Elevations vs Final Ground Elevations measurement/calculations. Will you please address how you plan to pay for this work scope.

    Please see revised Bid Forms and Specification P-152. All earthwork shall be paid for under Bid Item P-152-4.1, Embankment in Place – per cubic yard.

38. Where and How to you intend to use the Bid Item Additonal MSE Wall Backfill – 1,000 CY?

    See response to Question 31.

39. Please confirm that you are following GDOT Specs for the MSE Walls and that the MSE Wall backfill material is an incidental cost to the SF of MSE Wall bid item and will not be paid for separately?

    Wall specification is a part of Addendum 1.

40. After looking back at the plans and remembering what I saw yesterday during the site visit, I have a very big concern that Shoring will be needed to hold up the end of the runway while the Contractor excavates down for the installation of the New Box Culverts. We are looking at a 25-30 foot excavation that is so close to the runway that we cannot lay back slopes for an OSHA Safe Excavation. You really need to address this, that kind of shoring could cost $1M because it would have to be tied back due to depth.

    See response to Question 30c.

41. Some 50,00-60,000 CY of Dirt will have to be excavated to get to the bottom of the new culverts, I highly doubt that any of this has been calculated in the bid quantity.

    Please see revised Bid Forms and Specification P-152. All earthwork shall be paid for under Bid Item P-152-4.1, Embankment in Place – per cubic yard.

42. I don't see a bid item for Contractor Quality Control Program for Alternate #2? Will that be added? Actually, I don't see that bid item (Contractor Quality Control Program) for the Base Bid either.

    Contractor Quality Control Program line items have been added to the Bid Forms.

43. In follow up to the Pre-Bid Meeting held yesterday, we have an item we would like further clarification on. In the grading, there are 2 pay items for the dirt work – Unclassified Excavation 750,000 CY and Embankment In Place (On-Site Borrow) 625,000 CY. This perception is that there is 1,375,000 CY of dirt to move on this project. Its our opinion from our industry standard that "Unclassified Excavation" is to move all the CUT dirt per the project plans and that "Borrow Excavation" would be all the material need to get the project to design grade after the CUT dirt was placed.

    Please see revised Bid Forms and Specification P-152. All earthwork shall be paid for under Bid Item P-152-4.1, Embankment in Place – per cubic yard.

44. Please provide the envelope for the MSE wall.

    The wall envelope will be determined by the wall design provided by the Contractor.

45. Please set a price for all the allowances in the schedule of items, so we can compete on equal position with all the other contractors.

    Revised bid forms are a part of this Addendum that show the allowance amount for each of these. The amounts were inadvertently left off the bid forms.

46. Please provide a line item for stand by time per hour so we can use it, when activities are stopped to allow large aircrafts to land.

    No line item for Standby Time will be provided.

47. Please clarify the extends of the power line relocation. Is it just coordination with the utility owner? Or do we need to move the existing lines with our own crews and/or subs?

    As discussed at the pre-bid, the Contractor needs to contact the utility provider to coordinate the relocation.

48. Please clarify the extends of the gas line relocation. Is it just coordination with the utility owner? Or do we need to move the existing lines with our own crews and/or subs?

    As discussed at the pre-bid, the Contractor needs to contact the utility provider to coordinate the relocation.

49. Is the contractor responsible to pay for on site testing? If that is the case, please provide a line item on the base bid for quality control.

    Contractor Quality Control Program line items have been added to the Bid Forms.

50. Please clarify the difference between items L-105-2 and L-105-3. Their description is the same.

Please see revised Bid Forms. Descriptions have been corrected.

51. What concrete mix design is required for the concrete flume?

    A GDOT 3,500 psi concrete mix is acceptable for the flumes.

51. Could you please provide information about the potential design aircraft, specifically in relation to quoting the precast box culverts?

    The design aircraft is not of sufficient weight to affect the design of the box culvert. Please follow the GDOT depth tables provided.

52. Considering the lead time involved, is the owner open to the possibility of using cast-in-place box culverts, does the designer approve this alternative?

    See response to Question 7.

End of Addendum No. 1

BASE BID - GRADING, DRAINAGE AND RETAINING WALL					
ITEM NUMBER	**DESCRIPTION**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL**
C-100-14.1	Contractor Quality Control Program (CQCP)	1	LS		
C-102-5.1	Temporary Construction Exit	2	EA		
C-102-5.2	Temporary Stone Filter Ring	14	EA		
C-102-5.3	Ditch Crossing	2	EA		
C-102-5.4	Erosion Control Blanket	29,500	SY		
C-102-5.5	Compost Filter Sock	7,600	LF		
C-102-5.6	Compost Filter Sock Check Dam	90	EA		
C-102-5.7	Temporary Inlet Protection	32	EA		
C-102-5.8	Temporary Seeding (Mulched)	100	AC		
C-102-5.9	Temporary Skimmer Basin 1, Complete	1	LS		
C-102-5.10	Temporary Skimmer Basin 2, Complete	1	LS		
C-102-5.11	Riprap Outlet Protection	130	SY		
C-102-5.12	Proposed Concrete Flume	310	SY		
C-102-5.13	Tree Protection	4	EA		
C-102-5.14	Streambank Stabilization	500	LF		
C-102-5.15	Temporary Downdrain Structure, Complete	2,500	LF		
C-102-5.16	Temporary Stream Diversion Channel, Complete	2	EA		
C-102-5.17	Temporary Stream Crossing, Complete	2	EA		
C-103-8.1	Project Survey, Stakeout, and Record Drawing	1	LS		
C-105-6.1	Mobilization	1	LS		
C-107-4.1	Maintenance of Traffic and Airfield Safety	1	LS		
C-109-3.1	Engineer's Field Office - Fixed	12	MTH	$ 900.00	$ 10,800.00
D-701-5.1	10' x 10' Precast Box Culvert with Type II Foundation Material	2,000	LF		
D-701-5.2	15" RCP (Class III)	450	LF		
D-701-5.3	24" RCP (Class III)	1,450	LF		

D-701-5.4	24" RCP (Class V)	88	LF		
D-701-5.5	36" RCP (Class III)	1,050	LF		
D-701-5.6	36" RCP (Class V)	412	LF		
D-701-5.7	Connect New Storm Pipe to Existing Structure	1	EA		
D-751-5.1	2' x 2' Drop Inlet	4	EA		
D-751-5.2	3' x 3' Drop Inlet	2	EA		
D-751-5.3	4' x 4' Drop Inlet	8	EA		
D-751-5.4	5' x 5' Drop Inlet	15	EA		
D-752-5.1	24" Flared End Section	5	EA		
D-752-5.2	36" Flared End Section	3	EA		
D-752-5.3	Box Culvert Headwall	1	EA		
D-752-5.4	Box Culvert Headwall with Concrete Baffles	1	EA		
D-752-5.5	36" Headwall	1	EA		
F-162-5.1	8' Chain Link Fence	3,700	LF		
F-162-5.2	Temporary Fence	5,250	LF		
F-162-5.3	New 24-Foot-Wide Double Swing Gate	2	EA		
L-105-2	Demolish MALSR Light Bar – Tower Mounted on Steel Frame	1	EA		
L-105-3	Demolish MALSR Light Bar – Tower Mounted	5	EA		
L-105-4	Existing MALSR Demolition	1	LS		
L-105-5	Existing MALSR Shelter Removal	1	LS		
L-108-3	No. 1/0 AWG, BSDC Guard Wire, Installed in	1,800	LF		
L-108-6	No. 2/0 AWG, XHHW	5,500	LF		
L-110-4	1W-6" PVC Duct Concrete Encased	1,700	LF		
L-110-7	3/4 IN. X 10 FT Copper Clad Ground Rods -	30	EA		
L-115-1	FAA Handhole - Aircraft Rated	3	EA		
L-125-1	Concrete Bollard	8	EA		
L-125-19	MALSR Equipment Rack	1	LS		

L-125-24	Utility Requirements / Coordination with Georgia	1	LS		
P-101-5.1	Remove Existing Bituminous Pavement and Stone (Road)	5,950	SY		
P-101-5.2	Remove Existing Bituminous Pavement and Stone (Airfield)	270	SY		
P-101-5.3	Asphalt Trench Restoration	270	SY		
P-151-4.1	Clearing and Grubbing	8	AC		
P-151-4.2	Remove Existing Fence	4,300	LF		
P-151-4.3	Remove Existing Gate	3	EA		
P-151-4.4	Remove Gravel Road	3,700	SY		
P-151-4.5	Remove Existing Sidewalk and Curb	75	SY		
P-151-4.7	Remove Existing Drainage Manhole	1	EA		
P-151-4.8	Remove Existing Drop Inlet	1	EA		
P-151-4.9	Remove Existing 15" Flared End Section	2	EA		
P-151-4.10	Remove Existing 18" Flared End Section	5	EA		
P-151-4.11	Remove Existing 18" Headwall	5	EA		
P-151-4.12	Remove Existing 24" Headwall	3	EA		
P-151-4.13	Remove Existing Headwall for (3) 10' Diameter CMP	2	EA		
P-151-4.14	Remove Existing 15" CPP	1	LS		
P-151-4.15	Remove Existing 18" CPP	1	LS		
P-151-4.16	Remove Existing 24" RCP	1	LS		
P-151-4.17	Remove Existing (3) 10' CMP	1	LS		
P-151-4.18	Remove Existing Sewer Manhole	4	EA		
P-151-4.19	Remove Existing 36" RCP Sanitary Sewer	1,470	LF		
P-151-4.20	Remove Existing 12" Ductile Iron Waterline and	2,850	LF		
P-151-4.21	Remove Existing Fire Hydrant	4	EA		
P-152-4.1	Embankment In Place Placed and Compacted	675,000	CY		
P-152-4.2	Unsuitable Excavation	22,500	CY		

P-152-4.3	Geogrid	45,000	SY		
T-901-5.1	Permanent Seeding	80	AC		
T-905-5.1	Topsoiling (On-Site Stripping and Final	60,000	CY		
T-908-5.1	Mulching	80	AC		
MWA-101-5.1	36" PVC SDR 26 Sanitary Sewer	2,048	LF		
MWA-101-5.2	60" Sanitary Manholes	5	EA		
MWA-101-5.3	Connect New Sanitary Sewer Pipe to Existing Manhole	2	EA		
MWA-101-5.4	12" Ductile Iron Waterline	4,130	LF		
MWA-101-5.5	12" x 12" Tee	1	EA		
MWA-101-5.6	12" x 6" Hydrant Tee	9	EA		
MWA-101-5.7	12" 90° Bend	1	EA		
MWA-101-5.8	12" 22.5° Bend	5	EA		
MWA-101-5.9	12" Gate Valve	2	EA		
MWA-101-5.10	12" Gate Valve (Supplied by MWA - Install Cost	2	EA		
MWA-101-5.11	MWA Typical Blow-Off	1	EA		
MWA-101-5.12	Fire Hydrant Assembly Including Gate Valve and	9	EA		
MWA-101-5.13	Proposed 24" Steel Casing	635	LF		
ALLOWANCE	Electric Line Relocation Allowance (If required. Payment to be made to the Electric Company or their subcontractor.)	1	LS	$ 75,000.00	
ALLOWANCE	Gas Line Relocation Allowance (If required. Payment to be made to the Gas Company or their subcontractor.)	1	LS	$ 75,000.00	
ALLOWANCE	Reimbursement of Permit Fees Paid by Contractor	1	LS	$ 75,000.00	
PLANS	Traffic Control (In Accordance with GDOT Requirements and Latest Edition of MUTCD)	1	LS		
GDOT-627-5.1	MSE wall face, wall No. 0 - 10 ft., Including Coping	9,665	SF		
GDOT-627-5.2	MSE wall face, wall No. >10 -20 ft., Including Coping	8,750	SF		

GDOT-627-5.3	MSE wall face, wall No. >20- 30 ft., Including	7,550	SF		
GDOT-627-5.4	MSE wall face, wall No. >30 ft., Including Coping	2,000	SF		
GDOT-627-5.6	Type 7-WS Side Barrier	975	LF		
GDOT-627-5.7	Additional MSE backfill	2,500	CY		
				SUBTOTAL - BASE BID	

ADDITIVE ALTERNATE 1 - RUNWAY 5-23 AND TAXIWAY B EXTENSION PAVING, LIGHTING, AND APPROACH LIGHTING					
ITEM CODE	**DESCRIPTION**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL**
C-100-14.1	Contractor Quality Control Program (CQCP)	1	LS		
C-102-5.1	Temporary Construction Exit	1	EA		
C-102-5.5	Compost Filter Sock	3,000	LF		
C-102-5.6	Compost Filter Sock Check Dam	1	EA		
C-102-5.7	Temporary Inlet Protection	2	EA		
C-102-5.8	Temporary Seeding (Mulched)	6	AC		
C-102-5.12	Proposed Concrete Flume	246	SY		
C-102-5.18	Maintain Temporary Skimmer Basin 1, Complete	1	LS		
C-102-5.19	Maintain Temporary Skimmer Basin 2, Complete	1	LS		
C-103-8.1	Project Survey, Stakeout, and Record Drawing	1	LS		
C-105-6.1	Mobilization	1	LS		
C-107-4.1	Maintenance of Traffic and Airfield Safety	1	LS		
C-109-3.1	Engineer's Field Office - Fixed	2	MTH	$ 900.00	$ 1,800.00
L-104-01	Temporary Airfield Lighting Jumpers – Complete	1	LS		
L-105-01	Demolish Existing Fixture/Base Can	38	EA		
L-105-06	Miscellaneous Electrical Demolition	1	LS		
L-105-07	Remove Existing Sign and Foundation	7	EA		
L-105-08	Remove Existing Sign Panels from Existing Sign to Remain	10	EA		

L-108-01	1/12C No. 19 AWG, Shielded - CASSPIC-FSF	2,600	LF		
L-108-02	No. 1/0 AWG, BSDC Guard Wire, Installed in Trench or with Duct Bank or Conduit, Including Ground Rods and Ground Connectors	15,700	LF		
L-108-03	No. 12 AWG, XHHW	1,600	LF		
L-108-04	No. 2 AWG, XHHW	10,200	LF		
L-108-05	No. 4 AWG, XHHW	14,400	LF		
L-108-06	No. 4/0 AWG, BSDC, Installed in Trench or with Duct Bank or Conduit, Including Ground Rods and Ground Connectors	1,500	LF		
L-108-07	No. 4/0 AWG, XHHW	5,900	LF		
L-108-08	No. 6 AWG, XHHW	4,200	LF		
L-108-09	No. 8 AWG, XHHW	3,750	LF		
L-108-10	No. 6 AWG, Solid, Bare Counterpoise Wire, Installed in Trench, Above the Duct Bank, Conduit, or Cable, Including Ground Rods and Ground Connectors	20,600	LF		
L-108-11	No. 8 AWG, 5 kV, L-824, Type C Cable	10,900	LF		
L-110-01	1W-2" PVC Duct Concrete Encased	9,300	LF		
L-110-02	1W-2" RGSC Duct Concrete Encased	300	LF		
L-110-03	1W-4" PVC Duct Concrete Encased	150	LF		
L-110-05	2 Way 2-inch Concrete Encased	300	LF		
L-110-06	2W-4" PVC Duct Concrete Encased	3,000	LF		
L-110-07	3/4 IN. X 10 FT Copper Clad Ground Rods - Supplemental	500	EA		
L-110-08	3W-4" PVC Duct Concrete Encased	200	LF		
L-110-09	4W-4" PVC Duct Concrete Encased	600	LF		
L-110-10	6W-4" PVC Duct Concrete Encased	600	LF		
L-110-11	8W-4" PVC Duct Concrete Encased	500	LF		

L-115-01	FAA Handhole - Aircraft Rated	17	EA		
L-115-02	Junction Can Plaza - 2 L-867D Base Cans	4	EA		
L-115-03	L-867D Junction Can with 3/8" Thick Blank Steel	4	EA		
L-125-01	Concrete Bollard	15	EA		
L-125-02	L-850C In-Pavement Runway Edge Light	1	EA		
L-125-03	L-850D In-Pavement Runway Threshold Light	4	EA		
L-125-05	L-858 LED RDR Sign, 1-Module on a New Concrete	5	EA		
L-125-06	L-858 LED Sign, 1-Module on a New Concrete	1	EA		
L-125-07	L-858 LED Sign, 2-Module on a New Concrete Sign Base	3	EA		
L-125-08	L-861T(L) Elevated Taxiway Edge Light	81	EA		
L-125-10	L-862 Elevated Runway Edge Light	5	EA		
L-125-11	L-862E Elevated Runway Threshold Light	12	EA		
L-125-13	MALS EMT Light Bar - Installed in Turf	1	EA		
L-125-16	MALS MG20 Light Bar - Installed in Turf	5	EA		
L-125-17	MALS Semi Flush Light Bar - Full Strength Pavement	2	EA		
L-125-18	MALSR - Distribution Panel / Junction Box	1	EA		
L-125-19	MALSR Equipment Rack	1	LS		
L-125-20	MALSR Shelter	1	LS		
L-125-21	MALSR Shelter EES Grounding and Lightning Protection	1	LS		
L-125-22	Relocated Storage Shelter	1	LS		
L-125-23	Threshold Light Bar - Full Strength Pavement	1	EA		
L-125-25	L-858 LED Sign, 3-Module on a New Concrete Sign Base	2	EA		
L-125-26	Install New Sign Panels on Existing Signs	10	EA		
ALLOWANCE	Electrical System Clarifications/Engineer Directed Work (Non-FAA Eligible)	1	LS	$ 100,000.00	$ 100,000.00

P-101-5.2	Remove Existing Bituminous Pavement and Stone (Airfield)	6,400	SY		
P-101-5.4	Remove Existing Concrete Pavement	175	SY		
P-101-5.5	Pavement Marking Removal by Waterblasting	107,000	SF		
P-152-4.1	Embankment In Place Placed and Compacted, Complete	750	CY		
P-152-4.2	Unsuitable Excavation	250	CY		
P-152-4.3	Geogrid	500	SY		
P-209-5.1	Crushed Aggregate Base Course (8-Inch Depth)	1,200	SY		
P-209-5.2	Crushed Aggregate Base Course (10-Inch Depth)	12,000	SY		
P-401-8.1	Bituminous Surface Course	4,000	TONS		
P-401-8.2	Bituminous Binder Course	12,000	TONS		
P-602-5.1	Bituminous Prime Coat	8,500	GAL		
P-603-5.1	Bituminous Tack Coat	8,500	GAL		
P-620-5.1	Temporary Pavement Marking, White	107,200	SF		
P-620-5.2	Permanent Pavement Marking, White	107,200	SF		
P-620-5.3	Temporary Pavement Marking, Yellow	3,900	SF		
P-620-5.4	Permanent Pavement Marking, Yellow	3,900	SF		
P-620-5.5	Permanent Pavement Marking, Red	1,600	SF		
P-621-5.1	Saw-Cut Pavement Grooving	10,000	SY		
T-901-5.1	Permanent Seeding	6	AC		
T-905-5.1	Topsoiling (On-Site Stripping and Final	1,100	CY		
T-908-5.1	Mulching	6	AC		
SUBTOTAL - ADDITIVE ALTERNATE 1					
ADDITIVE ALTERNATE 2 - EMAS					
ITEM CODE	**DESCRIPTION**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL**
C-105-6.1	Mobilization	1	LS		
C-107-4.1	Maintenance of Traffic and Airfield Safety	1	LS		

C-103-8.1	Project Survey, Stakeout, and Record Drawing	1	LS		
C-109-3.1	Engineer's Field Office - Fixed	2	MTH	$ 900.00	$ 1,800.00
L-125-04	L-853 Retroreflective Marker	128	EA		
L-125-08	L-861T(L) Elevated Taxiway Edge Light	-1	EA		
L-125-09	L-861T(L) Elevated Taxiway Edge Light - Installed in Asphalt Overrun Pavement	1	EA		
L-125-11	L-862E Elevated Runway Threshold Light	-8	EA		
L-125-12	L-862E Elevated Runway Threshold Light - Installed	8	EA		
L-125-13	MALS EMT Light Bar - Installed in Turf	-1	EA		
L-125-14	MALS EMT Light Bar - Overrun Pavement	1	EA		
L-125-16	MALS MG20 Light Bar - Installed in Turf	-3	EA		
L-125-15	MALS MG20 Light Bar - Installed in EMAS	4	EA		
P-209-5.2	Crushed Aggregate Base Course (10-Inch Depth)	2,600	CY		
P-401-8.1	Bituminous Surface Course	2,220	TONS		
P-602-5.1	Bituminous Prime Coat	2,800	GAL		
P-603-5.1	Bituminous Tack Coat	1,000	GAL		
P-620-5.3	Temporary Pavement Marking, Yellow	3,400	SF		
P-620-5.4	Permanent Pavement Marking, Yellow	3,400	SF		
P-621-5.1	Saw-Cut Pavement Grooving	3,700	SY		
P-555-1	EMAS Bed Installation	1	LS		
SUBTOTAL - ADDITIVE ALTERNATE 2					

SUBTOTAL - BASE BID _____

SUBTOTAL - BASE BID + BID ALTERNATE 1 _____

SUBTOTAL - BASE BID + BID ALTERNATE 1 + BID ALTERNATE 2 _____

NOTE: THIS IS A UNIT PRICE CONTRACT. UNIT PRICES WILL GOVERN IN THE EVENT OF A MATH ERROR.

ITEM GDOT-627: MECHANICALLY STABILIZED EMBANKMENT RETAINING WALL - CONTRACTOR DESIGN

DESCRIPTION

GDOT-627-1.1 This item shall consist of the construction of a mechanically stabilized embankment retaining wall - contractor design in accordance with the Georgia Department of Transportation (GDOT) Specification Section 627 included in this section.

MATERIALS

GDOT-627-2.1 Materials shall meet the requirements as indicated in the GDOT Specifications.

CONSTRUCTION METHODS

GDOT-627-3.1 Construction methods shall meet the requirements shown on the plans and as indicated in the GDOT Specifications.

METHOD OF MEASUREMENT

Work required under this specification section will be performed as scheduled or directed by the RPR. Completed and accepted work will be measured as follows:

GDOT-627-4.1-4.4 MSE wall face area, complete in place and accepted, including Coping Type A, will be measured by the square foot in vertical bands bounded by the limits of each specific height range pay item in the plans. The height will be measured from the maximum top of leveling pad elevation on the wall envelope to the top of Coping A. Dividing the wall area into segments such as this provides the opportunity for the contractor to bid graduated unit prices that consider backfill volumes and reinforcement lengths.

No separate measurement will be made for internal wall facing.

No deduction in area will be made for pipe passing through the wall facing. The area of box culverts that interrupt the wall envelope will not be included in the wall area measured for payment.

Excavation and Shoring, backfill stabilizing devices, MSE backfill material, and Concrete Leveling Pads will not be measured separately.

Any additional MSE backfill required as a result of an undercut ordered by the Engineer and requiring the MSE backfill material to provide stability, as determined by the Engineer, will be measured and paid for as additional MSE wall backfill.

Backfill of undercut areas not requiring classes of soils higher than common excavation soils will not be measured separately.

Backfill material required by construction procedures to extend outside the MSE wall volume shall be considered incidental and will not be measured separately.

GDOT- 627-4.5 Type 7-WS Side Barrier will be designated on the Plans and measured as horizontal lengths in linear feet.

GDOT- 627-4.6 The MSE backfill material used in the MSE wall volume will not be paid for separately except as noted below. When not paid for separately, include the cost in the unit price bid for MSE wall

face.

Exceptions:

- The cost of MSE Backfill required behind bridge endwalls or backwalls and above the top coping will be paid for as Additional MSE Wall Backfill.
- Any additional MSE backfill required as a result of an undercut ordered by the Engineer and requiring the MSE backfill material to provide stability, as determined by the Engineer, will be paid as Additional MSE wall backfill.
- Backfill of undercut areas not requiring materials of grades higher than common excavation soils will not be paid for separately. Include the cost in the overall bid price submitted.
- Any backfill material required by construction procedures to extend outside the MSE Wall volume is considered incidental. Include this cost in the price bid for contract items.

BASIS OF PAYMENT

Accepted quantities of wall items ordered by the RPR and measured as provided in the Method of Measurement section of this specifications will be paid for under:

Payment will be made under:

Item GDOT-627-5.1	MSE wall face, wall No. 0 -10 ft., including Coping - per square foot
Item GDOT-627-5.2	MSE wall face, wall No. >10 -20 ft., including Coping - per square foot
Item GDOT-627-5.3	MSE wall face, wall No. >20- 30 ft., including Coping - per square foot
Item GDOT-627-5.4	MSE wall face, wall No. >30 ft., including Coping - per square foot
Item GDOT-627-5.5	Type 7-WS Side Barrier - per linear foot
Item GDOT-627-5.6	Additional MSE backfill - per cubic yard

Section 627—Mechanically Stabilized Embankment Retaining Wall—Contractor Design

627.1 General Description

This Specification covers the required materials, design, fabrication, construction, measurement, and payment for Contractor designed Mechanically Stabilized Embankment (MSE) retaining walls.

The scope of work of wall erection includes:

- Grading for wall construction
- Compacting the wall foundation
- General and local dewatering as required
- Constructing leveling pads
- Erecting precast panels
- Placing soil reinforcing devices
- Placing and compacting special embankment backfill within the reinforced volume
- Providing downdrag protection for piles
- Furnishing and placing precast or cast-in-place concrete coping and precast or cast-in-place traffic barrier on the top of the wall if these items are shown in the Plans.

For patented mechanically stabilized embankment retaining walls, obtain panels, soil reinforcing devices, connecting devices, joint materials, attachments, and expertise to construct the walls.

627.1.01 Definitions

Wall foundation—the area underlying the leveling pad and the reinforced volume.

627.1.02 Related References

A. Standard Specifications

Section 106—Control of Materials

Section 208—Embankments

Section 500—Concrete Structures

Section 511—Reinforcement Steel

Section 514—Epoxy Coated Steel Reinforcement

Section 535—Painting Structures

Section 645—Repair of Galvanized Coatings

Section 812—Backfill Materials

Section 848—Pipe Appurtenances

Section 865—Manufacture of Prestressed Concrete Bridge Members

Section 870—Paint

B. Referenced Documents

AASHTO M 243

AASHTO T 22

ASTM A 123/A 123M ASTM A 153/A 153M ASTM A 307

ASTM A 563

ASTM A 709 (ASTM A 709M)
ASTM A 1011 (ASTM A 1011M)
ASTM A 1064 (ASTM A 1064M)
ASTM B 695

ASTM D 2240

ASTM F 436 (ASTM F 436M)

ASTM F 3125 (ASTM F 3125M)
GDT 7
GDT 24a
GDT 24b
GDT 35
GDT 75
QPL 9
QPL 28
QPL 58
QPL 107
GDT 75
QPL 9
QPL 28
QPL 58
QPL 107

Standard Operating Procedure 3, Precast/Prestressed Concrete Bridge Members

Standard Operating Procedure 33, Certification of Mechanically Stabilized Embankment Retaining Walls.

AASHTO LRFD Bridge Design Specifications

627.1.03 Submittals

Submit to the Engineer shop drawings and calculations for the wall system, coping, and any special details for review and approval. Submission should be made electronically in a portable document format (pdf) and include an index.

Format all drawings to fit 11 in. x 17 in. (279 mm x 432 mm) paper. Present calculations to fit 8.5 in. x 11 in. (216 mm x 297 mm) paper. The submission shall be prepared and stamped by the Design Engineer who shall be registered as a Professional Engineer in the State of Georgia.

Include in the submission:

A. MSE Wall Backfill Information

1. Copy of source approval letter from Office of Materials and Testing
2. Dry Unit Weight, Optimum Moisture, and Angle of Internal Friction test results for MSE Backfill material
3. Pull out resistance testing results for approved source material or equivalent, if f* values greater than suggested in AASHTO LRFD Bridge Design Specifications are used in design

B. Retaining Wall Design Calculations

1. Internal stability design calculations for each design column in the retaining wall envelope
    - Evaluate Pullout
    - Evaluate Tension in reinforcement and connections
    - Evaluate Tension in reinforcement and connections due to vehicular collision load
2. External stability design verification calculations using project specific MSE Backfill materials
    - Evaluate Sliding Stability
    - Evaluate Eccentricity
    - Evaluate Bearing Capacity

Consider the final construction configuration and loads on the wall when preparing calculations.

C. Traffic Barrier H and Coping B Design Calculations

See Section 627.3.03.B.4.c for barrier coping design requirements.

D. Construction Drawings that include:

1. Plan and Elevation view of proposed wall
2. Details of leveling pad, including steps
3. Details of backfill stabilizing devices, including dimensions, spacing, size, and material type.
4. Details of Coping A, Coping B, or Traffic Barrier H.

   Traffic Barrier~~s~~ H and Coping B may be precast, cast in place, or a combination thereof. In all cases the moment slab shall be cast in place. Align the joints through all elements of the Traffic Barrier H or Coping B sections and detail such that there is no reinforcement crossing the joints. Omit joints in the moment slab as required by design.

   Provide transition details to allow for guardrail connection when necessary.
5. Details, dimensions, and schedules of all reinforcing steel, including dowels and/or studs for attaching the facing to the backfill reinforcement.
6. Details of all precast panels that are not presented in the library of panels approved as part of QPL 107 certification process outlined in SOP 33.
7. All other details necessary for the completion of work, including but not limited to details related to piling, drainage elements, noise barriers, traffic structures, etc.

~~Ensure that Plans match GDOT plans in size, format, borders, title block, etc. Include the Project Identification Number (P.I.) in or directly above the title block.~~

Itemize the wall quantities as follows:

1. Wall Envelope Quantities in the Plans. These are the values presented in the contract plans.
2. Adjusted Wall Envelope Quantities. These values are based on the approved survey verification of the Wall Envelope.
3. Material Quantities. These values reflect contractors means and methods and are not for payment.

Wall Envelope Quantities are required in all cases.

The time required for preparation and review of plans and calculations will be charged to the allowable contract time. The final plans and calculations for a wall shall be approved prior to beginning construction on the wall.

The Engineer will be allowed 45 days to review the plans and calculations and provide either approval or review comments to the contractor. The 45-day review time will begin when the Engineer has received all of the calculations and drawings concerning the structure. Each new submittal from the Contractor as a result of corrections resulting from the Engineer's review or changes that are made by the contractor to expedite construction or to correct for field errors will have a 45-day review time.

The Engineer will be the sole judge of the adequacy of the information submitted. The review and acceptance of the final plans and methods of construction by the Engineer will not in any way relieve the Contractor of responsibility for the successful completion of the work. Contractor delays due to untimely submissions and insufficient information will not be considered as justification for time extensions.

627.2 Materials

Ensure that items used to construct the mechanically stabilized embankment retaining walls but not mentioned in this Specification conform to the applicable sections of the Standard Specifications.

A. Soil Reinforcing Devices

1. Reinforcing and Tie Strips

   Use tie strips shop-fabricated of hot rolled steel that conform to the minimum requirements of ASTM A 1011 Grade 50 (ASTM A 1011M Grade 345). Hot roll reinforcing strips from bars to the required shape and dimensions. Their physical and mechanical properties shall conform to ASTM A 709 Grade 36 (ASTM A 709M

Grade 250).

2. Soil Reinforcing Mesh

   Use soil reinforcing mesh shop-fabricated of cold drawn steel conforming to the minimum requirements of ASTM A 1064/A 1064M.

3. Backfill Stabilizing Geogrid:

   Use Backfill Stabilizing Geogrid that conforms to the requirements of Section 809.

B. Connecting Devices

1. Fasteners

   Use high-strength bolts and nuts that are hexagonal cap screw and that conform to ASTM F3125, grade A325 (F3125M, A325), galvanized. Ensure that they are of the diameter shown in the Plans - 1-1/2 in. (40 mm) long with 3/4 in. (20 mm) thread length.

   Use galvanized washers with galvanizing fastener elements conforming to ASTM A 153/A 153M.

2. Steel Strap Connectors

   Use materials that conform to the following standards:

Material	Conforms to the Requirements of:
Steel strap connection bar and plate	ASTM A 709 Grade 36 steel (ASTM A 709 Grade 250)
Bolts	ASTM A 307 (ASTM A 307M)
Nuts	ASTM A 563
Washers	ASTM F 436 (ASTM F 436M)
Coatings for connecting devices	As specified in the Subsection below

3. Attachments

   a. Use clevis loops and mesh loops fabricated of cold drawn steel wire that conforms to ASTM A 1064 and are welded according to ASTM A 1064/A 1064M. Ensure that they develop a stress of at least 0.9 times the steel's yield strength. Use loops galvanized according to ASTM A 153/A 153M, Class B 3, or ASTM A 123/A 123M.

   b. Use a connector bar that is fabricated of cold drawn steel wire that conforms to ASTM A 1064 and is galvanized according to ASTM A 123/A123M.

4. Geogrid Connection Bar: Use a connection bar 1 inch (25 mm) by 0.2 inches (5 mm) thick by roll width plus 3 inches meeting the same physical and chemical properties as the backfill stabilizing geogrid.

C. Concrete

Use Class AA concrete for precast panels, Traffic Barrier H, and Coping B, except ensure that the 28-day strength is at least 4,000 psi (28 MPa). Except as indicated in the approved mix design, admixtures will not be allowed. Do not use admixtures containing chlorides.

Use Class A concrete for leveling pads and Coping A.

D. Joint Fillers

1. Bearing Pads

Ribbed bearing pads shall be made of SBR rubber with a durometer hardness of 80 plus or minus 10 as determined by ASTM D 2240.

Elastomeric pads shall be made of 100% virgin chloroprene (neoprene) and meet the requirements of the AASHTO LRFD Bridge Design Specifications, Section 14, Elastomeric Bearings.

2. Filter Fabric

In flood plains or other intermittently inundated areas, cover the different joint types as follows:

Joint Type	Action
Joints between panels from an elevation 3 ft. (1 m) above the 100-year flood elevation to the bottom of the wall	Cover on the back side of the wall with a woven plastic filter fabric sheet.
Joints between panels from 3 ft. (1 m) above the 100-year flood elevation to the top of the wall	Cover on the back side of the wall with a woven or nonwoven plastic filter fabric sheet.
All other locations	Cover joints between panels with a woven or nonwoven plastic filter fabric sheet

Use woven and nonwoven plastic filter fabric listed on QPL 28 for work in this Specification, subject to the above requirements.

Use adhesive listed on QPL 58 for attaching filter fabric to panels.

E. MSE Wall Backfill Material

Use material in the MSE Wall Backfill volume that conforms to the requirements of Subsection 812.2.04. In addition, obtain approval for use of the material by the Office of Materials and Testing.

F. Coatings for Steel Soil Reinforcing Devices

Apply coatings to the soil reinforcing devices as follows:

1. Galvanize the entire surface of reinforcing and tie strips, mesh, and connecting devices according to ASTM A 123/A 123M. Or galvanize it mechanically according to ASTM B 695, Class 110, unless otherwise specified on the Plans. Also galvanize the surfaces created by punching holes for bolts.
2. Repair damage sustained by the connecting devices, bolts, or reinforcing devices during phases of fabrication, storage, or erection according to Section 645.

   Repair by brush coating with an approved galvanizing repair compound as specified in Subsection 870.2.05.A.2 to the Engineer's satisfaction at no increase in Contract cost.
3. Galvanize the parts of the connecting devices that are threaded according to ASTM A 153/A 153M, Class C. Hot dip galvanize alignment pins.
4. When the Type 2P coating is required on the Plans:
   a. After manufacturer galvanizing is complete, shop-coat the entire surface for the length indicated on the Plans with a two-component coal tar epoxy system indicated in Subsection 535.3.03.D, "Prepare Steel Piling, Swaybracing, and Concrete Piling Surfaces for Special Protective Coatings," for a Type 2P coating according to Subsection 870.2.05.A.1.
   b. Use Type 2P coating to field-coat galvanized nuts, bolts, and washers used to connect reinforcing and tie strips. Repair damage to the coating on connecting devices or reinforcing devices from shipping, storage, or erection to the Engineer's satisfaction at no additional cost.
   c. Use Type 2P coating to field-coat the parts of the connecting devices exposed after installing the soil reinforcing devices.
5. Epoxy coat the entire surface according to Section 514 and Section 867, when required on the Plans.
   a. Do not galvanize the soil reinforcing devices if this coating method is used.
   b. Use Type 2P coating to field-coat galvanized nuts, bolts, and washers used to connect reinforcing and tie strips.
   c. Use Type 2P coating to field-coat the parts of the connecting devices exposed after installing the soil reinforcing devices.
6. Repair damage to the coating on the connecting devices or soil reinforcing devices from shipping, storage, or erection to the Engineer's satisfaction at no additional cost.

G. Reinforcing Steel

Use reinforcing steel that conforms to the requirements of Section 511.

H. Welded Wire Fabric for Precast Panels

Use welded wire fabric that conforms to the requirements of ASTM A 1064.

I. Certification

The Engineer will use certified test report as specified in Subsection 106.05, *Materials Certification* and perform routine tests as a basis for material acceptance furnished for The Work.

J. Corrosion Inhibiting Material

For the corrosion inhibiting material, use a bituminous plastic cement material that conforms to the requirements of Section 848, AASHTO M 243 Trowel Grade Asphalt Mastic, or use an approved corrosion-inhibiting grease.

627.2.01 Delivery, Storage, and Handling

Handle, store, and ship panels to eliminate the danger of chipping, cracking, discoloring, fracturing, and excessive bending stresses.

Repair at the plant the panels damaged during handling or storage at the casting plant as directed by the Engineer. Panels damaged during handling, storing, or shipping may be rejected upon delivery at the Engineer's discretion.

Support panels in storage on firm blocking located immediately adjacent to embedded connecting devices to avoid bending the connecting devices. Repair the coating on ties or soil-reinforcing devices damaged during handling or placing to the Engineer's satisfaction.

627.3 Construction Requirements

627.3.01 Personnel

Meet the following personnel requirements:

A. Design

Use a Design Engineer with the following qualifications to design the wall and prepare and submit plans for approval:

- Is registered as a Professional Engineer in the State of Georgia.
- Has knowledge and experience with the design and construction of MSE walls.
- Is available at any time during the life of the Contract to discuss the design of the walls directly with the Engineer.

B. Construction

The Contractor or Subcontractor shall meet the following requirements:

- Be experienced in the construction of Mechanically Stabilized Embankment Walls.
- Include on staff, a supervising engineer for the Project with at least five years of experience in the construction of Mechanically Stabilized Embankment Walls.

Submit the following proof, whenever requested by the Engineer, of the ability to design and/or construct Mechanically Stabilized Embankment Walls.

- Evidence of the successful completion of at least five Projects similar in concept and scope to the proposed wall.
- Resumes of the supervising engineer and foremen to be employed on this Project showing the type and number of Mechanically Stabilized Embankment Walls each worked on within the past five (5) years.

The Engineer will be the sole judge of the acceptability of the qualifications of the design engineer, supervising engineer and foreman.

627.3.02 Equipment

General Provisions 101 through 150.

627.3.03 Preparation

A. General Requirements – Designing and Detailing

The Engineer's plans will include a Wall Envelope. The Wall Envelope will show:

- The existing and proposed ground line,
- The proposed top of coping or the proposed gutterline elevations where the barrier is attached to the wall

- The soil parameters for the wall design
- Other obstructions in the wall backfill including but not limited to:

  -- Drainage structures and pipes

  -- Bridge columns, caps, wingwalls
- Details of any proposed ditches at the top of the wall
- Proposed pay quantities

Ensure that the wall design is compatible with all horizontal and vertical criteria and backfill loading conditions.

Verify the wall location according to Subsection 149.1.03.E and Subsection 149.3.03.D before the final wall design is submitted. Include in the verification:

- The top and bottom of the wall envelope
- Backfill design conditions
- Depth of wall embedment
- Location of drainage structures and other obstructions in the wall backfill
- Other appurtenances located on the wall.

If any changes to the wall envelope are required by the field survey, submit plan sheets to the Engineer for approval showing the wall envelope as detailed in the plans with the required changes noted.

B. Wall Design

Use the following design criteria for a Contractor designed wall:

1. Provide an approved MSE wall system from QPL 107
2. Design the MSE Wall according to the current AASHTO LRFD Bridge Design Specifications, Section 11.10, except as modified by these specifications.
3. Design MSE wall portions within 100 ft of a bridge to a service life of 100 years. All other MSE walls, including the remainder of walls greater than 100 ft away from a bridge may be designed to a service life of 75 years.
4. Design the MSE wall to account for all live load, dead load and wind load from all traffic barrier, lights, overhead signs, noise barriers and other appurtenances located on top and adjacent to the wall. Design MSE walls to account for all external forces. Also, design abutment walls for all horizontal and vertical loads applied by the bridge. Use the following load definitions as minimums for design:

   a) Live Load Surcharge:

      - Apply a live load surcharge of 0.25 KSF for walls with a pressure surface located within H/2 of a traffic load
      - Apply a live load surcharge of 0.10 KSF for all other walls to account for construction activities

   b) Bridge Loads:

      Provide soil reinforcement devices for the back side of abutments supported on piling that is encased in the MSE backfill. Design these soil reinforcement devices to resist the lateral forces from the bridge. If the lateral forces are not specifically stated on the retaining wall plans, use a minimum factored load of 1.0 k/ft along the length of the abutment cap, applied at the bearing seat height. Include this lateral loading from the bridge in the external stability calculations for the wall.

   c) Rail Loads:

      Traffic Barrier H, Coping B, and walls that include them should be designed for vehicular impact as follows:

      Evaluate precast or cast in place concrete barrier coping for sliding and eccentricity. For this analysis assume a 15 kip load applied over a width of 5 ft at the top of the barrier and distributed in to a maximum length equal to the minimum joint spacing in the moment resisting slab. Apply this same 15 kip load when considering internal and external stability of the reinforced wall mass.

      Design the barrier portion of the coping to resist an 80 kip load applied over a width of 5 ft at the top of the barrier. Evaluate the barrier using the yield line analysis procedures presented in the AASHTO LRFD Bridge Design Specifications, Section A13.

Detail the moment slab and connecting elements such that all sections will satisfy a design moment equal to the moment capacity at the base of the barrier about its horizontal axis. For this calculation, take the base of the barrier as the section at the finished grade on the traffic side of the barrier.

5. For MSE walls that are intersected by a box culvert, detail the soil reinforcement devices over the box culverts to a length equal to the soil reinforcement devices in the adjacent sections.
6. Assume responsibility for all temporary shoring that may be necessary for wall construction. Design the shoring using sound engineering principles.
7. Use permanent concrete wall facing panels that are at least 5 1/2 in (139 mm) thick.
8. Provide a minimum length of soil reinforcement of 10 feet (3 m) or seven-tenths (0.7) of the wall height, whichever is greater.
9. At any section of wall, detail all soil reinforcement devices the same, including length, cross section, and corrosive protection.
10. Positively connect all soil reinforcement devices to the precast panels.
11. Ensure that the special wall backfill extends a minimum of 12 in (300 mm) past the end of the soil reinforcement.
12. For MSE Walls at Bridge Ends:

    Ensure that MSE wall backfill extends vertically to the bottom of the approach slab.

    Ensure that the MSE wall backfill extends horizontally to the back limit of the MSE backfill for the wall below the approach slab or 12 inches (300 mm) beyond the end of the stabilizing devices attached to the bridge, whichever is greater.

    Show details of attachments to be cast into the bridge end bent and backwall.

    Do not make attachments to bridge endwalls that are integral to the bridge superstructure and are subject to movement due to superstructure expansion and contraction.
13. Provide internal walls to allow for future widening if shown on the wall plans. Ensure the internal walls have galvanized wire or concrete facing. Ensure as a minimum that the facing of the internal walls extend to the back limit of the MSE Wall Backfill for the permanent wall.
14. Ensure the maximum panel area does not exceed 35 square feet (3.25 square meters).
15. A Geotechnical Report is available. The information contained in this report may be used by the Contractor to assist in evaluating existing conditions for design as well as construction. However, the accuracy of the information is not guaranteed and no requests for additional monies or time extensions will be considered as a result of the Contractor relying on the information in this report.
16. Ensure the following requirements are met:
    - The gutterline grade on the proposed top of wall submitted matches the gutter elevations required by the plans. The top of coping is at or above the top of coping shown on the envelope.
    - The leveling pad is at or below the elevation shown on the wall envelope.
    - Any approved changes in Wall Envelope quantities due to the approved survey verification are noted in the contractor's plans as Adjusted Wall Envelope Quantities.
    - All changes in quantities due to the proposed walls being outside the wall envelope (step locations, ending wall at full panel, etc.) are shown as Material Quantities.
17. Ensure the minimum embedment of the wall (top of leveling pad) is at least 2 feet (600 mm). If the soil slopes away from the bottom of the wall, lower the bottom of the wall to provide a minimum horizontal distance of 10 ft. (3 m) to the slope. [i.e. a 2:1 slope in front of the wall requires 5 ft. (1.5 m) of embedment; a 4:1 slope in front of the wall requires 2.5 ft. (750 mm) of embedment]

627.3.04 Fabrication

A. Soil-Reinforcing Devices

Have steel soil-reinforcing devices shop fabricated. Use shop fabricated steel mesh of cold drawn steel welded into the finished mesh fabric according to ASTM A 1064/A 1064M.

Cut soil-reinforcing devices to lengths and tolerances shown on the Plans. Punch holes for bolts in the location shown. Ensure that soil-reinforcing devices are true to size and free of defects that may impair the strength or durability.

B. Connecting Devices

Use connecting devices of the dimensions shown on the Plans. Assemble connecting members and soil-reinforcing devices before galvanizing the connecting devices. Ensure that the connecting devices are true to size and are free of defects that may impair the strength or durability.

Tie strips may be partially bent to no more than a 1 in. (25 mm) radius before they are shipped to the precast yard. Perform final bending at the precast yard.

Do not allow connecting devices, reinforcing steel, or welded wire fabric used in the panels to contact each other.

C. Bolts and Nuts

Use bolts and nuts that meet the requirements defined in Subsection 627.2.B, *Connecting Devices*.

D. Precast Panels

Use precast panel materials as specified in Subsection 627.2, *Materials.* Before casting, set the following in place to the dimensions and tolerances shown on the drawings:

- Tie strips
- Mesh attachment straps
- Coil embeds
- Coil bolts
- Reinforcing steel
- Welded wire fabric
- Connecting pins
- Handling devices

Do not allow the metal connecting devices and reinforcing steel to contact each other when in their final position in the panel.

1. Testing and Inspection

   Use precast concrete panels that are cast at a Class A or B plant that conforms to Standard Operating Procedure 3, Precast/Prestressed Concrete Bridge Members. See QPL 9 for a list of approved plants.

2. Casting

   Cast the panels using steel forms.

   a. Cast the front face of the panel (the face exposed to view when installed in the wall) against a steel form or architectural form liner. Float finish the back face.

   b. Place the concrete in each panel without interruption and consolidate it using an approved vibrator. Supplement vibration with hand tamping as necessary to force the concrete into the corners of the forms and prevent the formation of stone pockets or cleavage planes from forming.

   c. Use clear form oil from only one manufacturer throughout the casting operation.

3. Curing

   Cure the panels as specified in Subsection 500.3.05.Z, *Cure Concrete*, or Subsection 865.2.01.B.10, *Concrete Curing.* Cure for at least 12 hours or until the concrete develops the specified compressive strength. The Engineer will reject panels that do not reach specified strength within 28 days.

4. Removing Forms

   Keep forms in place until they can be removed without damaging the panel.

5. Concrete Finishing and Tolerances

   Finish the concrete surface for the front face as designated on the Plans. Float-finish the rear face enough to eliminate open aggregate pockets and distortions greater than 1/4 in. (6 mm).

   Only use panels manufactured within the following tolerances:

   All dimensions are within 3/16 in. (5 mm).

   Angular distortion in the panel's height does not exceed 3/16 in. (5 mm) in 5 ft. (1.5 m).

   Diagonal tolerance from Plan dimensions is no more than 3/8 in. (10 mm).

For textured finishes, surface defects greater than 5/16 in. (8 mm) in 5 ft (1.5 m) will be rejected.

6. Determining Compressive Strength

   Perform compression tests to determine the minimum strength requirements on cylinders.

   a. Make at least three cylinders to determine when the units may be put into service from each day's production and cure according to GDT 35.D.1.
   b. Make two additional cylinders from each day's production or from each 10 cubic yards of concrete placed, whichever is the lesser amount of concrete, to determine the 28-day strength.
   c. Ensure that the shipping strength is equal to the required 28-day strength for each day's production or for each 10 yd^3 (7.5 m^3) of concrete placed, whichever amount of concrete is less.
   d. Cure according to GDT 35.D.1. Ensure that the 28-day compressive strength is at least 4,000 psi (28 MPa). Perform compressive strength tests according to AASHTO T 22.

7. Rejection

   Panels will be rejected if they do not meet the requirements above. The following defects are also cause for rejection:

   Indications of imperfect molding that result in tolerances being exceeded

   Honeycombed or open texture concrete

8. Marking

   Clearly and permanently mark on the rear face of each panel the date of manufacture, lot number, and type of panel.

E. Precast Coping and Precast Traffic Barrier

To construct the precast portion of the coping or precast traffic barrier, use materials that conform to Subsection 627.2.C, *Concrete.* Use the same procedures for precasting, testing, and inspection as those for precast panels.

627.3.05 Construction

A. Wall Erection

Place precast panels so that their final position at the completion of the wall is vertical.

1. Adjust the batter to allow for the effect of backfill type, equipment, and construction method on panel movement.
2. In general, batter the panels 1/2 in. (10 mm) in 4 ft. (1 m) into the reinforced volume to allow the panel to move during backfill placement and compaction.
3. Place panels in successive horizontal lifts as backfill is placed.
   a. When placing backfill behind a panel, maintain the panel in a vertical position by placing clamps and temporary wooden wedges in the joints at the junction of two adjacent panels on the external side of the wall.
   b. Use external bracing for the initial lift. Keep the wedges in place until the fourth layer of panels is placed, then remove the bottom layer of wedges.
   c. Remove each succeeding layer of wedges when placing the succeeding panel layers.
   d. When the wall is completed, remove the wedges. Do not use the wedges to level the panels on leveling pads.
   e. Remove the wedges placed below the groundline on the front face of the wall before backfilling this area.
4. Alignment and tolerance are as follows:
   a. Ensure that the horizontal and vertical joint openings between panels are uniform. Ensure that the opening is 7/8 in. ± 3/8 in. (22 mm ± 10 mm).
   b. Ensure that the vertical tolerance (plumbness) and horizontal alignment tolerance as the wall is constructed does not exceed 3/4 in. (20 mm) when measured along a 10 ft. (3 m) straightedge.
   c. Ensure that the overall vertical tolerance of the wall (plumbness from top to bottom) in its final position does not exceed 1/2 in. per 10 ft. (13 mm per 3 m) of wall height.
   d. Place cast-in-place concrete on top of the wall panel as needed to bring the precast coping elements on top of the wall to proper grade. See the plans or construction details.

      Before placing special backfill material on a soil-reinforcing device, complete the connections to the

panels.

B. Joint Fillers

Treat joints between the panels as follows:

1. Bearing Pads

   Ensure that horizontal joints between panels contain two 4 by 3 by ¾ in (100 by 75 by 20 mm) ribbed bearing pads or elastomeric pads as specified on the Plans.

2. Filter Fabric

   Cover all horizontal and vertical joints with 12 in. (300 mm) wide plastic filter fabric sheet glued securely to the backside of precast concrete panels. Overlap the filter fabric with the joint at least 4 in. (100 mm). When piecing the filter fabric together, overlap at least 4 in. (100 mm).

   In flood plains or other intermittently inundated areas, cover the joints as follows:

   - Use a woven plastic filter fabric sheet to cover the joint on the back side of the wall between panels from 3 ft. (1 m) above the 100-year flood elevation to the bottom of the wall.
   - Use a woven or nonwoven plastic filter fabric sheet to cover the joint on the back side of the wall between panels from 3 ft. (1 m) above the 100-year flood elevation to the top of the wall.

C. MSE Wall Backfill

Place backfill shortly after erecting each lift panel. Follow these guidelines:

1. Place backfill lift to a uniform thickness and place it from the back face of the wall to 1 ft. (300 mm) beyond the end of the soil-reinforcing devices.
2. At each soil-reinforcing device level, compact the backfill to the full length of reinforcing devices and slope it to drain away from the wall before placing and attaching the next layer of reinforcing devices.
3. Level the compacted backfill with the connecting device before connecting the reinforcing device.
4. Repair damaged soil reinforcing devices or panels before attaching and backfilling the reinforcing devices.
5. Place soil reinforcing devices at 90 degrees to the face of the wall, unless otherwise indicated on the Plans or by the Engineer.
6. Ensure that the maximum lift thickness is 8 in. (200 mm) (loose) and closely follows panel erection. Decrease this lift thickness to obtain the specified density, if required.
7. Compact the embankment backfill material to at least 100 percent of maximum laboratory dry density as determined by GDT 7 or GDT 24a, GDT 24b Method A or B, for full depth of the material.
8. Compact the embankment backfill material without disturbing or displacing the reinforcing devices and panels.
9. Compact from the area nearest the wall face to the back of the reinforcing devices except for a strip 3 ft. (1 m) wide adjacent to the backside of the wall.

   After compacting the remainder of the layer, compact this 3 ft. (1 m) strip with light mechanical tampers without causing the panels to move outward.
10. Whenever a compaction test fails on a special embankment backfill lift, do not place additional material over that area until the lift is re-compacted and obtains a passing compaction test.
11. Ensure that the stabilizing geogrid at any layer is held taut, by mechanical means, free of wrinkles, bends or undulations until the special backfill material has been placed and compacted above the restrained layer to the level of the next layer of stabilizing geogrid. Release the uppermost layer of stabilizing geogrid after the final layer of special backfill is placed and compacted.

D. Storm Drains

Provide precast panels that have the appropriate storm drain openings in panels at the elevation and locations indicated on drainage profiles.

Place catch basins so that pipes will enter perpendicular (plan view) to the panels or below the leveling pads as shown on the Plans. Coordinate the catch basin construction and the storm drain placement with the wall construction.

E. Dewatering

Furnish, install, operate, and maintain satisfactory dewatering systems to maintain the site in a dry and workable condition to permit grading, compacting the wall foundation, and erecting and backfilling the wall. Furnish

dewatering system equipment and materials and continue the system as long as necessary.

F. Catch Basins and Longitudinal Pipes

When catch basins are located behind the wall and the Wall Plans do not indicate a specific construction method, use the method outlined in the construction details.

When longitudinal pipes are located behind the wall, follow this procedure if specific details are not shown on the Wall Plans:

1. Bend the soil-reinforcing device around the pipe without damaging the device, its coating, or its attachment to the precast panel. See the construction details.
2. If the pipe is too close to the wall to bend the soil-reinforcing device without damaging it, the Engineer will investigate relocating the pipe. The Engineer will contact the design office that designed the drainage system or the office responsible for the pipe and will investigate the pipe relocation.
3. If the pipe cannot be relocated or if the pipe is too large for relocation to be feasible, use the back-up panel procedure indicated on the construction details.

Use precast concrete or cast-in-place concrete for:

- Drainage structures that are within the special embankment backfill
- Drainage structures that are outside the special embankment backfill but that are within 5 ft. (1.5 m) of the front face of the wall

627.3.06 Quality Acceptance

General Provisions 101 through 150.

627.3.07 Contractor Warranty and Maintenance

General Provisions 101 through 150.

627.4 Measurement

~~A. Excavation and Shoring~~

~~Excavation, including any required removal of unstable material, and shoring necessary for construction of the MSE Wall will not be measured for payment.~~

~~B. MSE Wall Face~~

~~MSE wall face area, complete in place and accepted, will be measured by the square foot (meter) in vertical bands bounded by the limits of each specific height range pay item in the plans. The height will be measured from the maximum top of leveling pad elevation on the wall envelope to the top of Coping A, the top of sidewalk elevation for Coping B, or the proposed gutterline elevation for Traffic Barrier H. Dividing the wall area into segments such as this provides the opportunity for the contractor to bid graduated unit prices that consider backfill volumes and reinforcement lengths.~~

~~Any area of cast-in-place facing around drainage structures within the approved wall envelope will be measured as MSE Wall Face. "Dummy" panels will not be measured for payment.~~

~~No separate measurement will be made for internal wall facing.~~

~~No deduction in area will be made for pipe passing through the wall facing. The area of box culverts that interrupt the wall envelope will not be included in the wall area measured for payment.~~

~~C. Backfill Stabilizing Devices~~

~~The backfill stabilizing devices will not be measured separately.~~

~~D. Backfill~~

~~The MSE backfill material used in the MSE wall volume will not be measured separately except as noted below.~~

- ~~The MSE Backfill required behind bridge endwalls or backwalls and above the top of coping will be measured as additional MSE wall backfill.~~
- ~~Any additional MSE backfill required as a result of an undercut ordered by the Engineer and requiring the MSE backfill material to provide stability, as determined by the Engineer, will be measured and paid for as additional~~

MSE wall backfill.

Backfill of undercut areas not requiring classes of soils higher than common excavation soils will not be measured separately.

Backfill material required by construction procedures to extend outside the MSE wall volume shall be considered incidental and will not be measured separately.

E. Concrete Leveling Pads

Concrete Leveling Pads will not be measured separately.

F. Coping A, Coping B, and Traffic Barrier H, mounted atop the MSE Wall

These units complete in place and accepted, will be designated on the Plans and measured per linear foot (meter) for each type unit.

The quantities of coping and barrier will be measured as horizontal lengths in linear feet (meters).

627.4.01 Limits

General Provisions 101 through 150.

627.5 Payment

The pay quantities will be the Wall Envelope quantities shown in the Plans unless the Engineer approves Adjusted Wall Envelope. In this case, the pay quantities will be the Adjusted Wall Envelope quantities.

No additional compensation will be made for any additional material, equipment, design, or other items found necessary to comply with the project Specifications as a result of the Engineer's review except for changes made necessary by the survey verification required by Subsection 149.1.03.E and Subsection 149.3.03.D, or other changes approved by the Engineer.

Include in the unit bid prices all costs necessary to comply with the requirements of this specification. No payment will be made for wall area outside of the Adjusted Wall Envelope.

A. Excavation and Shoring

Excavation, including removing unstable material and shoring for construction of the mechanically stabilized embankment retaining wall, will not be paid for separately.

B. MSE Wall Face

MSE Wall Face area will be paid for at the Contract Unit Price bid per square foot (meter) for each height range in the wall envelope. Payment is full compensation for furnishing materials, including bearing pads, filter fabric, and graffiti-proof coating.

Any area of cast-in-place facing around drainage structures within the approved wall envelope will be paid as wall face. Payment will include all costs for concrete, reinforcing steel in the cast-in-place areas. No additional payment will be made for any “dummy” panels required.

If the wall height changes to a height greater than the maximum height range included in the pay items, the area of wall with a height greater than the maximum will be paid at 120% of the bid price of the maximum height range pay item included in the plans.

No separate payment will be made for architectural treatment.

No separate payment will be made for internal wall facing, internal wall backfill stabilizing devices or additional MSE backfill necessitated by the internal wall.

C. Backfill Stabilizing Devices

The backfill stabilizing devices will not be paid for separately. Include this cost in the unit price bid for MSE wall face.

D. Backfill

The MSE backfill material used in the MSE wall volume will not be paid for separately except as noted below. When not paid for separately, include the cost in the unit price bid for MSE wall face.

Exceptions:

- The cost of MSE Backfill required behind bridge endwalls or backwalls and above the top coping will be

paid for as Additional MSE Wall Backfill.

- Any additional MSE backfill required as a result of an undercut ordered by the Engineer and requiring the MSE backfill material to provide stability, as determined by the Engineer, will be paid as additional MSE wall backfill.

Backfill of undercut areas not requiring materials of grades higher than common excavation soils will not be paid for separately. Include the cost in the overall bid price submitted.

Any backfill material required by construction procedures to extend outside the MSE Wall volume is considered incidental. Include this cost in the price bid for contract items.

E. Concrete Leveling Pads

Concrete leveling pads, including steps shown in the Plans will not be paid for separately.

F. Coping A, Coping B, and Traffic Barrier H, mounted atop the MSE Wall

These units, complete in place and accepted, will be designated on the Plans and paid for at the Contract Unit Price bid per linear foot (meter) for each type unit.

G. Dewatering

No separate payment will be made for dewatering. Include the cost of dewatering in the price bid for special embankment backfill.

Payment will be made under:

Item No. 627	MSE wall face, wall No. 0 -10 ft. (0 -3 m)	Per square foot (meter)
Item No. 627	MSE wall face, wall No. >10 -20 ft. (3 -6 m)	Per square foot (meter)
Item No. 627	MSE wall face, wall No. >20 -30 ft. (6 -9 m)	Per square foot (meter)
Item No. 627	MSE wall face, wall No. >30 ft. (>9 m)	Per square foot (meter)
Item No. 627	Coping, A, wall No. ___	Per linear foot (meter)
Item No. 627	Coping, B, wall No. ___	Per linear foot (meter)
Item No. 627	Traffic barrier, H, wall No. ___	Per linear foot (meter)
Item No. 627	Additional MSE backfill	Per cubic yard (meter)

627.5.01 Adjustments

General Provisions 101 through 150.

ITEM P-152: EXCAVATION, SUBGRADE, AND EMBANKMENT

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate areas as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans.

152-1.2 Classification. All material excavated shall be classified as defined below:

a. **Borrow excavation**. Borrow excavation shall consist of approved material required for the construction of embankments or for other portions of the work in excess of the quantity of usable material available from required excavations. Borrow material shall be obtained from areas designated by the Resident Project Representative (RPR) within the limits of the airport property but outside the normal limits of necessary grading, or from areas outside the airport boundaries.

152-1.3 Sources of supply for borrow material are available onsite. The Contractor may purchase a portion of, all, or none of the borrow material required to complete the project from Macon-Bibb County for a cost of $1.50 per cubic yard of excavated material. If used, the borrow material shall be excavated from the area identified on Sheet PH102 – Project Layout Plan as the borrow area and shall conform to the general grading concept shown on the plans. The number of cubic yards of borrow excavation material paid to Macon-Bibb County shall be measured as described in Paragraph 152-3.0. The Contractor shall provide an as-constructed survey with a digital terrain model (DTM) in accordance with Item C-103, Paragraph 103-4.2.

The cost of restoring the area disturbed by borrow material excavation shall be included under T-901-5.1, Permanent Seeding, T-905-5.1, Topsoiling (On-Site Stripping and Final Placement), and T-908-5.1, Mulching.

If offsite borrow material is used, all costs associated with offsite borrow will be included in Item P-152-4.2.

152-1.4 Unsuitable excavation. Unsuitable material shall be disposed in designated waste areas as shown on the plans. Materials containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material suitable for topsoil may be used on the embankment slope when approved by the RPR.

CONSTRUCTION METHODS

152-2.1 General. Before beginning excavation, grading, and embankment operations in any area, the area shall be cleared or cleared and grubbed in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the RPR. All unsuitable material shall be disposed of in waste areas as shown on the plans. All waste areas

shall be graded to allow positive drainage of the area and adjacent areas. The surface elevation of waste areas shall be specified on the plans or approved by the RPR.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the RPR notified per Section 70, paragraph 70-20. At the direction of the RPR, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches (100 mm), to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches (100 mm) in their greatest dimension will not be permitted in the top 6 inches (150 mm) of the subgrade.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the RPR, who shall arrange for their removal if necessary. The Contractor, at their own expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

a. Blasting. Blasting shall not be allowed.

152-2.2 Excavation. No excavation shall be started until the work has been staked out by the Contractor and the RPR has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and RPR shall agree that the original ground lines shown on the original topographic mapping are accurate, or agree to any adjustments made to the original ground lines.

Existing grades on the design cross sections or DTM's, where they do not match the locations of actual spot elevations shown on the topographic map, were developed by computer interpolation from those spot elevations. Prior to disturbing original grade, Contractor shall verify the accuracy of the existing ground surface by verifying spot elevations at the same locations where original field survey data was obtained as indicated on the topographic map. Contractor shall recognize that, due to the interpolation process, the actual ground surface at any particular location may differ somewhat from the interpolated surface shown on the design cross sections or obtained from the DTM's. Contractor's verification of original ground surface, however, shall be limited to verification of spot elevations as indicated herein, and no adjustments will be made to the original ground surface unless the Contractor demonstrates that spot elevations shown are incorrect. For this purpose, spot elevations which are within 0.1 foot (30 mm) of the stated elevations for ground surfaces, or within 0.04 foot for hard surfaces (pavements, buildings, foundations, structures, etc.) shall be considered "no change". Only deviations in excess of these will be considered for adjustment of the original ground surface. If Contractor's verification identifies discrepancies in the topographic map, Contractor shall notify the RPR in writing at least two weeks before disturbance of existing grade to allow sufficient time to verify the submitted information and make adjustments to the design cross sections or DTM's. Disturbance of existing grade in any area shall constitute acceptance by the Contractor of the accuracy of the original elevations shown on the topographic map for that area.

All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the RPR. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes **as** shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

The grade shall be maintained so that the surface is well drained at all times.

When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as directed by the RPR. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from (offsite) borrow areas.

a. Selective grading. When selective grading is indicated on the plans, the more suitable material designated by the RPR shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas until it can be placed. The more suitable material shall then be placed and compacted as specified. Selective grading shall be considered incidental to the work involved. The cost of stockpiling and placing the material shall be included in the various pay items of work involved.

b. Undercutting. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches below the subgrade or to the depth specified by the RPR. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed off the airport. The cost is incidental to this item. This excavated material shall be paid for at the contract unit price per cubic yard. The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans. Undercutting will be paid as unclassified excavation.

c. Over-break. Over-break, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the RPR. All over-break shall be graded or removed by the Contractor and disposed of as directed by the RPR. The RPR shall determine if the displacement of such material was unavoidable and their own decision shall be final. Payment will not be made for the removal and disposal of over-break that the RPR determines as avoidable. Unavoidable over-break will be classified as "Unclassified Excavation."

d. Removal of utilities. The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by the Contractor as indicated on the plans. All existing foundations shall be excavated at least 2 feet below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the RPR. All foundations thus excavated shall be backfilled with suitable material and compacted as specified for embankment or as shown on the plans.

152-2.3 Borrow excavation. A borrow source exists adjacent to the airport property. The Contractor shall notify the RPR at least 15 days prior to beginning the excavation so necessary

measurements and tests can be made by the RPR. All borrow pits shall be opened to expose the various strata of acceptable material to allow obtaining a uniform product. Borrow areas shall be drained and left in a neat, presentable condition with all slopes dressed uniformly. Borrow areas shall not create a hazardous wildlife attractant.

152-2.4 Drainage excavation. Drainage excavation shall consist of excavating drainage ditches including intercepting, inlet, or outlet ditches; or other types as shown on the plans. The work shall be performed in sequence with the other construction. Ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be placed in designated waste areas or as directed by the RPR. All necessary work shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

152-2.5 Preparation of cut areas or areas where existing pavement has been removed. In those areas on which a subbase or base course is to be placed, the top 2 inches of subgrade shall be compacted to not less than 100 % of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

152-2.6 Preparation of embankment area. All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches (150 mm) and shall then be compacted per paragraph 152-2.10.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches (300 mm) and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

152-2.7 Control Strip. The first half-day of construction of subgrade and/or embankment shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

152-2.8 Formation of embankments. The material shall be constructed in lifts as established in the control strip, but not less than 6 inches (150 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

The lifts shall be placed, to produce a soil structure as shown on the typical cross-section or as directed by the RPR. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained due to rain, freezing, or other unsatisfactory weather conditions in the field. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide surface drainage at all times.

The material in each lift shall be within ±2% of optimum moisture content before rolling to obtain the prescribed compaction. The material shall be moistened or aerated as necessary to achieve a uniform moisture content throughout the lift. Natural drying may be accelerated by blending in dry material or manipulation alone to increase the rate of evaporation.

The Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content to achieve the specified embankment density.

The contractor will take samples of excavated materials which will be used in embankment for testing and develop a Moisture-Density Relations of Soils Report (Proctor) in accordance with ASTM D698. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the contractor for every 3,000 square yards of compacted embankment for each lift which is required to be compacted, or other appropriate frequencies as determined by the RPR.

If the material has greater than 30% retained on the 3/4-inch (19.0 mm) sieve, follow AASHTO T-180 Annex Correction of maximum dry density and optimum moisture for oversized particles.

Rolling operations shall be continued until the embankment is compacted to not less than 100% of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils. On all areas outside of the pavement areas, no compaction will be required on the top 4 inches which shall be prepared for a seedbed in accordance with Item T-901.

The in-place field density shall be determined in accordance with ASTM D1556. The Contractor's laboratory shall perform all density tests in the RPR's presence and provide the test results upon completion to the RPR for acceptance. If the specified density is not attained, the area represented by the test or as designated by the RPR shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

Compaction areas shall be kept separate, and no lift shall be covered by another lift until the proper density is obtained.

During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each lift is placed. Lift placement shall begin in the deepest portion of the embankment fill. As placement progresses, the lifts shall be constructed approximately parallel to the finished pavement grade line.

When rock, concrete pavement, asphalt pavement, and other embankment material are excavated at approximately the same time as the subgrade, the material shall be incorporated into the outer portion of the embankment and the subgrade material shall be incorporated under the future paved areas. Stones, fragmentary rock, and recycled pavement larger than 4 inches (100 mm) in their greatest dimensions will not be allowed in the top 12 inches (300 mm) of the subgrade. Rockfill shall be brought up in lifts as specified or as directed by the RPR and the finer material shall be used to fill the voids forming a dense, compact mass. Rock, cement concrete pavement, asphalt pavement, and other embankment material shall not be disposed of except at places and in the manner designated on the plans or by the RPR.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in lifts of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in lifts not exceeding 2 feet (60 cm) in thickness. Each lift shall be leveled and smoothed with suitable equipment by distribution of spalls and finer fragments of rock. The lift shall not be constructed above an elevation 4 feet (1.2 m) below the finished subgrade.

There will be no separate measurement of payment for compacted embankment. All costs incidental to placing in lifts, compacting, discing, watering, mixing, sloping, and other operations necessary for construction of embankments will be included in the contract price for excavation, borrow, or other items.

152-2.9 Proof rolling. The purpose of proof rolling the subgrade is to identify any weak areas in the subgrade and not for compaction of the subgrade. Before start of embankment, and After compaction is completed, the subgrade area shall be proof rolled with a 20 ton Tandem axle Dual Wheel Dump Truck loaded to the legal limit with tires inflated to 80/100/150 psi in the presence of the RPR. Apply a coverage as specified by the RPR, under pavement areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch (25 mm) or show permanent deformation greater than 1 inch (25 mm) shall be removed and replaced with suitable material or reworked to conform to the moisture content and compaction requirements in accordance with these specifications. Removal and replacement of soft areas is incidental to this item.

152-2.10 Compaction requirements. The subgrade under areas to be paved shall be compacted to a depth of 12 inches and to a density of not less than 100 percent of the maximum dry density as determined by ASTM D698. The subgrade in areas outside the limits of the pavement areas shall be compacted to a depth of 12 inches and to a density of not less than 95 percent of the maximum density as determined by ASTM D698.

The material to be compacted shall be within ±2% of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the ¾ inch (19.0 mm) sieve, follow the methods in ASTM D698

The in-place field density shall be determined in accordance with ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

If the specified density is not attained, the entire lot shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the RPR and the finished subgrade shall be maintained.

152-2.11 Finishing and protection of subgrade. Finishing and protection of the subgrade is incidental to this item. Grading and compacting of the subgrade shall be performed so that it will drain readily. All low areas, holes or depressions in the subgrade shall be brought to grade. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans. All ruts or rough places that develop in the completed subgrade shall be graded, re-compacted, and retested. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes.

The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been accepted by the RPR.

152-2.12 Haul. All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

The Contractor's equipment shall not cause damage to any excavated surface, compacted lift or to the subgrade as a result of hauling operations. Any damage caused as a result of the Contractor's hauling operations shall be repaired at the Contractor's expense.

The Contractor shall be responsible for providing, maintaining and removing any haul roads or routes within or outside of the work area, and shall return the affected areas to their former condition, unless otherwise authorized in writing by the Owner. No separate payment will be made for any work or materials associated with providing, maintaining and removing haul roads or routes.

152-2.13 Surface Tolerances. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor’s expense.

a. **Smoothness.** The finished surface shall not vary more than +/- ½ inch (12 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the

centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. Grade. The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +/-0.05 feet (15 mm) of the specified grade.

On safety areas, turfed areas and other designated areas within the grading limits where no subbase or base is to placed, grade shall not vary more than 0.10 feet (30 mm) from specified grade. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152-2.14 Topsoil. When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall be located as shown on the plans and the approved CSPP, and shall not be placed on areas that subsequently will require any excavation or embankment fill. If, in the judgment of the RPR, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further re-handling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as shown on the plans and as required in Item T-905. Topsoil shall be paid for as provided in Item T-905. No direct payment will be made for topsoil under Item P-152.

152-2.14 As-Constructed Survey. In accordance with Specification Section 103-4.2, Final As-Built and Electronic Drawings, the Contractor shall provide a final as-built survey prepared, signed, and sealed by a Professional Surveyor licensed in the State of Georgia. The costs associated with the final as-built survey will be paid for under Item C-103, Project Survey, Stakeout, and Record Drawing.

METHOD OF MEASUREMENT

152-3.0 Measurement for payment specified by the cubic yard shall be computed by comparing the survey for the existing ground surface, prior to the beginning of construction, with a survey of the final, constructed surface. The difference in the two surfaces will be compared utilizing CAD software by the Engineer to determine the final embankment quantity.

152-3.1 The quantity of Embankment in Place to be paid for shall be the number of cubic yards measured as described above. Measurement shall not include the quantity of materials constructed without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed.

152-3.2 The quantity of Unsuitable Excavation to be paid for shall be the number of cubic yards measured as described above.

152-3.3 The quantity of Geogrid shall be the number of square yards measured installed in place, ready for operation, and accepted by the RPR.

BASIS OF PAYMENT

152-4.1 Embankment in Place payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for obtaining material, moving material, placing material to grade, compaction, and furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152-4.2 Unsuitable Excavation payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for excavating the unsuitable material, loading, legally disposing of the material, and furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152-4.3 Geogrid payment shall be made at the contract unit price of the number of square yards measured installed in place, ready for operation, and accepted by the RPR.

Payment will be made under:

Item P-152-4.1 – Embankment in Place, Placed and Compacted, Complete – per cubic yard

Item P-152-4.2 – Unsuitable Excavation – per cubic yard

Item P-152-4.3 – Geogrid – per square yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO T-180	Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

ASTM International (ASTM)

ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Advisory Circulars (AC)

AC 150/5370-2	Operational Safety on Airports During Construction Software

Software

FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design

U.S. Department of Transportation

FAA RD-76-66 Design and Construction of Airport Pavements on Expansive Soils

END OF ITEM P-152

Item L-108 Underground Power Cable for Airports

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the Resident Engineer. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

EQUIPMENT AND MATERIALS

108-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per AC 150/5345-53, current version.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the Resident Engineer.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the Resident Engineer) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the Resident Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the Resident Engineer, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format. The Resident Engineer reserves the right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's

discretion, with no additional cost to the Owner. The Contractor shall maintain a minimum insulation resistance in accordance with paragraph 108-3.10e with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period when tested in accordance with AC 150/5340-26, *Maintenance Airport Visual Aid Facilities*, paragraph 5.1.3.1, Insulation Resistance Test.

108-2.2 Cable. Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits latest edition. Conductors for use on 6.6 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #8 American wire gauge (AWG), L-824 Type C , 5,000 volts, non-shielded, with cross-linked polyethylene insulation. Conductors for use on 20 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #6 AWG, L-824 Type C , 5,000 volts, non-shielded, with cross-linked polyethylene insulation. L-824 conductors for use on the L-830 secondary of airfield lighting series circuits shall be sized in accordance with the manufacturer's recommendations. All other conductors shall comply with FAA and National Electric Code (NEC) requirements. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Commercial Item Description A-A-59544A and shall be type XHHW, 75°C for installation in conduit and RHW-2, 75°C for direct burial installations. Conductors for parallel (voltage) circuits shall be type and size and installed in accordance with NFPA-70, National Electrical Code.

Unless noted otherwise, all 600-volt and less non-airfield lighting conductor sizes are based on a 75°C, XHHW, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of XHHW 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductors, pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

Cable type, size, number of conductors, strand and service voltage shall be as specified in the Contract Document.

108-2.3 Bare copper wire (counterpoise, bare copper wire ground and ground rods). Wire for counterpoise or ground installations for airfield lighting systems shall be No. 6AWG bare solid copper wire for counterpoise and/or No. 6 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be bare copper wire. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be copper-clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 10 feet long and 3/4 inch in diameter.

108-2.4 Cable connections. In-line connections or splices of underground primary cables shall be of the type called for on the plans, and shall be one of the types listed below. No separate payment will be made for cable connections.

a. The cast splice. A cast splice, employing a plastic mold and using epoxy resin equivalent to that manufactured by 3M™ Company, "Scotchcast" Kit No. 82-B, or an approved equivalent, used for potting the splice is acceptable.

b. The field-attached plug-in splice. Field attached plug-in splices shall be installed as shown on the plans. The Contractor shall determine the outside diameter of the cable to be spliced and furnish appropriately sized connector kits and/or adapters. Tape or heat shrink tubing with integral sealant shall be in accordance with the manufacturer's requirements. Primary Connector Kits manufactured by Amerace, "Super Kit", Integro "Complete Kit", or approved equal is acceptable.

c. The factory-molded plug-in splice. Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

d. The taped or heat-shrink splice. Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Military Specification MIL-I-24391 or Commercial Item Description A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits that are designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made per the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except that a light base ground clamp connector shall be used for attachment to the light base. All exothermic connections shall be made per the manufacturer's recommendations and listings.

108-2.5 Splicer qualifications. Every airfield lighting cable splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5,000 volts AC. The Contractor shall submit to the Resident Engineer proof of the qualifications of each proposed cable splicer for the airport cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

108-2.6 Concrete. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

108-2.7 Flowable backfill. Not used.

108-2.8 Cable identification tags. Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped onto the tag. The tags shall be of the type as detailed on the plans.

108-2.9 Tape. Electrical tapes shall be Scotch™ Electrical Tapes –Scotch™ 88 (1-1/2 inch (38 mm) wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch (50 mm) wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

108-2.10 Electrical coating. Electrical coating shall be Scotchkote™ as manufactured by 3M™, or an approved equivalent.

108-2.11 Existing circuits. Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the Resident Engineer. The test shall be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the Resident Engineer. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the Resident Engineer. The Contractor shall record the results on forms acceptable to the Resident Engineer.

The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

108-2.12 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

CONSTRUCTION METHODS

108-3.1 General. The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Cable shall be run without splices, from fixture to fixture.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections unless otherwise authorized in writing by the Resident Engineer or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed and on both sides of slack loops where a future connector would be installed.

Provide not less than 3 feet (1 m) of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least one foot (30 cm) vertically above the top of the access structure. This requirement also applies where primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the Resident Engineer.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, hand holes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than 1/4 inch (6 mm) in size. The cable circuit identification shall match the circuits noted on the construction plans.

108-3.2 Installation in duct banks or conduits. This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the Resident Engineer of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer's recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the Resident Engineer prior to any cable installation. If required by the Resident Engineer, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the Resident Engineer. Cable pull tensions shall be recorded by the Contractor and reviewed by the Resident Engineer. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the Resident Engineer, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

108-3.3 Installation of direct-buried cable in trenches. Unless otherwise specified, the Contractor shall not use a cable plow for installing the cable. Cable shall be unreeled uniformly in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end. Slack cable sufficient to provide strain relief shall be placed in the trench in a series of S curves. Sharp bends or kinks in the cable shall not be permitted.

Where cables must cross over each other, a minimum of 3 inches (75 mm) vertical displacement shall be provided with the topmost cable depth at or below the minimum required depth below finished grade.

a. Trenching. Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of surface is disturbed. Graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be

essentially smooth and free from coarse aggregate. Unless otherwise specified, cable trenches shall be excavated to a minimum depth of 18 inches (0.5 m) below finished grade per NEC Table 300.5, except as follows:

When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches (91 cm) unless otherwise specified.

Minimum cable depth when crossing under a railroad track, shall be 42 inches (1 m) unless otherwise specified.

The Contractor shall excavate all cable trenches to a width not less than 6 inches (150 mm). Unless otherwise specified on the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill material may alternatively be used.

Duct bank or conduit markers temporarily removed for trench excavations shall be replaced as required.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

(1) Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.

(2) Trenching, etc., in cable areas shall then proceed, with approval of the Resident Engineer, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair or replacement.

b. Backfilling. After the cable has been installed, the trench shall be backfilled. The first layer of backfill in the trench shall encompass all cables; be 3 inches (75 mm) deep, loose measurement; and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. This layer shall not be compacted. The second layer shall be 5 inches (125 mm) deep, loose measurement, and shall contain no particles that would be retained on a one inch (25.0 mm) sieve. The remaining third and subsequent layers of backfill shall not exceed 8 inches (20 cm) of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 inches (100 mm) maximum diameter.

The second and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent material. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557.

Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when turf is to be established over the trench, the backfilling shall be stopped at an appropriate depth consistent with the type of turfing operation to be accommodated. A proper allowance for settlement shall also be provided. Any excess excavated material shall be removed and disposed of per the plans and specifications.

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the Resident Engineer. If not shown on the plans, the warning tape shall be located 6 inches (150 mm) above the direct-buried cable or the counterpoise wire if present. A 3-6 inch (75 - 150 mm) wide polyethylene film detectable tape, with a metalized foil core, shall be installed above all direct buried cable or counterpoise. The tape shall be of the color and have a continuous legend as indicated on the plans. The tape shall be installed 8 inches (200 mm) minimum below finished grade.

c. Restoration. Following restoration of all trenching near airport movement surfaces, the Contractor shall visually inspect the area for foreign object debris (FOD) and remove any that is found. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The restoration shall include the **sodding** and seeding as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. When trenching is through paved areas, restoration shall be equal to existing conditions. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557. Restoration shall be considered incidental to the pay item of which it is a component part.

108-3.4 Cable markers for direct-buried cable. The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet (60 cm) square and 4-6 inch (10 - 15 cm) thick, extending approximately one inch (25 mm) above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet (61 m) along the cable run, with an additional marker at each change of direction of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word "CABLE" and directional arrows on each cable marking slab. The letters shall be approximately 4 inches (100 mm) high and 3 inches (75 mm) wide, with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word "SPLICE" on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as directed by the Resident Engineer. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. After placement, all cable or splice markers shall be given one coat of high-visibility aviation orange paint as approved by the Resident Engineer. Furnishing and installation of cable markers is incidental to the respective cable pay item.

108-3.5 Splicing. Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

a. Cast splices. These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured per the manufacturer's instructions and to the satisfaction of the Resident Engineer.

b. Field-attached plug-in splices. These shall be assembled per the manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

c. Factory-molded plug-in splices. These shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) Wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint. (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint. or (3) On connector kits so equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

d. Taped or heat-shrink splices. A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch (6 mm) of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches (75 mm) on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch (25 mm) over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer’s instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminates prior to application.

e. Assembly. Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer’s recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch (6.4 mm) beyond all sides of the larger bonded area on all mating surfaces. Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

108-3.6 Bare counterpoise wire installation for lightning protection and grounding. If shown on the plans or included in the job specifications, bare solid #6 AWG copper counterpoise wire shall be installed for lightning protection of the underground cables. The Resident Engineer shall select one of two methods of lightning protection for the airfield lighting circuit based upon sound engineering practice and lightning strike density.

a. Equipotential. Not used

b. Isolation. Counterpoise size is as shown on the plans. The isolation method is an alternate method for use only with edge lights installed in turf and stabilized soils and raceways installed parallel to and adjacent to the edge of the pavement. NFPA 780 uses 15 feet to define “adjacent to”.

The counterpoise conductor shall be installed halfway between the pavement edge and the light base, mounting stake, raceway, or cable being protected.

The counterpoise conductor shall be installed 8 inches (203 mm) minimum below grade. The counterpoise is not connected to the light base or mounting stake. An additional grounding electrode is required at each light base or mounting stake. The grounding electrode is bonded to the light base or mounting stake with a 6 AWG solid copper conductor.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Isolation Method of lightning protection.

c. Common Installation requirements. When a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

Grounding electrodes may be rods, ground dissipation plates, radials, or other electrodes listed in the NFPA 70 (NEC) or NFPA 780.

Where raceway is installed by the directional bore, jack and bore, or other drilling method, the counterpoise conductor shall be permitted to be installed concurrently with the directional bore, jack and bore, or other drilling method raceway, external to the raceway or sleeve.

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet (150 m) apart around the entire circuit. The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode-grounding system. The connections shall be made as shown on the plans and in the specifications.

Where an existing airfield lighting system is being extended or modified, the new counterpoise conductors shall be interconnected to existing counterpoise conductors at each intersection of the new and existing airfield lighting counterpoise systems.

d. Parallel Voltage Systems. Provide grounding and bonding in accordance with NFPA 70, National Electrical Code.

108-3.7 Counterpoise installation above multiple conduits and duct banks. Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete area of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise wires above the conduits shall be adequate to provide a complete area of protection measured 45 degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

108-3.8 Counterpoise installation at existing duct banks. When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

108-3.9 Exothermic bonding. Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the Resident Engineer. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the Resident Engineer, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

a. All slag shall be removed from welds.

b. Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.

c. If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M™ Scotchkote™, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

108-3.10 Testing. The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the Resident Engineer. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the Resident Engineer. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

a. Earth resistance testing methods shall be submitted to the Resident Engineer for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the Resident Engineer. All such testing shall be at the sole expense of the Contractor.

b. Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The Resident Engineer shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the Resident Engineer the following:

c. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.

d. That all affected circuits (existing and new) are free from unspecified grounds.

e. That the insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments is not less than **100** megohms. Verify continuity of all series airfield lighting circuits prior to energization.

f. That the insulation resistance to ground of all new non-grounded conductors of new multiple circuits or circuit segments is not less than 100 megohms.

g. That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.

h. That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.

i. That the impedance to ground of each ground rod does not exceed 25 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by American National Standards Institute/Institute of Electrical and Electronic Engineers

(ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the Resident Engineer prior to performing the testing.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the Resident Engineer. Where connecting new cable to existing cable, insulation resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved "repair" procedures for items that have failed testing other than complete replacement.

METHOD OF MEASUREMENT

108-4.1 Trenching shall be measured by the linear feet of trench, including excavation, backfill, and restoration, completed, measured as excavated, and accepted as satisfactory. When specified, separate measurement shall be made for trenches of various widths.The cost of all excavation, backfill, dewatering and restoration regardless of the type of material encountered shall be included in the unit price bid for the work.

108-4.2 Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet of cable or counterpoise wire installed in trenches, duct bank, or conduit, including ground rods and grounding connectors, and trench marking tape ready for operation, and accepted as satisfactory. Separate measurement shall be made for each cable or counterpoise wire installed in trench, duct bank or conduit. The measurement for this item shall not include additional quantities required for slack. Cable and counterpoise slack is considered incidental to this item and is included in the Contractor's unit price. No separate measurement or payment will be made for cable or counterpoise slack.

108-4.3 Separate measurement is made for additional supplemental ground rods required after the first ground rod to reach ground resistance requirements, measured per each.

BASIS OF PAYMENT

108-5.1 Payment will be made at the contract unit price for trenching, cable and bare counterpoise wire installed in trench (direct-buried), or cable and equipment ground installed in duct bank or conduit, and any required additional supplemental ground rods installed, in place by the Contractor and accepted by the Resident Engineer. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

L-108-1	1/12C No. 19 AWG, Shielded - CASSPIC-FSF	per linear foot
L-108-2	No. 1/0 AWG, BSDC Guard Wire, Installed in Trench or with Duct Bank or Conduit, Including Ground Rods and Ground Connectors	per linear foot
L-108-3	No. 3 AWG, XHHW	per linear foot
L-108-4	No. 2 AWG, XHHW	per linear foot
L-108-5	No. 4 AWG, XHHW	per linear foot

L-108-6	No. 4/0 AWG, BSDC, Installed in Trench or with Duct Bank or Conduit, Including Ground Rods and Ground Connectors	per linear foot
L-108-7	250 KCMIL, XHHW	per linear foot
L-108-8	No. 6 AWG, XHHW	per linear foot
L-108-9	No. 8 AWG, XHHW	per linear foot
L-108-10	No. 6 AWG, Solid, Bare Counterpoise Wire, Installed in Trench, Above the Duct Bank, Conduit, or Cable, Including Ground Rods and Ground Connectors	per linear foot
L-108-11	No. 8 AWG, 5 kV, L-824, Type C Cable	per linear foot
L-108-12	No. 2 AWG, 15kV, EPR	per linear foot

Addendum 1 Changes

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description

A-A-59544A	Cable and Wire, Electrical (Power, Fixed Installation)
A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic

ASTM International (ASTM)

ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
ASTM D4388	Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes

Mil Spec

MIL-PRF-23586F	Performance Specification: Sealing Compound (with Accelerator), Silicone Rubber, Electrical
MIL-I-24391	Insulation Tape, Electrical, Plastic, Pressure Sensitive

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-780	Standard for the Installation of Lightning Protection Systems

American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Federal Aviation Administration Standard

FAA STD-019E	Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment

END OF ITEM L-108

ITEM L-105
ALTERATIONS, REMOVAL AND DEMOLITION

GENERAL

105-1.1 DEFINITIONS. Removal shall mean the dismantling of existing materials, components, equipment, and utilities. Removed items shall be handled, prepared for storage, transported to storage areas as specified.

Demolition shall mean the dismantling and disposal of existing materials, components, equipment, and utilities which cannot or will not be reused or which will have no salvage value, or which cannot be reused due to unrepairable damage caused by age, non-demolition related reasons, etc. All demolished items not designated to be turned over to the Owner shall be legally and properly disposed of in a safe manner and at a location acceptable to the Owner.

All items to be turned over to the Owner shall be thoroughly cleaned and properly enclosed or placed in 27 gal. tough storage tote in a black with yellow lid (manufactured by HDX or an approved equal) to protect the items from damage and transported by the Contractor to a location on the Owner's property, designated by the Resident Engineer.

Storge Tote Box Requirements:

- Weight Capacity 75 lb
- Exterior dimensions (at top of tote) 28.55 in. L x 19.61 in. W x 15.27 in. H
- Interior dimensions (at bottom of tote) 23.5 in. L x 14.5 in. W x 13 in. H
- Tough polypropylene plastic for durability
- Snap-on, lockable lid included
- 27 Gal. capacity holds large items
- General purpose tote
- Can handle at least 900 lbs. of distributed weight stacked on lid
- Handles can withstand at least 680 lbs. of pressure
- Passes a drop test of at least 110 lbs. from 6 ft.

The installation and/or removal of lighting equipment may be critical to airport operations; therefore, the Contractor shall follow the work schedule established in the plans and specifications or as directed by the Engineer. The system shall be installed in accordance with the National Electrical Code and/or local code requirements.

The Contractor shall provide temporary wiring as required to reconnect existing circuits to provide guidance for aircraft to pass through the construction areas on those taxiways/runways which must remain open. The Contractor shall check all temporary circuits before dark each day to assure that they are operational. In the event of failure, the Contractor shall immediately take steps to restore operation.

105-1.2 CONDITION OF EXISTING FACILITIES. The Contractor shall verify the areas, conditions, and features necessary to tie into existing construction. This verification shall be done prior to submittal of shop drawings, fabrication or erection, construction or installation. The Contractor shall be responsible for the accurate tie-in of the new work to existing facilities.

Special attention is called to the fact that there may be conduit, fixtures or other items in the existing systems which must be removed or relocated in order to perform the alteration work. All conduit, wiring, boxes, etc., that do not comply with these specifications shall be removed or corrected to comply with these specifications. All unused conduit not removed shall be identified and a pull line shall be installed. The

work shall include all removal and relocation required for completion of the alterations and the new construction.

Whenever the scope of work requires connection to an existing circuit, the circuit's insulation resistance shall be tested, in the presence of the Owner and Resident Engineer. The Contractor shall record the results on the forms included in these specifications. When the circuit is returned to its final condition, the circuit's insulation resistance shall be checked again in the presence of the Owner and Resident Engineer. The Contractor shall record the results on the forms included in these specifications. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance Manuals as described in Item L-106, Submittals, Record Documents and Maintenance Manuals.

105-1.3 OCCUPANCY AND USE OF EXISTING FACILITIES. The Owner will occupy and use the facilities / airfield pavement near the work areas of work during the entire construction period as shown on the safety plan. The Contractor shall be required to plan and coordinate his activities in order to provide all necessary controls for the abatement of dust during all phases of the work.

105-1.4 SAFETY REQUIREMENTS. The Contractor shall conduct alterations and removal operations in a manner that will ensure the safety of persons in accordance with the requirements of CFR 29 PART 1926 and 1910.

105-1.5 CLASSIFICATION OF REMOVED/DEMOLISHED ITEMS. Existing materials and equipment indicated to be removed will be classified as "salvageable" and shall remain the property of the Owner or will be classified as "debris" and shall be disposed of legally off the airport.

Reusable salvaged items:

Salvaged materials and equipment shall be reused in the work as described on the contract drawings, unless noted otherwise.

Items classified as debris shall be legally disposed of off the airport property. The cost of such disposal shall be included in the cost of other items of work.

Retained salvaged items:

Salvaged materials and equipment to be retained by the Owner but not reused in the work shall be turned over to the Owner at a site at the facility to be determined by the Owner. Retained salvaged items shall be stored on Owner property where indicated by the Owner.

EXECUTION

105-2.1 DISCONNECTING UTILITIES. Prior to the start of work, the necessary utilities serving each area of alteration or removal will be shut off by the Owner and shall be disconnected and sealed by the Contractor, as required. Lockout/Tag/Try procedures shall be utilized in accordance with Item L-104, General Electrical Safety Requirements and Temporary Airfield Lighting.

105-2.2 REMOVAL WORK. The Contractor shall not disturb the existing construction beyond that indicated or necessary for installation of new work.

The Contractor shall provide protective measures to control accumulation and migration of dust and dirt in all areas of work, particularly those adjacent to occupied areas via watering as needed during construction. The Contractor shall remove dust, dirt, and debris from the areas of work daily.

105-2.4 SALVAGEABLE MATERIALS AND EQUIPMENT. The Contractor shall remove all salvageable materials and equipment in a manner that will cause the least possible damage thereto. Removed items which are to be retained by the Owner shall be carefully handled, stored, and protected.

The Contractor shall provide identification tags on all items boxed or placed in containers, indicating the type, size, and quantity of materials.

DEMOLITION

105-3.1 DEMOLITION OPERATIONS. Demolition operations shall be conducted to ensure the safe passage of persons to and from facilities occupied and used by the Owner. The sequence of operations shall be such that maximum protection from inclement weather will be provided for materials and equipment located in partially dismantled structures.

Immediately after demolition of any electrical item, any disturbed area shall be repaired and restore. Any holes shall be filled back to the existing grade per P-152 and regraded to match the surrounding area. Any and all bare spots shall be seeded.

105-3.2 REFERENCE STANDARDS REQUIREMENTS. Demolition operations shall be conducted to ensure the safety of persons in accordance with ANSI A 10.6 Safety Requirements for Demolition.

Demolition shall be conducted in accordance with O.S.H.A., State and local requirements.

DISPOSAL OF DEMOLISHED MATERIALS

105-4.1 GENERAL. The Contractor shall dispose of debris, rubbish, scrap, and other non-salvageable materials resulting from demolition operations. Demolished materials shall not be stored or disposed of on Airport property.

105-4.2 REMOVAL FROM OWNER PROPERTY. Materials classified as debris shall be transported from Owner property and legally disposed at no additional cost to the Owner. Permits and fees for disposal shall be paid by the Contractor.

METHOD OF MEASUREMENT

105-6.1 This item includes all materials, labor, transportation incidentals and services required for the airfield electrical demolition as shown on the plans. It is the intent of the demolition pay item that all equipment, devices, fixtures, wiring, materials, systems and appurtenances, etc. which are no longer required as a result of the project to be removed shall be measured by the contract lump sum price. This includes all incidental electrical demolition to include but not be limited to cable(s), conduit, ducts banks, counterpoise, concrete foundations/encasement, ID tags, cable markers, duct markers, frames, racks, and all other miscellaneous electrical equipment.

BASIS OF PAYMENT

105-7.1 Payment will be made at the contract price per lump sum for required airfield electrical demolition items. This item includes all materials, labor, transportation, incidentals and services required for the demolition as shown on the plans. It is the intent of the demolition pay item that all equipment, devices, fixtures, wiring, materials, systems and appurtenances, etc. which are no longer required as a result of the project be removed. Payment shall be made at the contract line item "per lump sum" price.

Payment will be made under:

L-105-1	Demolish Existing Fixture/Base Can	per each
L-105-2	Demolish MALSR Light Bar – Tower Mounted on Steel Frame	per each
L-105-3	Demolish MALSR Light Bar – Tower Mounted	per each
L-105-4	Existing MALSR Demolition	per lump sum
L-105-5	Existing MALSR Shelter Removal	per lump sum
L-105-6	Miscellaneous Electrical Demolition	per lump sum
L-105-7	Remove Existing Sign and Foundation	per each
L-105-8	Remove Existing Sign Panels from Existing Sign to Remain	per each
L-105-9	Remove Existing MG-40 Antenna Tower	Per lump sum
L-105-10	Remove Existing MALSR Equipment to be Relocated to New MALSR Shelter	Per lump sum

END OF ITEM L-105

[Addendum 1]

SECTION 13 34 23.10
~~GOVERNMENT FURNISHED~~ FAA SHELTERS

PART-1 GENERAL

1.1 SCOPE

This section describes the means and methods of moving and installing ~~GFM~~ contractor prefabricated fiberglass shelters as indicated on the drawings.

The shelters are to be delivered to the site.

PART-2 PRODUCTS

2.1 ANTENNA FEED CABLES

Antenna feed cables will be terminated by FAA personnel after shelters are installed.

2.2 SHELTER ANCHORS

Anchor the shelter as shown on the drawings.

PART-3 EXECUTION

3.1 CONDUITS AT SHELTERS

The Contractor shall furnish and install additional lengths of conduit, sweep elbows, and insulated grounding bushings. The conduits shall be connected to the ~~existing~~ conduit stub outs in the shelters. The conduits installed shall match the type of conduit used in the shelter, rigid galvanized steel or PVC. Conduit sweep elbows shall be installed at a depth of three (3) feet below grade.

3.2 WARNING SIGNS

The Contractor shall install FAA warning signs on the exterior door of each equipment shelter ~~and on the glide slope antenna tower~~.

3.3 POWER SERVICE CONNECTION

Power service feeder cables and galvanized rigid steel conduit shall be installed at time of shelter installation.

3.4 SHELTER TRANSPORT

Inspect the shelters and contents prior to beginning the process of transporting the shelters. Notify the Contractor of any existing damage to shelters prior to beginning the process of transporting the shelters. Confirm that all shelter contents are secured prior to beginning the process of transporting. ~~Once the process of transporting the shelters has begun, t~~The Contractor shall assume responsibility for the shelters and contents until final acceptance by the FAA.

3.4.1 Lifting and Transporting Equipment

The shelters have steel floor beams/skid assemblies and lifting points provided by the manufacturer. Provide adequately sized equipment to lift and load; transport; and lift and offload the shelters. The use of a forklift for this purpose will not be permitted. All fees, permits, rentals, etc. for transportation shall be included in the bid. Any and all lifting off of the shelter shall be at the Contractor expense.

END OF SECTION

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Addendum 1

SECTION 26 27 26
LOW VOLTAGE WIRING DEVICES

PART-1 GENERAL

1.1 SUMMARY

A. This Section includes various types of receptacles, multi-outlet assemblies, lighting switches, and finish plates.

B. Contractor shall furnish and completely install lighting switches, convenience and multi-outlet assemblies, special purpose receptacles, etc., along with appropriate outlet boxes, trim and finish plates, etc., as indicated on the drawings and schedules and as herein specified.

C. Where connection to an item of equipment is required under this contract, and where such equipment requires a wiring device (special purpose receptacle) for connection, Contractor shall furnish and install the appropriate device, whether or not the device is specifically shown or specified.

1.2 REFERENCE STANDARDS

Applicable only to the extent specified.

A. **Federal Aviation Administration (FAA)**

1. FAA-C-1217G Electrical Work, Interior
2. FAA-STD-019f Lightning and Surge Protection, Grounding, Bonding, and Shielding Requirements for Facilities and Electronic Equipment

B. **Federal Specifications (FS)**

1. W-C-596 General and Associated Detailed Specifications: Connector, Plug Receptacle, and Cable Outlet, Electrical Power
2. W-S-896E Switch, Toggle, Flush Mounted

C. **National Electrical Manufacturer Association (NEMA)**

1. WD1 General Requirements for Wiring Devices

D. **National Fire Protection Association (NFPA)**

1. 70 National Electrical Code (NEC), latest edition

E. **Occupational Safety and Health Administration (OSHA)**

1. 29 CFR1910.7 Definitions and Requirements for a Nationally Recognized Testing Laboratory (NRTL)

F. **Underwriters Laboratories (UL)**

1. 20 General Use Snap Switches
2. 498 Electrical Attachment Plugs and Receptacles
3. 943 Ground Fault Circuit Interrupters

Addendum 1

1.3 SUBMITTALS

Resident Engineer approval is required for all submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

A. Provide Component catalog numbers and manufacturer's data sheets, including pertinent data identifying each component by the item number and nomenclature, as specified.

B. Operation and maintenance data for materials and products specified in this Section to be included in Section 26 05 00.10 BASIC ELECTRICAL MATERIALS AND METHODS.

1.4 QUALITY CONTROL

A. Comply with NFPA 70, NEC, latest edition, for devices and installation.

B. **Listing and Labeling:** Provide products that are listed and labeled for their applications and installation conditions and for the environments in which installed.

1. The Terms "Listed" and "Labeled": As defined in the NEC," Article 100.
2. Listing and Labeling Agency Qualifications: A NRTL as defined in OSHA Regulation 1910.7

C. The manufacturer shall be a company specializing in the manufacturing products specified in this Section with a minimum of five (5) years experience.

1.5 COORDINATION:

A. **Wiring Devices for ~~Government Furnished~~ Equipment:** Match devices to plug connectors for ~~Government furnished~~ all equipment.

B. Device plates shall be stainless steel, brushed finish PRODUCTS.

1.6 GENERAL:

A. Materials procured and installed in this Section shall be in accordance with:

a. FAA-C-1217G

b. FAA-STD-019f

B. All wiring devices of any one general type (e.g. all duplex receptacles, all wall switches etc.) shall be of the same manufacturer and shall match throughout.

1.7 WIRING DEVICES

A. Comply with NEMA Standard WD 1, "General Purpose Wiring Devices," and UL approved, specification grade.

B. **Enclosures:** NEMA 1 equivalent, except as otherwise indicated. Exterior receptacles shall be mounted in waterproof cast outlet boxes with waterproof covers.

C. **Receptacles, General:** All receptacles shall be specification grade in accordance with NEMA WD 1. Wiring terminals shall be of the screw-type. Receptacles with push-in connections or a combination of screw-type and push-in connectors are not acceptable.

D. **Straight-Blade:** Except as otherwise indicated, comply with Federal Specification W-C-596 and heavy-duty grade of UL Standard 498, "Electrical Attachment Plugs and Receptacles." Provide NRTL labeling of devices to verify these compliances.

E. **General Purpose Duplex Receptacle:** 125 volt, 20 Ampere, 2 pole, 3 wire grounded, with polarized slots, NEMA 5-20R.

F. **Receptacles, Straight-Blade, Special Features:** Comply with the basic requirements specified above for straight-blade receptacles of the class and type indicated, and with the following additional requirements:

G. Ground-Fault Circuit Interrupter Receptacles: UL Standard 943, "Ground Fault Circuit Interrupters," feed-through type, with integral NEMA 5-20R (UL Group I, Class A), duplex receptacle arranged to protect connected downstream receptacles on the same circuit. Contact arrangement shall be such that contact is made on two sides of an inserted blade. Receptacle shall be side or back wired with two screws per terminal. The grounding screw shall be connected to the metal mounting yoke.

H. Weatherproof Receptacles shall be mounted in a box with a gasketed cover.

I. Special Purpose or Heavy Duty Receptacles: Shall be of the type, rating and number of poles indicated or required for the anticipated purpose. Contact surfaces may be either round or rectangular. One appropriate straight or angle type plug of the same configuration shall be furnished with each receptacle.

J. **Wall Switches:**

i. Snap Switches: AC switches, NRTL listed and labeled as complying with UL Standard 20 “General Use Snap Switches”, and with Federal Specification W-S-896E.

K. Single-pole and three way wall switches shall be specification grade, 120/277 volts, and shall be fully rated 20 amperes AC only, totally enclosed toggle type with bodies of phenolic compound.

L. Wire terminals shall be of the screw type.

M. Switches with push-in connections or a combination of screw type and push-in connectors are not acceptable.

N. Switches shall be the quiet-operating type.

O. Switch handles shall be ivory in color.

P. Devices and Devices Plates:

i. Provide device plates of one-piece type to suit the devices installed.

ii. Plate screw shall be metal with countersunk head, in a color to match the finish of the plate.

iii. Provide device plates as follows:

1. Brushed stainless steel in unfinished areas (e.g. ALSF Shelter).

2. Gasketed in wet locations.

iv. Intercommunications outlets shall be provided with a blank cover plate unless otherwise indicated.

Addendum 1

PART-2 EXECUTION

2.1 INSTALLATION

A. **Arrangement of Devices:** Except as otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on bottom. Group adjacent switches under single, multi-gang wall plates.

B. Where two or more devices indicated for gang installation, they shall be trimmed with gang type plates. Sectional Plates are not acceptable.

C. Install devices and assemblies tightly to boxes and adjusted plumb, level.

D. Receptacles shall be installed 18 inches above finished floor, unless noted otherwise.

E. Wall switches shall be installed 48 inches above finished floor, unless noted otherwise.

F. Install receptacles with grounding pole on the bottom.

G. **Wall Switch Installation:**

1. Not more than one switch shall be installed in a single gang position.
2. Grounding: Where switches have grounding terminals, they shall be grounded with a green grounding pigtail connected from the switch grounding screw directly to the grounding lug on the outlet box where the green equipment grounding conductor is terminated.
3. Install switches with “Off” position down.

H. **Device Plate Installation:**

1. Plates shall be installed with all four edges in continuous contact with finished wall surfaces without use of mats or similar devices.
2. Plates installed in wet locations shall be gasketed.
3. Use of sectional type device plates shall not be permitted.
4. Plastic rings shall not be permitted.
3. Install wall plates after painting is complete.

I. Protect devices and assemblies during painting.

J. Install products in accordance with the manufacturer’s instructions.

2.2 IDENTIFICATION

Comply with Section 26 05 53 IDENTIFICATION OF ELECTRICAL SYSTEMS.

2.3 GROUNDING

The green insulated equipment grounding conductor, run with the power conductors, shall terminate at the device yoke grounding screw. In addition to this ground connection, install a 12 AWG jumper from the device yoke grounding screw to device box grounding lug screw.

2.4 FIELD QUALITY CONTROL:

A. **Testing:** Test wiring devices for proper polarity, continuity and operation.

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B. Test ground-fault circuit interrupter operation with both local and remote fault simulations according to manufacturer's recommendations.

C. Test that each switch operates properly 6 times in succession.

D. Verify that each receptacle device is energized.

E. Replace damaged or defective components.

2.5 CLEANING

General: Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION

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Addendum 1

SECTION 26 05 00.10
BASIC ELECTRICAL MATERIALS AND METHODS

PART-1 GENERAL

1.1 WORK INCLUDED

1.1.1 General

A. Furnish material, equipment, labor, and incidentals necessary for complete and operational systems as specified herein.

B. This section concerns all other sections in Division 26 and shall be considered a part of each of those sections as if written in their entirety.

C. The general electrical requirements in this section are applicable to both GFE and non-GFE equipment.

D. Replacement and spare parts shall be provided as indicated in other sections of Division 26.

1.2 REFERENCE STANDARDS

1.2.1 General:

Comply with the standards in effect as of the date of the Contract Documents as applicable to the extent specified in this Division. The rules, regulations and reference specifications enumerated in these specifications shall be considered as minimum requirements. Adherence to other standards shall not relieve the contractor from furnishing and installing higher grades of materials and workmanship when so required by this specification. Adherence to this specification shall not relieve the Contractor from furnishing and installing higher grades of materials and workmanship when so required by the Contract Drawings or special contracts provisions. Electrical work shall be executed in accordance with local, state, and national codes, ordinances, and regulations that have jurisdiction authority over the work. If Conflicts occur between FAA documents and any other document, the FAA requirements shall be used.

1.2.1.1 Federal Aviation Administration (FAA)

FAA-STD-019	Lightning and Surge Protection, Grounding, Bonding, and Shielding Requirements for Facilities and Electronic Equipment (latest version).
FAA-C-1217	Electrical Work, Interior (latest version).
FAA-C-1391	Installation, Termination, Splicing, and Transient/Surge Protection of Underground Electrical Distribution System Power Cables (latest version).

1.2.1.2 Institute of Electrical and Electronic Engineers (IEEE)

519	Recommended Practices and Requirements for Harmonic Control and Electrical Power Systems

1.2.1.3 National Electrical Manufacturers Association (NEMA)

WC70-00	Non-Shielded Power Cable 2000V or Less
WC26-00	Binational Wire and Cable Packaging Standard

1.2.1.4 National Fire Protection Association (NFPA)

70	National Electrical Code (NEC), latest edition

Addendum 1

1.2.1.5 National Electrical Contractors Association (NECA)

1-2000	Standard of Installation

1.2.1.6 Occupational Safety and Health Administration (OSHA)

29CFR1907	Description and Requirements for a Nationally Recognized Testing Laboratory (NRTL)

1.2.1.7 Underwriters Laboratories (UL)

486A	Wire Connectors and Soldering Lugs for Use with Copper Conductors

1.2.1.8 Federal Specifications:

J-C-30	Cable and Wire, Electrical (Power, Fixed Installation)
L-T-1512	Tape, Wrapping, Pressure-Sensitive; Adhesive Tape 1512
L-P-390	Plastic Molding and Extrusion Material, Polyethylene and Co-polymers Low, Medium Density
W-C-582	Raceway, Metal and Fittings: Surface
W-C-586	Raceway Outlets, Boxes, Bodies, and Entrance Caps, Electrical; Cast Metal – For Shore Use
W-F-406	Fittings for Cable, Power, Electrical and Raceway, Metal Flexible
W-F-408	Fittings for Raceway, Metal, Rigid (Thick-Wall and Thin Wall (EMT-Type)
W-S-610	Splice, Conductor
HH-I-510	Insulation Tape, Electrical, Friction
HH-I-595	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic, or Low Temperature Application
W-C-563	Raceway, Metal, Rigid; and Bends and Elbows, Electrical Raceway: Thin Walled Type (EMT)
W-C-566	Raceway, Metal, Flexible
W-C-581	Raceway, Metal, Rigid and Intermediate; Coupling, Elbow, Nipple, Electrical Raceway: Zinc-Coated

1.3 JOB CONDITIONS

A. Obtain and pay for all permits, licenses, and inspection completion as required by law for the completion of the work. Certificates of approval shall be secured, paid for and delivered to the Contractor before receiving the acceptance of the work.

B. The location of materials, equipment, devices, and appliances indicated are approximate and subject to revisions at the time of installation. The Contract Drawings are diagrammatic only and do not give fully dimensioned locations of various elements of work. Determine exact locations from field measurements.

C. Should project conditions require any rearrangement of work, or if equipment or accessories can be installed to a better advantage than the general arrangement of work on the plans, the Contractor may, before proceeding with the work, prepare and submit plans of the proposed rearrangement to the Resident Engineer .

D. **Equipment Size:** Electrical equipment size indicated on the Contract Drawings is based on a particular manufacturer. It is the responsibility of the Contractor to verify that the equipment he proposes to furnish will fit in the space indicated on the Drawings.

Addendum 1

E. **Equipment Coordination:** Equipment furnished and installed under other Sections of this Specification and by the Contractor shall be coordinated with equipment furnished and installed under this section.

F. **Supervision:** Electrical work shall be performed under the supervision of a master Electrician who holds a valid license.

G. **Code Violations:** Perform work to meet or exceed the requirements of the National Electrical Code and other applicable statues, ordinances, codes, and regulations of the governmental authorities having jurisdiction. Resolve any code violations discovered in the Contract Documents with the Subcontracts Administrator prior to award of the Contract.

H. **After Contract** award, make any corrections or additions necessary for the compliance with applicable codes at no additional cost to the Government.

1.4 GUARANTEES

The work shall be guaranteed for one year from the date of final acceptance of the project and during that period the Contractor shall make repair at his expense any faults or imperfections that may rise due to defects of omissions in materials or workmanship.

1.5 SUBMITTALS

Engineer approval is required for all submittals. Submit the following in accordance with Section L-106 *Submittals, Record Documents And Maintenance Manuals*:

A. **Manufacturer's data sheets:** Component catalog numbers and manufacturer's data sheets, including pertinent data identifying each component by the item number and nomenclature, as specified.

B. **List of equipment and principal materials:** Within 5 days after the Notice of Award (NOA) of the contract and before orders are placed or shop drawings are submitted, the Contractor shall submit to the Resident Engineer a list of equipment and principal materials specified. Give names and manufacturer's catalog and model numbers and other such supplemental information as necessary for identification.

C. **Project Record Documents:** Maintain at the job site a separate set of redline bond prints of the Contract Documents (specifications, drawings, change orders, addendums) for the purpose of recording the system and dimension changes of those portions of work in which actual construction is significantly at variance with the Contract Documents. The Contractor shall record changes for both GFE and Contractor provided equipment. Upon acceptance of the project, submit documents to the Resident Engineer, with verification of data accuracy. Mark the Record Drawings with colored pencil. Prepare the Record Drawings as the work progresses. Upon completion of work, submit Record Drawings clearly indicating the following:

   a. Locations of devices, raceways, equipment and other pertinent items; Indicate the depth of buried ducts and direct burial cables.

   b. Schematic and interconnection wiring diagrams of the completed power and control system incorporating the data derived from the equipment shop drawings, and the cable and raceway schedule. The drawings shall be detailed to wire and terminal block numbers, conductor color coding, device designations, locations, and reflect identifications established at the site.

D. **Test Report:** Submit a summary of the Electrical Test Report and Motor Test Report, noting deviations from requirements listed below:

Addendum 1

a. Maximum plus or minus five percent variation between nominal system voltage and no load voltage.

b. Maximum plus or minus ten percent variation between average phase current and measured individual phase currents for panelboards.

1.6 QUALITY CONTROL

1.6.1 General:

The rules, regulations and reference specifications enumerated herein shall be considered as minimum requirements and shall not relieve the Contractor from furnishing and installing higher grades of material and workmanship than are specified herein or when so required by the Contract Drawings. Materials, appliances, and equipment provided shall meet the requirements of the Underwriters Laboratories, Inc. (UL), Electrical Testing Laboratories (ETL) and other standard organizations. This specification shall govern when conflicts occur between reference documents and this specification.

1.6.2 Electrical Contractor's Qualification:

Use adequate numbers of skilled workmen, trained and experienced in their crafts, and who are familiar with the specifications and methods of performing the work in this Division.

1.6.3 Licensed:

The electrical foreman shall be a licensed master electrician.

1.6.4 Workmanship:

Work shall be performed in accordance with quality, commercial practices. The appearance of finished work shall be of equal importance with its operation. Material and equipment shall be installed based upon the actual dimensions and conditions at the project site. Locations for materials or equipment requiring exact fit shall be field measured. Raceway, transformers, and motors shall be isolated to avoid unacceptable noise levels from objectionable vibrations from all systems.

1.6.5 Contract Drawings:

Where the electrical drawings indicate (diagrammatically or otherwise) the work intended and the function to be performed even though some minor details are not shown, the Contractor shall furnish all equipment, material ~~(other than Government Furnished Equipment)~~, and labor to complete the installation work and accomplish all indicated functions of the electrical installation. Further, the Contractor shall be responsible for taking the necessary actions to ensure that all electrical work is coordinated and compatible with all other disciplines, general, NFPA 70 latest edition, and FAA Standards.

1.6.6 View Other Sections:

The Contractor is to review other sections of this specification to determine electrical requirements for equipment furnished under those sections. Coordinate all electrical rough-ins and connections for proper function of this equipment.

1.6.7 Listing and Labeling:

Provide products specified in the section that are listed and labeled:

A. The terms "Listed and Labeled" as defined in the National Electrical Code, (latest edition) Article 100.

B. Listing and Labeling Agency Qualifications: NRTL as defined in OSHA Regulation 1910.7.

C. Field installed nameplates shall conform to Division 26 05 53, Identification of Electrical Systems.

Addendum 1

D. Nameplates on manufactured items shall be aluminum or type 304 stainless steel not less than 20 US Gauge, riveted, bolted to the manufactured item, with nameplate data engraved or punched to form a non-erasable record of the equipment data.

PART-2 PRODUCTS

2.1 PRODUCTS

A. **Manufacturer's Recommendation:** While installation procedures or any part thereof are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendation prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish the recommendations shall be cause of rejection of the equipment or material.

B. **Material:** Provide equipment and material of sizes, capacities, power ratings and dimensions as indicated on the Contract Drawings and in drawing schedules.

C. **Structural:** All structural and miscellaneous steel used in connection with electrical work and located out-of-doors or in damp locations shall be hot dipped galvanized unless otherwise specified. Included are underground steel pull box covers and similar electrical items. Galvanizing shall average 2.0 ounce per square foot and shall conform to ASTM A123.

D. **Approval:** Approval of materials and equipment will be based on the manufacturer's printed data. The label or listing of Underwriter's Laboratories, Inc., will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this listing, the Contractor may submit a statement from a nationally recognized, adequately equipped testing agency indicating that the items have been tested in accordance with required procedures of the Underwriter's Laboratories, Inc., and that the materials and equipment comply with all Contract requirements. A manufacturer's statement indicating complete compliance with the applicable Federal Specification or Standard of the American Society for Testing and Materials, National Electrical Manufacturers Association or other Commercial Standards, will be acceptable proof of such compliance.

E. **Coformation:** Materials and equipment shall conform to respective publications and any other requirements specified below. The Contractor shall furnish all materials. Materials and equipment, to be acceptable, must comply with all contract requirements. Materials to be furnished by the Contractor under this specification shall be of manufacturers regularly engaged in the production of such material and of the manufacturer's latest designs that comply with the specification requirements.

2.2 SUPPORT FOR ELECTRICAL EQUIPMENT:

Channel and Angle Supports, Raceway Supports, Sleeves and Fasteners: As specified in Section 26 05 29.

2.3 MANUFACTURER'S STANDARD PRODUCTS:

Use colors prescribed by ANSI A13.1, NFPA 70.

PART-3 EXECUTION

3.1 EQUIPMENT INSTALLATION REQUIREMENTS

A. All materials and equipment shall be installed in accordance with the Contract Drawings, and with FAA-C-1217G, and FAA-STD-019f.

B. Coordinate electrical work with that of other trades so that:

a. Interference between electrical and other specialty trades is to be avoided.

b. Maintain clearances and advise other trades of clearance requirements for operation, repair, removal and testing of electrical equipment.

c. All electrical materials and equipment shall be kept as close as possible to ceilings, walls and columns to occupy the minimum amount of space.

d. Furnish and install all offsets, fittings and similar items necessary to accomplish the requirements of coordination without additional expense.

e. Equipment required to be temporarily disconnected and relocated shall be carefully removed, stored, leaned, reinstalled, reconnected, and made operational.

C. Where manufacturers recommended installation methods conflict with contract requirements, difference shall be resolved by the Resident Engineer .

D. The installation shall be accomplished by skilled workers regularly engaged in this type of work. Where required by local regulation, the workers shall be properly licensed.

E. Install components and equipment to provide the maximum possible headroom where mounting heights or other location criteria are not indicated.

F. Install items level, plumb, parallel, and/or perpendicular to other building systems and components, except where otherwise indicated.

G. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

H. Maintain the waterproof integrity of raceway penetrations through the roof, exterior walls, and floors.

I. The drawings indicate certain information pertaining to surface and subsurface obstructions that has been taken from available site drawings. Such information is not guaranteed as to accuracy of location or completeness.

J. Equipment shall be properly anchored and supported to resist shear and overturning moments for UBC Seismic Zone 2B.

3.2 INSTALLATION

3.2.1 Contract Drawings:

Where the Contract Drawings schematically indicate the work, diagrammatically or electrically, ensure that the electrical and communications work is coordinated and compatible with Architectural, Mechanical and Structural work.

3.2.2 Support and Fastening:

Unless otherwise indicated, securely fasten electrical items and their supporting hardware to the building structure in accordance with Section 26 05 29.

3.2.3 Identification Devices

Install identification devices where required in accordance with the requirements of Section 26 05 53.

3.2.4 Wiring Methods:

3.2.4.1 General

All wiring shall consist of insulated copper conductors installed in metallic raceways unless otherwise specified.

3.2.4.2 Conductor routing:

Panelboards, surge arresters, disconnect switches, etc., shall not be used as raceway for conductor routing other than conductors that originate or terminate in these enclosures. Isolated ground conductors will be allowed to traverse these enclosures:

3.2.4.3 Conductor separation

Power conductors shall be routed separately from all other conductor types. Route power conductors and other conductors in separate raceways, or use a metallic divider between the power conductors and any other conductors in the same raceway, in these enclosures. Isolated ground conductors will be allowed to traverse these enclosures.

A. Power cables of less than 600 volts may be installed in the same duct.

B. Power cables of less than 600 Volts shall not be installed in the same duct with control, telephone, or signal type cables.

3.2.4.4 Neutral conductor

Shared/common neutrals shall not be permitted, i.e., each overcurrent protection device shall have its own separate neutral conductor. Neutral conductor sizes shall not be less than the respective feeder or phase conductor sizes.

3.2.5 Raceway Openings

All Raceway openings through floors shall be both airtight and watertight.

3.2.6 Weather Protection

Seal equipment or components exposed to the weather and make watertight and rodent proof. Protect equipment outlet and Raceway openings with temporary plugs or caps at all times work is not in progress.

3.3 CUTTING AND PATCHING

Cut, channel, chase, and drill floors, walls, and other surfaces necessary for electrical installations. Perform cutting by skilled mechanics of the trades involved. Repair disturbed surfaces to match adjacent undisturbed surfaces.

3.4 TESTING

3.4.1 General:

Unless otherwise indicated, the contractor shall furnish all test instruments, materials and labor necessary to perform tests designated in other Sections of this Division.

3.4.2 Calibration:

All tests shall be performed in the presence of the Resident Engineer . All instruments shall have been calibrated within a period of two years preceding testing. Calibrations shall be traceable to applicable industry recognized standards.

3.4.2.1 Tests:

A. An interim operating and performance test shall be performed for each major equipment item after installation is complete and before the item is placed in service.

B. After mechanical systems have been completely installed and balanced, test each system for proper operation.

C. Tests shall be conducted in the presence of the Resident Engineer under design conditions to ensure proper sequence and operation throughout the range of operation.

D. Make adjustments as required to ensure proper functioning of the systems.

E. Special tests on individual systems are specified under individual sections.

F. Provide 5 days written notice to the Resident Engineer for major tests. Contractor shall demonstrate, to the Resident Engineer 's satisfaction, proper operation of control devices by simulating actual operating conditions.

G. Devices tested shall include, but not be limited to, flow and pressure controls, temperature controls, and system interlocks and alarms.

H. Perform the tests specified and other tests necessary to establish the adequacy, quality, safety, completed status, and suitable operation of each system.

I. Repair or replace equipment that does not meet test requirements and retest. Notify the Resident Engineer in writing 5 days prior to conducting tests.

3.4.3 Instructions:

After final tests and adjustments have been completed, fully instruct the Resident Engineer and other personnel as directed by the Resident Engineer in details of operation and maintenance of electrical equipment.

3.4.4 Underground Cable Test:

Test in accordance with the latest version of FAA-C-1391. Testing cable shall be performed before and after installation.

3.5 DELIVERY, STORAGE AND HANDLING

A. Clean and wipe the interior of Raceway, pullboxes and panelboards before proceeding with the wiring.

B. Do not install damaged, broken or marred material or products, replace them with new.

C. On long-lead delivery items which are damaged in shipping or storage, field repair may be authorized instead of replacement. Repair authorization must be in writing.

3.6 FIELD QUALITY CONTROL

3.6.1 Restoration of Finish:

All marred or damaged surfaces, except exposed metal for grounding purposes, shall be refinished to leave a smooth, uniform finish at final inspection. Paint to match existing.

3.6.2 Repair of Existing Work:

Where cutting, channeling, or drilling of floors, walls, or other surfaces is necessary for the proper installation, support or anchorage of the raceway, raceways, or other electrical work, it shall be carefully done. The contractor shall repair with equal material by skilled workers, any damage to facilities caused by the contractor's workers or equipment. Prior Resident Engineer approval must be obtained for the materials, workers, time of day or night, repair method and for temporary or permanent repair purposes.

On completion, repair work shall be inspected and accepted by the Resident Engineer with the concurrence of any other affected parties such as Utility Companies and Airport Authority.

Addendum 1

3.6.3 Damage:

Where raceway and wiring to remain are inadvertently damaged or disturbed, cut out and remove portion and all damaged wiring form the source panelboard, disconnect switch or pull box to the load/destination point. Provide new wiring of equal capacity.

END OF SECTION

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[Addendum 1]

Item L-125 Installation of Airport Lighting Systems

DESCRIPTION

125-1.1 This item shall consist of airport lighting systems furnished and installed in accordance with this specification, the referenced specifications, and the applicable advisory circulars (ACs). The systems shall be installed at the locations and in accordance with the dimensions, design, and details shown in the plans. This item shall include the furnishing of all equipment, materials, services, and incidentals necessary to place the systems in operation as completed units to the satisfaction of the Resident Engineer.

EQUIPMENT AND MATERIALS

125-2.1 General.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified under the Airport Lighting Equipment Certification Program in accordance with AC 150/5345-53, current version. FAA certified airfield lighting shall be compatible with each other to perform in compliance with FAA criteria and the intended operation. If the Contractor provides equipment that does not performs as intended because of incompatibility with the system, the Contractor assumes all costs to correct the system for to operate properly.

b. Manufacturer's certifications shall not relieve the Contractor of their responsibility to provide materials in accordance with these specifications and acceptable to the Resident Engineer. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the Resident Engineer and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

c. All materials and equipment used shall be submitted to the Resident Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be clearly made with arrows or circles (highlighting is not acceptable). The Contractor shall be responsible for delays in the project accruing directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the Resident Engineer, to determine compliance with the plans and specifications. The Contractor's submittals shall be submitted in an electronic PDF format, tabbed by specification section. The Resident Engineer reserves the right to reject any or all equipment, materials or procedures, which, in the Resident Engineer’s opinion, does not meet the system design and the standards and codes, specified herein.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

125-2.2 Conduit/Duct. Conduit shall conform to Specification Item L-110 Airport Underground Electrical Duct Banks and Conduits.

125-2.3 Cable and Counterpoise. Cable and Counterpoise shall conform to Item L-108 Underground Power Cable for Airports.

125-2.4 Tape. Rubber and plastic electrical tapes shall be Scotch Electrical Tape Numbers 23 and 88 respectively, as manufactured by 3M Company or an approved equal.

125-2.5 Concrete. All concrete used in structures must conform to the requirements of Item P-610, Concrete for Miscellaneous Structures.

125-2.5 Cable Connections. Cable Connections shall conform to Item L-108 Installation of Underground Cable for Airports.

125-2.6 Runway Edge Lights. Runway edge lights shall conform to the requirements of FAA AC 150/5345-46, latest edition TYPE L-862 and TYPE L-850D Runway edge fixture lamps shall be quartz type with properly sized transformer at the locations indicated on the plans. Runway edge lights shall be installed with the color pattern and at the locations indicated in the plans in accordance with the details.

125-2.7 Taxiway Edge Lights. Taxiway edge lights shall conform to the requirements of FAA AC 150/5345-46, latest edition TYPE L-861T(L). Taxiway edge fixture lamps shall be LED type with properly sized transformer at the locations indicated on the plans. Taxiway edge lights shall be installed at the locations indicated in the plans in accordance with the details.

125-2.8 Guidance Signs. Guidance Signs shall conform to the requirements of FAA AC 150/5345-44 latest edition TYPE L-858 Y, R, L, and B. Guidance signs shall be of size 2, class 2, mode 2 and style 2 or 3 as required in the field and as indicated on the details in the plans with LED type engines. The signs shall be installed at the locations indicated in the plans in accordance with the details with the messages as shown on the sign schedule.

125-2.9 Light Base and Transformer Housings. Light Base and Transformer Housings should conform to the requirements of AC 150/5345-42. Light bases shall be Type L-867, Class 1A, Size shall be as shown on plans. Base cans shall be provided as indicated or as required to accommodate the fixture or device installed thereon. Base plates, cover plates, and adapter plates shall be provided to accommodate various sizes of fixtures.

125-2.10 Isolation Transformers. Isolation Transformers shall be Type L-830 , size as required for each installation. Transformer shall conform to AC 150/5345-47.

125-2.11 Constant Current Regulators. The constant current regulators (CCR) shall be L-828 switchgear type, air cooled, ferro-resonant, dry type, with 120 volt AC internal control, sized as indicated on the contract drawings. The input power shall be as indicated on drawings. The output shall be 6.6 AMP. The units shall have integral primary switches and shall be five (5) brightness steps for all runway circuits and three (3) brightness steps for all taxiway circuits. The regulators shall have local control switches for ON/OFF and all brightness steps and a digital display of electrical outputs, inputs and KVA. Each regulator shall have integral input and output lightning protection. The Constant Current Regulator shall be integrated into the existing control system.

125-2.17 Basis Of Design. The airfield lighting systems are designed using the below listed maximum fixture wattages. Approved airfield lighting fixtures with higher wattages are permissible provided the Contractor assumes all costs for the redesign of the airfield lighting and necessary power distribution systems and all costs incurred furnishing and installing any additional equipment. In no case shall the Contractor be allowed to reduce the size of the constant current regulators or the power distribution systems.

L-861T	Taxiway Edge Light - LED (Elevated)	21 W

L-862	Runway Edge Light – Quartz (Elevated)	120 W
L-850D	Runway Edge Light – Quartz (Inpavement)	120 W
L-858Y,R,L, B - LED	Signs	
	1 Module	100 VA
	2 Module	100 VA
	3 Module	110 VA
	4 Module	110 VA

125-2.18 Square duct. Duct shall be square similar to that manufactured by the Square D Company (or equivalent), or the Trumbull Electric Manufacturing Company (or equivalent). The entire front of the duct on each section shall consist of hinged or removable cover for ready access to the interior. The cross-section of the duct shall be not less than 4 × 4 inch (100 × 100 mm) except where otherwise shown in the plans.

125-2.19 FAA-approved equipment for Airfield Lighting Vaults. Certain items of airport lighting equipment installed in vaults are covered by individual ACs listed below:

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-10	Specification for Constant Current Regulators and Regulator Monitors

125-2.20 Other electrical equipment. Distribution transformers, oil switches, cutouts, relays, terminal blocks, transfer relays, circuit breakers, and all other regularly used commercial items of electrical equipment not covered by FAA equipment specifications and ACs shall conform to the applicable rulings and standards of the Institute of Electrical and Electronic Engineers (IEEE) or the National Electrical Manufacturers Association (NEMA). When specified, test reports from a testing laboratory indicating that the equipment meets the specifications shall be supplied. In all cases, equipment shall be new and a first-grade product. This equipment shall be supplied in the quantities required for the specific project and shall incorporate the electrical and mechanical characteristics specified in the proposal and plans. Equipment selected and installed by the Contractor shall maintain the interrupting current rating of the existing systems or specified rating whichever is greater.

125-2.21 Wire. Wire (in conduit) rated up to 5,000 volts shall be per AC 150/5345-7, Specification for L-824 Underground Electrical Cables for Airport Lighting Circuits. For ratings up to 600 volts, moisture and heat resistant thermoplastic wire conforming to Commercial Item Description A-A-59544A Type XHHW shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the plans or in the proposal.

a. Control circuits. Unless otherwise indicated on the plans, wire shall be not less than No. 12 American wire gauge (AWG) and shall be insulated for 600 volts. If telephone control cable is specified, No. 19 AWG telephone cable per ANSI/Insulated Cable Engineers Association (ICEA) S-85-625 specifications shall be used.

b. Power circuits.

(1) 600 volts maximum – Wire shall be No. 6 AWG or larger and insulated for at least 600 volts with XHHW type insulation.

(2) 3,000 volts maximum – Wire shall be No. 6 AWG or larger and insulated for at least 3,000 volts.

(3) Over 3,000 volts-Wire shall be No. 6 AWG or larger and insulated for at least the circuit voltage.

125-2.22 Constant Current Regulator (CCR) – Stand Alone Type. CCR equipment must be fully compatible with the performance specifications of the existing CCRs. All equipment must be fully integrated (power and control) with the existing hardware and system enclosures.

Constant current regulators (CCR) must conform to specifications for constant current regulators as set forth in FAA Advisory Circular 150/5345-10, latest edition. Regulators must be L-828 Ferresonant, be individual, stand-alone style units. The input power for all regulators must be 60 Hz, phase and size as shown on the drawings. The output power must be rated 6.6A (taxiways) as shown on the drawings.

For taxiway regulators, the CCR must be equipped with three brightness steps, 4.8/5.5/6.6A, unless otherwise noted.

The regulators must be equipped with an integral contactor for primary switching. The regulators must have switches for remote/local function switch, local ON/OFF, and all brightness steps. Regulators must have a direct reading, digital output RMS ammeter of +/-1% accuracy and a digital output RMS voltmeter of +/-1% accuracy mounted to the front panel of the CCR enclosure.

Each regulator must have integral lightning protection and S1 Cutout.

Each CCR must be provided with door safety interlocks with a maintenance bypass position. The interlock must be wired to turn the CCR off should the door be opened.

INSTALLATION

125-3.1 Installation. The Contractor shall furnish, install, connect and test all equipment, accessories, conduit, cables, wires, buses, grounds and support items necessary to ensure a complete and operable airport lighting system as specified here and shown in the plans.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and state and local code agencies having jurisdiction.

The Contractor shall install the specified equipment in accordance with the applicable advisory circulars and the details shown on the plans.

125-3.2 Testing. All lights shall be fully tested by continuous operation for not less than 24 hours as a completed system prior to acceptance. The test shall include operating the constant current regulator in each step not less than 10 times at the beginning and end of the 24-hour test. The fixtures shall illuminate properly during each portion of the test.

Require the Contractor to furnish all necessary equipment and appliances for testing the underground cables, counterpoise, and safety ground in accordance with Item L-108, Underground Power Cable for Airports and L-131.

125-3.3 Shipping and Storage. Equipment shall be shipped in suitable packing material to prevent damage during shipping. Store and maintain equipment and materials in areas protected from weather and physical damage. Any equipment and materials, in the opinion of the Resident Engineer, damaged during construction or storage shall be replaced by the Contractor at no additional cost to the owner. Painted or galvanized surfaces that are damaged shall be repaired in accordance with the manufacturer's recommendations.

125-3.4 Elevated and In-pavement Lights. Water, debris, and other foreign substances shall be removed prior to installing fixture base and light.

A jig or holding device shall be used when installing each light fixture to ensure positioning to the proper elevation, alignment, level control, and azimuth control. Light fixtures shall be oriented with the light beams parallel to the runway or taxiway centerline and facing in the required direction. The outermost edge of fixture shall be level with the surrounding pavement. Surplus sealant or flexible embedding material shall be removed. The holding device shall remain in place until sealant has reached its initial set.

125-3.5 Maintenance Of Airport Lighting Systems. The Contractor shall maintain the airport lighting systems during the various phases of the work as shown on the phasing plan(s) or as directed by the Engineer. The Contractor shall be responsible for all temporary connections in the field or at the regulator necessary for operation of the circuits during construction.

125-3.6 Restoration. After the backfill is completed, the contractor shall dispose of all surplus material, dirt and rubbish from the site. The Contractor shall restore all disturbed areas equivalent to or better than their original condition. The restoration shall include top soiling, seeding, and mulching. The Contractor shall grade around structures as required to provide positive drainage away from the structure. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacement until final acceptance. All restoration shall be considered incidental to the item for which it applies.

125-3.7 Inspection. Inspect each light fixture, marker, and sign to determine that it is installed correctly, at the proper height, in line with the other fixtures, level, and properly oriented.

Check all fixture, marker, and sign securing screws or bolts to ensure that they have been tightened per manufacturer's recommendations. Use an anti-seize compound on bolts made of stainless steel.

Check each fixture, marker, and sign to determine that the lenses and panels are clean and unscratched.

Check identification numbers for each light fixture and sign to determine that the number at the installation is assigned in the plans or by the Owner's direction.

Check equipment covered by FAA specifications to determine if the manufacturers have supplied certified equipment. Also check equipment for general conformance with the specification requirements.

Check base plates for damage during installation and refinish according to manufacturer's instructions.

125-3.8 Installation of Equipment in Vault – General. The Contractor shall furnish, install, and connect all equipment, equipment accessories, conduit, cables, wires, buses, grounds, and support necessary to ensure a complete and operable electrical distribution center for the airport lighting system as specified herein and shown in the plans.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and local code agency having jurisdiction. All electrical work shall comply with the NEC and local code agency having jurisdiction including the separation of under 600V work from 5,000V work."

125-3.9 Vault Power supply equipment. Transformers, regulators, booster transformers, and other power supply equipment items shall be furnished and installed at the location shown in the plans or as directed by the RPR. The power supply equipment shall be set on steel "H" sections, "I" beams, channels, or concrete blocks to provide a minimum space of 1-1/2 inch (38 mm) between the equipment and the floor. The equipment shall be placed so as not to obstruct the oil-sampling plugs of the oil-filled units; and name-plates shall, so far as possible, not be obscured.

125-3.10 Vault Duct and conduit. The Contractor shall furnish and install square-type exposed metallic ducts with hinged covers for the control circuits in the vault. These shall be mounted along the walls

behind all floor-mounted equipment and immediately below all wall-mounted equipment. The hinged covers shall be placed to open from the front side with the hinges at the front bottom.

Wall brackets for square ducts shall be installed at all joints 2 feet (60 cm) or more apart with intermediate brackets as specified. Conduit shall be used between square ducts and equipment or between different items of equipment when the equipment is designed for conduit connection. When the equipment is not designed for conduit connection, conductors shall enter the square-type control duct through insulating bushings in the duct or on the conduit risers.

125-3.11 Vault Wiring and connections. The Contractor shall make all necessary electrical connections in the vault per the wiring diagrams furnished and as directed by the RPR. In wiring to the terminal blocks, the Contractor shall leave sufficient extra length on each control lead to make future changes in connections at the terminal block. This shall be accomplished by running each control lead the longest way around the box to the proper terminal. Leads shall be neatly laced in place.

125-3.12 Vault Marking and labeling. All equipment, control wires, terminal blocks, etc., shall be tagged, marked, or labeled as specified below:

a. Wire identification. The Contractor shall furnish and install self-sticking wire labels or identifying tags on all control wires at the point where they connect to the control equipment or to the terminal blocks. Wire labels, if used, shall be of the self-sticking preprinted type and of the manufacturer's recommended size for the wire involved. Identification -markings designated in the plans shall be followed. Tags, if used, shall be of fiber not less than 3/4 inch (19 mm) in diameter and not less than 1/32 inch (1 mm) thick. Identification markings designated in the plans shall be stamped on tags by means of small tool dies. Each tag shall be securely tied to the proper wire by a nonmetallic cord.

b. Labels. The Contractor shall stencil identifying labels on the cases of regulators, breakers, and distribution and control relay cases with white oil paint as designated by the RPR. The letters and numerals shall be not less than one inch (25 mm) in height and shall be of proportionate width. The Contractor shall also mark the correct circuit designations per the wiring diagram on the terminal marking strips, which are a part of each terminal block.

METHOD OF MEASUREMENT

125-4.1 Taxiway lights and guidance signs will be measured by the number of each type installed as completed units in place, ready for operation, and accepted by the Resident Engineer.

125-4.2 Measurement for Constant Current Regulators (CCRs) will be per each. This will include all work associated with furnishing and installation of a new constant current regulator, including all work within 5 feet of the vault building, to include, but not limited to, digital display, testing of the constant current regulator separately and as a system, lockout/tagout procedures, coordination, CCR racking stand, power and control conductors and conduits, power panels, circuit breakers, cable trays, properly sized wire ways, flexible conduits, channel, input and output lightning projection, modifications of vault electrical systems, junction boxes, grounding, splice kits, connections, mounting hardware, S-1 cutout devices, connection to series lighting cable, connection to radio control, equipment identification, and all labor, equipment, tools and incidentals necessary to complete this item in accordance with these specifications, installation details shown on the plan drawings, and as directed by the RPR/Airport.

BASIS OF PAYMENT

125-5.1 Payment will be made at the Contract unit price for each complete light fixture, guidance sign, installed by the Contractor and accepted by the Resident Engineer. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

Taxiway edge light units include fixtures, stems, frangible couplings, base cans, base plates, gaskets, isolation transformers, grounding connections, ground rods, excavation, backfill, restoration, testing, and incidental items required to provide a functioning unit in accordance with the Contract Documents.

Payment will be made at the contract unit price for each completed and accepted constant current regulator installation. This price will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

L-125-1	Concrete Bollard	per each
L-125-2	L-850C In-Pavement Runway Edge Light	per each
L-125-3	L-850D In-Pavement Runway Threshold Light	per each
L-125-4	L-853 Retroreflective Marker	per each
L-125-5	L-858 LED RDR Sign, 1-Module on a New Concrete Sign Base	per each
L-125-6	L-858 LED Sign, 1-Module on a New Concrete Sign Base	per each
L-125-7	L-858 LED Sign, 2-Module on a New Concrete Sign Base	per each
L-125-8	L-861T(L) Elevated Taxiway Edge Light	per each
L-125-9	L-861T(L) Elevated Taxiway Edge Light - Installed in Asphalt Overrun Pavement	per each
L-125-10	L-862 Elevated Runway Edge Light	per each
L-125-11	L-862E Elevated Runway Threshold Light	per each
L-125-12	L-862E Elevated Runway Threshold Light - Installed in Asphalt Overrun Pavement	per each
L-125-13	MALS EMT Light Bar - Installed in Turf	per each
L-125-14	MALS EMT Light Bar - Overrun Pavement	per each
L-125-15	MALS MG20 Light Bar - Installed in EMAS	per each
L-125-16	MALS MG20 Light Bar - Installed in Turf	per each
L-125-17	MALS Semi Flush Light Bar - Full Strength Pavement	per each
L-125-18	MALSR - Distribution Panel / Junction Box	per each
L-125-19	MALSR Equipment Rack	per each
L-125-20	MALSR Shelter	per each
L-125-21	MALSR Shelter EES Grounding and Lightning Protection	per each
L-125-22	Relocated Storage Shelter	per each
L-125-23	Threshold Light Bar - Full Strength Pavement	per each

L-125-24	Utility Requirements / Coordination with Georgia Power	per lump sum
L-125-25	L-858 LED Sign, 3-Module on a New Concrete Sign Base	per each
L-125-26	Install New Sign Panels on Existing Signs	per each
L-125-27	Install 10KW L-828 Constant Current Regulator	Per each
L-125-28	Relocate Existing MALSR Equipment to New MALSR Shelter	Per lump sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-18	Standards for Airport Sign Systems
AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-28	Precision Approach Path Indicator (PAPI) Systems
AC 150/5345-39	Specification for L-853, Runway and Taxiway Retroreflective Markers
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5345-44	Specification for Runway and Taxiway Signs
AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Specification for Series to Series Isolation Transformers for Airport Lighting Systems
AC 150/5345-51	Specification for Discharge-Type Flashing Light Equipment
AC 150/5345-53	Airport Lighting Equipment Certification Program

Engineering Brief (EB)

EB No. 67	Light Sources Other than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures

END OF ITEM L-125

Item L-110 Airport Underground Electrical Duct Banks and Conduits

DESCRIPTION

110-1.1 This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrelling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

EQUIPMENT AND MATERIALS

110-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Resident Engineer.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications and acceptable to the Resident Engineer. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the Resident Engineer and replaced with materials, that comply with these specifications, at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the Resident Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the Resident Engineer, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The Resident Engineer reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes specified in this document.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by

the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

110-2.2 Steel conduit. Rigid galvanized steel (RGS) conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242. All RGS conduits or RGS elbows installed below grade, in concrete, permanently wet locations or other similar environments shall be painted with a 10-mil thick coat of asphaltum sealer or shall have a factory-bonded polyvinyl chloride (PVC) cover. Any exposed galvanizing or steel shall be coated with 10 mils of asphaltum sealer. When using PVC coated RGS conduit, care shall be exercised not to damage the factory PVC coating. Damaged PVC coating shall be repaired per the manufacturer's written instructions. In lieu of PVC coated RGS, corrosion wrap tape shall be permitted to be used where RGS is in contact with direct earth."

110-2.3 Plastic conduit. Plastic conduit and fittings-shall conform to the following requirements:

- UL 514B covers W-C-1094-Conduit fittings all types, classes 1 thru 3 and 6 thru 10.
- UL 514C covers W-C-1094- all types, Class 5 junction box and cover in plastic (PVC).
- UL 651 covers W-C-1094-Rigid PVC Conduit, types I and II, Class 4.
- UL 651A covers W-C-1094-Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4.

Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

a. Type I–Schedule 40 and Schedule 80 PVC suitable for underground use either direct-buried or encased in concrete.

b. Type II–Schedule 40 PVC suitable for either above ground or underground use.

c. Type III – Schedule 80 PVC suitable for either above ground or underground use either direct-buried or encased in concrete.

d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

110-2.4 Split conduit. Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

110-2.5 Conduit spacers. Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads. They shall be designed to accept No. 4 reinforcing bars installed vertically.

110-2.6 Concrete. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

110-2.7 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another Resident Engineer approved third party certification program. Precast concrete structures shall conform to ASTM C478.

110-2.8 Flowable backfill. Not Used.

110-2.9 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) red (electrical power lines, cables, conduit and lighting cable), orange (telephone/fiber optic cabling) with

continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item.

CONSTRUCTION METHODS

110-3.1 General. The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The Resident Engineer shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches (50 mm) inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches (75 mm) per 100 feet (30 m). On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. Under pavement, the top of the duct bank shall not be less than 18 inches (0.5 m) below the subgrade; in other locations, the top of the duct bank or underground conduit shall be be not less than 18 inches (0.5 m) below finished grade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch (6 mm) smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes, etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor’s expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the Resident Engineer of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound (90 kg) test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet (1.5 m).

Unless otherwise shown on the plans, concrete encased duct banks shall be used when crossing under pavements expected to carry aircraft loads, such as runways, taxiways, taxilanes, ramps and aprons. When under paved shoulders and other paved areas, conduit and duct banks shall be encased using flowable fill for protection.

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill may alternatively be used.

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the Resident Engineer. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet (60 cm).

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the Resident Engineer, the unsuitable material shall be removed per Item P-152 and replaced with suitable material. Additional duct bank supports shall be installed, as approved by the Resident Engineer.

All excavation shall be unclassified and shall be considered incidental to Item L-110. Dewatering necessary for duct installation, and erosion per federal, state, and local requirements is incidental to Item L-110.

Unless otherwise specified, excavated materials that are deemed by the Resident Engineer to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.

Any excess excavation shall be filled with suitable material approved by the Resident Engineer and compacted per Item P-152.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables) cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

a. Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred

b. Trenching, etc., in cable areas shall then proceed with approval of the Resident Engineer, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

110-3.2 Duct banks. Unless otherwise shown in the plans, duct banks shall be installed so that the top of the concrete envelope is not less than 18 inches (0.5 m) below the bottom of the base or stabilized base course layers where installed under runways, taxiways, aprons, or other paved areas, and not less than 18 inches (0.5 m) below finished grade where installed in unpaved areas.

Unless otherwise shown on the plans, duct banks under paved areas shall extend at least 3 feet (1 m) beyond the edges of the pavement or 3 feet (1 m) beyond any under drains that may be installed alongside the paved area. Trenches for duct banks shall be opened the complete length before concrete is placed so that if any obstructions are encountered, provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3 inches (75 mm) thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches (75 mm) apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3 inches (75 mm) thick unless otherwise shown on the plans. All conduits shall terminate with female ends for ease of access in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the Resident Engineer for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot (1.5-m) intervals.

All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct.

Install a plastic, detectable, color as noted, 3 to 6 inches (75 to 150 mm) wide tape, 8 inches (200 mm) minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch (75-mm) wide tape only for single conduit runs. Utilize the 6-inch (150-mm) wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches (600 mm) in width, utilize more than one tape for sufficient coverage and identification of the duct bank as required.

When existing cables are to be placed in split duct, encased in concrete, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the Resident Engineer shall be notified so that he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the Resident Engineer.

110-3.3 Conduits without concrete encasement. Trenches for single-conduit lines shall be not less than 6 inches (150 mm) nor more than 12 inches (300 mm) wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches (100 mm) thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding

material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch (6.3 mm) sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches (0.5 m) below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches (60 cm) below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and lot less than 6 inches (150 mm) apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the Resident Engineer for review prior to use.

110-3.4 Markers. The location of each end and of each change of direction of conduits and duct banks shall be marked by a concrete slab marker 2 feet (60 cm) square and 4 - 6 inches (100 - 150 mm) thick extending approximately one inch (25 mm) above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet (61 m) along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word "DUCT" or "CONDUIT" on each marker slab. Impression of letters shall be done in a manner, approved by the Resident Engineer, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the Resident Engineer. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the Resident Engineer. The letters shall be 4 inches (100 mm) high and 3 inches (75 mm) wide with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

110-3.5 Backfilling for conduits. For conduits, 4 inches of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152 except that material used for back fill shall be select material not larger than 4 inches (100 mm) in diameter.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the Resident Engineer.

110-3.6 Backfilling for duct banks. After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152 "Excavation and Embankment" except that the material used for backfill shall be select material not larger than 4 inches (100 mm) in diameter. In addition to the requirements of Item P-152, where duct banks are installed under pavement, one moisture/density test per lift shall be made for each 250 linear feet (76 m) of duct bank or one work period's construction, whichever is less.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the Resident Engineer.

110-3.7 Restoration. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall include sodding and seeding as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

METHOD OF MEASUREMENT

110-4.1 Underground conduits and duct banks shall be measured by the linear feet of conduits and duct banks installed, including encasement, locator tape, trenching and backfill with designated material, and restoration, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

BASIS OF PAYMENT

110-5.1 Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench and backfill with the designated material, and, for drain lines, the termination at the drainage structure. This price shall be full compensation for removal and disposal of existing duct banks and conduits as shown on the plans, furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and specifications.

Payment will be made under:

L-110-1	1W-2" Concrete Encased	per linear foot
L-110-2	1W-2" RGSC Duct Concrete Encased	per linear foot

L-110-3	1W-4" PVC Duct Concrete Encased	per linear foot
L-110-4	1W-6" PVC Duct Direct Earth Buried	per linear foot
L-110-5	2W-2"PVC Concrete Encased	per linear foot
L-110-6	2W-4" PVC Duct Direct Earth Buried	per linear foot
L-110-7	3/4 IN. X 10 FT Copper Clad Ground Rods - Supplemental	per each
L-110-8	4W-4" PVC Duct Direct Earth Buried	per linear foot
L-110-9	4W-4" PVC Duct Concrete Encased	per linear foot
L-110-10	6W-4" PVC Duct Direct Earth Buried	per linear foot
L-110-11	8W-4" PVC Duct Direct Earth Buried	per linear foot
L-110-12	1W-6” PVC Duct Concrete Encased	per linear foot

Addendum 1 Changes

References

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circular (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

ASTM International (ASTM)

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit - Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 1242	Electrical Intermediate Metal Conduit Steel
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

END OF ITEM L-110

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EXISTING MALSR ELECTRICAL ITEMS

	EXISTING MALSR STEADY BURNER LIGHT BAR
	EXISTING MALSR FLASHER
	EXISTING MALSR JUNCTION BOX AND DISTRIBUTION PANEL
	EXISTING MALSR THRESHOLD LIGHT

EXISTING AIRFIELD ELECTRICAL ITEMS

	EXISTING RUNWAY THRESHOLD LIGHT
	EXISTING RUNWAY EDGE LIGHT
	EXISTING STAKE MOUNTED TAXIWAY EDGE LIGHT
	EXISTING BASE MOUNTED TAXIWAY EDGE LIGHT
	EXISTING AIRFIELD GUIDANCE SIGN
	EXISTING MAN HOLE
	EXISTING JUNCTION CAN
X-Y"	EXISTING ELECTRICAL DUCT. X = NUMBER OF CONDUITS IN DUCT, Y = DIAMETER OF CONDUIT IN INCHES
CKT	EXISTING ELECTRICAL CONDUIT/TRENCH. NUMBER OF TIC MARKS INDICATES NUMBER OF EXISTING CABLE(S) IN CONDUIT. CKT = CIRCUIT DESIGNATOR

ELECTRICAL DEMOLITION ITEMS

X	DEMOLISH. COMPLETELY REMOVE UNLESS OTHERWISE NOTED. ITEMS TO BE REMOVED INCLUDE, BUT ARE NOT LIMITED TO: LIGHT FIXTURE OR SIGN, CONCRETE, REBAR, CONDUIT, DUCT BANK, CABLE, COUNTERPOISE, JUNCTION STRUCTURES (ANY DEPTH), AGGREGATE, GROUND RODS, BASE CANS, CONDUIT SPACERS, CONDUIT HOLD DOWN BARS, WARNING TAPE, DRAINAGE CONCECTIONS, GROUND RINGS, AND ALL OTHER INCIDENTALS, AS SHOWN ON PLANS. DEMOLISHED CABLE MUST BE REMOVED BACK TO THE NEXT ADJACENT JUNCTION STRUCTURE TO REMAIN UNLESS OTHERWISE NOTED. (NOTE 14)
	CONDUIT CAP. CAP EXISTING CONDUITS AT DEMOLITION LIMITS WITH APPROPRIATELY SIZED PVC FRICTION FIT CAPS TO PREVENT DIRT AND DEBRIS FROM ENTERING THE CONDUIT. REMOVE CABLE BACK TO ADJACENT JUNCTION STRUCTURES/LIGHT BASES.

ABBREVIATIONS

AWG	-	AMERICAN WIRE GAUGE
BSD	-	BARE SOFT DRAWN
CC	-	CENTER TO CENTER
CE	-	CONCRETE ENCASED
CKT	-	CIRCUIT
CL	-	CENTERLINE
CU	-	COPPER
DEB	-	DIRECT EARTH BURIED
DIA	-	DIAMETER
EOP	-	EDGE OF PAVEMENT
FO	-	FIBER OPTIC
JCP	-	JUNCTION CAN PLAZA
KV	-	KILOVOLT
MAX	-	MAXIMUM
MIN	-	MINIMUM
PC	-	POINT OF CURVATURE
PI	-	POINT OF INFLECTION
PS	-	PAVEMENT SENSOR
PT	-	POINT OF TANGENCY
PVC	-	POLYVINYL CHLORIDE
RGS	-	RIGID GALVANIZED STEEL
RPR	-	RESIDENT PROJECT REPRESENATIVE
SCH	-	SCHEDULE
T/W	-	TAXIWAY
TDZ	-	TOUCH DOWN ZONE
TYP	-	TYPICAL
UNO	-	UNLESS NOTED OTHERWISE
WWF	-	WELDED WIRE FABRIC

NEW MALSR ELECTRICAL ITEMS - FURNISH AND INSTALL

	MALSR LIGHT BAR. SEE MALSR LIGHT PLANE FOR INSTALLATION TYPE OF MALSR LIGHT BAR.
	IN-PAVEMENT MALSR THRESHOLD LIGHT
B	INSTALL L-867B BASE CAN, CLASS 1A, WITH 3/8" STEEL COVER
P C	AIRCRAFT RATED MANHOLE COMPLETE AND INSTALLED WITH ALL APPURTENANCES. P = POWER MANHOLE. \PC = COMMUNICATIONS MANHOLE.

NEW AIRFIELD LIGHTING ELECTRICAL ITEMS - FURNISH AND INSTALL

	INTERCEPT EXISTING CONDUIT AND CONNECT TO NEW CONDUIT WITH APPROPRIATELY SIZED PVC COUPLING. INSTALL NEW CABLE(S) BACK TO ADJACENT JUNCTION STRUCTURES/LIGHT BASES AS SHOWN ON CIRCUITING PLANS.
	L-861T(L), LED, OMNI-DIRECTIONAL, TAXIWAY EDGE LIGHT. INSTALL STEM ON AN L-867B BASE CAN WITH A BASE PLATE, PROPERLY SIZED L-830 TRANSFORMER AND L-823 CONNECTORS.
R Y G C	L-862 BIDIRECTIONAL ELEVATED RUNWAY EDGE LIGHT COLUMN MOUNTED ON AN L-867B BASE CAN WITH A BASE PLATE AND PROPERLY SIZED L-830 TRANSFORMER AND L-823 CONNECTORS. R = RED LENS, Y = YELLOW LENS, G = GREEN LENS, C = CLEAR LENS (WHITE)
G	L-850D UNIDIRECTIONAL IN-PAVEMENT RUNWAY DISPLACED THRESHOLD LIGHT INSTALLED ON AN L-868B BASE CAN WITH A FLANGE RING, SPACERS, PROPERLY SIZED L-830 TRANSFORMER AND L-823 CONNECTORS. G = GREEN LENS
R Y	L-850C BIDIRECTIONAL IN-PAVEMENT RUNWAY EDGE LIGHT INSTALLED ON AN L-868B BASE CAN WITH A FLANGE RING, SPACERS, PROPERLY SIZED L-830 TRANSFORMER AND L-823 CONNECTORS. R = RED LENS, Y = YELLOW LENS
R R	L-862E BIDIRECTIONAL ELEVATED RUNWAY END LIGHT COLUMN MOUNTED ON AN L-867B BASE CAN WITH A BASE PLATE AND PROPERLY SIZED L-830 TRANSFORMER AND L-823 CONNECTORS. R = RED LENS
G	L-862E UNIDIRECTIONAL ELEVATED RUNWAY DISPLACED THRESHOLD LIGHT COLUMN MOUNTED ON AN L-867B BASE CAN WITH A BASE PLATE AND PROPERLY SIZED L-830 TRANSFORMER AND L-823 CONNECTORS. G = GREEN LENS
	L-858(L) AIRFIELD SIGN, LED, INSTALLED ON A CONCRETE FOUNDATION WITH L-867B CLASS 1, 24" DEEP BASE CAN, PROPERLY SIZED L-830 TRANSFORMER AND L-823 CONNECTORS. SEE SIGN SCHEDULE FOR MORE INFORMATION.
JCP-X(#)	JUNCTION CAN PLAZA IN CONCRETE BASE. JCP-X = JUNCTION CAN PLAZA IDENTIFICATION NUMBER. # = NUMBER OF CLASS 1A L-867D BASE CANS IN PLAZA.
CKT	2" SCH. 40 PVC CONDUIT, DIRECT EARTH BURIED IN UNPAVED AREAS, CONCRETE ENCASED UNDER FULL STRENGTH PAVEMENT. NUMBER OF TICK MARKS INDICATE THE NUMBER OF NEW L-824, TYPE C, 5 KV, #8 AWG, CABLES INSTALLED IN DUCT. CKT = CIRCUIT DESIGNATOR. NO TICK MARKS AND CIRCUIT DESIGNATOR INDICATES A SPARE CONDUIT.
X-Y"	PROPOSED ELECTRICAL DUCT BANK, SCHEDULE 40 PVC CONCRETE ENCASED. X = NUMBER OF CONDUITS IN DUCT, Y = DIAMETER OF CONDUIT IN INCHES. AND END OF DUCT MARKER SHALL BE INSTALLED ABOVE EACH END OF THE DUCT.
X-Y"	PROPOSED ELECTRICAL DUCT BANK, SCHEDULE 80 PVC DIRECT EARTH BURIED. X = NUMBER OF CONDUITS IN DUCT, Y = DIAMETER OF CONDUIT IN INCHES. AND END OF DUCT MARKER SHALL BE INSTALLED ABOVE EACH END OF THE DUCT.

1

NOTES:

1. PROJECT PAY ITEMS: THE PROJECT PAY ITEMS ARE PROVIDED TO BE INCLUSIVE OF ALL WORK TO BE PERFORMED AS SHOWN IN THE CONTRACT DOCUMENTS. ALL WORK NOT IDENTIFIED WITH A SPECIFIC PAY ITEM IS TO BE CONSIDERED REQUIRED WORK TO COMPLETE THE PROJECT, AND IS TO BE ANCILLARY TO THE COST OF PROJECT PAY ITEMS PROVIDED.
2. WHENEVER, IN THE CONTRACT DOCUMENTS, THE WORDS "PROVIDE", "FURNISH", "INSTALL", "FURNISH AND INSTALL", OR OTHER WORDS OF LIKE IMPORTANCE ARE USED, IT SHALL BE UNDERSTOOD THAT THE INTENT OF THE CONTRACT DOCUMENTS IS TO PROVIDE FOR THE CONSTRUCTION AND COMPLETION IN EVERY DETAIL OF THE WORK DESCRIBED. IT IS FURTHER INTENDED THAT THE CONTRACTOR SHALL FURNISH ALL LABOR, SUPERVISION, MATERIALS, EQUIPMENT, TOOLS, TRANSPORTATION, SUPPLIES, TESTING AND INCIDENTALS REQUIRED TO COMPLETE THE WORK IN ACCORDANCE WITH THE DRAWINGS (PLANS), SPECIFICATIONS AND TERMS OF THE CONTRACT.
3. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL REQUIRED PERMITS, LICENSES, ETC., PRIOR TO COMMENCEMENT OF WORK. THE COST OF PERMITS, LICENSES, ETC., SHALL BE INCIDENTAL TO AND INCLUDED IN THE BID PRICE FOR THE RESPECTIVE PAY ITEMS.
4. ITEMS SHOWN IN SCREEN (GHOST/GREYSCALE) ARE EXISTING OR CIVIL ITEMS. ITEMS SHOWN IN SOLID (BOLD) ARE NEW TO BE INSTALLED UNDER THIS CONTRACT, UNLESS OTHERWISE NOTED
5. ALL EXCAVATION WITHIN 5 FEET OF AN UNDERGROUND UTILITY SHALL BE PERFORMED BY HYDRO EXCAVATION METHODS. EXISTING DIRECT BURIED CABLES TO REMAIN SHALL BE ENCLOSED IN SPLIT SCH. 40 DUCT AND ENCASED IN A 3" ENVELOPE OF CONCRETE (P-610) UNDER THE FOLLOWING CONDITIONS:
   A. WHEN WITHIN 20 FEET OF EXCAVATION, TRENCHING, ETC.
   B. WHEN PAVEMENT WIDENING OR EXTENSIONS WILL BE ROUTED OVER THE EXISTING CABLE. THE SPLIT DUCT WILL EXTEND 20 FEET BEYOND THE NEW EDGE OF PAVEMENT.
   C. WHEN ENCOUNTERED DURING CONSTRUCTION.
   D. WHEN SUBJECT TO DAMAGE, IN THE OPINION OF THE OWNER/ENGINEER, FROM CONSTRUCTION ACTIVITIES.
6. AN END OF DUCT MARKER SHALL BE INSTALLED ABOVE EACH END OF THE DUCT.
7. ALL DAMAGE TO UTILITIES OR EXISTING STRUCTURES SHALL BE IMMEDIATELY REPORTED TO THE OWNER. THE OWNER SHALL DETERMINE WHETHER REPAIR OR REPLACEMENT IS NECESSARY. ALL REPAIR METHODS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVED BY THE OWNER PRIOR TO INITIATING THE WORK.
8. IN NEW OR EXISTING PAVEMENT, OR TURF, PRIOR TO PLACEMENT OF THE FINAL LIFT OF PAVEMENT OR TURF, ALL CONDUITS, DUCT BANKS, BASE CANS, COUNTERPOISE, GROUND GRID CONDUCTORS, ETC., SHALL BE INSTALLED AND CONNECTION VERIFIED AND DOCUMENTED.
9. THE CONTRACTOR SHALL VERIFY EXISTING CONDITIONS PRIOR TO STARTING WORK. EXISTING CONDITIONS SHALL BE RECORDED AND SENT TO ENGINEER/RPR FOR VERIFICATION, ANY EXISTING ITEMS DAMAGED DURING CONSTRUCTION SHALL BE REPLACED AT NO ADDITIONAL COST TO OWNER.
10. EXISTING CONDUIT, DUCT BANK, CIRCUITING AND UTILITY INFORMATION IS BASED ON "AS-BUILT" AND "RECORD" DRAWINGS, AND SITE VISITS BY THE ENGINEER. THE EXISTING UTILITY LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE AND SHALL NOT BE SCALED FOR EXACT LOCATIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT THE APPROPRIATE UTILITY/AGENCY, PRIOR TO STARTING WORK, AND STAKE/MARK THE LOCATION OF ALL EXISTING UTILITIES. ANY PLANNED INTERRUPTION OF AN EXISTING SYSTEM OR UTILITY SERVICE SHALL BE COORDINATED AND APPROVED BY THE AUTHORITY, AGENCY OR UTILITY HAVING JURISDICTION, PRIOR TO STARTING WORK.
11. ALL EXISTING SYSTEMS/UTILITIES TO REMAIN SHALL BE PROTECTED FROM DAMAGE, GROUND PENETRATING RADAR (GPR) IS TO BE USED TO LOCATE UNDERGROUND UTILITIES. REPLACEMENT OF ANY DAMAGED EXISTING SYSTEMS/ UTILITIES TO REMAIN SHALL BE IMMEDIATELY REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER AT NO ADDITIONAL COST TO THE OWNER. FAA CABLES, FIBER OPTIC CABLES, OR OTHER CABLES DEEMED NOT SPLICABLE, SHALL BE COMPLETELY REPLACED. DAMAGE TO FAA CABLES WILL RESULT IN THE CONTRACTOR BEING RESPONSIBLE FOR COMPLETE REPLACEMENT OF THE FAA CABLE.
12. ELECTRICAL DEMOLITION WORK SHALL BE LIMITED TO THE AREAS AND SCHEDULES IDENTIFIED IN THE APPROVED PHASING PLAN.
13. ALL WORK SHOWN ON THE DEMOLITION DRAWINGS IS BASED ON FIELD OBSERVATION OF THE ACTUAL EXISTING CONDITIONS AND ON EXISTING "AS-BUILT" DRAWINGS OF THE AREAS AFFECTED. THEY ARE THEREFORE CONSIDERED TO BE SCHEMATIC. IT IS THE INTENT OF THE DEMOLITION DRAWINGS THAT ALL EQUIPMENT, DEVICES, FIXTURES, WIRING MATERIALS, SYSTEMS AND APPURTENANCES, ETC., WHICH ARE NO LONGER REQUIRED AS A RESULT OF THE PROJECT BE REMOVED.
14. ALL REMOVED ITEMS TO BE COMPLETELY DEMOLISHED INCLUDING, BUT NOT LIMITED TO, CABLES, DUCT, BASE CANS, CONCRETE PADS, MANHOLES, ETC., SHALL BE PROPERLY AND LEGALLY DISPOSED OF OFF THE SITE BY THE CONTRACTOR. ALL ITEMS TO BE RELOCATED SHALL BE REMOVED FIRST AND PROPERLY STORED FOR FUTURE INSTALLATION.
15. IT SHALL BE THE CONTRACTORS' RESPONSIBILITY TO DETERMINE THAT ALL AIRFIELD LIGHTING CIRCUITS, EXCEPT THOSE THAT ARE SERVING CLOSED TAXIWAYS OR RUNWAYS, ARE COMPLETELY OPERATIONAL, USING THE NORMAL CONTROL SYSTEM, AT THE END OF EACH WORK SHIFT AND SHALL SO CERTIFY TO THE OWNER/RPR BEFORE THE END OF EACH SHIFT. THE CONTRACTOR SHALL NOT LEAVE THE WORK SITE UNTIL CIRCUIT OPERATION HAS BEEN CONFIRMED BY THE OWNER/RPR.
16. LOCATE AND UTILIZE EXISTING DUCTS WHERE POSSIBLE. MANDREL EXISTING DUCTS TO DETERMINE ACCEPTABILITY FOR USE. THE COST OF MANDRELLING THE EXISTING DUCTS SHALL BE INCIDENTAL. IF EXISTING DUCTS SHOWN ARE DAMAGED, NON-EXISTENT, OR ROUTED DIFFERENTLY, WITH THE PERMISSION OF THE OWNER/ENGINEER, OPEN CUT PAVEMENT AND INSTALL NEW DUCT AS DETAILED IN THE PLANS.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR STORAGE OF ALL ITEMS REQUIRING STORAGE PRIOR TO REINSTALLATION. ALL SIGNS UNITS, LIGHT FIXTURES, ETC. SHALL BE REINSTALLED OR RETURNED TO THE OWNER UNDAMAGED, IN PROPER WORKING CONDITION, CLEANED AND RE-LAMPED. ITEMS WHICH ARE DAMAGED PRIOR TO CONTRACTOR POSSESSION SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER BY THE CONTRACTOR PRIOR TO DEMOLITION AND SHALL BE PHOTO DOCUMENTED. ANY ITEMS DAMAGED AS A RESULT OF CONSTRUCTION ACTIVITIES OR STORAGE SHALL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER. NO ADDITIONAL TIME WILL BE GRANTED FOR DELAYS IN OBTAINING REPLACEMENT EQUIPMENT.
18. ANY REGRADING OR SODDING ASSOCIATED WITH THE ELECTRICAL WORK SHALL BE INCIDENTAL TO THE ELECTRICAL PAY ITEMS.
19. CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL ITEMS SHOWN FOR DEMOLITION AND REMOVAL, INCLUDING LIGHT CANS, CONDUIT, WIRE, CONCRETE BASE, AND OTHER, AND ALL RELATED APPURTENANCES, IN A SAFE AND LEGAL MANNER OFF AIRPORT PROPERTY, UNLESS NOTED OTHERWISE.
20. ALL ITEMS REQUIRING RPR/ENGINEER APPROVAL OR NOTICE MUST ALSO INCLUDE FAA RESIDENT ENGINEER FOR ANY FAA SYSTEM.
21. FOR ALL FAA ITEMS, INCLUDING THE MALSR, THE "OWNER" MEANS THE FAA.
22. PRIOR TO THE START OF WORK, THE CONTRACTOR MUST RECORD EXISTING CONDITIONS OF THE AIRFIELD LIGHTING SYSTEM WITHIN, AND ADJACENT TO, THE PROJECT CONSTRUCTION LIMITS AND SEND PROOF OF CONDITION TO THE RPR AND OWNER AS A SUBMITTAL TO BE VERIFIED AND APPROVED. CONTRACTOR MUST ENSURE ALL EXISTING AND RECENTLY INSTALLED LIGHTS AND SIGNS ARE PROTECTED FROM DAMAGE. ANY ITEMS DAMAGED AFTER APPROVED EXISTING CONDITIONS SUBMITTAL MUST BE FULLY REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. THE CONTRACTOR MUST TAKE CARE NOT TO RUN OVER AIRFIELD LIGHTS WITH VACUUM OR SWEEPER TRUCKS.
23. THE CONTRACTOR SHALL COMPLETELY SURVEY AND STAKE OUT EACH AREAS' LIGHTING LAYOUT PRIOR TO STARTING ANY INSTALLATION. SHOULD ANY IRREGULARITIES OCCUR IN THE LIGHTING LAYOUT, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY. THE BID ITEM PRICE SHALL INCLUDE THE NECESSARY LAYOUT FOR EACH FIXTURE AND THE COST FOR ANY ADDITIONAL ADJUSTMENT OF THE LOCATION OF THE FIXTURES DUE TO THE EXISTING GEOMETRIC CONDITIONS. THE NEW LIGHTING INSTALLATION SHALL BE COORDINATED WITH AND BLEND INTO THE EXISTING INSTALLATION.
24. IF A LIGHT CAN IS INSTALLED INCORRECTLY, THE DUCT/CONDUIT IS PLUGGED/BROKEN, OR THE LIGHT CAN IS SAWED BY THE CONCRETE SAW, THE CONCRETE SLABS OR ASPHALT PAVEMENT AROUND THE LIGHT CAN AND THE LIGHT SHALL BE REMOVED AND REPLACED AT NO ADDITIONAL COST TO THE OWNER.
25. THE DISTANCE SHOWN BETWEEN LIGHTS ON A RADIUS IS CHORD LENGTH, NOT ARC LENGTH.
26. AIRFIELD LIGHTING CONTROL AND MONITORING SYSTEM (ALCMS) - THE UPDATING OF THE ALCMS SHALL BE COMPLETED BY ADB SAFEGATE, INC. THE CONTRACTOR SHALL COORDINATE THE UPDATING OF THE SYSTEM WITH THE AIRPORT AND ADB SAFEGATE, INC. ALL COORDINATION WITH ADB SAFEGATE, INC. IS INCIDENTAL TO THE LUMP SUM PAY ITEM: "L-125-21 COORDINATE UPDATE OF EXISTING ALCMS".

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SUBMITTAL:

BIDDING

ENGINEER OF RECORD:

NORTH ARROW AND SCALE:

PROJECT:

BASE BID RUNWAY 5 EXTENSION

CLIENT:

MACON-BIBB COUNTY

MIDDLE GEORGIA REGIONAL AIRPORT (MCN)
MACON-BIBB COUNTY, GEORGIA

REVISIONS

No.	Date	By	Description
1	6/15/23	JDT	ADDENDUM 1

SHEET TITLE:

ELECTRICAL LEGEND AND GENERAL NOTES

SHEET:

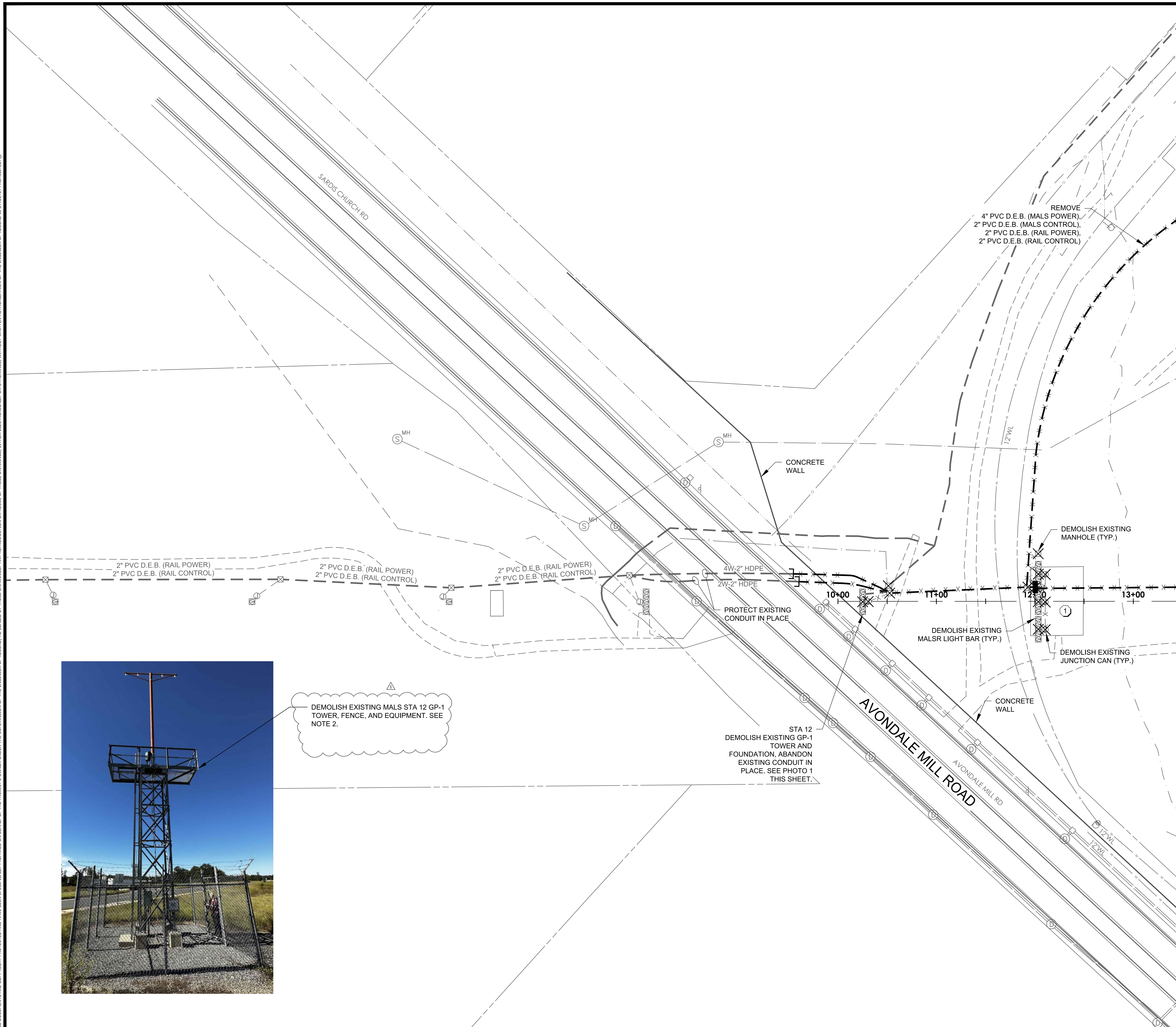
EA-001

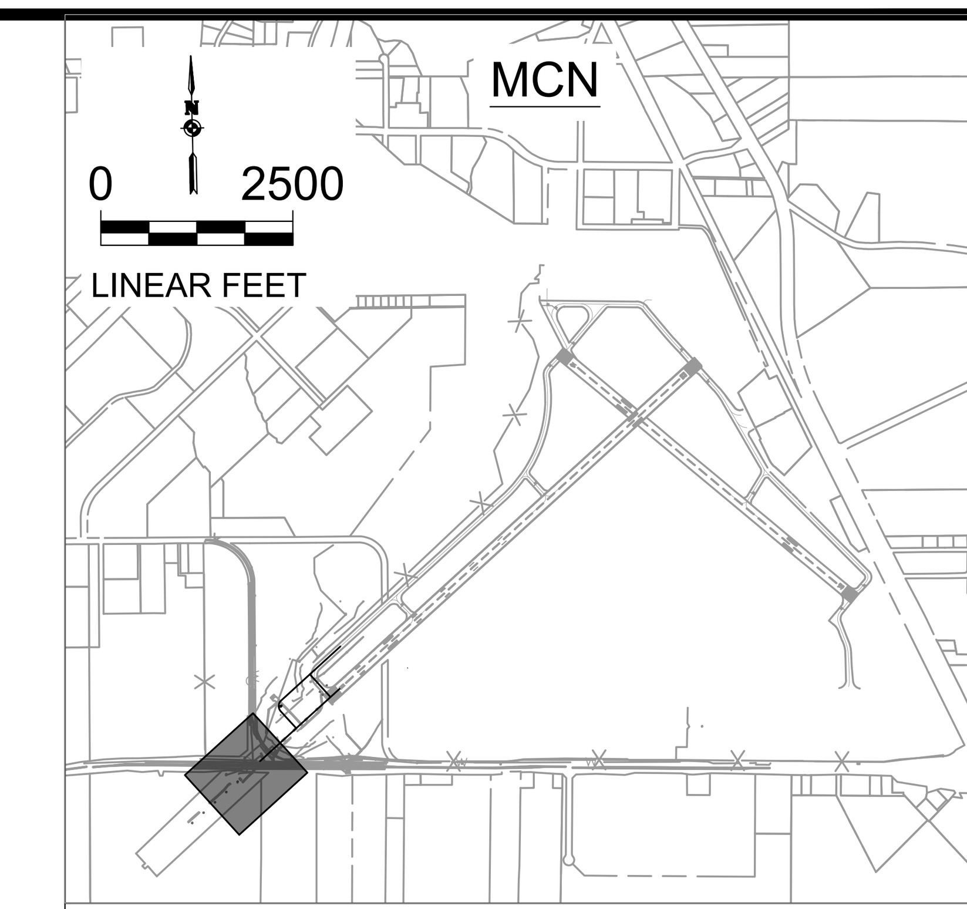
PROJECT NO.:

20202946.0003

DATE:

MAY 2023





KEY MAP

NOTES:

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO DEMOLITION AND IMMEDIATELY NOTIFY THE RPR OF ANY DISCEPANCIES.
2. THE FAA HAS RIGHT OF FIRST REFUSAL FOR ALL ITEMS TO BE DEMOLISHED, REMOVED, OR SALVAGED. ANY PARTS, EQUIPMENT, TOWERS, NOT TO BE REUSED, MUST BE OFFERED TO THE FAA SYSTEM SUPPORT CENTER (SSC) BEFORE DEMOLITION, REMOVAL, OR SALVAGING.
3. STORAGE OF MALSR EQUIPMENT IS INCIDENTAL TO THE LUMP SUM LINE ITEM "REMOVE EXISTING MALSR EQUIPMENT TO BE RELOCATED TO NEW MALSR SHELTER.

KEY NOTES:

(1) DEMOLISH LIGHT BAR CONCRETE FOUNDATION

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ENGINEER OF RECORD:

NORTH ARROW AND SCALE:

50 0 50
GRAPHIC SCALE IN LINEAR FEET

PROJECT:

BASE BID RUNWAY 5 EXTENSION

CLIENT:

MACON-BIBB COUNTY

MIDDLE GEORGIA REGIONAL AIRPORT (MCN)
MACON-BIBB COUNTY, GEORGIA

REVISIONS

No.	Date	By	Description
1	6/15/23	JDT	ADDENDUM 1

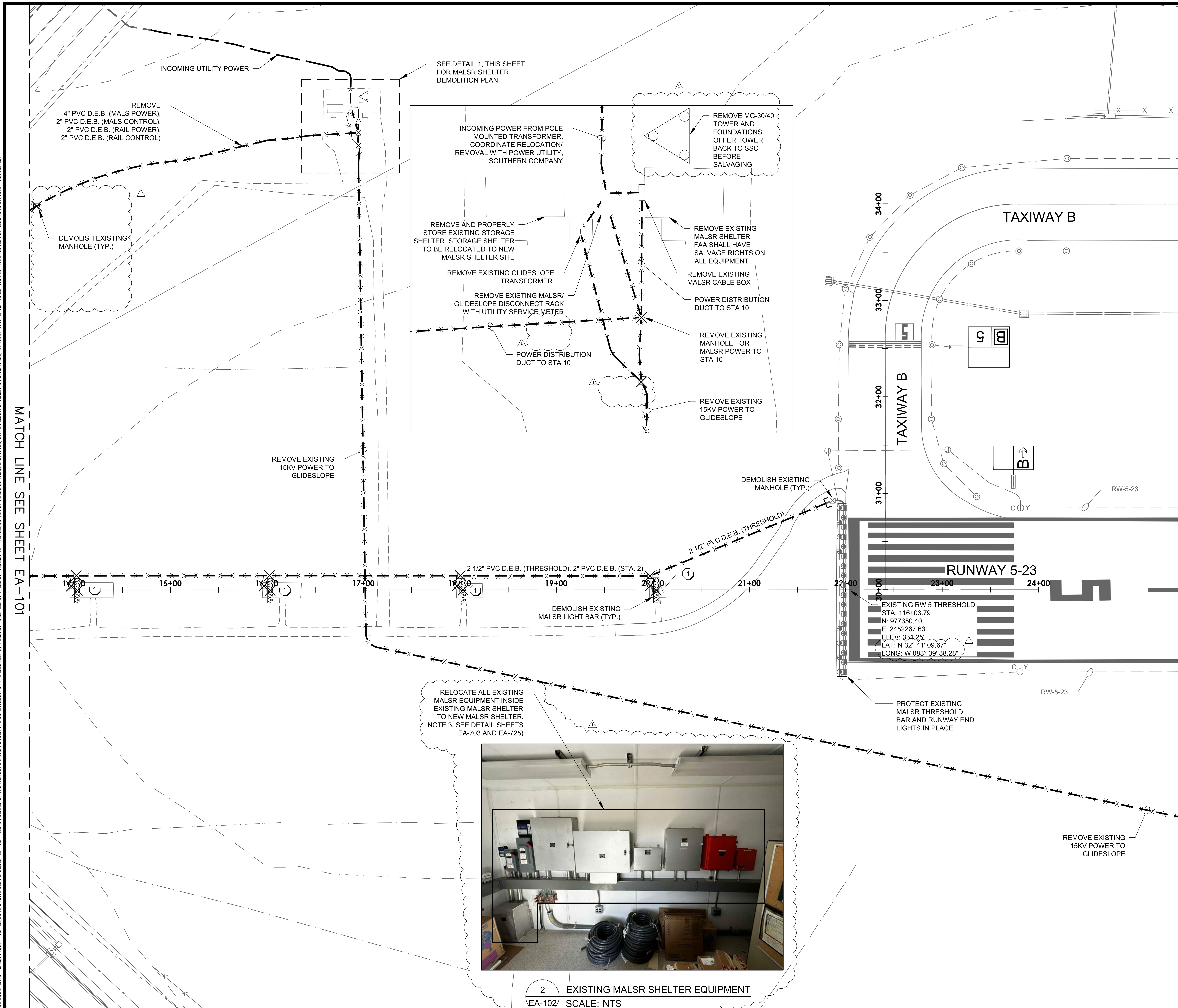
SHEET TITLE:

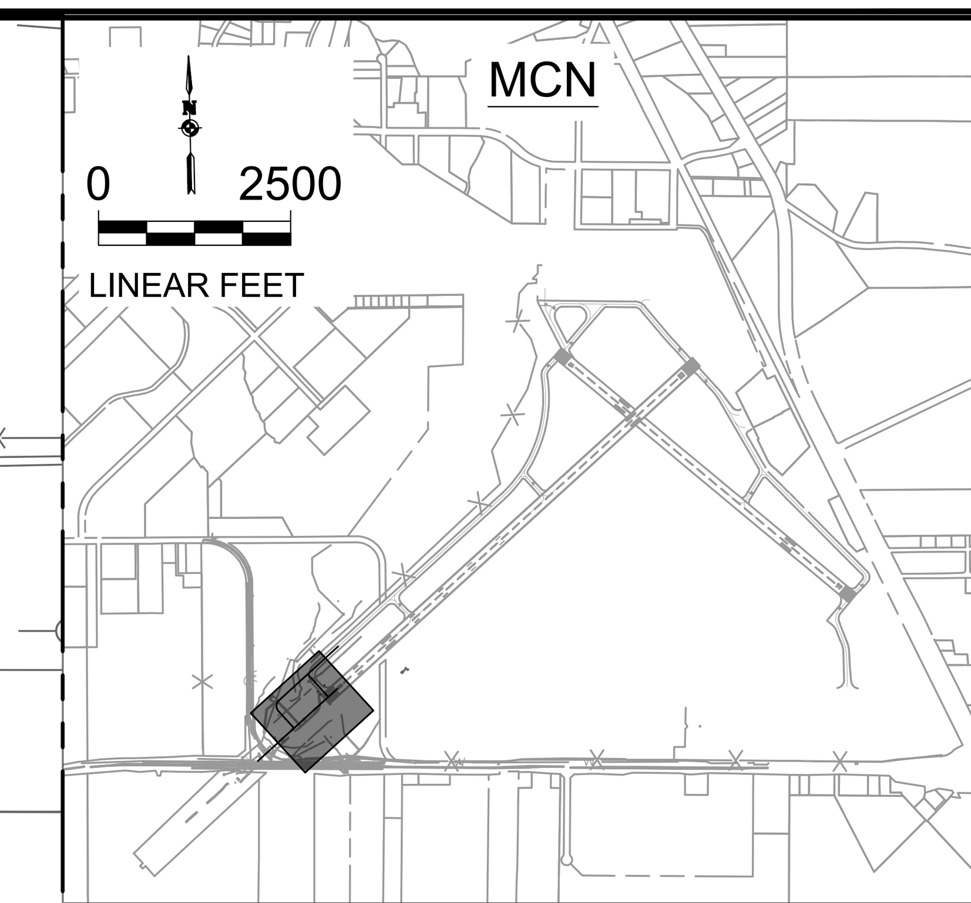
ELECTRICAL DEMOLITION PLAN - SHEET 1 - SHEET 1

SHEET: EA-101

PROJECT NO.: 20202946.0003

DATE: MAY 2023


INCOMING UTILITY POWER
SEE DETAIL 1, THIS SHEET FOR MALSR SHELTER DEMOLITION PLAN
REMOVE 4" PVC D.E.B. (MALS POWER), 2" PVC D.E.B. (MALS CONTROL), 2" PVC D.E.B. (RAIL POWER), 2" PVC D.E.B. (RAIL CONTROL)
DEMOLISH EXISTING MANHOLE (TYP.)
INCOMING POWER FROM POLE MOUNTED TRANSFORMER. COORDINATE RELOCATION/ REMOVAL WITH POWER UTILITY, SOUTHERN COMPANY
REMOVE MG-30/40 TOWER AND FOUNDATIONS. OFFER TOWER BACK TO SSC BEFORE SALVAGING
REMOVE AND PROPERLY STORE EXISTING STORAGE SHELTER. STORAGE SHELTER TO BE RELOCATED TO NEW MALSR SHELTER SITE
REMOVE EXISTING MALSR SHELTER FAA SHALL HAVE SALVAGE RIGHTS ON ALL EQUIPMENT
REMOVE EXISTING GLIDESLOPE TRANSFORMER.
REMOVE EXISTING MALSR CABLE BOX
REMOVE EXISTING MALSR/ GLIDESLOPE DISCONNECT RACK WITH UTILITY SERVICE METER
POWER DISTRIBUTION DUCT TO STA 10
REMOVE EXISTING MANHOLE FOR MALSR POWER TO STA 10
POWER DISTRIBUTION DUCT TO STA 10
REMOVE EXISTING 15KV POWER TO GLIDESLOPE
REMOVE EXISTING 15KV POWER TO GLIDESLOPE
MATCH LINE SEE SHEET EA-101
MATCH LINE SEE SHEET EA-103
TAXIWAY B
TAXIWAY B
34+00
33+00
32+00
31+00
30+00
15+00
17+00
19+00
21+00
22+00
23+00
24+00
DEMOLISH EXISTING MANHOLE (TYP.)
2 1/2" PVC D.E.B. (THRESHOLD)
2 1/2" PVC D.E.B. (THRESHOLD), 2" PVC D.E.B. (STA. 2)
DEMOLISH EXISTING MALSR LIGHT BAR (TYP.)
RUNWAY 5-23
EXISTING RW 5 THRESHOLD
STA: 116+03.79
N: 977350.40
E: 2452267.63
ELEV: 331.25'
LAT: N 32° 41' 09.67"
LONG: W 083° 39' 38.28"
RW-5-23
RW-5-23
PROTECT EXISTING MALSR THRESHOLD BAR AND RUNWAY END LIGHTS IN PLACE
RELOCATE ALL EXISTING MALSR EQUIPMENT INSIDE EXISTING MALSR SHELTER TO NEW MALSR SHELTER. NOTE 3. SEE DETAIL SHEETS EA-703 AND EA-725)
REMOVE EXISTING 15KV POWER TO GLIDESLOPE
2 EA-102 EXISTING MALSR SHELTER EQUIPMENT
SCALE: NTS



KEY MAP

NOTES:

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO DEMOLITION AND IMMEDIATELY NOTIFY THE RPR OF ANY DISCEPANCIES.
2. THE FAA HAS RIGHT OF FIRST REFUSAL FOR ALL ITEMS TO BE DEMOLISHED, REMOVED, OR SALVAGED. ANY PARTS, EQUIPMENT, TOWERS, NOT TO BE REUSED, MUST BE OFFERED TO THE FAA SYSTEM SUPPORT CENTER (SSC) BEFORE DEMOLITION, REMOVAL, OR SALVAGING.
3. STORAGE OF MALSR EQUIPMENT IS INCIDENTAL TO THE LUMP SUM LINE ITEM "REMOVE EXISTING MALSR EQUIPMENT TO BE RELOCATED TO NEW MALSR SHELTER.

KEY NOTES:

(1) DEMOLISH LIGHT BAR CONCRETE FOUNDATION

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SUBMITTAL:

BIDDING

ENGINEER OF RECORD:

NORTH ARROW AND SCALE:

50 0 50

GRAPHIC SCALE IN LINEAR FEET

PROJECT:

BASE BID RUNWAY 5 EXTENSION

CLIENT:

MACON-BIBB COUNTY

MACON-BIBB COUNTY · FORT HAWKINS · EST. 1806 · FORWARD TOGETHER · 1823 · 2014 · 1822

MIDDLE GEORGIA REGIONAL AIRPORT (MCN)
MACON-BIBB COUNTY, GEORGIA

REVISIONS

No.	Date	By	Description
1	6/15/23	JDT	ADDENDUM 1

SHEET TITLE:

ELECTRICAL DEMOLITION PLAN - SHEET 2

SHEET:

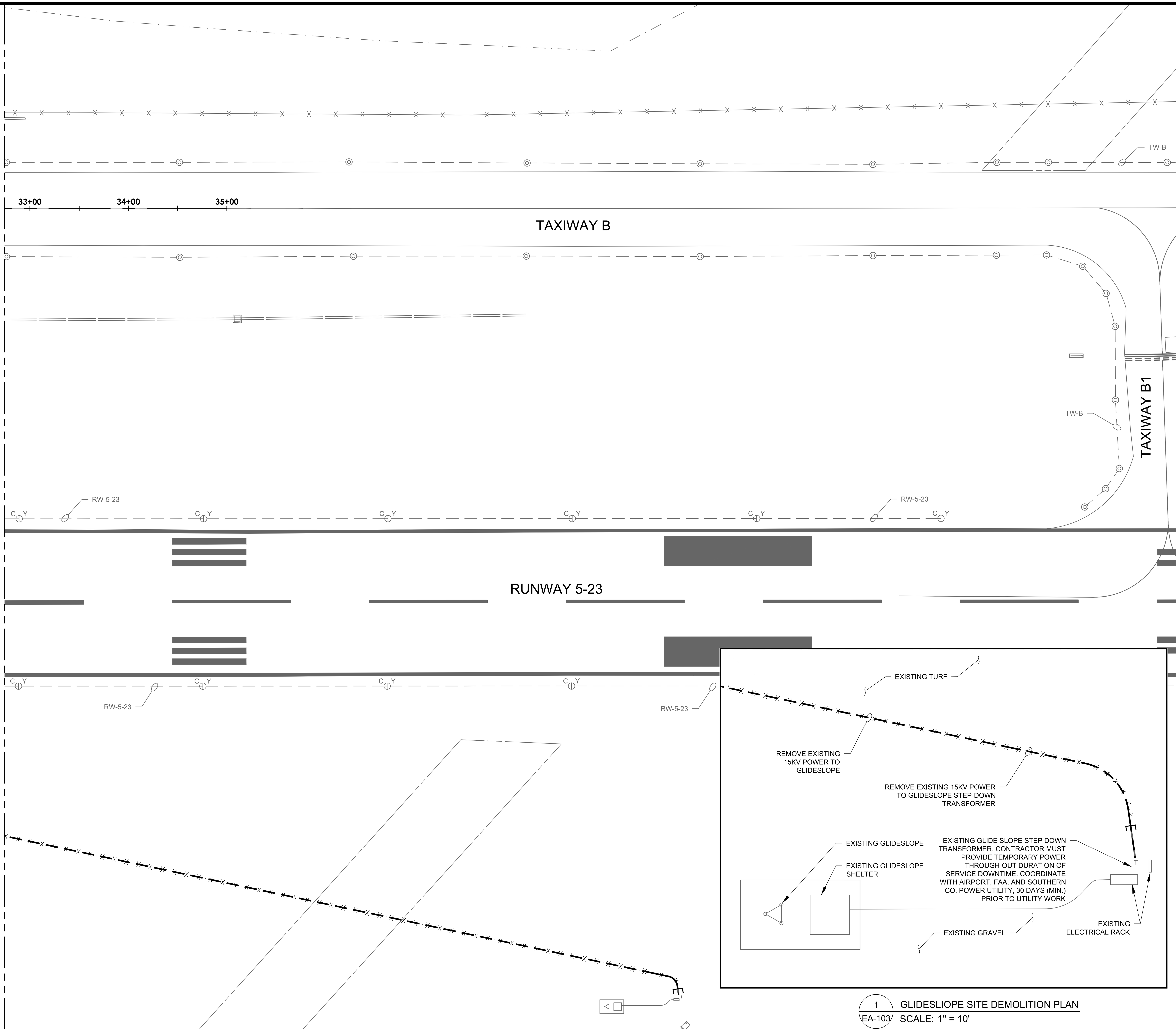
EA-102

PROJECT NO.:

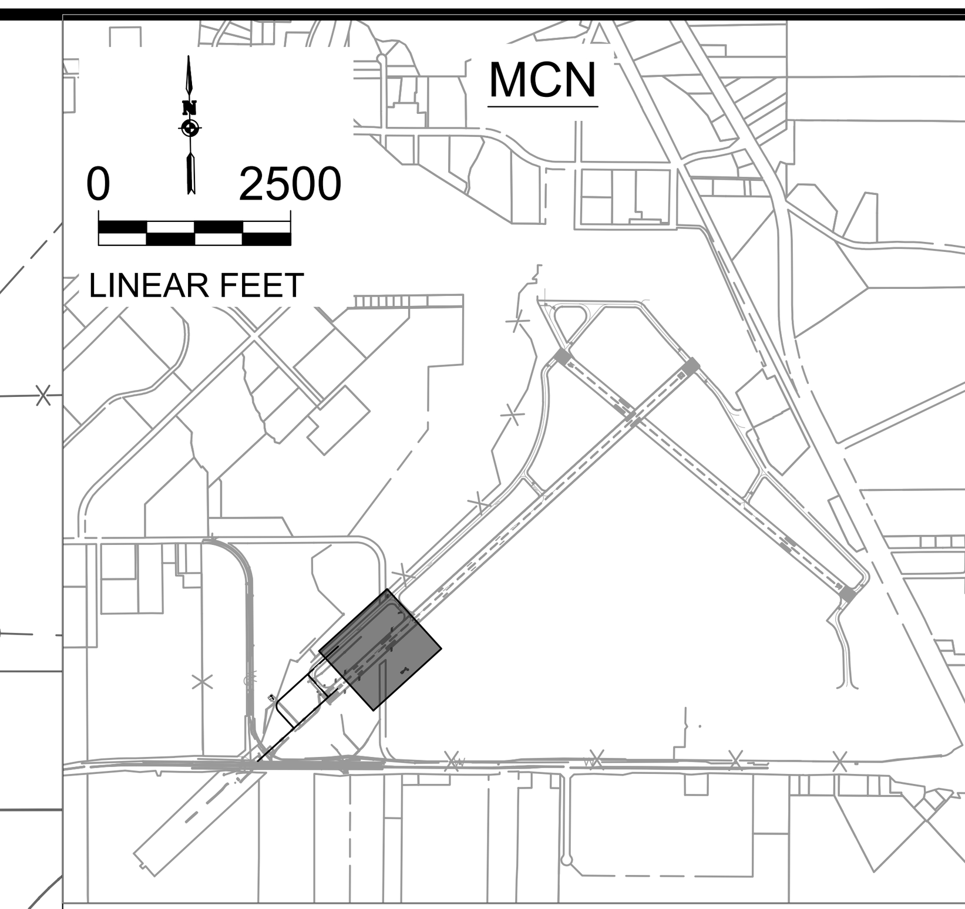
20202946.0003

DATE:

MAY 2023



1 / EA-103 GLIDESLIOPE SITE DEMOLITION PLAN
SCALE: 1" = 10'



KEY MAP

NOTES:

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO DEMOLITION AND IMMEDIATELY NOTIFY THE RPR OF ANY DISCEPANCIES.
2. THE FAA HAS RIGHT OF FIRST REFUSAL FOR ALL ITEMS TO BE DEMOLISHED, REMOVED, OR SALVAGED. ANY PARTS, EQUIPMENT, TOWERS, NOT TO BE REUSED, MUST BE OFFERED TO THE FAA SYSTEM SUPPORT CENTER (SSC) BEFORE DEMOLITION, REMOVAL, OR SALVAGING.
3. STORAGE OF MALSR EQUIPMENT IS INCIDENTAL TO THE LUMP SUM LINE ITEM "REMOVE EXISTING MALSR EQUIPMENT TO BE RELOCATED TO NEW MALSR SHELTER.

KEY NOTES:

(1) DEMOLISH LIGHT BAR CONCRETE FOUNDATION

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ENGINEER OF RECORD:

NORTH ARROW AND SCALE:
50 0 50
GRAPHIC SCALE IN LINEAR FEET

PROJECT:
BASE BID RUNWAY 5 EXTENSION

CLIENT:
MACON-BIBB COUNTY

MIDDLE GEORGIA REGIONAL AIRPORT (MCN)
MACON-BIBB COUNTY, GEORGIA

REVISIONS

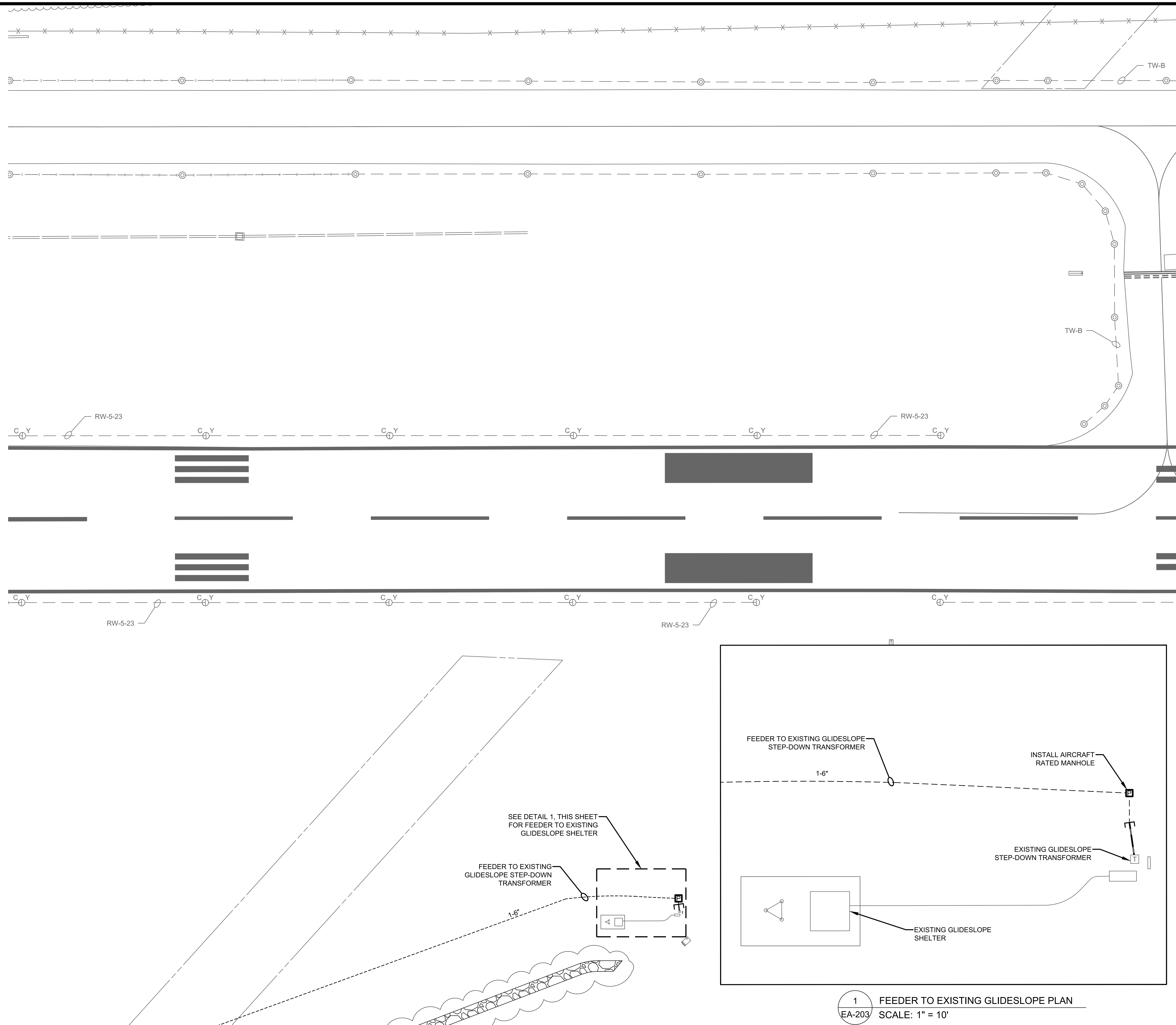
No.	Date	By	Description
1	6/15/23	JDT	ADDENDUM 1

SHEET TITLE: ELECTRICAL DEMOLITION PLAN - SHEET 3

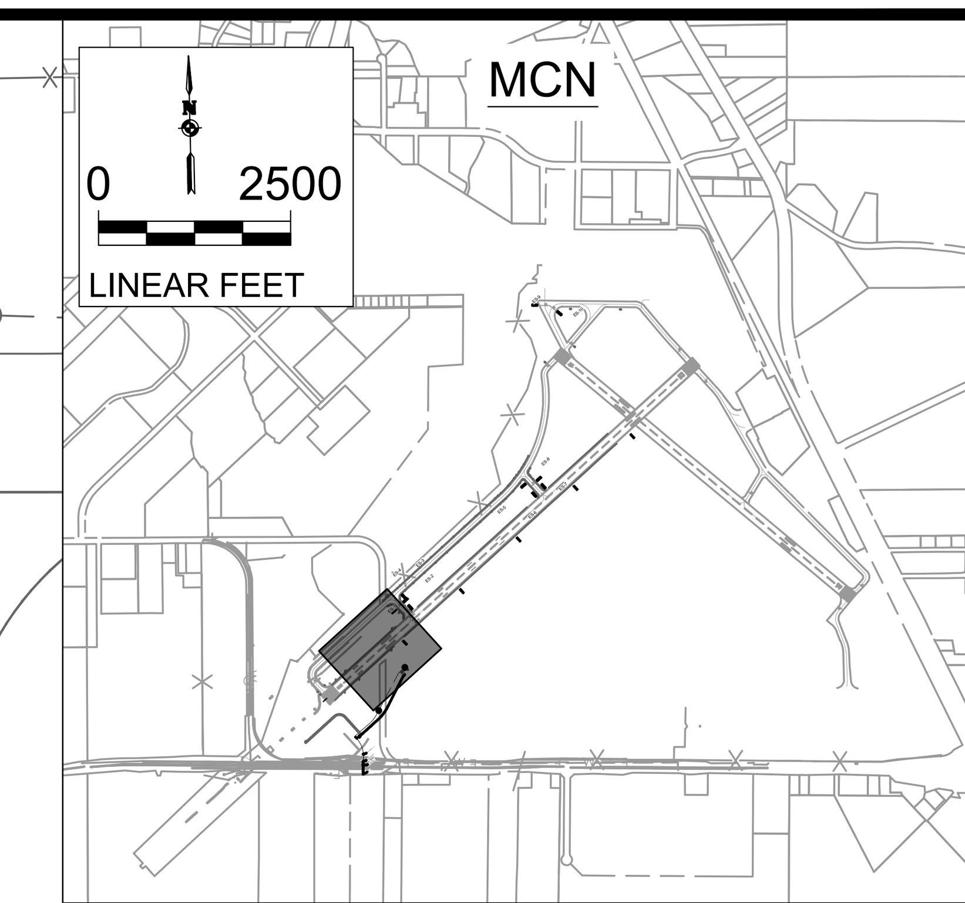
SHEET: EA-103

PROJECT NO.: 20202946.0003

DATE: MAY 2023



MATCH LINE SEE SHEET EA-204



KEY MAP

NOTES:

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO UTILITY FEEDER/EQUIPMENT INSTALLATION AND IMMEDIATELY NOTIFY THE RPR OF ANY DISCEPANCIES.

1 EA-203 FEEDER TO EXISTING GLIDESLOPE PLAN
SCALE: 1" = 10'

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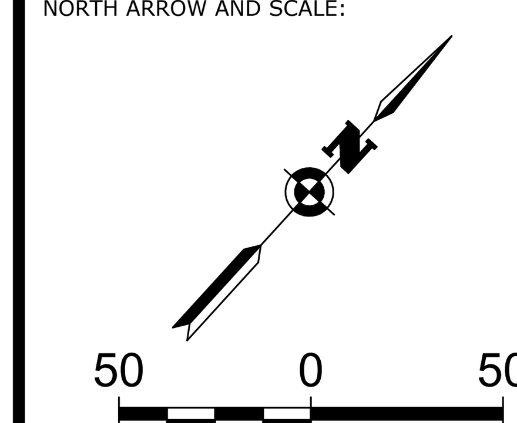
SUBMITTAL:

BIDDING

ENGINEER OF RECORD:

NORTH ARROW AND SCALE:



GRAPHIC SCALE IN LINEAR FEET

PROJECT:

BASE BID RUNWAY 5 EXTENSION

CLIENT:

MACON-BIBB COUNTY

MIDDLE GEORGIA REGIONAL AIRPORT (MCN)
MACON-BIBB COUNTY, GEORGIA

REVISIONS

No.	Date	By	Description

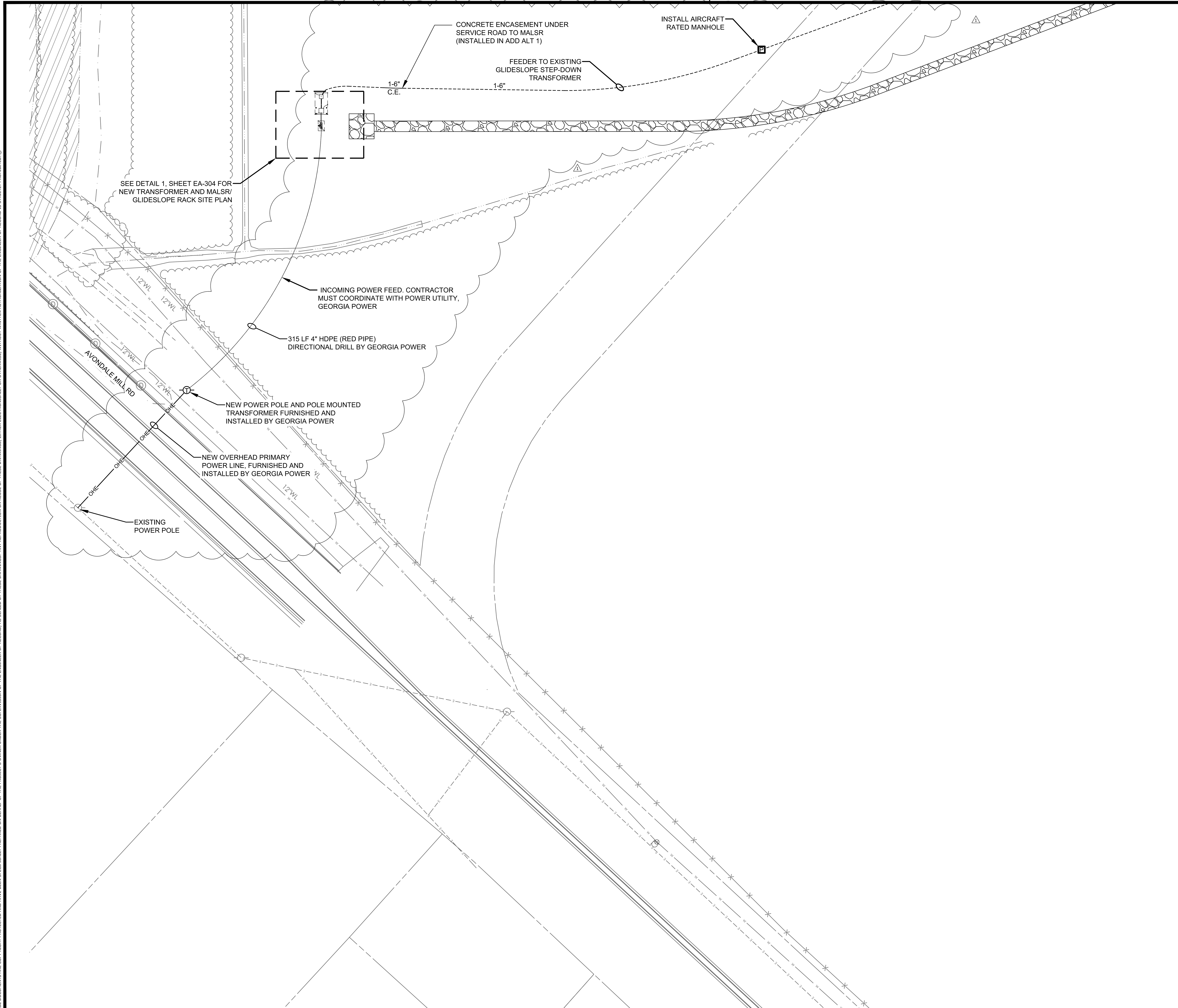
SHEET TITLE:
ELECTRICAL LAYOUT AND CIRCUITING PLANS - SHEET 1

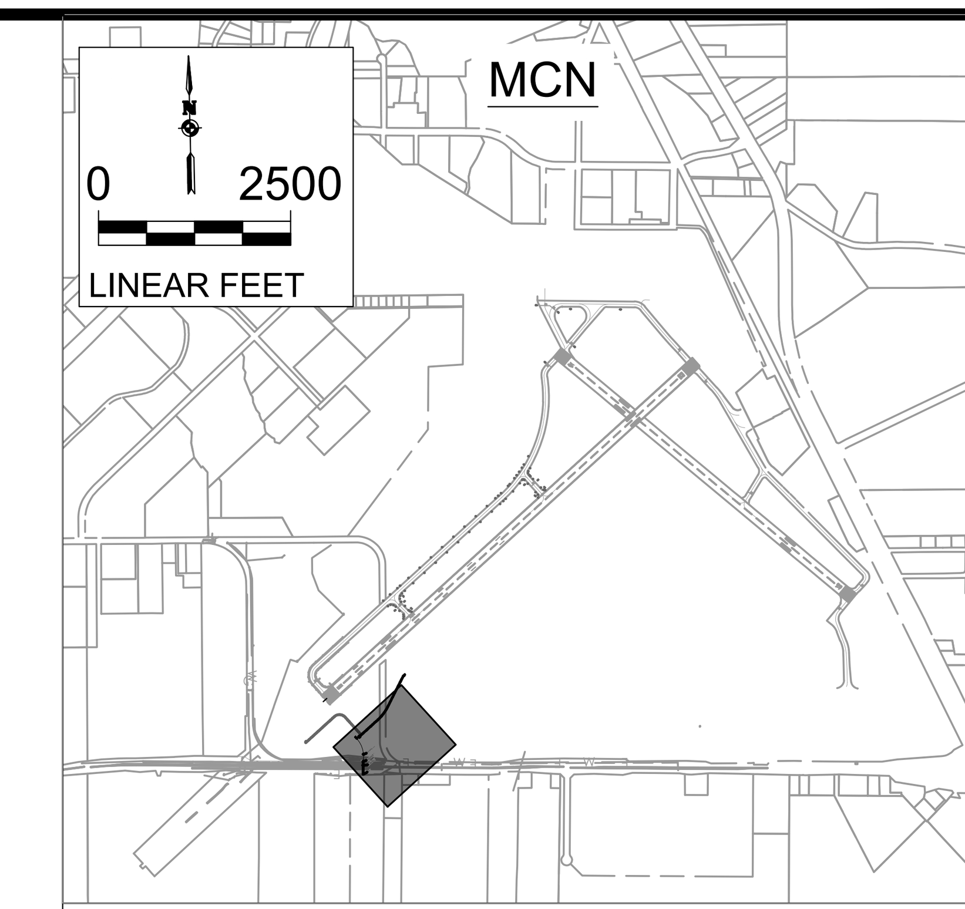
SHEET:
EA-203

PROJECT NO.:
20202946.0003

DATE:
MAY 2023

MATCH LINE SEE SHEET EA-203





KEY MAP

NOTES:

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO UTILITY FEEDER/EQUIPMENT INSTALLATION AND IMMEDIATELY NOTIFY THE RPR OF ANY DISCEPANCIES.

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SUBMITTAL: **BIDDING**

ENGINEER OF RECORD:

NORTH ARROW AND SCALE:

50 0 50
GRAPHIC SCALE IN LINEAR FEET

PROJECT:

BASE BID RUNWAY 5 EXTENSION

CLIENT:

MACON-BIBB COUNTY

MIDDLE GEORGIA REGIONAL AIRPORT (MCN)
MACON-BIBB COUNTY, GEORGIA

REVISIONS

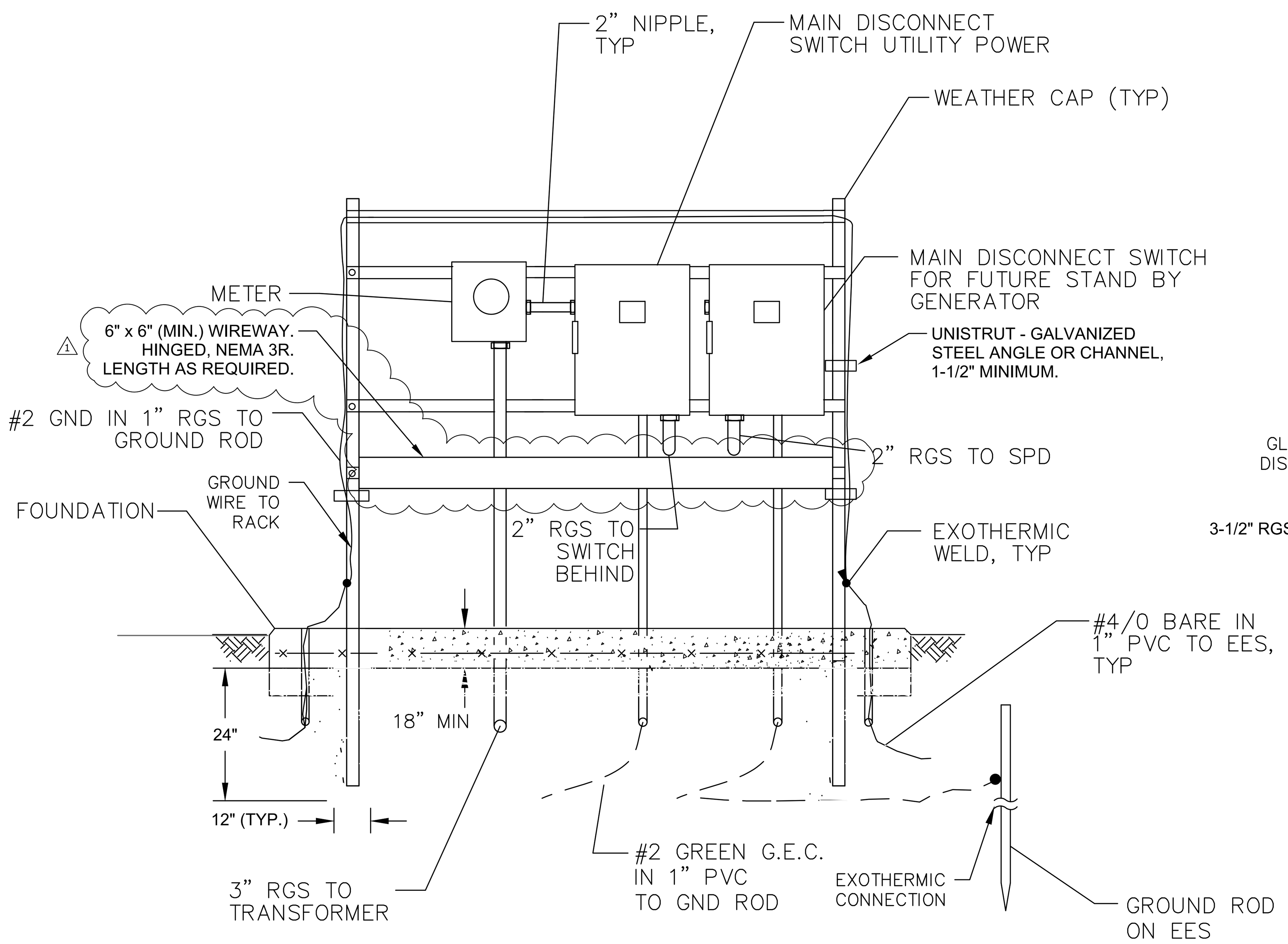
No.	Date	By	Description
1	6/15/23	JDT	ADDENDUM 1

SHEET TITLE:
ELECTRICAL LAYOUT AND CIRCUITING PLANS - SHEET 2

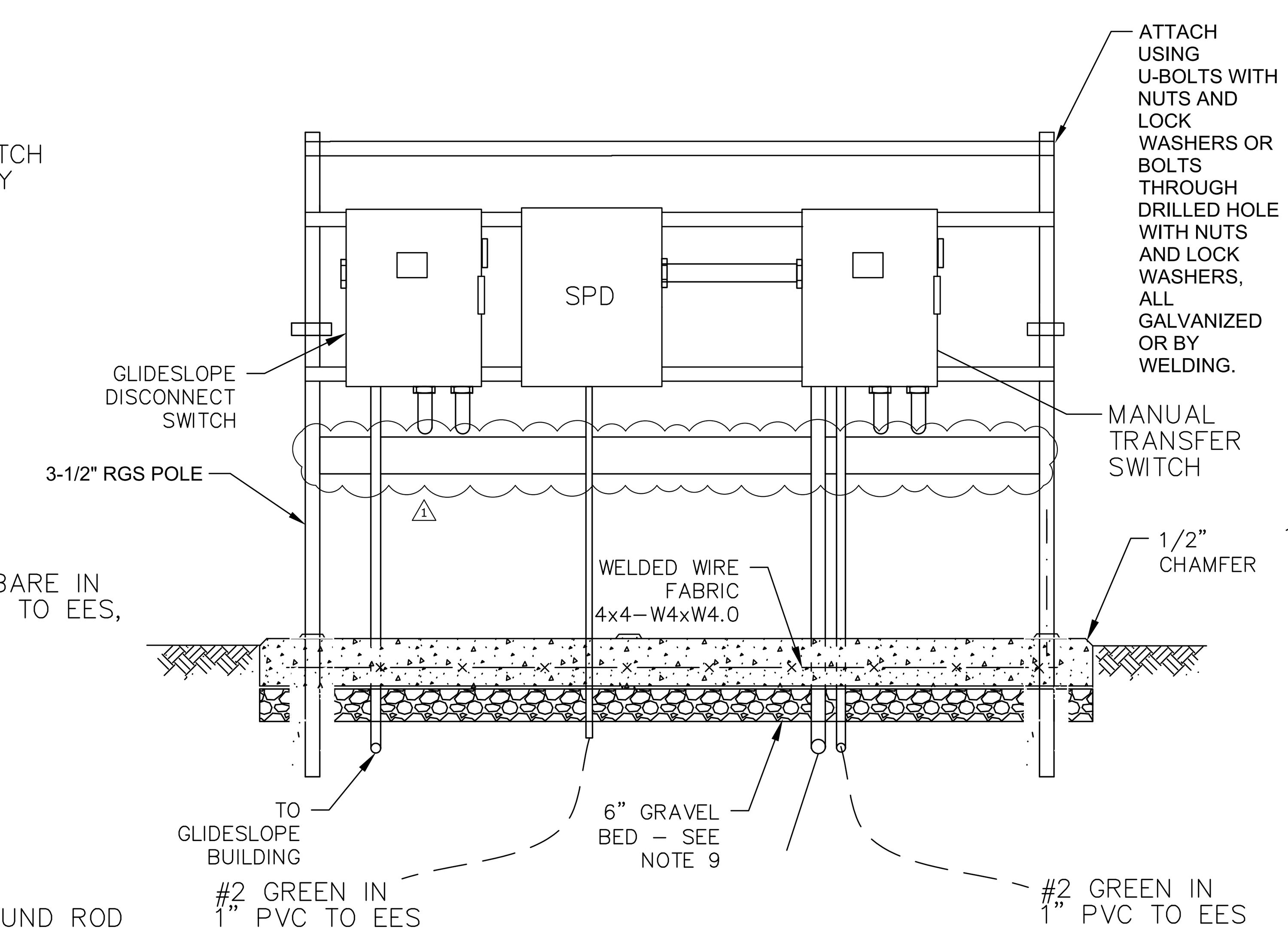
SHEET: EA-204

PROJECT NO.: 20202946.0003

DATE: MAY 2023



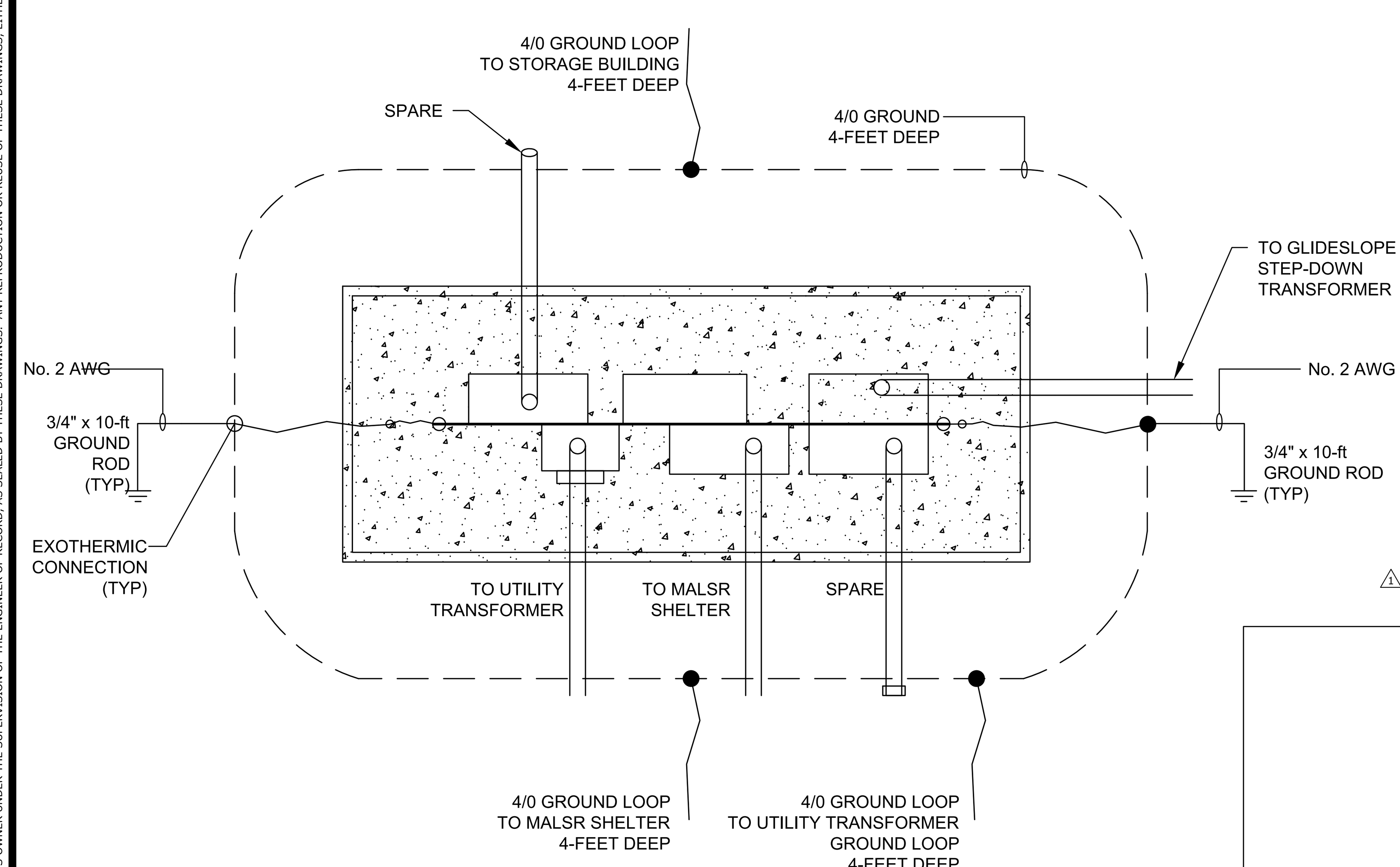
FRONT



BACK

NOTES

1. AFTER ALL EQUIPMENT GROUNDS ARE TERMINATED, COAT EACH GROUND CONNECTION POINT WITH AN ANTI-OXIDANT GREASE.
2. EACH RGS IN J-BOX SHALL BE GROUNDED WITH AN INSULATED GROUNDING BUSHING AND BARE #2 CONDUCTOR.
3. THE 28 STRAND DOWN CONDUCTOR SHALL BE COPPER.
4. SEAL BOTH ENDS OF THE CONDUITS ENTERING EQUIPMENT FROM BELOW GRADE WITH DUCT SEAL.
5. CONNECT GEC TO NEUTRAL BAR. BOND NEUTRAL AND GROUND BAR
6. BOND RGS TO EES WITH #2 BARE.
7. RGS SHALL EXTEND 5' BEYOND EES AND/OR GRAVELED AREAS.
8. EXOTHERMIC WELD SHALL BE NO LESS THAN 18" ABOVE GRADE.
9. GRAVEL USED SHALL BE ENGINEERED GRANULAR MATERIAL OR LOCALLY AVAILABLE APPROVED EQUAL. COMPACTION SHALL BE AT LEAST 95% OF MODIFIED PROCTOR DENSITY AT NEAR OPTIMUM MOISTURE CONTENT.
10. UNDERGROUND CONNECTIONS SHALL BE EXOTHERMIC WELD.



PLAN VIEW

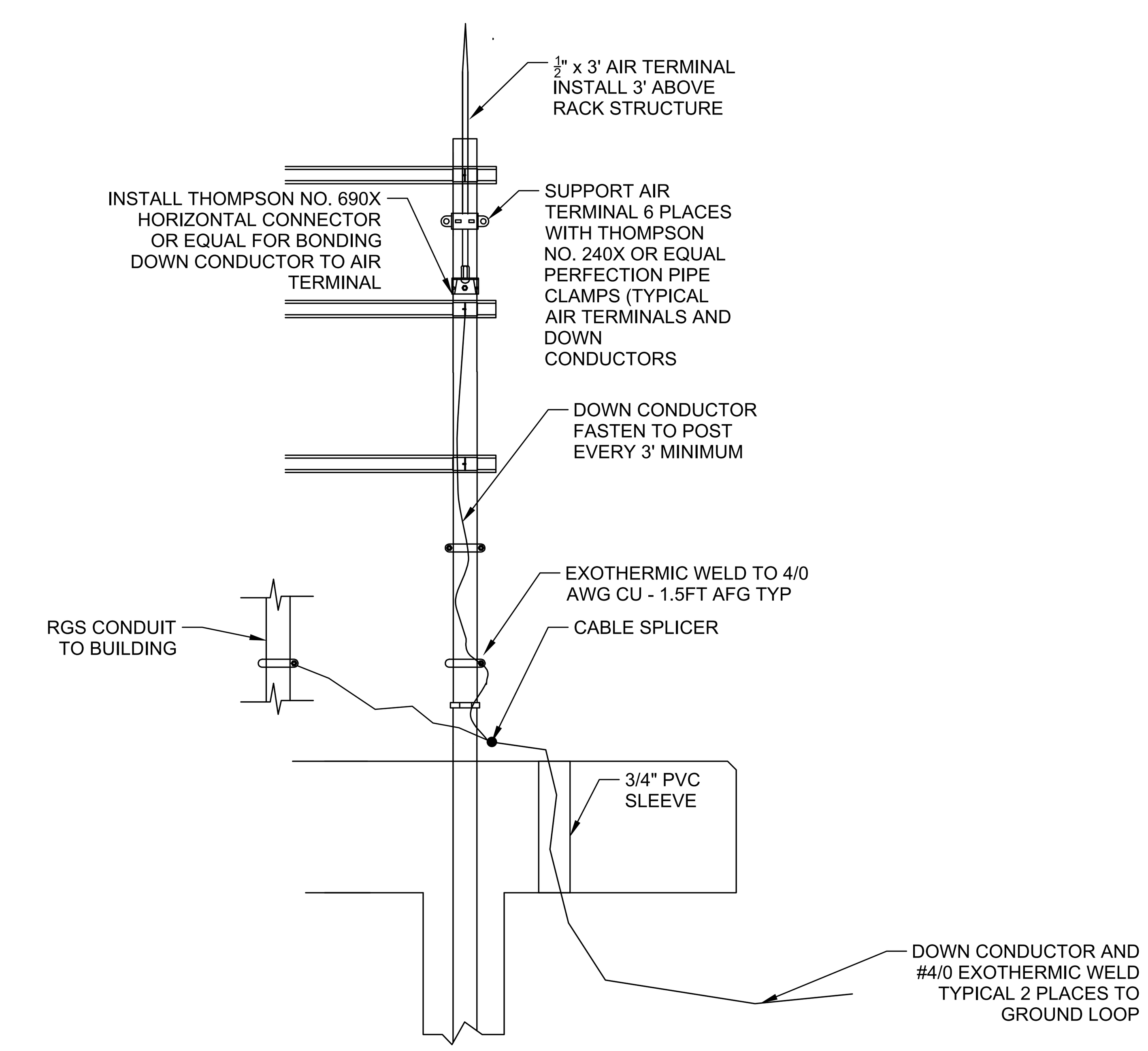
1 E013 METER AND DISCONNECT RACK

NOT TO SCALE

UTILITY SERVICE MATRIX OF RESPONSIBILITY				
	ELECTRICAL CONTRACTOR		POWER COMPANY	
ITEM	FURNISHED	INSTALLED	FURNISHED	INSTALLED
PRIMARY CONDUIT AND CABLES TO TRANSFORMER			X	X
OVERHEAD PRIMARY LINE AND POWER POLE			X	X
POLE MOUNTED UTILITY TRANSFORMER			X	X
SECONDARY CONDUIT TO TRANSFORMER			X	X
SECONDARY CABLES TO TRANSFORMER			X	X
TERMINATIONS AT THE TRANSFORMER			X	X
TERMINATIONS LINE SIDE OF METER			X	X
TERMINATIONS LOAD SIDE OF METER	X	X		
METER AND METER SOCKET			X	X
ALL OTHER WORK	X	X		

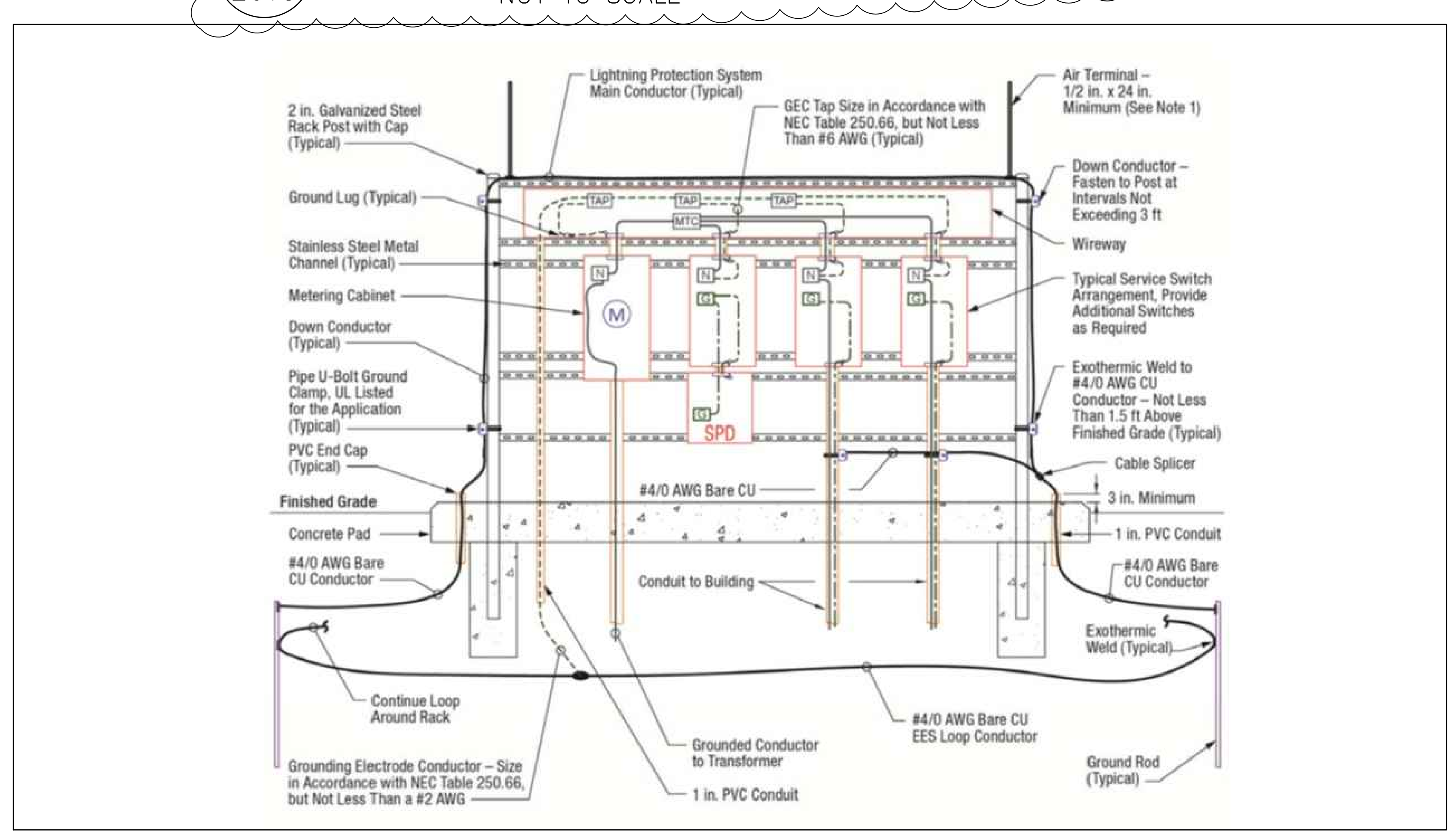
2 E013 UTILITY MATRIX OF RESPONSIBILITY

NOT TO SCALE



3 E013 ELECTRIC RACK INSTALLATION

NOT TO SCALE



NOTE - THE GROUNDING SHALL MEET FAA-STD-019f, FIGURE 4.

4 E013 SAMPLE RACK GROUNDING

NOT TO SCALE

ATO – TECHNICAL OPERATIONS | EASTERN SERVICE AREA

MALSR

RUNWAY 05
INCOMING POWER AND
METER RACK DETAILS

MACON | MIDDLE GEORGIA RGNL AIRPORT | GA

XX PROJECT ENGINEER | XXXXX MGR: ENGINEERING – CENTER A

XX XXX ENGINEERING SERVICES NAVAIDS | XX/XX/XXXX | XXXXXX

E013

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SUBMITTAL: **BIDDING**

ENGINEER OF RECORD:

NORTH ARROW AND SCALE:

PROJECT: **BASE BID RUNWAY 5 EXTENSION**

CLIENT: **MACON-BIBB COUNTY**

MACON-BIBB COUNTY · FORT HAWKINS · EST. 1806 · FORWARD TOGETHER · 1823 · 2014 · 1822

MIDDLE GEORGIA REGIONAL AIRPORT (MCN) MACON-BIBB COUNTY, GEORGIA

REVISIONS

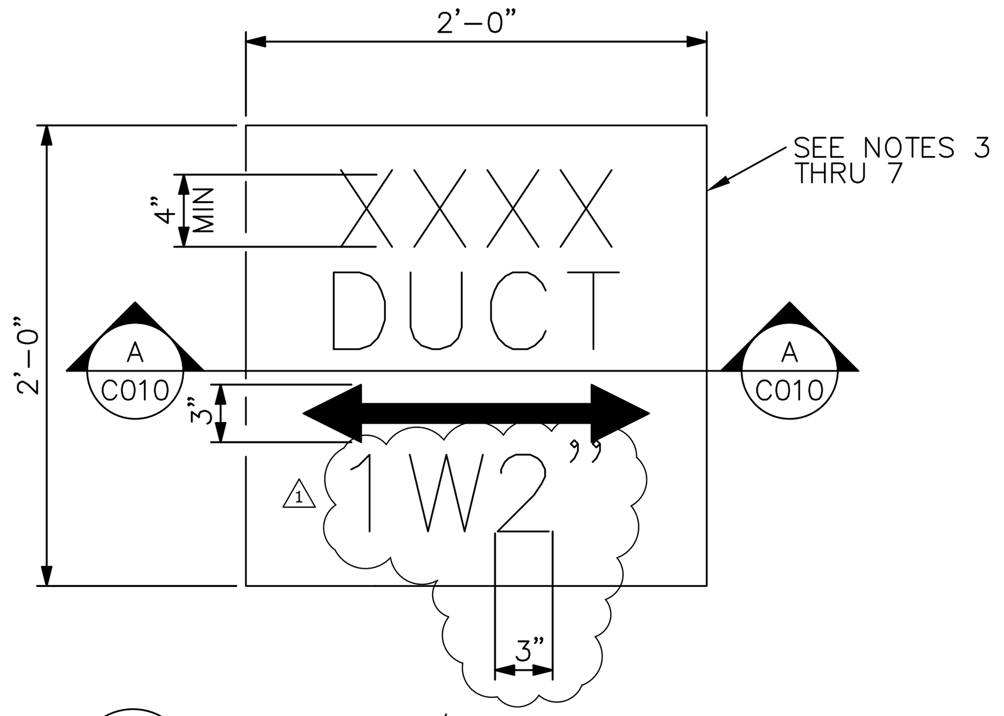
No.	Date	By	Description
1	6/15/23	JDT	ADDENDUM 1

SHEET TITLE: MALSR SHELTER AND GLIDESLOPE SHELTER POWER DETAILS

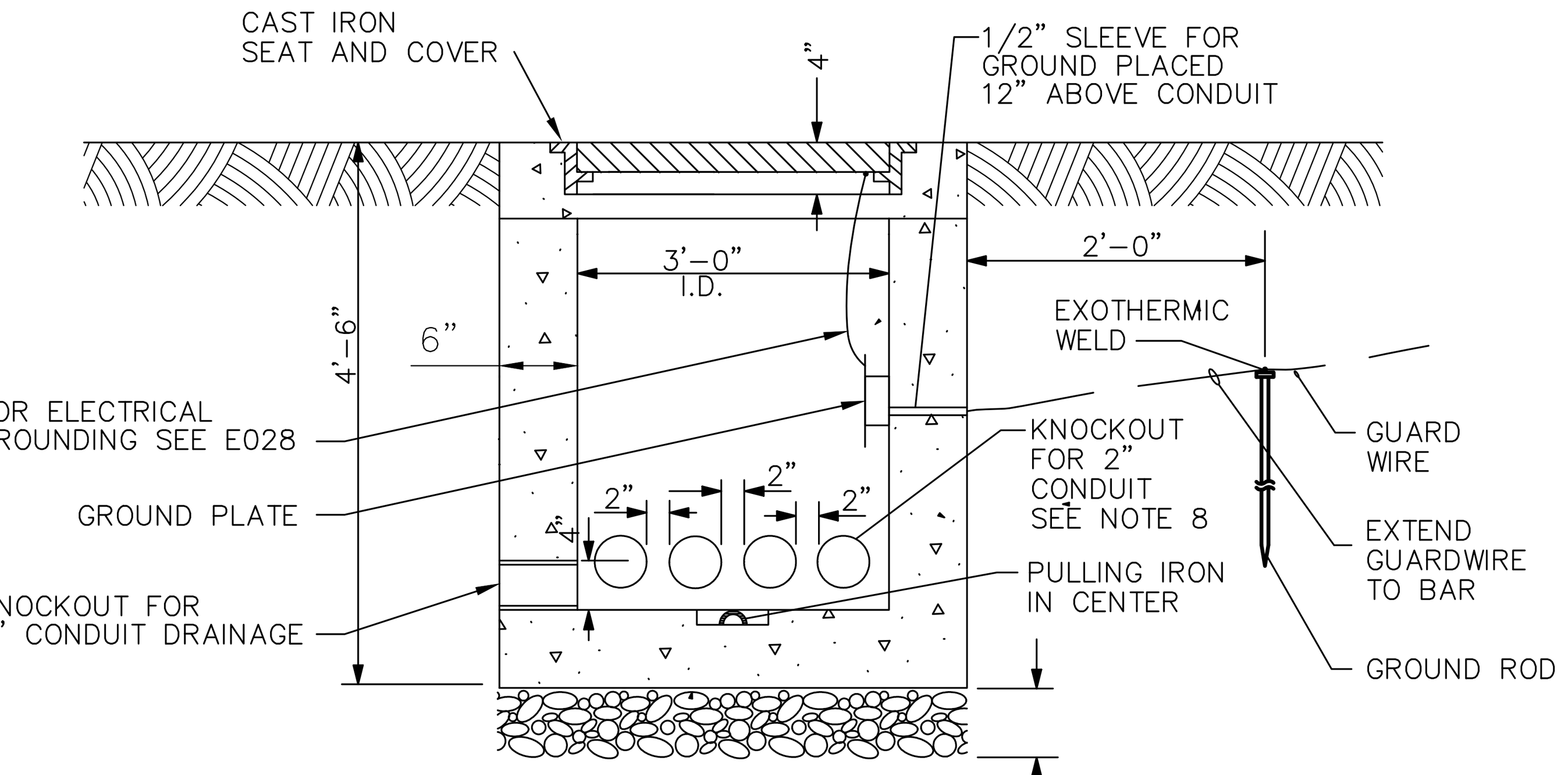
SHEET: EA-301

PROJECT NO.: 20202946.0003

DATE: MAY 2023



1 C010 CABLE/DUCT MARKER
NOT TO SCALE



AIRCRAFT RATED HANDHOLE SHALL BE 100,000 LBS MAXIMUM LOAD WHEN USED WITHIN THE RSA AND TSA.

TRAFFIC RATED HANDHOLE SHALL BE 20,000 LB MAXIMUM LOAD (OUTSIDE OF RSA).

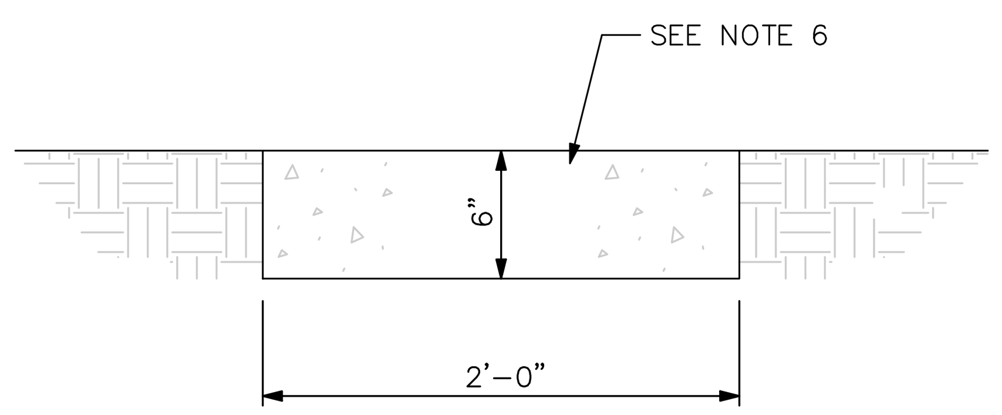
CAST IRON SEAT AND COVER:

A. SHALL BE OF UNIFORM QUALITY, FREE FROM BLOW HOLES, SHRINKAGE, DISTORTION OR DEFECTS. THEY SHALL BE SMOOTH AND WELL-CLEANED BY SHOT BLASTING.
B. SHALL CONFORM TO CLASS 30, GRAY CAST IRON, TO SPECIFICATIONS ASTM-A48-83 AND AASHTO M105-82.
C. SHALL BE LETTERED "FAA", CONTRACTOR TO ADD "POWER" OR "CONTROL" BASED UPON THE APPLICATION.
D. SPRING LOADED COVER.
E. CONCRETE WALLS SHALL BE 6" MINIMUM THICKNESS.
F. LID SHALL BE LOCKABLE INCLUDE ONE UNLOCKING TOOL.
G. PROVIDE PRECAST LIFTING HOOKS ON BOTH BOX AND CAST LID FOR INSTALLATION.

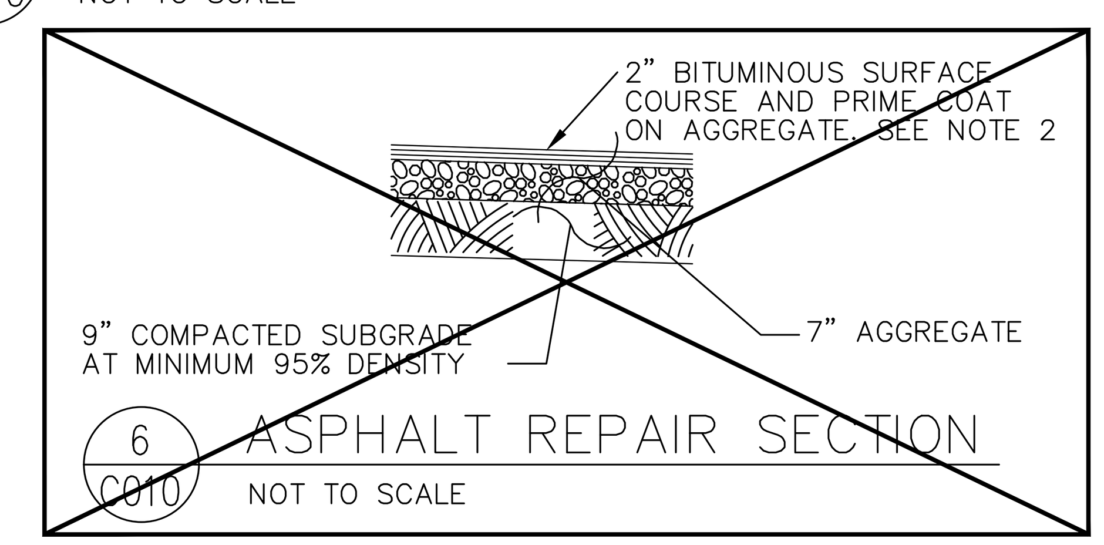
B C010 AIRCRAFT RATED OR TRAFFIC RATED HANDHOLE SECTION
NOT TO SCALE

NOTES

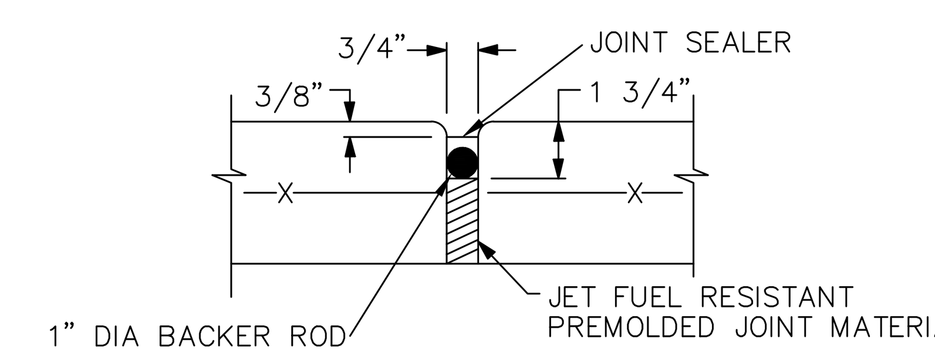
1. THE CONCRETE SHALL DEVELOP A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3000 PSI. MAXIMUM AGGREGATE SIZE SHALL BE 3/4 INCH. CONCRETE SHALL NOT BE LOADED FOR AT LEAST 7 DAYS AFTER CONCRETE PLACEMENT. THE CONCRETE SURFACE SHALL BE LEVEL (+/- 1/8") AND TROWEL FINISHED.
2. GRAVEL USED SHALL BE ENGINEERED GRANULAR MATERIAL OR LOCALLY AVAILABLE APPROVED EQUAL. COMPACTION SHALL BE AT LEAST 95% OF MODIFIED PROCTOR DENSITY AT NEAR OPTIMUM MOISTURE CONTENT.
3. CABLE/DUCT SHALL BE MARKED EVERY 200' ALONG A CABLE/DUCT RUN AT THE BEGINNING AND END, AT EACH CHANGE OF DIRECTION AND AT EACH CABLE SPLICE WITH A CONCRETE SLAB MARKER AS SHOWN.
4. ALL MARKERS SHALL BE INSTALLED WITHIN 24 HOURS OF FINAL BACKFILL OF THE CABLE TRENCH.
5. AFTER THE CONCRETE MARKER HAS SET A MINIMUM OF 24 HOURS, THE TOP SURFACE SHALL BE PAINTED WITH BRIGHT INTERNATIONAL ORANGE PAINT, SPECIFICALLY FOR UNCURED EXTERIOR CONCRETE.
6. DUCT MARKERS. MARK THE LOCATION OF THE ENDS OF ALL DUCTS BY A CONCRETE MARKER SLAB 2 FT. SQUARE AND 4 INCHES THICK LOCATE THE MARKERS ABOVE THE ENDS OF ALL DUCTS OR DUCT BANKS, EXCEPT WHERE DUCTS TERMINATE IN A HANDHOLE, MANHOLE, OR BUILDING. THE WORD "DUCT" MUST BE IMPRESSED ON EACH MARKER SLAB, AS WELL AS THE NUMBER AND SIZE OF DUCTS BENEATH THE MARKER. THE LETTERS MUST BE 4 INCHES HIGH AND 3 INCHES WIDE WITH WIDTH OF STROKE 1/2" INCH AND 1/4" INCH DEEP OR AS LARGE AS THE AVAILABLE SPACE PERMITS. SPECIFY THE NAME OF FACILITY IT IS SERVING. (ALSF IN THIS CASE). ALSO INDICATE THE NUMBER OF CONDUITS AND THE TYPE OF CONDUITS: FOR EXAMPLE 1-P/2C (FOR 1 POWER CONDUIT AND 2 CONTROL CONDUITS). DIRECTIONAL ARROWS MUST BE IMPRESSED ON EACH DUCT MARKER SLAB.
7. ALL MARKERS SHALL BE FLUSH WITH THE GROUND.
8. CONTRACTOR IS RESPONSIBLE FOR INSTALLING ADDITIONAL CORES IN THE GFM HANDHOLES AS REQUIRED BY THE DUCTBANK.



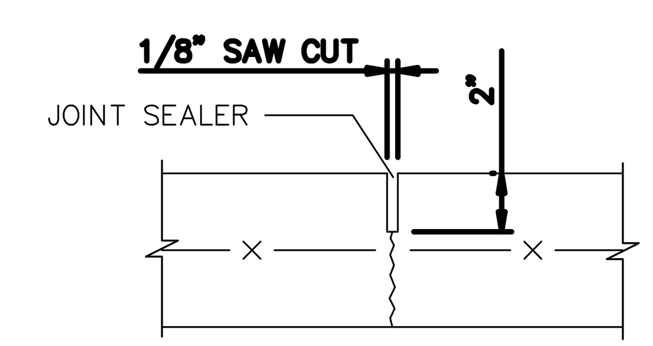
A C010 CABLE/DUCT MARKER SECTION
NOT TO SCALE



6 C010 ASPHALT REPAIR SECTION
NOT TO SCALE

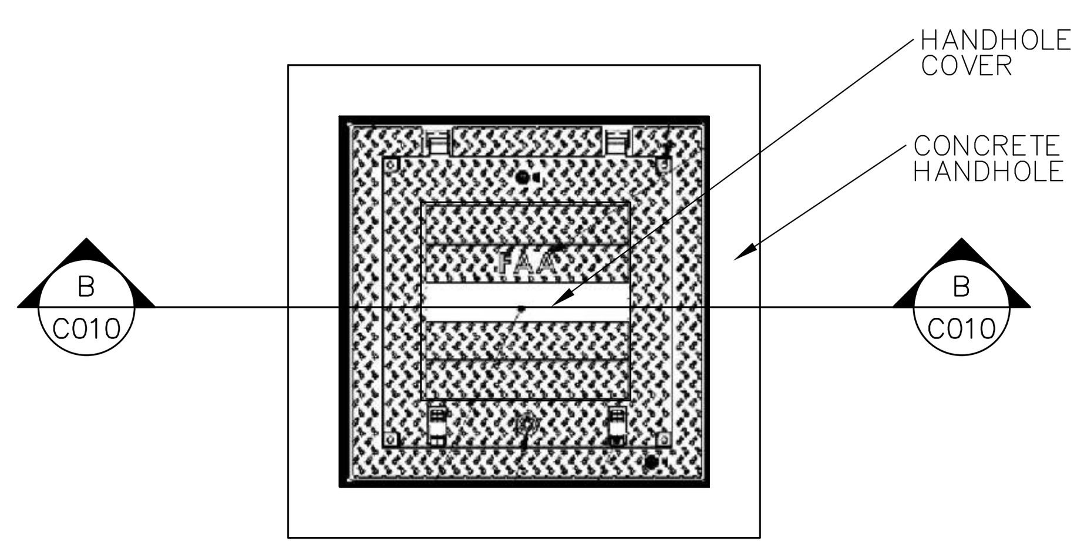


EXPANSION JOINTS (EJ)

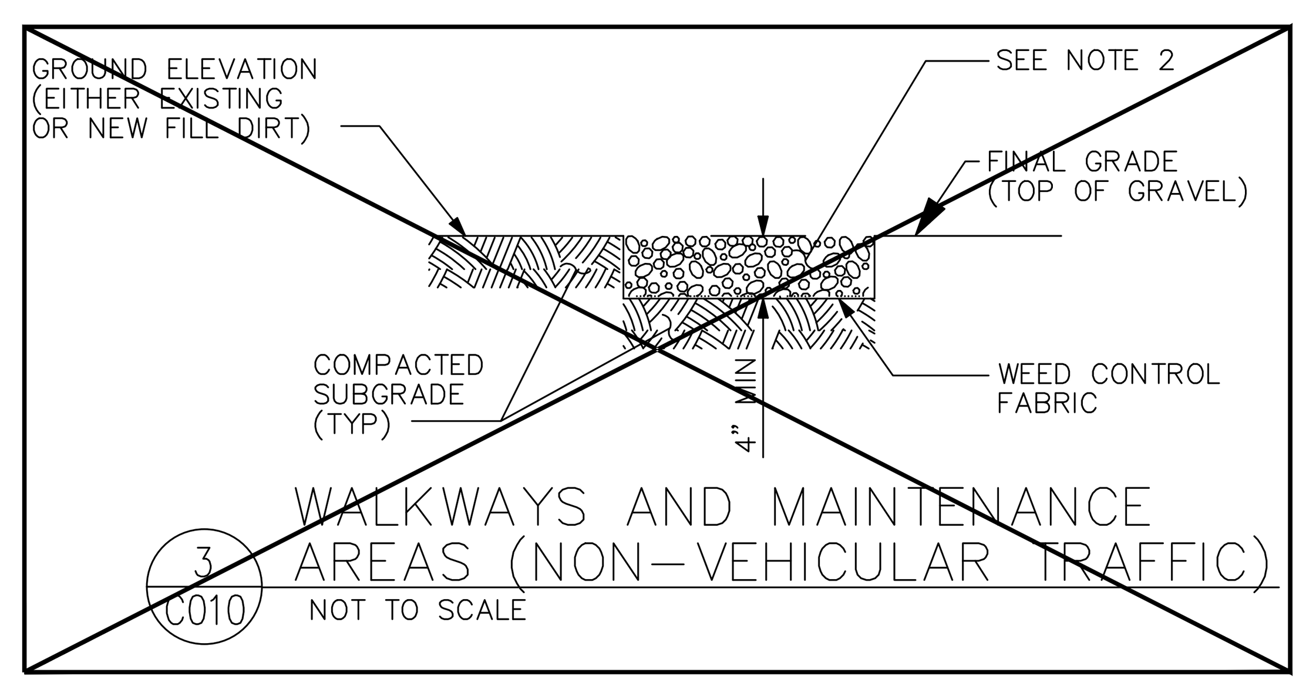


CONTROL JOINTS (CJ)

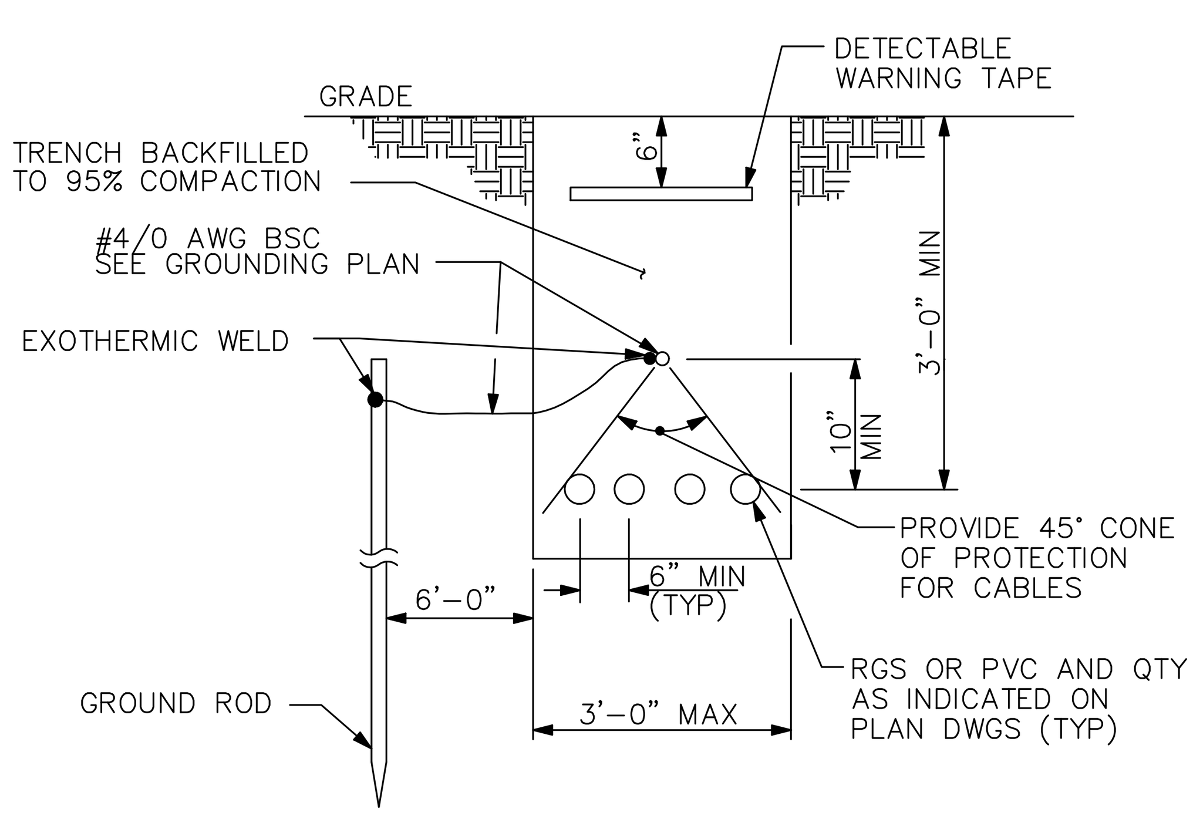
5 C010 JOINT DETAILS
NOT TO SCALE



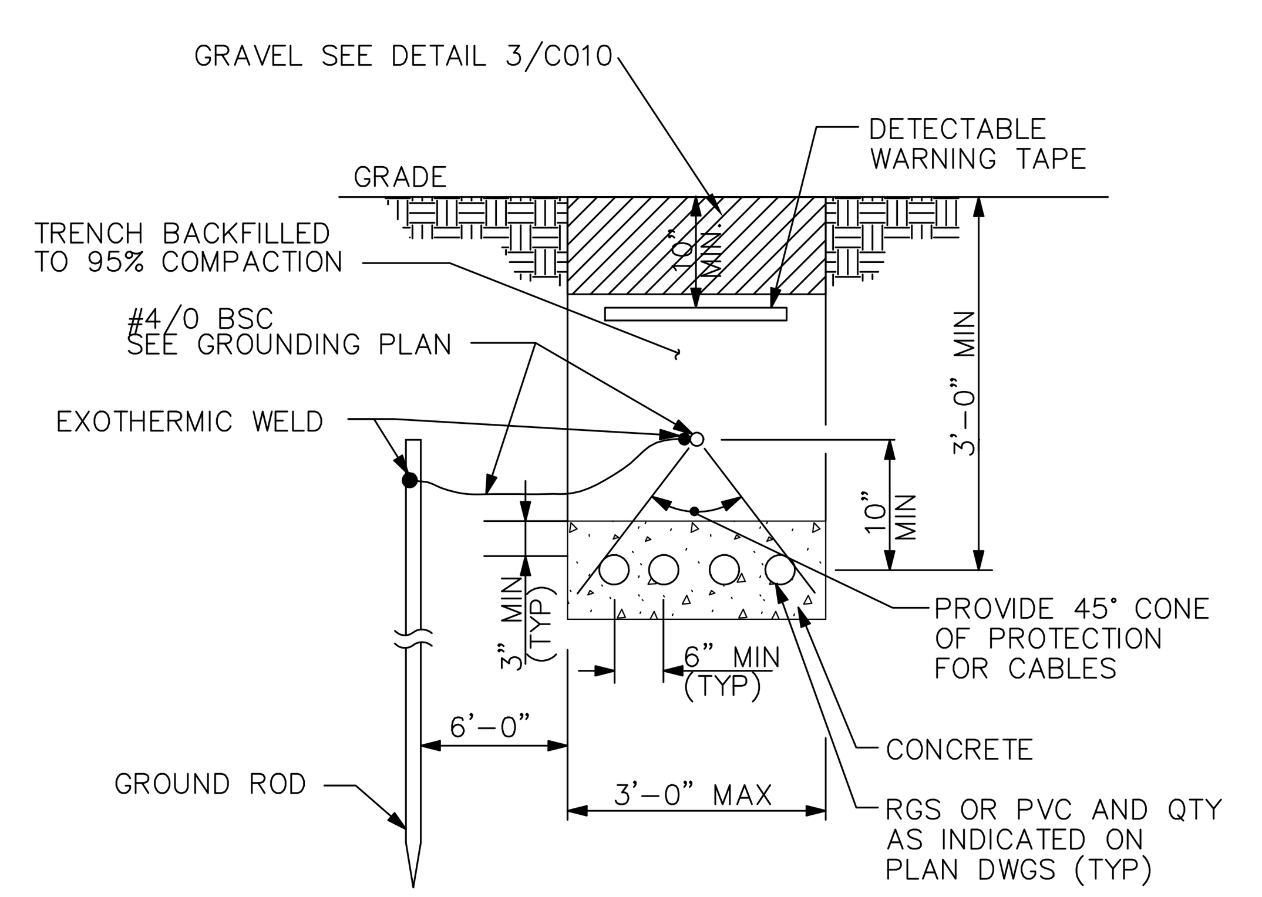
2 C010 AIRCRAFT RATED OR TRAFFIC RATED HANDHOLE DETAIL (GFM)
NOT TO SCALE



3 C010 WALKWAYS AND MAINTENANCE AREAS (NON-VEHICULAR TRAFFIC)
NOT TO SCALE



4A C010 CONDUIT TRENCH
NOT TO SCALE



4B C010 CONDUIT TRENCH CONCRETE ENCASED
NOT TO SCALE

REV	APPROVED DATE	DESCRIPTION	JCN	REDLINE DATE	APVD

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
ATO – TECHNICAL OPERATIONS — EASTERN SERVICE AREA

MALSR
RUNWAY 05
MISCELLANEOUS DETAILS
SHEET 2 OF 2

MACON — MIDDLE GEORGIA RGNL AIRPORT — GA

REVIEWED BY | SUBMITTED BY ORIGINAL SIGNED BY: | APPROVED BY ORIGINAL SIGNED BY:
PROJECT ENGINEER | MGR: ENGINEERING – CENTER A
DESIGNED | ISSUED BY ENGINEERING SERVICES NAVAIDS | DATE | JCN
DRAWN | DRAWING NO C010 | REV
CHECKED

PASSERO ASSOCIATES
Engineering • Architecture
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WE ENGINEERING
8226 CREEDMOOR ROAD, SUITE 201
RALEIGH NC, 27613

PROJECT MANAGER: RICHARD WALLS, P.E.
DESIGNED BY: JUSTIN TUDOR, P.E.
DRAWN BY: JAMES WAGNER, E.I.

SUBMITTAL: **BIDDING**

ENGINEER OF RECORD:

NORTH ARROW AND SCALE:

PROJECT: **BASE BID RUNWAY 5 EXTENSION**

CLIENT: **MACON-BIBB COUNTY**

MIDDLE GEORGIA REGIONAL AIRPORT (MCN)
MACON-BIBB COUNTY, GEORGIA

REVISIONS

No.	Date	By	Description
1	6/15/23	JDT	ADDENDUM 1

SHEET TITLE: MALSR MISCELLANEOUS ELECTRICAL DETAILS

SHEET: EA-302

PROJECT NO.: 20202946.0003

DATE: MAY 2023

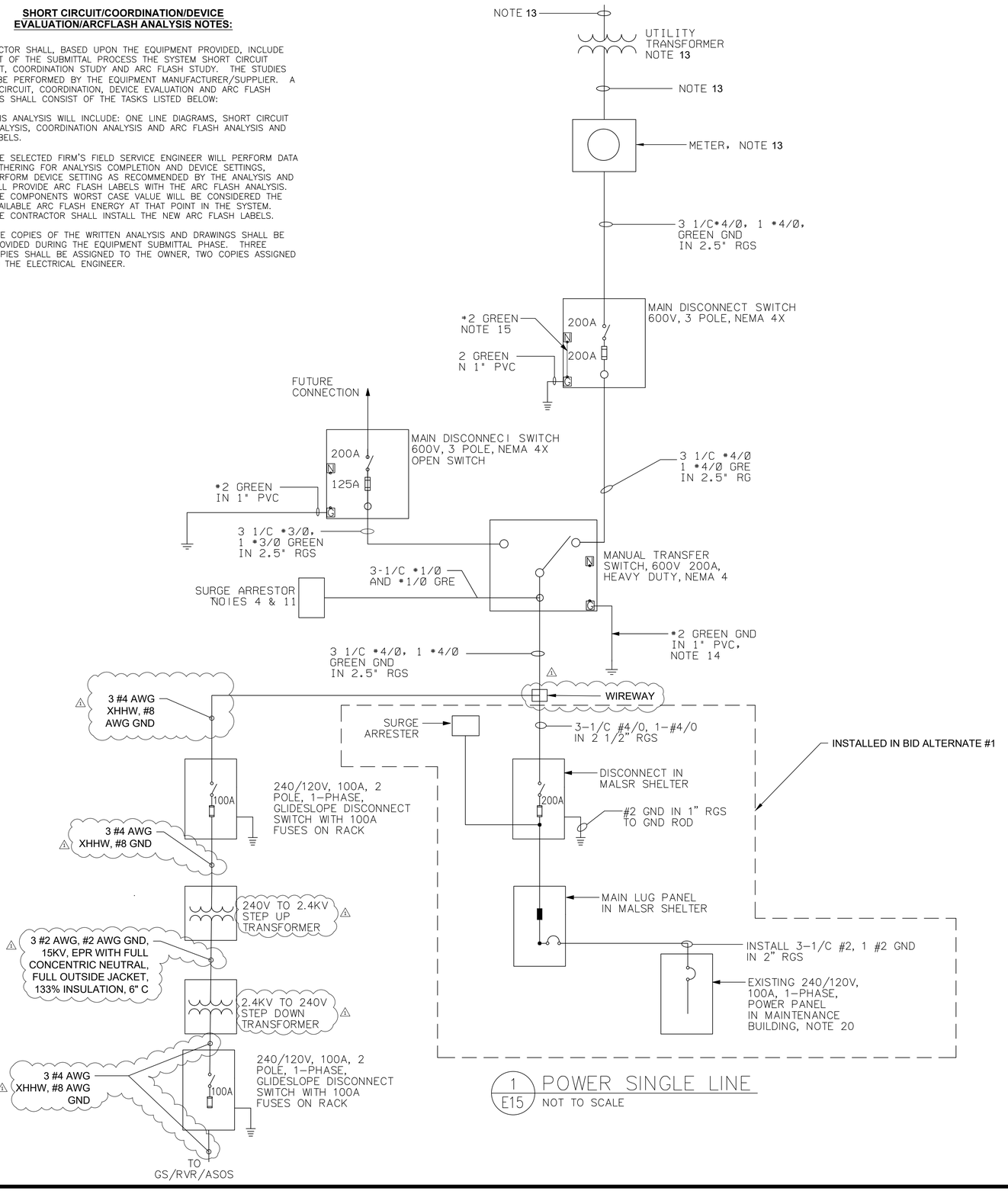
SHORT CIRCUIT/COORDINATION/DEVICE EVALUATION/ARCFLASH ANALYSIS NOTES:

CONTRACTOR SHALL, BASED UPON THE EQUIPMENT PROVIDED, INCLUDE AS PART OF THE SUBMITTAL PROCESS THE SYSTEM SHORT CIRCUIT CURRENT, COORDINATION STUDY AND ARC FLASH STUDY. THE STUDIES SHALL BE PERFORMED BY THE EQUIPMENT MANUFACTURER/SUPPLIER. A SHORT CIRCUIT, COORDINATION, DEVICE EVALUATION AND ARC FLASH ANALYSIS SHALL CONSIST OF THE TASKS LISTED BELOW:

1. THIS ANALYSIS WILL INCLUDE: ONE LINE DIAGRAMS, SHORT CIRCUIT ANALYSIS, COORDINATION ANALYSIS AND ARC FLASH ANALYSIS AND LABELS.

2. THE SELECTED FIRM'S FIELD SERVICE ENGINEER WILL PERFORM DATA GATHERING FOR ANALYSIS COMPLETION AND DEVICE SETTINGS, PERFORM DEVICE SETTING AS RECOMMENDED BY THE ANALYSIS AND WILL PROVIDE ARC FLASH LABELS WITH THE ARC FLASH ANALYSIS. THE COMPONENTS WORST CASE VALUE WILL BE CONSIDERED THE AVAILABLE ARC FLASH ENERGY AT THAT POINT IN THE SYSTEM. THE CONTRACTOR SHALL INSTALL THE NEW ARC FLASH LABELS.

3. FIVE COPIES OF THE WRITTEN ANALYSIS AND DRAWINGS SHALL BE PROVIDED DURING THE EQUIPMENT SUBMITTAL PHASE. THREE COPIES SHALL BE ASSIGNED TO THE OWNER, TWO COPIES ASSIGNED TO THE ELECTRICAL ENGINEER.



1 E15 POWER SINGLE LINE
NOT TO SCALE

NOTES

1. NOT USED
2. THE CONTRACTOR SHALL INSTALL THE COAXIAL CABLES FROM THE G-G RECEIVER A-G RECEIVER AND RMS TRANSMITTER UNITS THROUGH A 2' SLEEVE IN THE SHELTER WALL TO THE POLYPHASER IS -NEMP-C1 COAXIAL LIGHTNING ARRESTORS IN THE BULKHEAD PLATE. THEN TO THE G-G RECEIVER, A-G RECEIVER AND RMS ANTENNAS, INSTALL TYPE N CONNECTORS ON BOTH ENDS OF THE COAXIAL CABLES. SEAL BOTH ENDS OF THE SLEEVE WITH DUCT SEAL AFTER THE CABLE INSTALLATION.
3. THE CONTRACTOR SHALL PROVIDE 1-12 PR #18, 3 - 1/C #2, 600V AND 1-#2 GREEN FROM THE MALSR CONTROL CABINET TO THE FIRST RAIL STATION AND SPLICE TO EXISTING CABLE. THE POWER CABLES SHALL BE SEPARATED FROM THE CONTROL CABLES INSTALLED IN SEPARATE CONDUITS WHERE REQUIRED, UNLESS OTHERWISE SHOWN ON PLANS.
4. THE CONTRACTOR SHALL PROVIDE SQUARE 'D' MODEL SSP01EMA12S(D) SURGE ARRESTOR.
5. THE CONTRACTOR SHALL PAINT ALL RIGID STEEL CONDUITS BELOW GRADE WITH A BITUMINOUS COMPOUND.
6. THE CONTRACTOR SHALL SEAL BOTH ENDS OF CONDUITS ENTERING THE EQUIPMENT AND THE MAIN GROUND PLATE FROM BELOW GRADE WITH DUCT SEAL.
7. CONTRACTOR SHALL ROUTE ALL SIGNAL GROUNDS TO MAIN GROUND PLATE.
8. ALL POWER CABLES MUST HAVE EQUIPMENT GROUNDS WITH EACH CIRCUIT, WHETHER OR NOT INDICATED ON THE DRAWING.
9. COORDINATE WITH SITE LAYOUT DRAWINGS FOR CONDUIT AND CABLE RUNS.
10. THE CONTRACTOR SHALL PROVIDE APPROPRIATE LUGS WHERE NEEDED.
11. ALL SPD'S SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
12. NOT USED
13. FOR CONTRACTOR VERSE UTILITY COMPANY RESPONSIBILITIES, SEE UTILITY SERVICE MATRIX OF RESPONSIBILITY TABLE ON SHEET EA-301.
14. THIS IS CONSIDERED A SEPARATELY DERIVED SOURCE AND SHOULD BE GROUNDED ACCORDINGLY,
15. THE CONTRACTOR SHALL CHECK THE SAFETY SWITCH INSIDE THE MALSR SHELTER FOR THE JUMPER BETWEEN THE GROUND AND NEUTRAL, REMOVE IF PRESENT, INSTALL JUMPER AS SHOWN.
16. POINT OF CONTACT FOR GEORGIA POWER/SOUTHERN CO. POWER UTILITY IS JEREMY YORK, (470)401-8347.
17. THE MAIN SERVICE DISCONNECT SHALL BE A LOCKABLE HEAVY DUTY SWITCH NEMA 3R, 200A FUSED AT 200A. IT SHALL HAVE A SEPARATE NEUTRAL AND GROUND BAR. DO NOT INTERCONNECT THE NEUTRAL AND BUS BARS. CONNECT THE NEUTRAL DIRECTLY TO GROUND WITH A #2 AWG IN 1" RGS. THE #2 AWG SHALL BE CONNECTED TO THE GROUND ROD WITH A THOMPSON 519 GROUND CLAMP IN THE ACCESS WELL. SEE DETAIL 5/E06.
18. ALL DISCONNECTS SHALL BE LOCKABLE IN THE "ON" AND "OFF" POSITIONS.
19. ALL RIGID STEEL CONDUIT BELOW GRADE SHALL BE COATED WITH LIQUID BITUMINOUS COATING.
20. REEFED THE RELOCATED MAINTENANCE BUILDING. THE DISTRIBUTION PANEL IS EXISTING AND IS LOCATED INSIDE THE BUILDING
21. NOT USED

REV	APPROVED DATE	DESCRIPTION	JCN	REDLINE DATE	APVD
B	07/09/2018	FIELD REVISION (G. RESTA) NXS	906120	07/01/2018	GR
A	01/11/2007	AS-BUILT DS	9908665	02/16/2006	GR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
ATLANTA IMPLEMENTATION CENTER ATLANTA, GA

MALSR
RUNWAY 05
ELECTRICAL POWER DETAILS

MACON MIDDLE GEORGIA RGNL AIRPORT GA

REVIEWED BY		SUBMITTED BY ORIGINAL SIGNED BY:	APPROVED BY ORIGINAL SIGNED BY:
CMATT	380.23	Jeffrey D. Whitten	David L. Patrick
EWC	380.22	SR ENGR, NAVAIDS/LANDINGS AIDS	MGR, OPS, NAVAIDS/LANDING AIDS
		DESIGNED KA / ISSUED BY NAS IMPLEMENTATION ANI-300	DATE 04/23/2004 JCN
		DRAWN BB	DRAWING NO SO-D-103391-E15 REV B
		CHECKED JF	

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PROJECT MANAGER RICHARD WALLS, P.E.
DESIGNED BY JUSTIN TUDOR, P.E.
DRAWN BY JAMES WAGNER, E.I.T.

SUBMITTAL:

BIDDING

ENGINEER OF RECORD:

NORTH ARROW AND SCALE:

PROJECT:

BASE BID
RUNWAY 5
EXTENSION

CLIENT:

MACON-BIBB COUNTY

MIDDLE GEORGIA
REGIONAL AIRPORT (MCN)
MACON-BIBB COUNTY, GEORGIA

REVISIONS

No.	Date	By	Description
1	6/15/23	JDT	ADDENDUM 1

SHEET TITLE:

MALSR ELECTRICAL POWER DETAILS

SHEET:

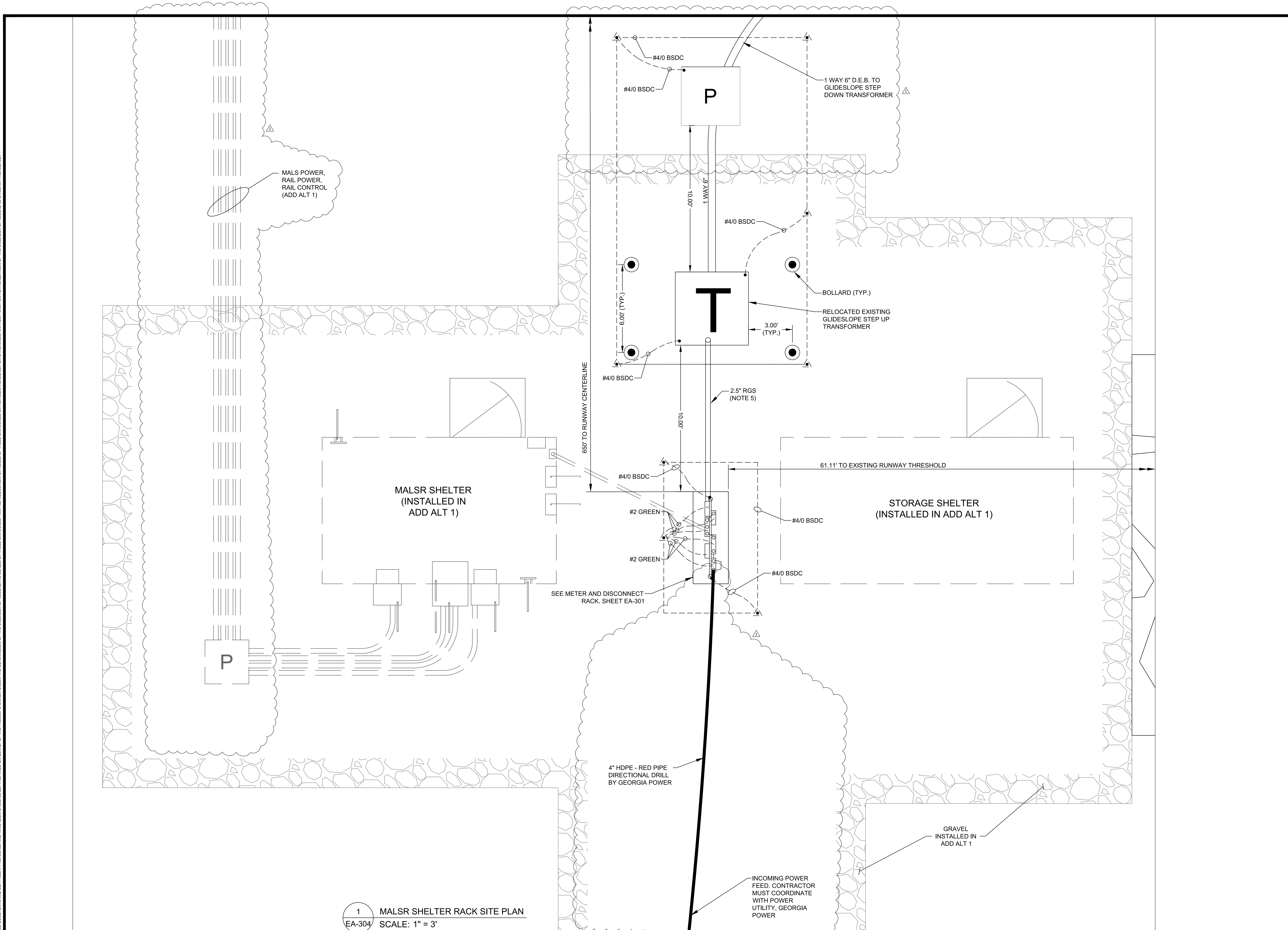
EA-303

PROJECT NO.:

20202946.0003

DATE:

MAY 2023



1 / EA-304 MALSR SHELTER RACK SITE PLAN
SCALE: 1" = 3'

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8226 CREEDMOOR ROAD, SUITE 201

RALEIGH NC, 27613

PROJECT MANAGER RICHARD WALLS, P.E.

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SUBMITTAL:

BIDDING

ENGINEER OF RECORD:

NORTH ARROW AND SCALE:

PROJECT:

BASE BID RUNWAY 5 EXTENSION

CLIENT:

MACON-BIBB COUNTY

MACON-BIBB COUNTY
FORWARD TOGETHER
1823 · 2014 · 1822

MIDDLE GEORGIA REGIONAL AIRPORT (MCN) MACON-BIBB COUNTY, GEORGIA

REVISIONS

No.	Date	By	Description
1	6/15/23	JDT	ADDENDUM 1

SHEET TITLE:

MALSR RACK SITE PLAN

SHEET:

EA-304

PROJECT NO.:

20202946.0003

DATE:

MAY 2023

GEC
A Terracon COMPANY
GeoReport

Geotechnical Engineering Report

MCN – Runway 5 Extension
Macon, Georgia
February 10, 2022
GEC Project No. HN215071

Prepared for:
Holt Consulting Company, LLC
Columbia, South Carolina

Prepared by:
Geotechnical & Environmental Consultants, Inc., A Terracon Company
Macon, Georgia

February 10, 2022

Holt Consulting Company, LLC
2801 Devine Street, Suite 201
Columbia, South Carolina 29205

Attn: Mr. Mark Counts
P: 770-285-8754
E: mcounts@holtconsultingco.com

Re: Geotechnical Engineering Report
MCN – Runway 5 Extension
Macon, Georgia
GEC Project No. HN215071

Dear Mr. Counts:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with GEC Proposal No. PHN215071 dated April 2, 2021. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and foundations for use in project planning.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Geotechnical & Environmental Consultants, Inc., A Terracon Company

Brad Thigpen, P.E.
Project Engineer

Thomas E. Driver, P.E.
Regional Manager

REPORT TOPICS

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the ***GeoReport*** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

Geotechnical Engineering Report

MCN – Runway 5 Extension

Macon, Georgia

GEC Project No. HN215071

February 10, 2022

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed development to be located at 1000 Terminal Drive in Macon, Georgia. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Excavation considerations
- Dewatering considerations
- Foundation design and construction
- Seismic site classification per IBC

The geotechnical engineering Scope of Services for this project included the advancement of 18 test borings to depths ranging from approximately 15 to 30 feet below existing site grades.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of readily available geologic and topographic maps as well as provided documents, plans, etc.

Item	Description
Parcel Information	The project is located at 1680 Leverette Road in Macon, Georgia. Approximate Coordinates: 32.685320°N / -83.661089°W See **Site Location**

Item	Description
Existing Improvements	The site of the proposed additions is to the southern end of Runway 5 at the existing airport.
Current Ground Cover	Mostly vacant and grassed, with the airport lighting system interspersed.
Existing Topography	There is approximately 36 feet of maximum relief on the runway side of the site and approximately 13 feet of maximum relief on the airport lighting side of the site.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. Our current understanding of the project conditions is as follows:

Item	Description
Information Provided	Our understanding of the project is based upon email correspondence and phone conversations with the client.
Project Description	The project will consist of the construction of a new runway extension to the existing Runway 5 at the airport. The extension will be a 600-foot extension with a 300-foot EMAS system at the south end. A new MSE wall will be constructed along the road right of way. The wall is expected to be up to 25 feet in height. A borrow area has been identified to the northwest of the proposed extension. Improvements to the lighting MALSR system will also be performed.
Proposed Structures	MALSR light system structures. MSE wall
Grading/Slopes	Fills of up to 38 feet are anticipated in the area of the existing drainage ditch on the northeast side of the site.

GEOTECHNICAL CHARACTERIZATION

Site Geology

The site is located in the Coastal Plain Physiographic Province of Georgia. Soils in the Coastal Plain are the result of the deposition of sediments in a former marine environment. Coastal Plain sedimentary deposits make up about 60 percent of Georgia's surface area, and consist of a southwardly thickening wedge of sediments, which are bordered on the north by the parent rocks of the Piedmont Physiographic Province. The border between these provinces is known as the "Fall-Line." The Coastal Plain sediments range in age from the Cretaceous to the recent, with the

oldest exposed along the "Fall-Line" and the youngest along the coast. Typically, the surface soils consist of complexly interbedded sands, silts, and clays of various mixtures. Sandstones, shales, and limestones comprise the characteristic lithology of the Coastal Plain. These formations are usually found at depths greater than fifty feet but can also be found at or near the ground surface. They are not known to occur near the surface in the site area. Topography in this region of the Coastal Plain is generally flat to gently rolling.

In drainage swales, floodplains and other low-lying areas, the Coastal Plain soils may be covered by alluvium that has been transported and deposited by flowing water. Alluvium may differ significantly from the Coastal Plain soils and vary from fine grained clays and silts to coarse grained sands and gravels depending on how they were deposited. Alluvium frequently is soft or loose and the soils types can change drastically in short horizontal and vertical distances.

Typical Subsurface Profile

The borings drilled at the site generally encountered residual soils and auger refusal materials.

Based on the results of the borings, subsurface conditions on the project site can be generalized as follows:

Description	Approximate Depth to Bottom of Stratum	Material Encountered	Consistency/Density
Stratum 1	2 to 5 inches	Topsoil or Aggregate Base Course	
Stratum 2[1]	3 feet to 17 feet	Fill Soils – Silty Sands (SM); Clayey Sands (SC); Fat Clays (CH); Poorly Graded Sands (SP)	Soft to Medium Stiff; Very Loose to Medium Dense
Stratum 3	Boring termination	Coastal Plain Soils - Silty Sands (SM); Clayey Sands (SC); Fat Clays (CH); Poorly Graded Sands (SP); Elastic Silts (MH) Alluvium – Silty Sands (SM); Clayey Sands (SC); Sandy Silts (ML); Poorly Graded Sands (SP)	Soft to Very Stiff; Loose to Very Dense

1. Fill soils encountered in borings G-3 through G-7, G-9, G-10, and G-15 through G-18

Laboratory tests were conducted on selected soil samples and the test results are presented in Appendix B.

As part of the laboratory tests, 20 moisture content, 5 Atterberg limits, 1 California Bearing Ratio (CBR), 3 direct shear tests, 1 standard Proctor test, and 5 grain size analysis were conducted on selected soil samples. The test results are presented in Appendix B.

Briefly, the moisture content of representative soil samples ranged from 8.9% to 26.4%. The results of the Atterberg limits and grain size analysis are summarized in the following tables.

Atterberg Limits				
Boring	**Depth (feet)**	**Liquid Limit**	**Plastic Limit**	**Plasticity Index**
G-3	6 - 7.5	79	26	53
G-6	1 - 2.5	45	23	22
G-6	3.5 - 5	57	29	28
G-13	6 - 7.5	76	26	50
G-14	1 - 2.5	53	20	33

Grain Size Analysis			
Boring	**Depth (feet)**	**Sand (Percentage)**	**Fines (Percentage)**
G-1	1 - 2.5	65.5	34.4
G-2	1 - 2.5	72.9	26.3
G-10	1 - 2.5	70.4	28.8
G-10	6 - 7.5	71.1	28.2
G-10	8.5 - 10	69.3	27.7
G-10	13.5 - 15	68.8	29.3
G-16	6 - 7.5	89.7	10.3

CBR and Compaction Results					
Boring Number	**Depth (Feet)**	**CBR**	**Maximum Dry Density (pcf)**	**Optimum Moisture (%)**	**In-situ Moisture (%)**
G-10	0-5	3.3	122.9	9.4	N/A

Specific conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in situ, the transition between materials may be gradual. Details for each of the borings are presented on the boring logs included in Appendix A of this report.

Borings G-10 and G-11 were placed in proposed borrow pit areas. Both borings encountered soils suitable for use as fill in the construction project, with the exception of backfill for the MSE reinforced zone wall construction. Groundwater was encountered at a depth of 16 feet in G-11 and groundwater was not encountered to the fifteen-foot depth in G-10. Cuts to these depths are not anticipated.

Groundwater

The boreholes were observed while drilling and after completion for the presence and level of groundwater. Groundwater was encountered in borings G-1, G-2, G-8, and G-11 through G-18 at depths ranging from 6 to 26 feet while drilling and 5 to 17 feet at the completion of drilling.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. In addition, perched water can develop over low permeability soil or rock strata. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

GEOTECHNICAL OVERVIEW

Based on the geotechnical engineering analyses, subsurface exploration and laboratory test results, we recommend that the proposed structures be supported by conventional shallow foundations bearing on the existing soils and/or newly placed structural fill.

The **Shallow Foundations** section addresses support of the MALSR lighting system on Coastal Plain soils or engineered fill.

Geotechnical engineering recommendations for foundation systems and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of data presented herein, engineering analyses, and our current understanding of the proposed project.

The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

Earthwork is anticipated to include clearing and grubbing, excavations, and fill placement. The following sections provide recommendations for use in preparation of specifications. Recommendations include quality criteria necessary, to appropriately prepare the site.

Earthwork on the project should be observed and evaluated by GEC. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during the construction of the project and identified in this report.

Site Preparation

We anticipate construction will be initiated by stripping vegetation and loose, soft or otherwise unsuitable material. Stripped materials consisting of vegetation and organic materials should be wasted off site or used to vegetate landscaped areas or exposed slopes after completion of grading operations.

After stripping, proofrolling should be performed with heavy rubber tire construction equipment such as a loaded scraper or fully loaded tandem-axle dump truck. A GEC geotechnical engineer or his representative should observe proofrolling to aid in locating unstable subgrade materials. Proofrolling should be performed after a suitable period of dry weather to avoid degrading an otherwise acceptable subgrade and to reduce the amount of undercutting / remedial work required. Unstable materials identified should be stabilized as directed by the engineer based on conditions observed during construction. Undercut and replacement and densification in-place are typical remediation methods. It is anticipated that undercutting will be required to depths of up to three feet in the area of borings G-6 and G-9, located adjacent to the existing runway, and boring G-3, located in the proposed new runway area. Loose surficial fill soils were noted in these areas.

Prior to fill placement, the subgrade in the drainage area and existing culvert subgrade after culvert removal should be evaluated. Potential undercutting may be needed in these areas before deep fill placement. Fill placement above the new culvert structure should be monitored as it is brought up to proposed grades.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill and general fill. Structural fill is material used below, or within 10 feet of structures, pavements or slopes. General fill is material used to achieve grade outside of these areas. Soils used for structural and general fill should meet the following material property requirements:

Soil Type [1,2,3]	USCS Classification	Acceptable Parameters (for Structural Fill)
Fine Grain	CL and ML LL < 50 / PI < 30 More than 25% retained on No. 200 sieve	All Locations and Elevations
Granular	SP, SM, SC, and SW	All Locations and Elevations
On-Site Soils	SM, ML, SP, SC	All Locations and Elevations

1. Structural and general fill should consist of materials relatively free of organic matter, debris, and particles larger than about 4 inches. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.
2. All fill should have a maximum dry density of at least 90 pounds per cubic foot (pcf) as determined by the standard Proctor test (ASTM D 698).
3. Any materials proposed as fill from off-site sources should be tested for compliance with these criteria before being hauled to the site.

Fill Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	Structural Fill	General Fill
Maximum Lift Thickness	■ 8 inches or less in loose thickness when heavy, self-propelled compaction equipment is used ■ 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used	Same as Structural fill
Minimum Compaction Requirements [1,2]	■ 98% of max. dry density below foundations and within 1 foot of finished pavement subgrade ■ 95% of max. dry density above foundations, below floor slabs, and more than 1 foot below finished pavement subgrade	92% of max.
Moisture Content Range [1,2,3]	Fine Grain Soils: -2% to +3% of optimum Granular: -2% to +3% of optimum	As required to achieve min. compaction requirements

Item	Structural Fill	General Fill

1. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).
2. Fill should be tested for compaction and moisture content during placement. Should the results of the in-place density tests indicate that the specified moisture or compaction requirements have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
3. Moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without pumping when proofrolled. Some moisture conditioning should be expected prior to or during fill placement.

Settlement of Deep Fill Areas and Monitoring

Up to 38+/- feet of fill is expected in some areas of the site. In areas where more than 15 feet of fill is placed, we expect the weight of the fill will produce obvious settlements due to compression within and below the fill mass. Therefore, we recommend a wait period of at least 1 to 3 months to allow for settlement to subside, prior to constructing the runway. Foundation construction on the MALSR lighting system can commence during this waiting period. However, actual settlement behavior of the fill embankment may necessitate shimming of column base plates before the structure can be erected.

Project planning should include stripping and preparation of the deeper fill areas early in the schedule along with all fill placement so that portions of the settlement can occur while earthwork is completed in other portions of the site requiring thinner fill thicknesses. Foundation work could also commence in the opposite portions of the site and progress toward the deeper fill areas to accommodate the fill settlement duration.

Settlement plates or settlement pins can be utilized to monitor the rate of settlement and evaluate the actual required length of the waiting period. We recommend that the elevations at the top of the completed subgrades be surveyed to the nearest 0.01 foot at least three times a week, beginning at the time of monument installation. Precise elevation data will be necessary for accurate settlement analyses, and surveying services from a licensed surveyor should be obtained. GEC can help recommend areas where settlement monitoring is required and assist with evaluation of the data.

Grading and Drainage

Adequate positive drainage should be provided during construction and maintained throughout the life of the development to prevent an increase in moisture content of the foundation, pavement and backfill materials. Surface water drainage should be controlled to prevent undermining of fill slopes and structures during and after construction.

It is recommended that all exposed earth slopes be seeded to provide protection against erosion as soon as possible after completion. Seeded slopes should be protected until the vegetation is established. Sprinkler systems should not be installed behind or in front of walls or near slopes.

Earthwork Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

Surface water should not be allowed to pond on the site and soak into the soil during construction. Construction staging should provide drainage of surface water and precipitation away from the building and pavement areas. Any water that collects over or adjacent to construction areas should be promptly removed, along with any softened or disturbed soils. Surface water control in the form of sloping surfaces, drainage ditches and trenches, and sump pits and pumps will be important to avoid ponding and associated delays due to precipitation and seepage.

Groundwater was encountered in borings G-1, G-2, G-8, and G-11 through G-18 at depths ranging from 6 to 26 feet while drilling and 5 to 17 feet at the completion of drilling. Based on our understanding of the proposed development, we do not expect groundwater to affect construction. If groundwater is encountered during construction, some form of temporary or permanent dewatering may be required. Conventional dewatering methods, such as pumping from sumps, should likely be adequate for temporary removal of any groundwater encountered during excavation at the site. Well points would likely be required for significant groundwater flow, or where excavations penetrate groundwater.

All excavations should be sloped or braced as required by Occupational Safety and Health Administration (OSHA) regulations to provide stability and safe working conditions. Temporary excavations will probably be required during grading operations. The grading contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, state and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean GEC is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Our scope of services did not include an analysis of slope stability using laboratory derived shear strength data. However, in the Coastal Plain soils, up to 20-foot tall slopes are regularly built at inclinations of up to 2.5(H):1(V) and perform satisfactory if properly constructed, are not inundated

or subject to rapid drawdown conditions. Shallow sloughing at the surface can occur when slopes are not properly constructed and/or exposed to inclement weather prior to placement of vegetative cover. It is advisable to create a berm at the midpoint of taller slopes to help reduce slope erosion. We recommend that fill slopes be over filled and cut back to develop an adequately compacted slope face rather than tracking in the slope face for compaction. In addition, for erosion protection, a protective vegetative cover should be established on temporary and permanent slopes as soon as possible.

Construction Observation and Testing

The earthwork operations should be observed by the Geotechnical Engineer or his representative. Monitoring should include documentation of adequate removal of vegetation and topsoil, proofrolling, and mitigation of unstable areas delineated by the proofroll. Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer or his representative prior to placement of additional lifts. Any areas that do not meet the compaction specifications should be reworked to achieve compliance.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer or his representative. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in the **Earthwork** section, the proposed MALSR lighting system can be supported by shallow, spread footing foundation systems bearing on residual soils or structural fill extending to residual soils. Under cutting of the foundation bearing zone may be required in the area of borings G-15 and G-16 to depths of three feet or more due to low consistency soils. Design recommendations for shallow foundations for the proposed structures are presented in the following paragraphs.

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing pressure [1, 2]	2,500 psf
Required Bearing Stratum [3]	Structural fill, existing soils
Minimum Foundation Dimensions	Columns: 24 inches Continuous: 16 inches
Ultimate Coefficient of Sliding Friction [4]	0.35

Item	Description
Minimum Embedment below Finished Grade [5]	Exterior footings: 18 inches
Estimated Total Settlement from Structural Loads [2]	Less than about 1 inch
Estimated Differential Settlement [2, 6]	About ½ of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Values assume that exterior grades are no steeper than 5% within 10 feet of structure.
2. Values provided are for maximum loads noted in **Project Description**.
3. Unsuitable or soft soils should be over-excavated and replaced per the recommendations presented in **Earthwork**.
4. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
5. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
6. Differential settlements are as measured over a span of 40 feet.

The allowable foundation bearing pressures apply to dead loads plus design live load conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

Footings, foundations, and masonry walls should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

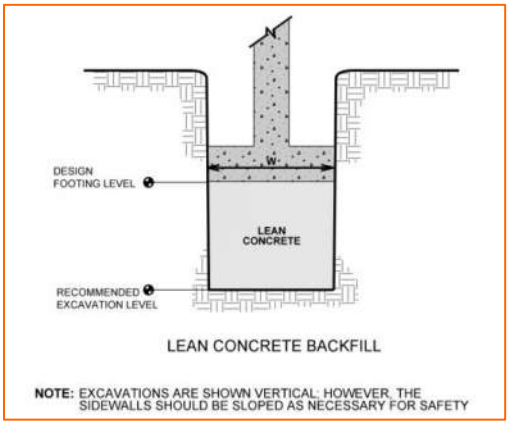
Foundation excavations should be observed by the geotechnical engineer. If the soil conditions encountered differ from those presented in this report, supplemental recommendations will be required.

Foundation Construction Considerations

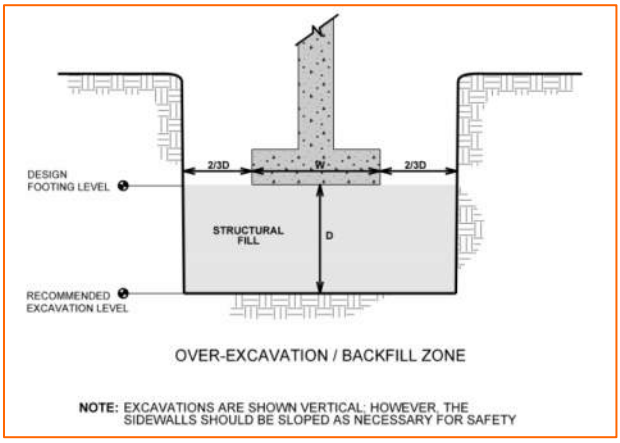
As noted in the **Earthwork** section, soils exposed in footing excavations should be evaluated by the Geotechnical Engineer or his representative. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Should the soils at bearing level become excessively dry, disturbed or saturated, or frozen, the affected soil should be removed prior to placing concrete. Place a lean concrete mud-mat over the bearing soils if the excavations must remain open over night or for an extended period of time. It is recommended that the geotechnical engineer be retained to observe and test the soil foundation bearing materials.

If unsuitable bearing soils are encountered at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on

these soils at the lower level or on lean concrete backfill placed in the excavations. This is illustrated on the sketch below.



Over-excavation for structural fill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation. The overexcavation should then be backfilled up to the footing base elevation with well-graded granular material placed in lifts of 8 inches or less in loose thickness and compacted to at least 95 percent of the material's maximum standard Proctor dry density (ASTM D-698). The overexcavation and backfill procedure is described in the figure below.



For foundations adjacent to slopes, a minimum horizontal setback of 10 feet should be maintained between the foundation base and slope face. In addition, the setback should be at a location where an imaginary line extending downward at 45 degrees from the nearest edge of the foundation does not intersect the slope face.

Areas of loose soils may be encountered at foundation bearing depth after excavation is completed for footings. When such conditions exist beneath planned footing areas, the subgrade

soils should be surficially compacted prior to placement of the foundation system. If sufficient compaction cannot be achieved in-place, the loose soils should be removed and replaced with engineered fill. For placement of engineered fill below footings, the excavation should be widened laterally, at least eight inches for each foot of fill placed below footing base elevations.

SEISMIC CONSIDERATIONS

Seismic Site Classification

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is a required component in determining the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site subsurface profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7-16 and the International Building Code (IBC) 2018.

The 2018 International Building Code (2018 IBC) requires a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope requested does not include the required 100-foot soil profile determination. Subsurface explorations at this site were extended to a maximum depth of 30 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Based on the standard penetration resistance values from the soil borings drilled at the site, it is our professional opinion that the **Seismic Site Classification is D**. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

MSE WALLS

A Mechanically Stabilized Earth (MSE) retaining wall is currently planned for construction in the southern portion of the site along Avondale Mill Road. The MSE retaining wall will be designed and constructed with segmental block facing and the earth reinforcement will consist of extensible geogrid.

We recommend that internal stability analyses for the planned MSE walls conform to the latest design methodology accepted for use by the National Concrete Masonry Association (NCMA). Since these analysis procedures are based on the use of drained strength parameters, the backfill used for the geogrid reinforced backfill section should be a drainable, granular material to conform with the assumptions of the analysis. The use of cohesive soils as backfill material should not be allowed in any of the MSE construction on this project.

In addition to the analyses for internal stability, global stability of the wall systems and the geometry of the proposed slopes above and below the walls should be included in the global stability models.

Recommended geotechnical engineering parameters for the engineering analyses of the MSE walls should be based on the parameters outlined in the following table.

MSE WALL DESIGN PARAMETERS			
SOIL ZONE	**FRICTION ANGLE**	**COHESION (psf)**	**MOIST UNIT WEIGHT (pcf)** [1]
Reinforced Zone Soils[2]	34°	30	130
Retained Soil	32°	50	120
Foundation Soil	30°	100	120

1. The wet unit weight of the retained soils assume that the materials will be compacted to a minimum of 95% of the maximum dry density determined in accordance with Standard Proctor criteria, ASTM D698.
2. Reinforced zone backfill design information must be verified once source is selected. The on-site soils will not likely meet these requirements. Additional requirements, such as material gradation, may apply as well.

Other design and construction considerations for the planned MSE walls are as follows:

• The designer should specify the required gradation for the reinforced backfill soils and should determine the appropriate friction angle for use in the design. The selected materials should be tested to verify the use of the design values. We recommend the reinforced backfill meet specific gradation and plasticity requirements such as those outlined in the design code of the NCMA with no more than 35% passing the US No. 200 Sieve. The on-site soils do not typically meet this requirement. The designer should specify suitable qualification testing, including strength testing of the proposed reinforced backfill materials be performed as part of the construction to verify the use of the strength parameters used in the design of the wall system.

• The MSE wall should be designed for a maximum allowable bearing pressure not to exceed 3,000 pounds per square foot (psf).

• The bottom of the MSE retaining wall should be set at a depth below potential scour in locations subject to water discharge.

• The facing of the MSE wall should be set on a gravel leveling pad unless there is concern regarding potential differential movement in the wall facing.

• Passive pressure should be neglected for any below grade portions of the MSE wall in the analyses for internal or external stability.

• Internal, external and global stability evaluations should include analyses for both static and seismic conditions. Recommended seismic acceleration for design is discussed in our prior geotechnical report for the project.

• The bearing subgrade conditions for the planned MSE wall should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. GEC should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by GEC to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location

of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either substantiate or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet)	Planned Location
2	25 or auger refusal	MSE Wall
7	20 or auger refusal	Planned runway area
8	30 or auger refusal	MALSR System- locations provided by Benesch
1	15 or auger refusal	Borrow pit area

Boring Layout and Elevations: GEC personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±20 feet).

Subsurface Exploration Procedures: We advanced the borings with an ATV-mounted rotary drill rig using continuous flight hollow stem augers. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

SITE LOCATION

MCN – Runway 5 Extension ■ Macon, Georgia
February 10, 2022 ■ GEC Project No. HN215071

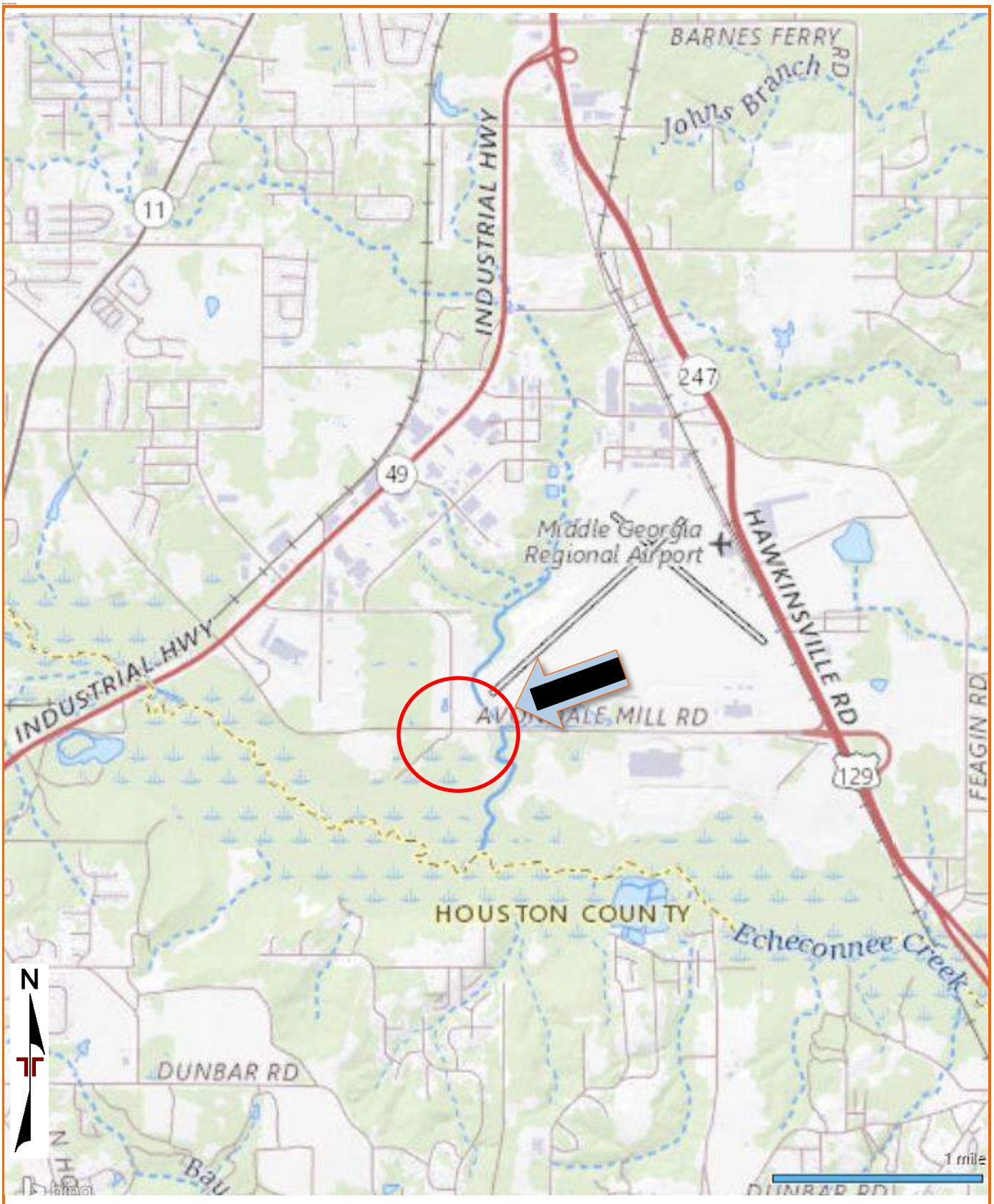


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

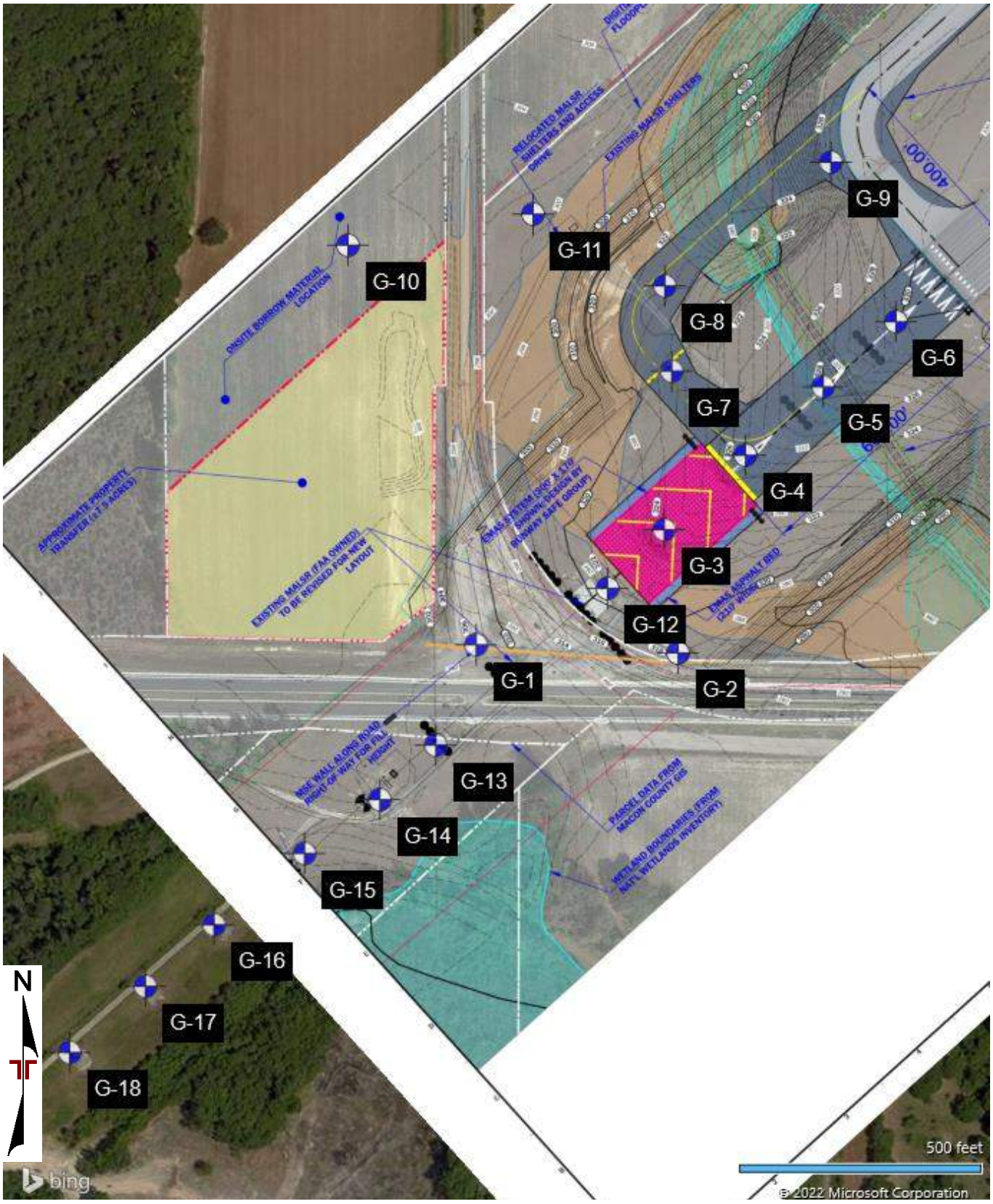


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Note: All attachments are one page unless noted above.

BORING LOG NO. G-1

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6834° Longitude: -83.6641°

Approximate Surface Elev.: 291 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description	FIELD TEST RESULTS	WATER CONTENT (%)
0.3	290.5+/-	**TOPSOIL**, Approx. 4" of topsoil		
		COASTAL PLAIN - SILTY SAND (SM), tan brown, loose	4-4-4 N=8	11.0
3.0	288+/-	Shelby Tube		
6.0	285+/-	**SILTY SAND (SM)**, white, medium dense	10-11-13 N=24	
			16-12-13 N=25	
12.0	279+/-	**POORLY GRADED SAND (SP)**, orange, medium dense	8-9-11 N=20	
17.0	274+/-	**SILTY SAND (SM)**, white, wet, loose to medium dense	4-4-5 N=9	
25.0	266+/-		4-5-9 N=14	
		Boring Terminated at 25 Feet		

DEPTH (Ft.): 5, 10, 15, 20, 25

WATER LEVEL OBSERVATIONS: Cave In (12.0); While drilling (15.0)

SAMPLE TYPE: Shelby Tube (6.0 - 12.0)

ATTERBERG LIMITS: LL-PL-PI

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

- *While drilling*
- *At completion of drilling*
- *Cave In*

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-03-2021 | Boring Completed: 11-03-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-2

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6831° Longitude: -83.6644°

Approximate Surface Elev.: 293 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	
0.3	292.5+/-	**TOPSOIL**, Approx. 4" of topsoil
		COASTAL PLAIN - SILTY SAND (SM), tan gray, dense
5.0	288+/-	**SILTY SAND (SM)**, tan red, medium dense to dense
12.0	281+/-	**CLAYEY SAND (SC)**, tan red, medium dense
17.0	276+/-	**SILTY SAND (SM)**, orange tan to white, wet, medium dense
25.0	268+/-	***Boring Terminated at 25 Feet***

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)
		10-14-17 N=31	9.5
5		11-13-16 N=29	
		13-13-18 N=31	
10			
		7-6-7 N=13	
15			
		4-5-8 N=13	
20			
		11-10-11 N=21	
25			

WATER LEVEL OBSERVATIONS: ▽ at 17.0

ATTERBERG LIMITS: LL-PL-PI

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

▽ *At completion of drilling*

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-02-2021 | Boring Completed: 11-02-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-3

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6828° Longitude: -83.6650°

Approximate Surface Elev.: 298 (Ft.) +/-

DEPTH		ELEVATION (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	**TOPSOIL**, Approx. 4" of topsoil	297.5+/-			
	FILL - SILTY SAND (SM), tan brown, loose		4-3-3 N=6		
3.0		295+/-			
	FILL - CLAYEY SAND (SC), tan orange, loose		4-2-4 N=6		
6.0		292+/-			
	COASTAL PLAIN - CLAYEY SAND (SC), white red, medium dense		4-6-8 N=14	21.8	79-26-53
			5-7-12 N=19		
12.0		286+/-			
	POORLY GRADED SAND (SP), coarse to fine grained, orange, medium dense		9-12-13 N=25		
17.0		281+/-			
	POORLY GRADED SAND (SP), with rock fragments, coarse to fine grained, tan, medium dense		12-13-14 N=27		
20.0		278+/-			
	Boring Terminated at 20 Feet				

DEPTH (Ft.): 5, 10, 15, 20

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Not encountered

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company

514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-02-2021 | Boring Completed: 11-02-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-4

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6824° Longitude: -83.6655°

Approximate Surface Elev.: 307 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	
0.3	306.5+/-	**TOPSOIL**, Approx. 4" of topsoil
		FILL - CLAYEY SAND (SC), tan gray, loose
6.0	301+/-	**COASTAL PLAIN - CLAYEY SAND (SC)**, tan, medium dense
17.0	290+/-	**POORLY GRADED SAND (SP)**, with trace clay, coarse to fine grained, pink, medium dense
20.0	287+/-	***Boring Terminated at 20 Feet***

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS
5		3-4-4 N=8
		5-4-3 N=7
		4-3-8 N=11
10		5-4-10 N=14
		5-9-12 N=21
15		
		5-11-14 N=25
20		

GRAPHIC LOG | WATER LEVEL OBSERVATIONS | WATER CONTENT (%) | ATTERBERG LIMITS (LL-PL-PI)

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
Not encountered

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-02-2021 | Boring Completed: 11-02-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-5

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6820° Longitude: -83.6660°

Approximate Surface Elev.: 317 (Ft.) +/-

DEPTH		ELEVATION (Ft.)	FIELD TEST RESULTS
0.3	**TOPSOIL**, Approx. 3" of topsoil	317+/-	
	FILL - CLAYEY SAND (SC), pink tan, medium dense		5-7-9 N=16
3.0		314+/-	
	FILL - SILTY SAND (SM), tan, medium dense		7-8-7 N=15
6.0		311+/-	
	FILL - CLAYEY SAND (SC), tan, medium dense		4-6-7 N=13
8.0		309+/-	
	COASTAL PLAIN - SILTY SAND (SM), gray, medium dense		3-8-6 N=14
12.0		305+/-	
	CLAYEY SAND (SC), tan brown, medium dense		3-6-8 N=14
20.0		297+/-	3-4-10 N=14
	Boring Terminated at 20 Feet		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
Not encountered

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-02-2021 | Boring Completed: 11-02-2021
Drill Rig: ATV | Driller: J. Waddell
Project No.: HN215071

BORING LOG NO. G-6

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6817° Longitude: -83.6665°

Approximate Surface Elev.: 327 (Ft.) +/-

DEPTH		ELEVATION (Ft.)
0.3	**TOPSOIL**, Approx. 4" of topsoil	326.5+/-
	FILL - SANDY FAT CLAY (CH), white, soft to medium stiff	
3.5		323.5+/-
	FILL - SANDY FAT CLAY (CH), pink white @ 3.5'	
15.0		312+/-
	COASTAL PLAIN - SILTY SAND (SM), orange red, medium dense	
20.0		307+/-
	Boring Terminated at 20 Feet	

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		3-2-2 N=4	19.7	45-23-22
5		4-4-4 N=8	26.4	57-29-28
		3-3-2 N=5		
10		5-2-3 N=5		
15		5-3-5 N=8		
20		4-4-7 N=11		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
Not encountered

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-02-2021 | Boring Completed: 11-02-2021
Drill Rig: ATV | Driller: J. Waddell
Project No.: HN215071

BORING LOG NO. G-7

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6840° Longitude: -83.6638°

Approximate Surface Elev.: 298 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description
0.3	297.5+/-	**TOPSOIL**, Approx. 4" of topsoil
		FILL - SILTY SAND (SM), pink tan, medium dense
3.0	295+/-	
		FILL - CLAYEY SAND (SC), tan brown to red, medium dense
6.0	292+/-	
		COASTAL PLAIN - SILTY SAND (SM), gray tan, medium dense to dense
12.0	286+/-	
		CLAYEY SAND (SC), gray, medium dense
20.0	278+/-	
		Boring Terminated at 20 Feet

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)
		6-6-7 N=13	11.7
5		6-7-8 N=15	
		7-10-18 N=28	
		9-12-22 N=34	
10			
		8-10-13 N=23	
15			
		7-12-17 N=29	
20			

WATER LEVEL OBSERVATIONS: Not encountered

ATTERBERG LIMITS: LL-PL-PI

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-03-2021 | Boring Completed: 11-03-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-8

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6839° Longitude: -83.6624°

Approximate Surface Elev.: 297 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	
0.3	296.5+/-	**TOPSOIL**, Approx. 4" of topsoil
		COASTAL PLAIN - POORLY GRADED SAND (SP), with trace clay, white pink, loose to medium dense
6.0	291+/-	
		SILTY SAND (SM), white tan, loose to medium dense
12.0	285+/-	
		SILTY SAND (SM), white, damp, loose to medium dense
20.0	277+/-	
		Boring Terminated at 20 Feet

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)
5		7-7-8 N=15	10.8
		8-9-10 N=19	
		9-8-11 N=19	
10		15-8-8 N=16	
15		10-9-9 N=18	
20		11-7-10 N=17	

WATER LEVEL OBSERVATIONS: ▽ While drilling; ▽ At completion of drilling; Cave In

ATTERBERG LIMITS: LL-PL-PI

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

▽ *At completion of drilling*

Cave In

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-03-2021 | Boring Completed: 11-03-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-9

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6867° Longitude: -83.6614°

Approximate Surface Elev.: 324 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)
0.3	323.5+/-	**TOPSOIL**, Approx. 4" of topsoil				
		FILL - CLAYEY SAND (SC), tan brown, loose			3-2-2 N=4	
					4-3-4 N=7	13.7
6.0	318+/-	**FILL - SILTY SAND (SM)**, pink tan, loose to medium dense	5		4-4-3 N=7	
					5-5-7 N=12	
			10			
					3-3-3 N=6	
17.0	307+/-	**COASTAL PLAIN - CLAYEY SAND (SC)**, brown tan, loose	15			
					3-4-5 N=9	
22.0	302+/-	**CLAYEY SAND (SC)**, tan red, medium dense	20			
					4-7-9 N=16	
25.0	299+/-	***Boring Terminated at 25 Feet***	25			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
Not encountered

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-02-2021 | Boring Completed: 11-02-2021
Drill Rig: ATV | Driller: J. Waddell
Project No.: HN215071

BORING LOG NO. G-10

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6850° Longitude: -83.6620°

Approximate Surface Elev.: 300 (Ft.) +/-

DEPTH		ELEVATION (Ft.)	DEPTH (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)
0.1	**TOPSOIL**, Approx. 4" of cultivated topsoil	300+/-			
	FILL - SILTY SAND (SM), tan, loose			2-2-3 N=5	10.4
3.0		297+/-			
	Shelby Tube		5		
6.0		294+/-			
	COASTAL PLAIN - CLAYEY SAND (SC), tan brown, medium dense			7-10-14 N=24	12.5
8.0		292+/-			
	CLAYEY SAND (SC), white red, medium dense to dense		10	8-11-16 N=27	14.3
15.0		285+/-	15	10-13-18 N=31	11.9
	Boring Terminated at 15 Feet				

ATTERBERG LIMITS: LL-PL-PI

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
Not encountered

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-08-2021 | Boring Completed: 11-08-2021
Drill Rig: ATV | Driller: J. Waddell
Project No.: HN215071

BORING LOG NO. G-11

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6854° Longitude: -83.6615°

Approximate Surface Elev.: 301 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	
0.3	300.5+/-	**TOPSOIL**, Approx. 4" of topsoil
		COASTAL PLAIN - SILTY SAND (SM), tan gray, medium dense
6.0	295+/-	**CLAYEY SAND (SC)**, brown, dense
30.0	271+/-	***Boring Terminated at 30 Feet***

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)
5		6-7-9 N=16	11.0
		8-7-10 N=17	
		9-13-17 N=30	14.0
10		12-16-19 N=35	
		8-8-10 N=18	
15			
		10-10-12 N=22	
20			
		8-6-8 N=14	
25			
		10-4-5 N=9	
30			

ATTERBERG LIMITS: LL-PL-PI

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

- *While drilling*
- *At completion of drilling*

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-02-2021 | Boring Completed: 11-02-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-12

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6842° Longitude: -83.6628°

Approximate Surface Elev.: 294 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description	FIELD TEST RESULTS
0.3	293.5+/-	**TOPSOIL**, Approx. 4" of topsoil	
		COASTAL PLAIN - SILTY SAND (SM), tan orange, medium dense	7-8-9 N=17
3.0	291+/-	**SILTY SAND (SM)**, brown, medium dense	8-5-9 N=14
6.0	288+/-	**CLAYEY SAND (SC)**, tan, medium dense	7-7-8 N=15
			6-7-10 N=17
12.0	282+/-	**SILTY SAND (SM)**, orange red, medium dense	8-13-14 N=27
17.0	277+/-	**SILTY SAND (SM)**, with small rock fragments, coarse to fine grained, brown tan, dense	10-14-16 N=30
22.0	272+/-	**SILTY SAND (SM)**, white, wet, medium dense	10-7-10 N=17
27.0	267+/-	**SILTY SAND (SM)**, very fine grained, white, loose	6-3-6 N=9
30.0	264+/-	***Boring Terminated at 30 Feet***	

DEPTH (Ft.): 5, 10, 15, 20, 25, 30

WATER LEVEL OBSERVATIONS: ▽ at 15 ft; ▽ at 22 ft

SAMPLE TYPE

WATER CONTENT (%)

ATTERBERG LIMITS — LL-PL-PI

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

▽ *At completion of drilling*

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-02-2021 | Boring Completed: 11-02-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-13

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6833° Longitude: -83.6640°

Approximate Surface Elev.: 289 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	288.5+/-	**TOPSOIL**, Approx. 4" of topsoil			
		COASTAL PLAIN - SILTY SAND (SM), brown, medium dense	7-7-8 N=15		
			8-9-13 N=22		
6.0	283+/-	**FAT CLAY (CH)**, gray, very stiff	5-7-11 N=18	21.6	76-26-50
			6-10-15 N=25		
12.0	277+/-	**POORLY GRADED SAND (SP)**, yellow white, wet, medium dense	6-6-7 N=13		
			4-7-5 N=12		
22.0	267+/-	**ELASTIC SILT (MH)**, white, stiff	4-5-7 N=12		
27.0	262+/-	**POORLY GRADED SAND (SP)**, orange gray, wet, medium dense	4-7-10 N=17		
30.0	259+/-	***Boring Terminated at 30 Feet***			

DEPTH (Ft.): 5, 10, 15, 20, 25, 30

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

While drilling

At completion of drilling

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-03-2021 | Boring Completed: 11-03-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-14

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6830° Longitude: -83.6643°

Approximate Surface Elev.: 288 (Ft.) +/-

DEPTH	ELEVATION (Ft.)		FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.2	288+/-	**AGGREGATE BASE COURSE**, Approx. 2" of aggregate base course			
		COASTAL PLAIN - CLAYEY SAND (SC), tan orange, dense	6-14-18 N=32	13.9	53-20-33
3.0	285+/-	**SILTY SAND (SM)**, pink, dense	7-16-19 N=35		
6.0	282+/-	**CLAYEY SAND (SC)**, white tan, medium dense	8-8-11 N=19		
			9-10-12 N=22		
12.0	276+/-	**SILTY SAND (SM)**, orange, medium dense	9-9-10 N=19		
			10-8-10 N=18		
22.0	266+/-	**POORLY GRADED SAND (SP)**, with rock, tan gray, damp, medium dense	11-13-12 N=25		
27.0	261+/-	**CLAYEY SAND (SC)**, brown, loose	2-3-5 N=8		
30.0	258+/-	***Boring Terminated at 30 Feet***			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

- *While drilling*
- *At completion of drilling*

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company

514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-08-2021 | Boring Completed: 11-08-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-15

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6827° Longitude: -83.6648°

Approximate Surface Elev.: 278 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	
0.2	278+/-	**AGGREGATE BASE COURSE**, Approx. 2" of aggregate base course
		FILL - SILTY SAND (SM), tan brown, very loose
6.0	272+/-	**ALLUVIUM - CLAYEY SAND (SC)**, gray, medium dense
12.0	266+/-	**SILTY SAND (SM)**, yellow, wet, loose to medium dense
		white @ 23.5'
		dense @ 28.5'
30.0	248+/-	***Boring Terminated at 30 Feet***

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
5		0-0-1 N=1		
		0-0-2 N=2		
		4-5-6 N=11		
10		6-7-12 N=19		
		3-3-5 N=8		
15				
		4-5-10 N=15		
20				
		9-8-10 N=18		
25				
		12-17-22 N=39		
30				

WATER LEVEL OBSERVATIONS

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

While drilling

At completion of drilling

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-08-2021 | Boring Completed: 11-08-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-16

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6862° Longitude: -83.6646°

Approximate Surface Elev.: 276 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	
0.4	275.5+/-	**AGGREGATE BASE COURSE**, Approx. 5" of aggregate base course
		FILL - SILTY SAND (SM), with gravel & organics, black, very loose
6.0	270+/-	**ALLUVIUM - SILTY SAND (SM)**, white tan, wet, loose
17.0	259+/-	**SANDY SILT (ML)**, brown black, medium stiff to stiff
27.0	249+/-	**POORLY GRADED SAND (SP)**, tan brown, very dense
30.0	246+/-	***Boring Terminated at 30 Feet***

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)
5		1-1-2 N=3	
		1-3-4 N=7	
		2-3-4 N=7	21.0
10		3-4-4 N=8	
15		3-2-3 N=5	
20		3-4-4 N=8	
25		3-4-5 N=9	
30		16-24-31 N=55	

WATER LEVEL OBSERVATIONS: ▽ While drilling; ▽ At completion of drilling

ATTERBERG LIMITS: LL-PL-PI

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

▽ *At completion of drilling*

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-08-2021 | Boring Completed: 11-08-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-17

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6864° Longitude: -83.6634°

Approximate Surface Elev.: 276 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	
0.4	275.5+/-	**AGGREGATE BASE COURSE**, Approx. 5" of aggregate base course
		FILL - SILTY SAND (SM), tan gray, medium dense
3.0	273+/-	
		FILL - SILTY SAND (SM), tan, medium dense
6.0	270+/-	
		FILL - POORLY GRADED SAND (SP), tan gray, wet, medium dense
12.0	264+/-	
		ALLUVIUM - SANDY SILT (ML), with organics, black brown, soft to medium stiff
22.0	254+/-	
		SILTY SAND (SM), yellow tan, wet, loose to medium dense
30.0	246+/-	
		Boring Terminated at 30 Feet

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)
		6-6-7 N=13	8.9
		7-7-5 N=12	9.1
5		6-7-8 N=15	
		6-8-8 N=16	
10			
		3-4-3 N=7	
15			
		4-1-1 N=2	
20			
		2-3-5 N=8	
25			
		3-5-5 N=10	
30			

ATTERBERG LIMITS: LL-PL-PI

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

While drilling

At completion of drilling

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-08-2021 | Boring Completed: 11-08-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071

BORING LOG NO. G-18

PROJECT: MCN Runway 5 Extension

CLIENT: Holt Consulting Company, LLC
Columbia, SC

SITE: 1000 Terminal Drive
Macon, GA

LOCATION

Latitude: 32.6842° Longitude: -83.6630°

Approximate Surface Elev.: 276 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description	FIELD TEST RESULTS	WATER CONTENT (%)
0.4	275.5+/-	**AGGREGATE BASE COURSE**, Approx. 5" of aggregate base course		
		FILL - CLAYEY SAND (SC), tan gray, loose	4-3-5 N=8	11.6
3.0	273+/-	**FILL - SILTY SAND (SM)**, gray, medium dense	5-10-8 N=18	
6.0	270+/-	**FILL - POORLY GRADED SAND (SP)**, tan, wet, loose	3-3-3 N=6	
			3-4-5 N=9	
12.0	264+/-	**ALLUVIUM - SANDY SILT (ML)**, with organics, brown black, stiff	4-5-7 N=12	
17.0	259+/-	**SILTY SAND (SM)**, gray tan, wet, loose to medium dense	4-6-9 N=15	
			8-5-2 N=7	
30.0	246+/-		8-10-11 N=21	
		Boring Terminated at 30 Feet		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2.25" HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

While drilling

At completion of drilling

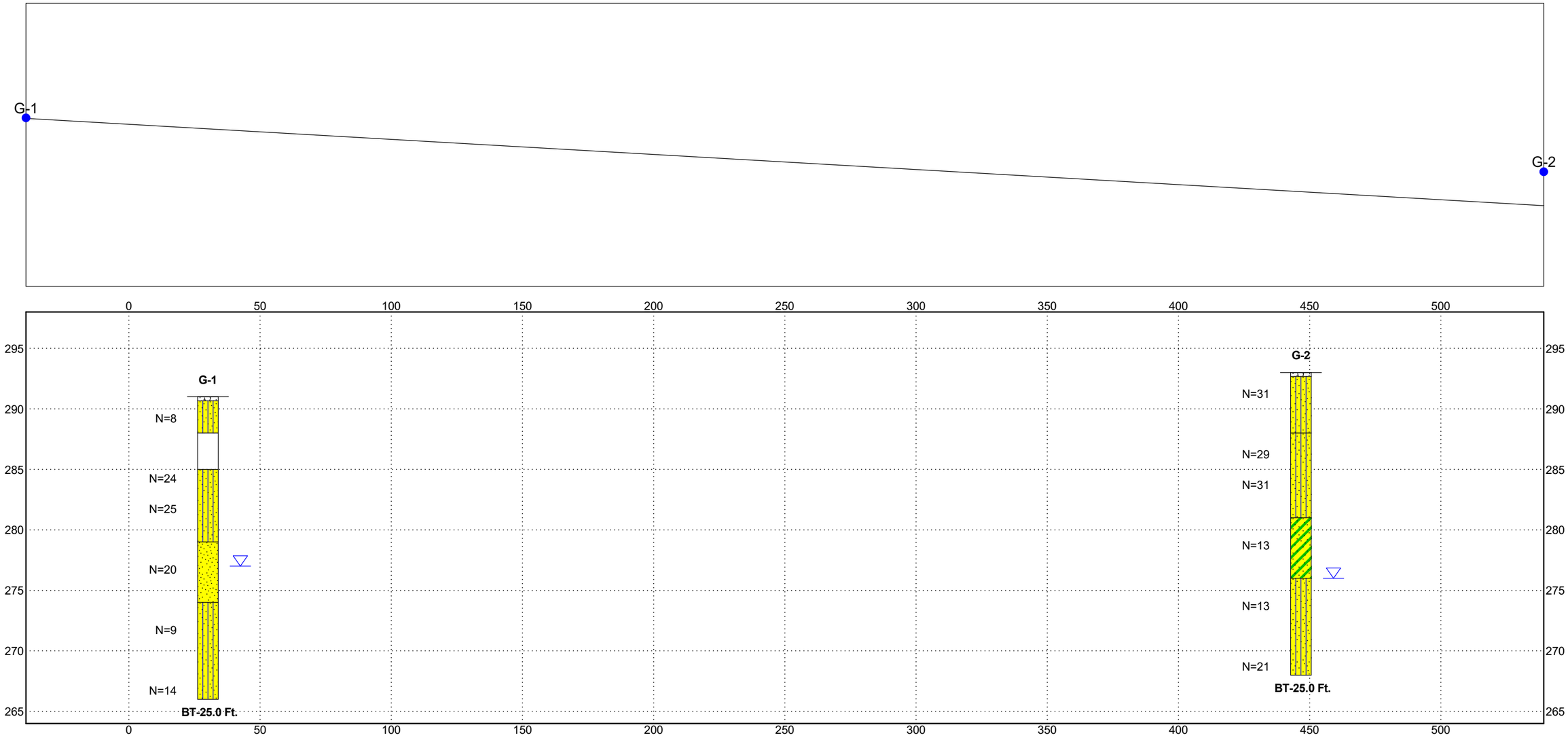
GEC Geotechnical Environmental Consultants, Inc. A Terracon Company

514 Hillcrest Indust. Blvd
Macon, GA

Boring Started: 11-08-2021 | Boring Completed: 11-08-2021

Drill Rig: ATV | Driller: J. Waddell

Project No.: HN215071



Topsoil | Silty Sand | Poorly-graded Sand | Clayey Sand

Explanation

G-1 — Borehole Number

Moisture Content — %w — LL PL — Liquid and Plastic Limits

Sampling (See General Notes) — Borehole Lithology

AR / BT — Borehole Termination Type

Water Level Reading at time of drilling.

Water Level Reading after drilling.

NOTES:

See Exhibit A-2 for orientation of soil profile.
See General Notes in Appendix C for symbols and soil classifications.
Soils profile provided for illustration purposes only.
Soils between borings may differ
AR - Auger Refusal
BT - Boring Termination

Project Manager: B. Thigpen	Project No.: HN215071
Drawn by: B.R.T.	Scale: N.T.S.
Approved by:	File Name: HN215071
Date: 2/10/2022	

GEC Geotechnical Environmental Consultants, Inc. A Terracon Company
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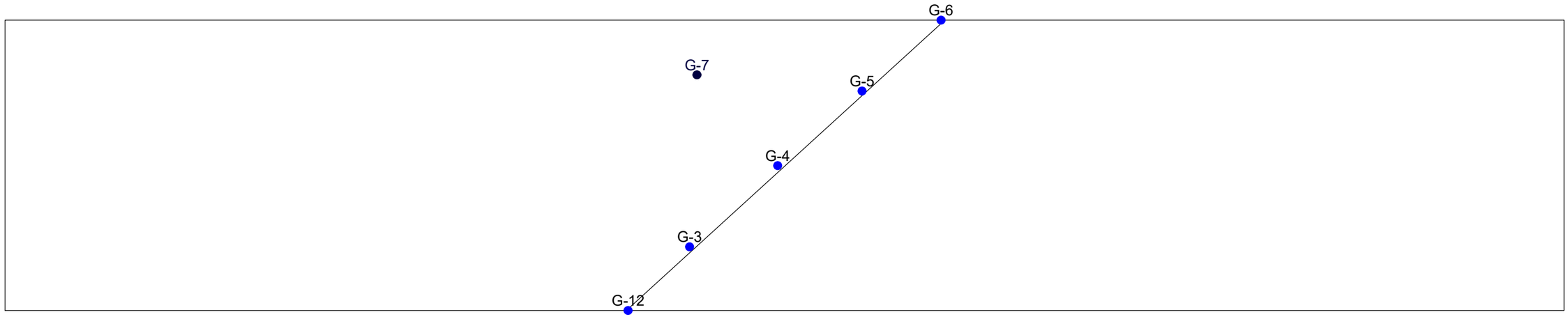
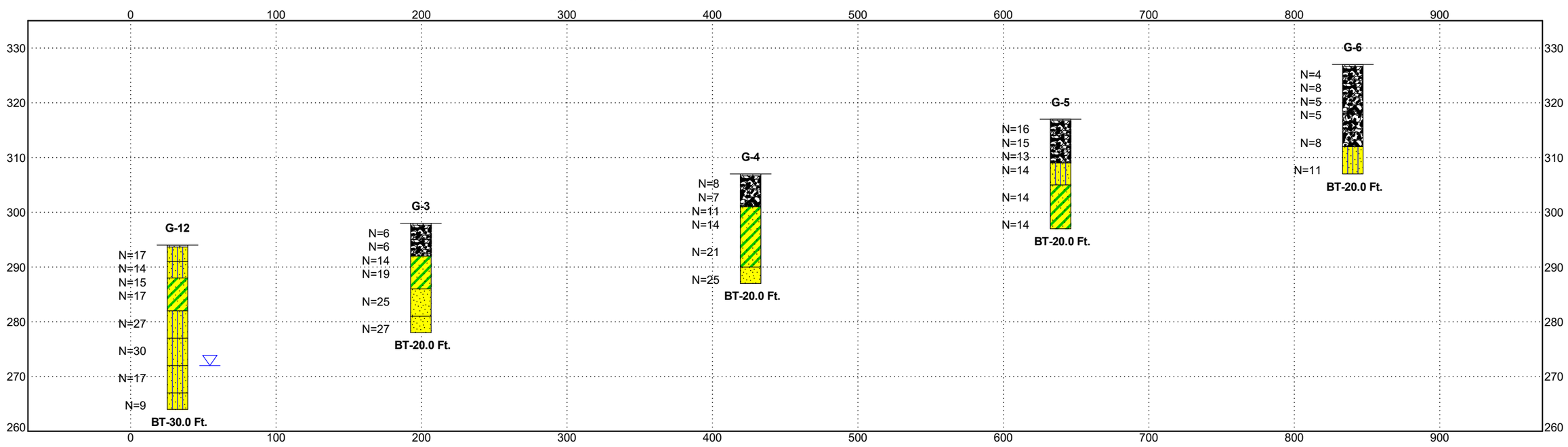
Macon, GA
PH. 478-757-1606 FAX. 478-757-1608

SUBSURFACE PROFILE

Fence 1
MCN RUNWAY 5 EXTENSION
1000 TERMINAL DRIVE
MACON, GA

EXHIBIT 1





Topsoil | Fill | Clayey Sand | Poorly-graded Sand | Silty Sand

Explanation

G-3 — Borehole Number
Moisture Content — %w — LL PL — Liquid and Plastic Limits
Sampling (See General Notes) — Borehole Lithology
AR / BT — Borehole Termination Type

Water Level Reading at time of drilling.

Water Level Reading after drilling.

NOTES:

See Exhibit A-2 for orientation of soil profile.
See General Notes in Appendix C for symbols and soil classifications.
Soils profile provided for illustration purposes only.
Soils between borings may differ
AR - Auger Refusal
BT - Boring Termination

Project Manager: B. Thigpen	Project No.: HN215071
Drawn by: B.R.T.	Scale: N.T.S.
Approved by:	File Name: HN215071
Date: 2/10/2022	

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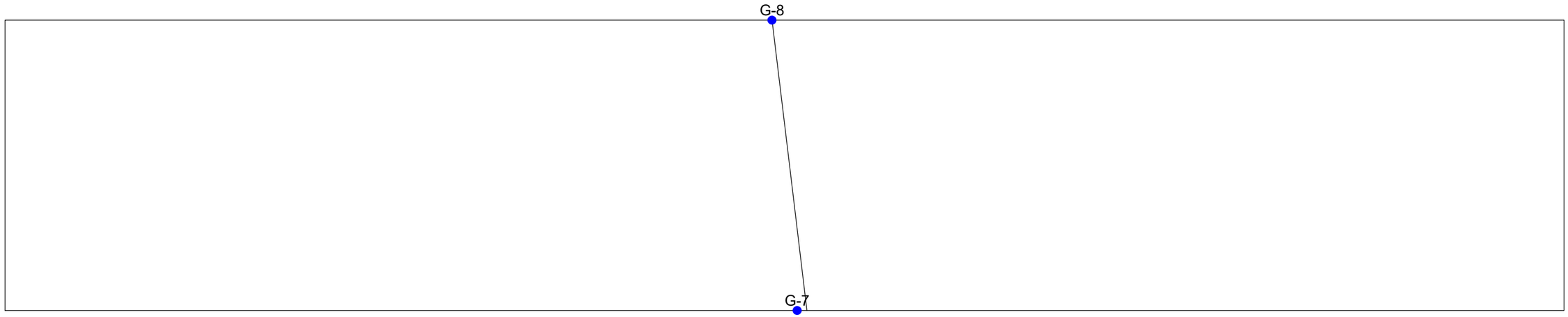
Macon, GA
PH. 478-757-1606 FAX. 478-757-1608

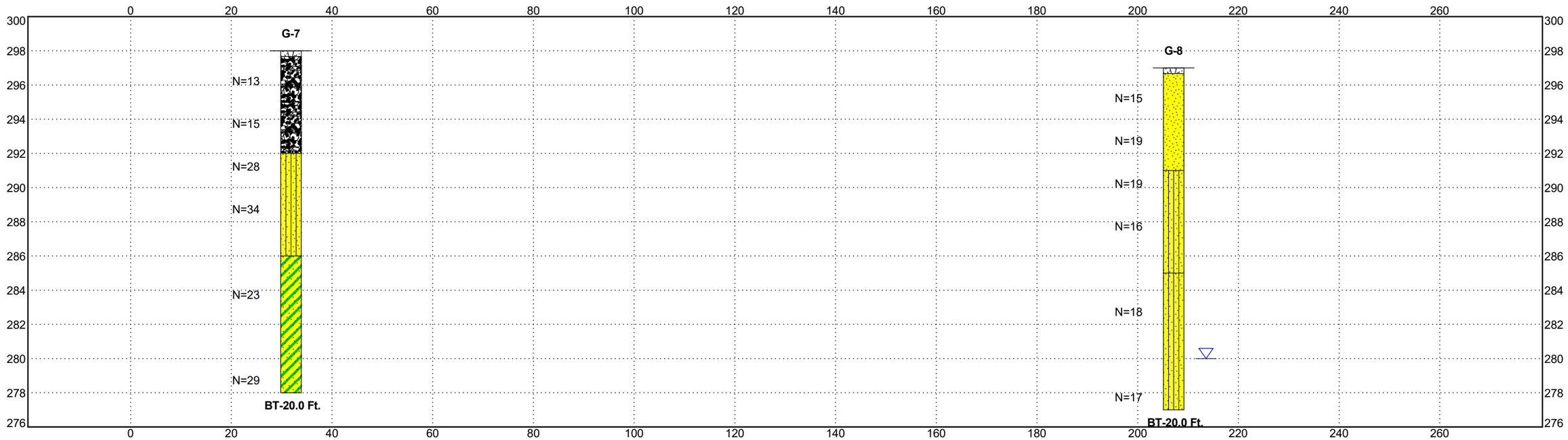
SUBSURFACE PROFILE

Fence 2
MCN RUNWAY 5 EXTENSION
1000 TERMINAL DRIVE
MACON, GA

EXHIBIT 1

X





Explanation

G-7 — Borehole Number

Moisture Content — %w

LL PL — Liquid and Plastic Limits

Sampling (See General Notes)

Borehole Lithology

AR / BT — Borehole Termination Type

Water Level Reading at time of drilling.

Water Level Reading after drilling.

NOTES:

See Exhibit A-2 for orientation of soil profile.
See General Notes in Appendix C for symbols and soil classifications.
Soils profile provided for illustration purposes only.
Soils between borings may differ
AR - Auger Refusal
BT - Boring Termination

Project Manager: B. Thigpen	Project No.: HN215071
Drawn by: B.R.T.	Scale: N.T.S.
Approved by:	File Name: HN215071
Date: 2/10/2022	

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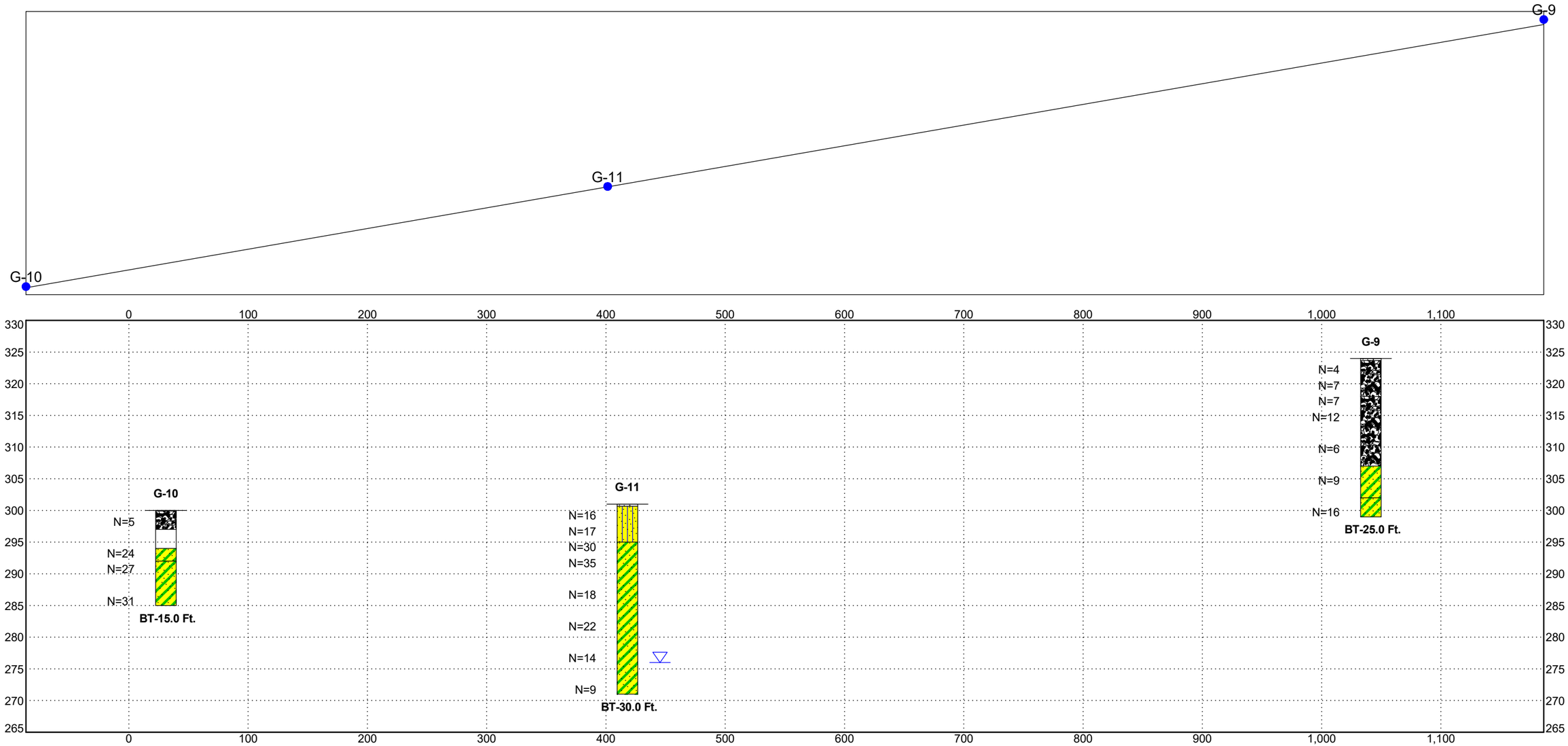
Macon, GA
PH. 478-757-1606 FAX. 478-757-1608

SUBSURFACE PROFILE

Fence 3
MCN RUNWAY 5 EXTENSION
1000 TERMINAL DRIVE
MACON, GA

EXHIBIT 1



Explanation

G-9 — Borehole Number
Moisture Content — %w
LL PL — Liquid and Plastic Limits
Sampling (See General Notes)
Borehole Lithology
AR / BT — Borehole Termination Type
Water Level Reading at time of drilling.
Water Level Reading after drilling.

NOTES:

See Exhibit A-2 for orientation of soil profile.
See General Notes in Appendix C for symbols and soil classifications.
Soils profile provided for illustration purposes only.
Soils between borings may differ
AR - Auger Refusal
BT - Boring Termination

Project Manager: B. Thigpen	Project No.: HN215071
Drawn by: B.R.T.	Scale: N.T.S.
Approved by:	File Name: HN215071
Date: 2/10/2022	

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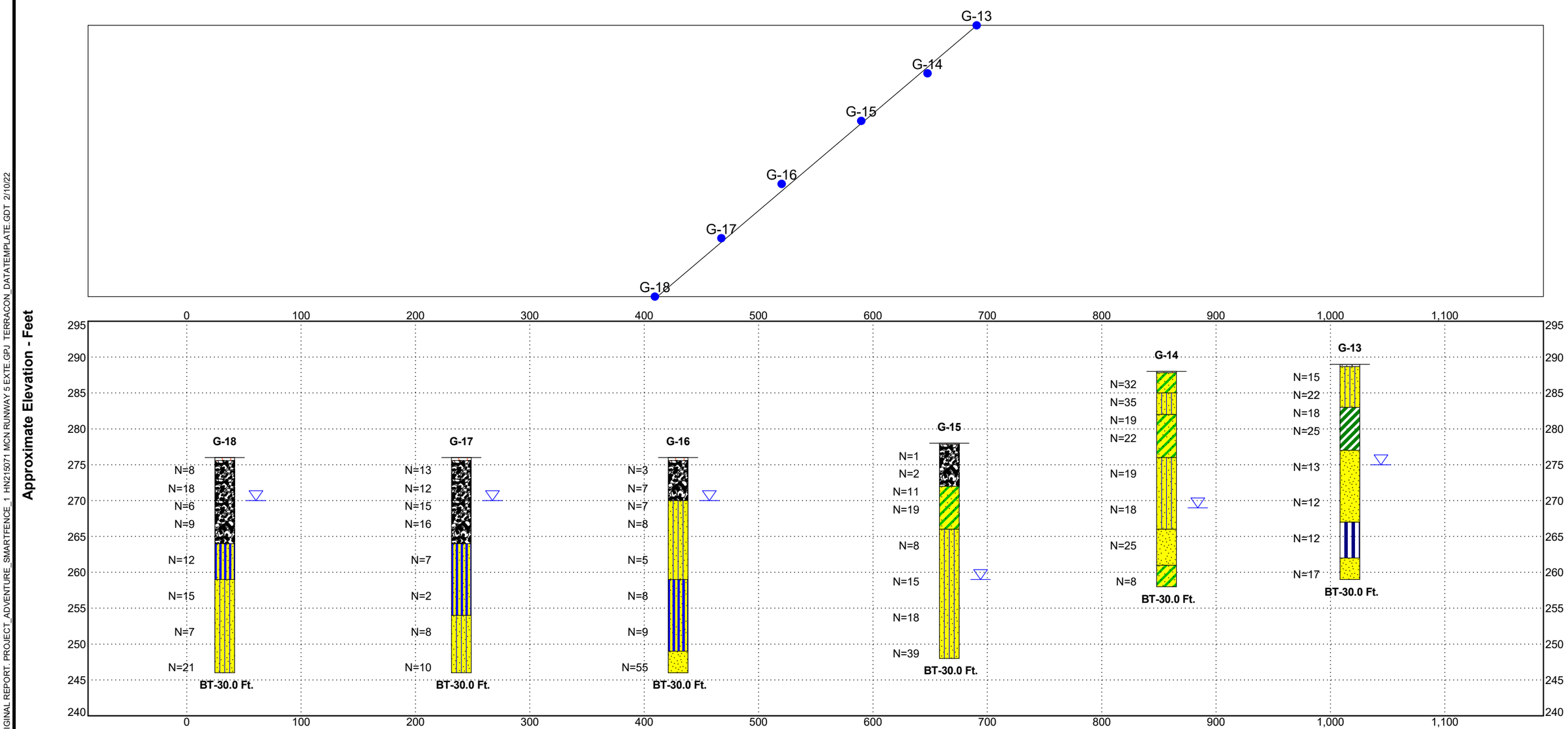
Macon, GA
PH. 478-757-1606 FAX. 478-757-1608

SUBSURFACE PROFILE

Fence 4
MCN RUNWAY 5 EXTENSION
1000 TERMINAL DRIVE
MACON, GA

EXHIBIT 1



Approximate Elevation - Feet

Distance Along Baseline - Feet

Explanation

G-13 — Borehole Number
Moisture Content — %w — LL PL — Liquid and Plastic Limits
Sampling (See General Notes) — Borehole Lithology
AR / BT — Borehole Termination Type

▽ Water Level Reading at time of drilling.
▼ Water Level Reading after drilling.

Topsoil | Silty Sand | Fat Clay | Poorly-graded Sand | Elastic Silt
Aggregate Base Course | Clayey Sand | Fill | Sandy Silt

NOTES:

See Exhibit A-2 for orientation of soil profile.
See General Notes in Appendix C for symbols and soil classifications.
Soils profile provided for illustration purposes only.
Soils between borings may differ
AR - Auger Refusal
BT - Boring Termination

Project Manager: B. Thigpen	Project No.: HN215071
Drawn by: B.R.T.	Scale: N.T.S.
Approved by:	File Name: HN215071
Date: 2/10/2022	

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514 Hillcrest Indust. Blvd
Macon, GA
PH. 478-757-1606 FAX. 478-757-1608

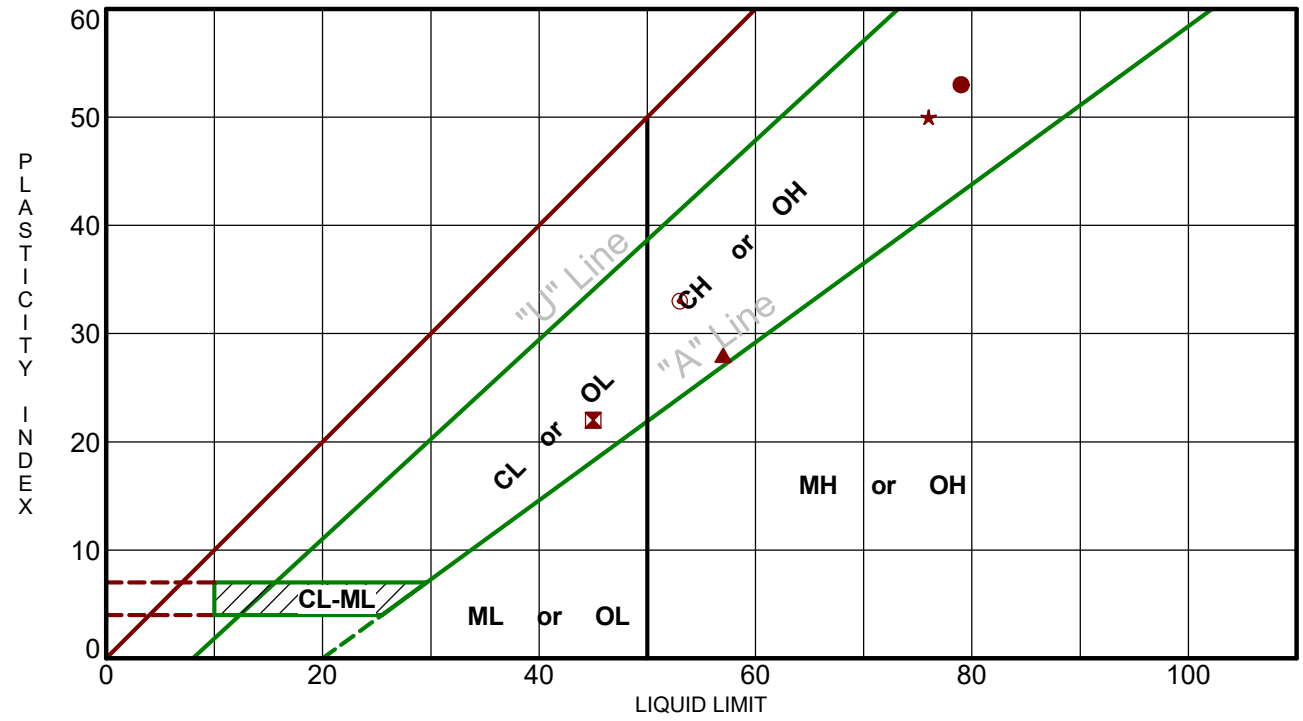
SUBSURFACE PROFILE

Fence 5
MCN RUNWAY 5 EXTENSION
1000 TERMINAL DRIVE
MACON, GA

EXHIBIT 1

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID	Depth	LL	PL	PI	Fines	USCS	Description
● G-3	6 - 7.5	79	26	53			
⊠ G-6	1 - 2.5	45	23	22			Off white brown CLAYEY M-F SAND
▲ G-6	3.5 - 5	57	29	28			Light purple FINE SANDY CLAY
★ G-13	6 - 7.5	76	26	50			Light gray M-F SANDY CLAY
⊙ G-14	1 - 2.5	53	20	33			Tan brown yellow CLAYEY M-F SAND

PROJECT: MCN Runway 5 Extension

SITE: 1000 Terminal Drive
Macon, GA

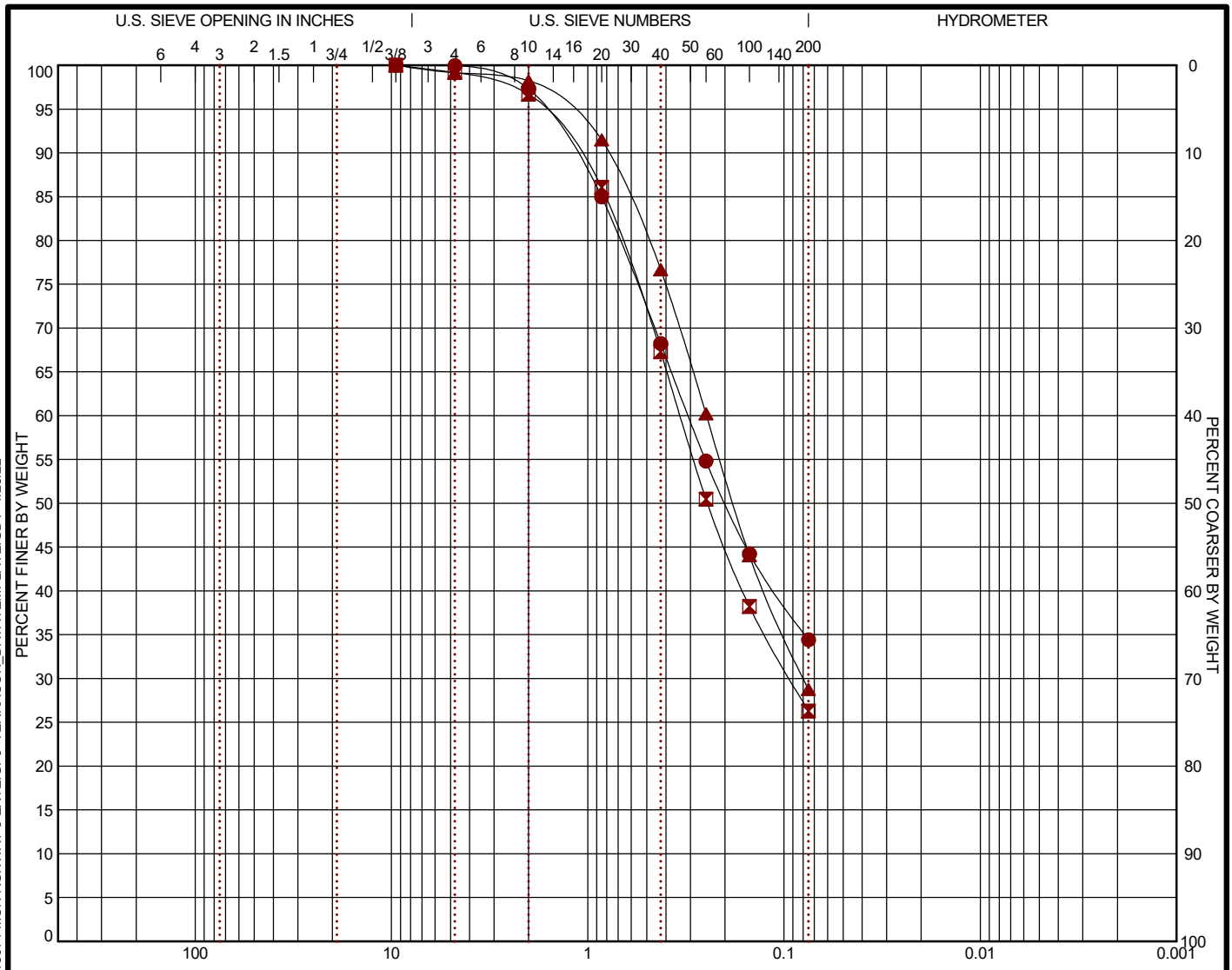
GEC Geotechnical Environmental Consultants, Inc. A Terracon company
514 Hillcrest Indust. Blvd
Macon, GA

PROJECT NUMBER: HN215071

CLIENT: Holt Consulting Company, LLC
Miramar Beach, FL

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	**G-1**	**1 - 2.5**	**0.0**	**0.1**	**65.5**		**34.4**		
⊠	**G-2**	**1 - 2.5**	**0.0**	**0.8**	**72.9**		**26.3**		
▲	**G-10**	**1 - 2.5**	**0.0**	**0.9**	**70.4**		**28.8**		

	GRAIN SIZE		
	●	⊠	▲
D_{60}	**0.307**	**0.338**	**0.248**
D_{30}		**0.093**	**0.079**
D_{10}			
	COEFFICIENTS		
C_C			
C_U			

●		⊠		▲	
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
3/8"	**100.0**	**3/8"**	**100.0**	**3/8"**	**100.0**
#4	**99.94**	**#4**	**99.17**	**#4**	**99.15**
#10	**97.28**	**#10**	**96.68**	**#10**	**98.23**
#20	**84.98**	**#20**	**86.06**	**#20**	**91.48**
#40	**68.24**	**#40**	**67.29**	**#40**	**76.67**
#60	**54.82**	**#60**	**50.49**	**#60**	**60.22**
#100	**44.24**	**#100**	**38.21**	**#100**	**44.04**
#200	**34.42**	**#200**	**26.3**	**#200**	**28.77**

SOIL DESCRIPTION

● Brown CLAYEY M-F SAND

⊠ Gray tan CLAYEY M-F SAND

▲ Brown SILTY M-F SAND

REMARKS

●

⊠

▲

PROJECT: MCN Runway 5 Extension

SITE: 1000 Terminal Drive
Macon, GA

[redacted]
514 Hillcrest Indust. Blvd
Macon, GA

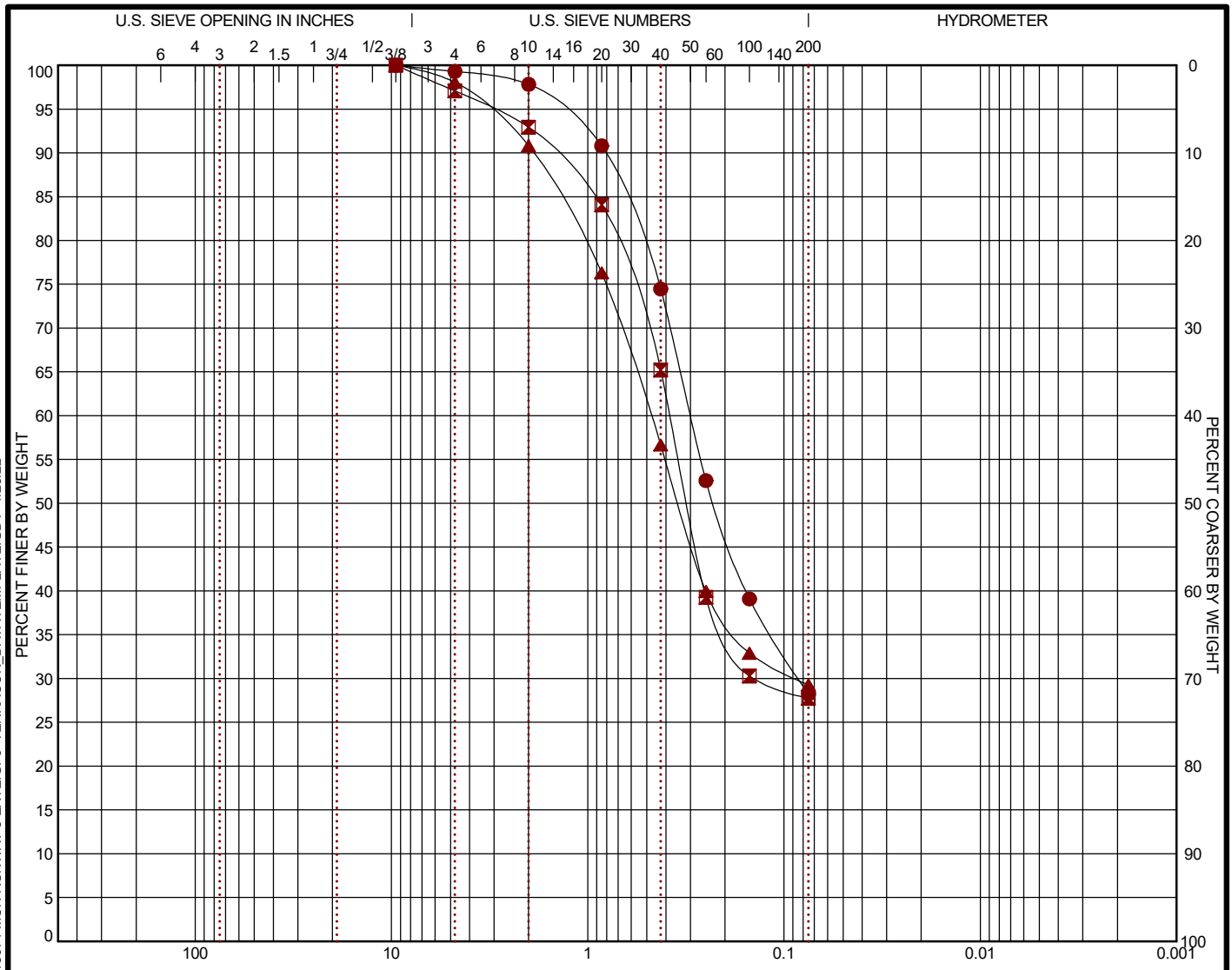
PROJECT NUMBER: HN215071

CLIENT: Holt Consulting Company, LLC
Miramar Beach, FL

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 HN215071 MCN RUNWAY 5 EXTE.GPJ TERRACON_DATATEMPLATE.GDT 1/25/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	**G-10**	**6 - 7.5**	**0.0**	**0.7**	**71.1**		**28.2**		
⊠	**G-10**	**8.5 - 10**	**0.0**	**2.9**	**69.3**		**27.7**		
▲	**G-10**	**13.5 - 15**	**0.0**	**1.9**	**68.8**		**29.3**		

	GRAIN SIZE		
	●	⊠	▲
D_{60}	**0.299**	**0.382**	**0.478**
D_{30}	**0.084**	**0.139**	**0.086**
D_{10}			
	COEFFICIENTS		
C_C			
C_U			

●		⊠		▲	
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
3/8"	**100.0**	**3/8"**	**100.0**	**3/8"**	**100.0**
#4	**99.29**	**#4**	**97.07**	**#4**	**98.05**
#10	**97.82**	**#10**	**92.93**	**#10**	**90.8**
#20	**90.8**	**#20**	**84.07**	**#20**	**76.3**
#40	**74.47**	**#40**	**65.21**	**#40**	**56.65**
#60	**52.59**	**#60**	**39.27**	**#60**	**39.93**
#100	**39.08**	**#100**	**30.28**	**#100**	**32.9**
#200	**28.23**	**#200**	**27.73**	**#200**	**29.27**

SOIL DESCRIPTION

● Dark brown tan gray orange SILTY M-F SAND

⊠ Orange gray tan CLAYEY C-F SAND

▲ Gray red tan CLAYEY C-F SAND

REMARKS

●

⊠

▲

PROJECT: MCN Runway 5 Extension

SITE: 1000 Terminal Drive
Macon, GA

[redacted]

514 Hillcrest Indust. Blvd
Macon, GA

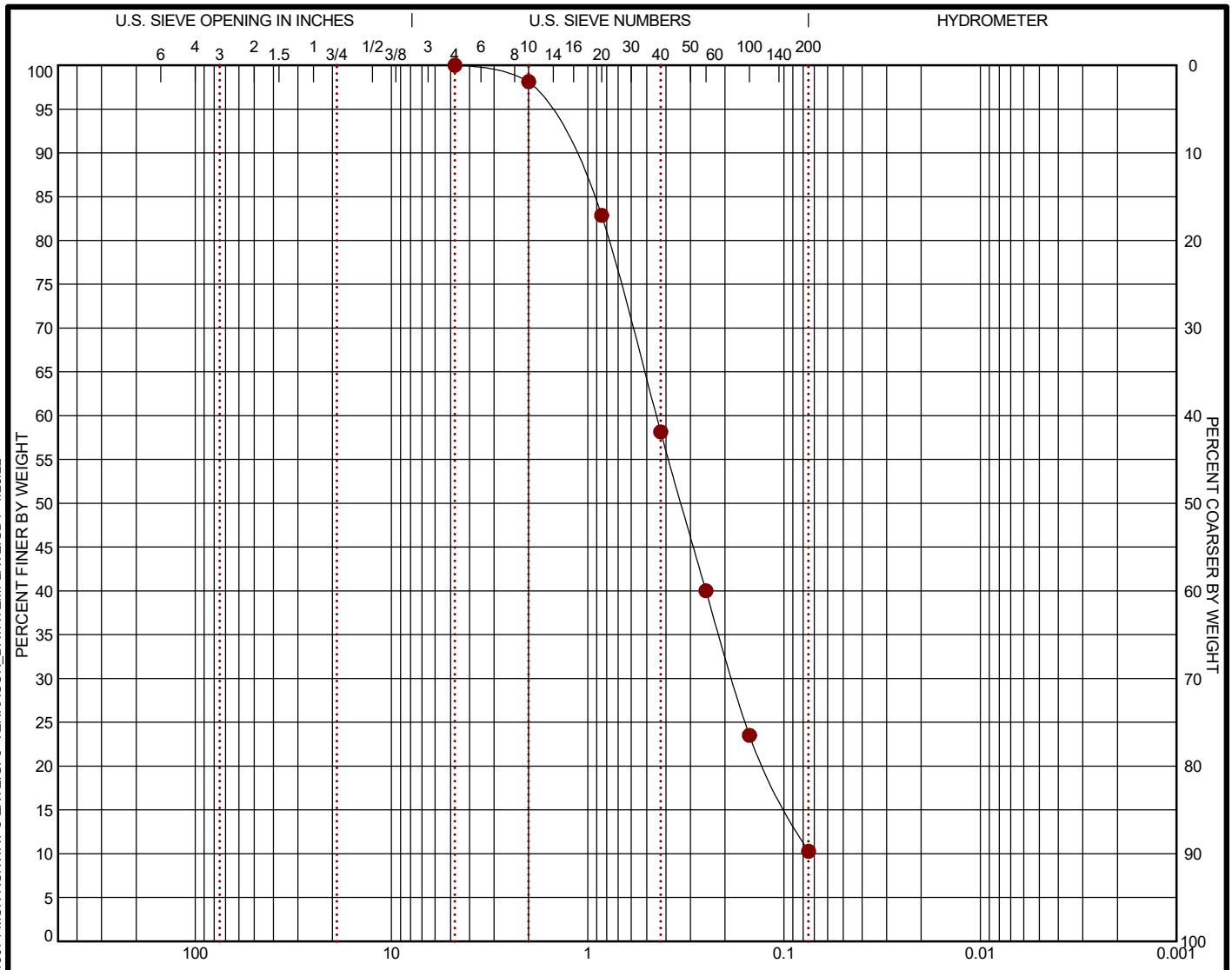
PROJECT NUMBER: HN215071

CLIENT: Holt Consulting Company, LLC
Miramar Beach, FL

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 HN215071 MCN RUNWAY 5 EXTE.GPJ TERRACON_DATATEMPLATE.GDT 1/25/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	**G-16**	**6 - 7.5**	**0.0**	**0.0**	**89.7**		**10.3**		

	GRAIN SIZE
●	
D_{60}	**0.448**
D_{30}	**0.183**
D_{10}	
	COEFFICIENTS
C_C	**1.02**
C_U	**6.06**

● Sieve	● % Finer	Sieve	% Finer	Sieve	% Finer
#4	**100.0**				
#10	**98.13**				
#20	**82.86**				
#40	**58.15**				
#60	**40.02**				
#100	**23.52**				
#200	**10.28**				

SOIL DESCRIPTION

● Tan gray M-F SAND with silt

REMARKS

●

PROJECT: MCN Runway 5 Extension

SITE: 1000 Terminal Drive
Macon, GA

[redacted]

514 Hillcrest Indust. Blvd
Macon, GA

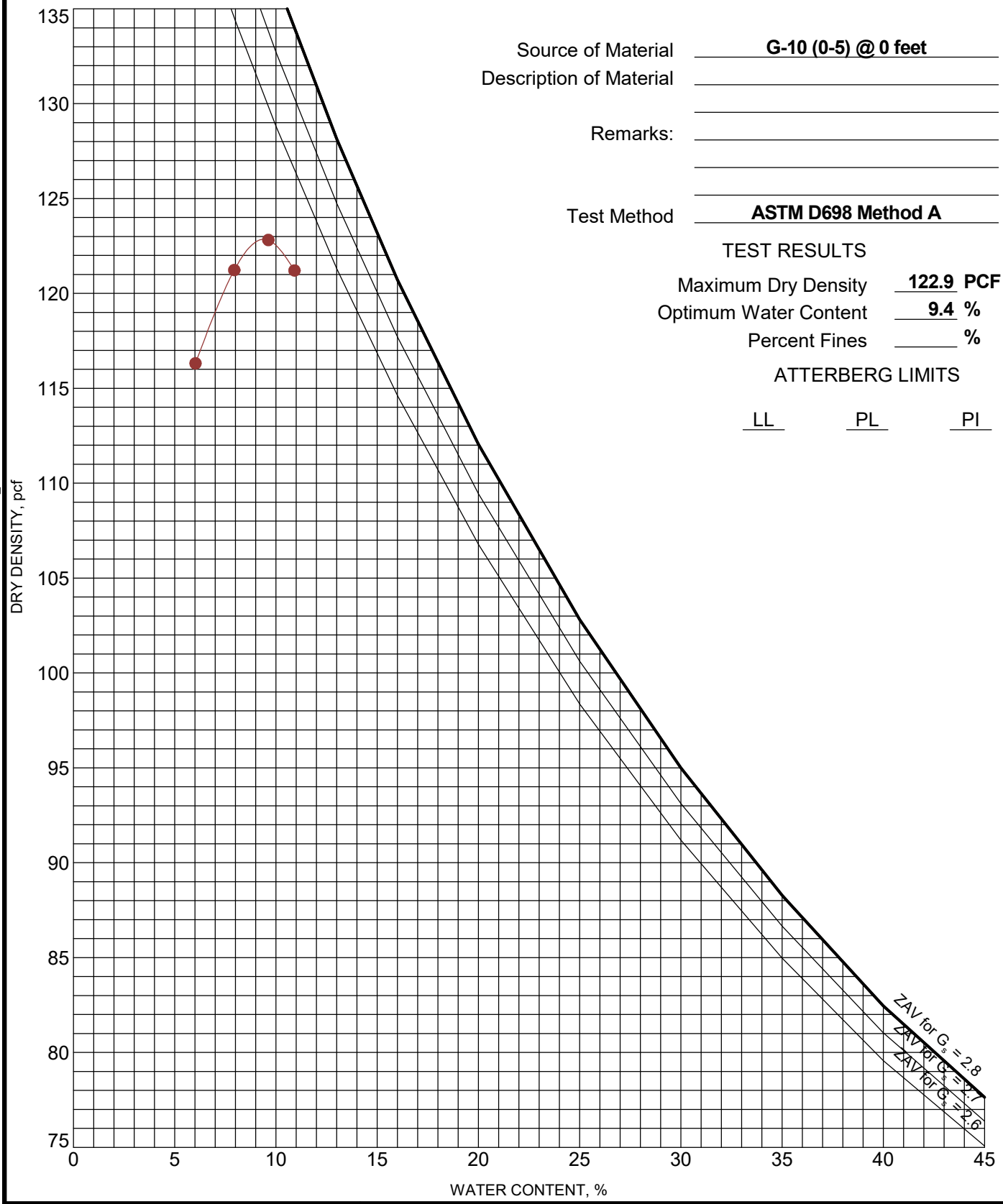
PROJECT NUMBER: HN215071

CLIENT: Holt Consulting Company, LLC
Miramar Beach, FL

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 HN215071 MCN RUNWAY 5 EXTE.GPJ TERRACON_DATATEMPLATE.GDT 1/25/22

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **G-10 (0-5) @ 0 feet**

Description of Material:

Remarks:

Test Method: **ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**122.9**	**PCF**
Optimum Water Content	**9.4**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: MCN Runway 5 Extension

SITE: 1000 Terminal Drive
Macon, GA

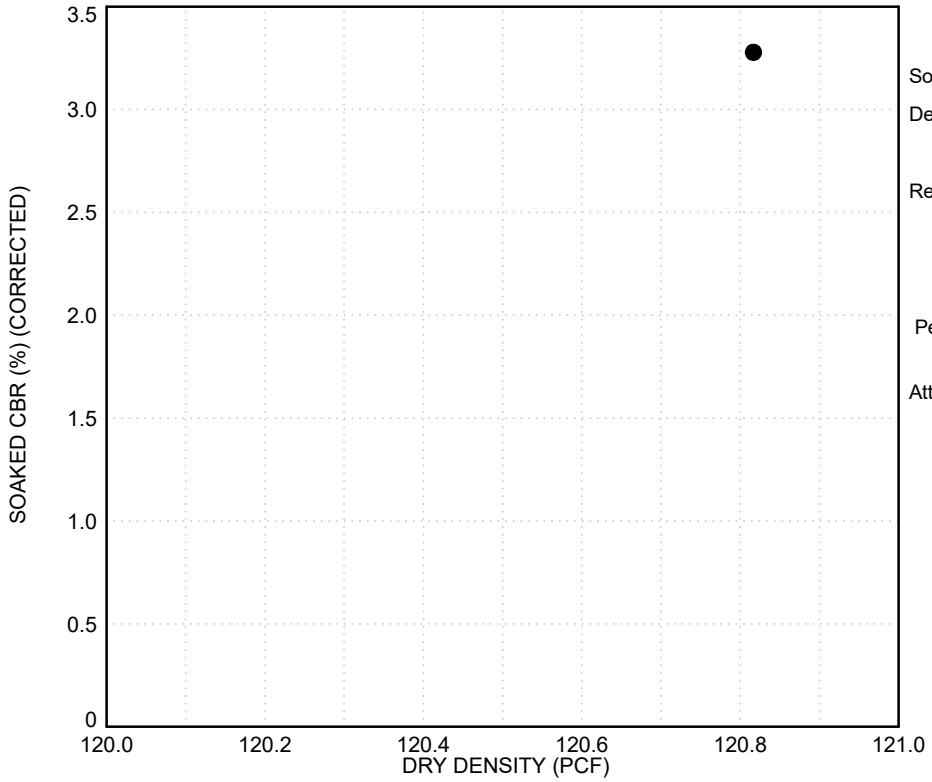
GEC Geotechnical & Environmental Consultants, Inc. A Terracon Company
514 Hillcrest Indust. Blvd
Macon, GA

PROJECT NUMBER: HN215071

CLIENT: Holt Consulting Company, LLC
Miramar Beach, FL

CALIFORNIA BEARING RATIO

ASTM D1883-07[2]



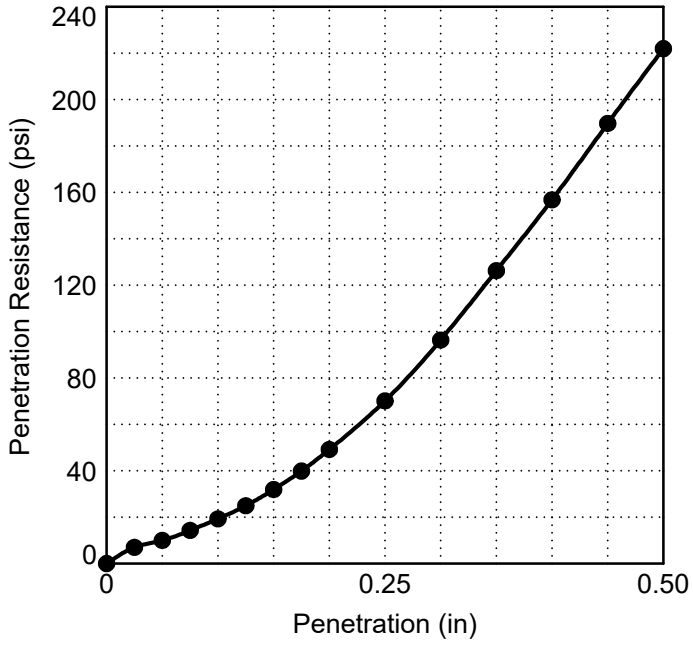
Source of Material: **G-10 (0-5) 0.0**

Description of Material: _____

Remarks: _____

Percent Fines: **%**

Atterberg Limits: LL _____ PL _____ PI _____



Sample No.	1
Sample Condition	Soaked
Compaction Method	ASTM 698A
Maximum Dry Density, (pcf)	122.9
Optimum Moisture Content, (%)	9.4
Dry Density before Soaking, (pcf)	120.82
Moisture Content, (%)	
After Compaction	11.4
Top 1" After Soaking	11.5
Surcharge,. (lbs)	10.00
Swell, (%)	-0.17
Bearing Ratio, (%)	3.3

PROJECT: MCN Runway 5 Extension

SITE: 1000 Terminal Drive
Macon, GA

GEC Geotechnical Environmental Consultants, Inc
A Terracon Company

514 Hillcrest Indust. Blvd
Macon, GA

PROJECT NUMBER: HN215071

CLIENT: Holt Consulting Company, LLC
Miramar Beach, FL

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

GENERAL NOTES

SAMPLING	WATER LEVEL	FIELD TESTS
Standard Penetration Test	Water Initially Encountered Water Level After a Specified Period of Time Water Level After a Specified Period of Time Cave In Encountered Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (tsf)	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

GEC A Terracon COMPANY GeoReport

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu ≥ 4 and 1 ≤ Cc ≤ 3 [E]		GW	Well-graded gravel [F]
			Cu < 4 and/or [Cc<1 or Cc>3.0] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu ≥ 6 and 1 ≤ Cc ≤ 3 [E]		SW	Well-graded sand [I]
			Cu < 6 and/or [Cc<1 or Cc>3.0] [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K, L, M, N]
			Liquid limit - not dried			Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K, L, M, P]
			Liquid limit - not dried			Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

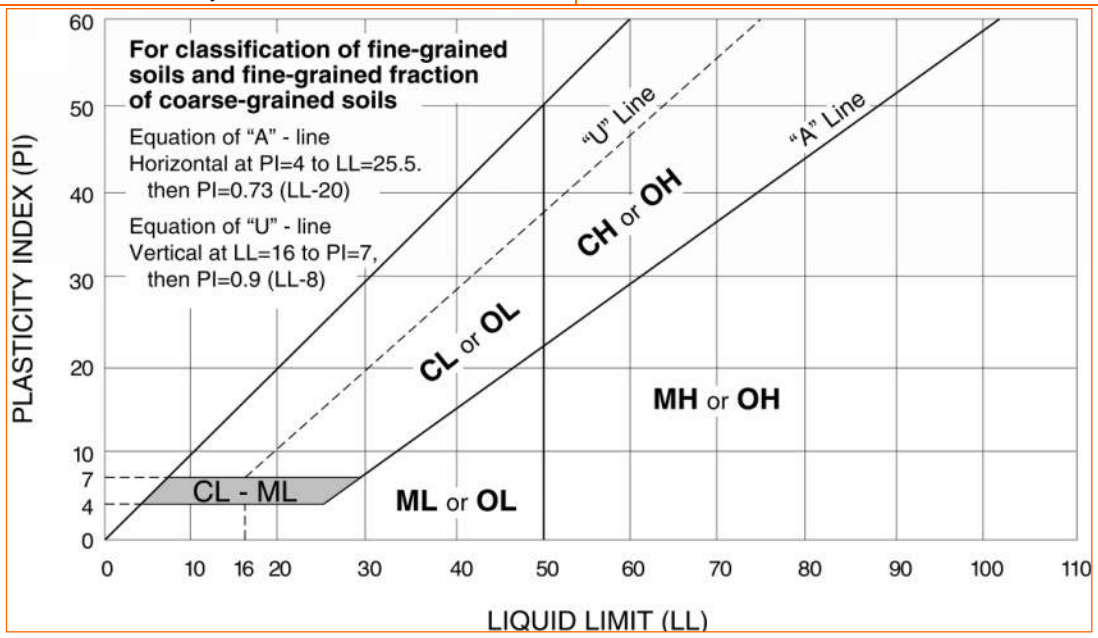
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



ATTENDANCE LOG

Pre-Bid Meeting
Runway 5-23 Extension
Middle Georgia Regional Airport

Date: June 6, 2023
2:00 PM

	NAME	REPRESENTING	E-MAIL	TELEPHONE
1	MIKE KLEUCKUNG	CW MATTHEWS	MIKEK@CWMATTHEWS.COM	404-271.3637
2	Kris Kmec	Independence Excavating	KKmec@indexc.com	717-579-9641
3	Jon Phillips	Morgan Corp	jphillips@morgan-corp.com	864-270-7170
4	Richie Deasing	Strack, Inc.	richied@strackinc.com	404-787-9332
5	Mike Volavka	Strack, Inc	mikev@strackinc.com	770-778-2515
6	Jim Sams	Strack, Inc.	jims@strackinc.com	7)876 1549
7	Cristhian Moreno	P2K	cmoreno@precision2k.com	7705706095
8	Garrett Smith	Piedmont Civilworks	gsmith@orcillamining.com	478-456-7279
9	Buster Dixon	Sellers Contracting	bdixon@sellersconstruction.com	478-972-0785
10	Jeff Brown	Kiewit	Jeffrey.Brown@Kiewit.com	954-410-9768
11	JOEY TANNER	REEVES CONSTRUCTION	Jtanner@reevescc.com	229-886-5098
12	BOBBY EVERLY	SELLERS CONTRACTING	beverly@sellersconstruction.com	478-628-1080
13	Logan Smith	Passero	lsmith@passero.com	717-321-6404

ATTENDANCE LOG

Pre-Bid Meeting
Runway 5-23 Extension
Middle Georgia Regional Airport

Date: June 6, 2023
2:00 PM

	NAME	REPRESENTING	E-MAIL	TELEPHONE
14	David Smith	Passero	Dsmith@passero.com	404-438-9125
15	Stan Price	Passero	sprice@passero.com	(478) 262-7750
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

PRE-BID MEETING

MACON-BIBB COUNTY
MIDDLE GEORGIA REGIONAL AIRPORT (MCN)

RUNWAY 5 EXTENSION

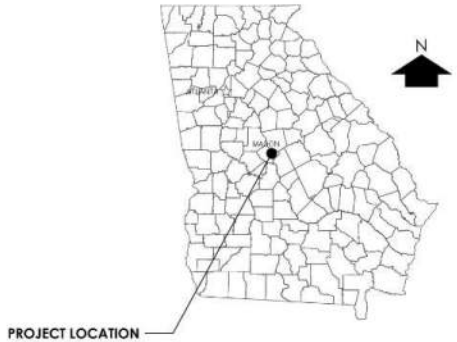
Tuesday, June 6, 2023
2:00 PM

CONTRACT DRAWINGS FOR:

MIDDLE GEORGIA REGIONAL AIRPORT (MCN)

1000 TERMINAL DRIVE SUITE 100
MACON, GA 31216

RUNWAY 5 EXTENSION



VICINITY MAP
NOT TO SCALE

LOCATION MAP
NOT TO SCALE

FEDERAL AVIATION ADMINISTRATION
AIRPORT IMPROVEMENT PROGRAM
PROJECT NUMBER: 3-13-0079-035-2023

PASSERO ASSOCIATES
PROJECT NUMBER 20202946.0003

X
DOUGLAS FAOUR, CM - DIRECTOR OF AVIATION

PRE-BID MEETING

BID DOCUMENTS

PASSERO ASSOCIATES
Engineering + Architecture
www.passero.com

SUBMITTAL:
BID DOCUMENTS -
DO NOT USE FOR CONSTRUCTION

ENGINEER OF RECORD:

NORTH ARROW AND SCALE:

PROJECT:
BASE BID: GRADING, DRAINAGE AND UTILITIES FOR RUNWAY 5 EXTENSION

CLIENT:
MACON-BIBB COUNTY

MIDDLE GEORGIA
REGIONAL AIRPORT (MCN)
MACON-BIBB COUNTY, GEORGIA

REVISIONS

No.	Date	By	Description

SHEET TITLE:
COVER SHEET

SHEET:
G100

PROJECT NO.:
20202946.0003

DATE:
MAY 2023

AGENDA

- Introductions – Key Personnel
- Project Elements and Phasing
- Contract Time
- Bid Schedule and Bid Submittal
- Engineer's Estimate of Probable Construction Costs
- Safety on Airports During Construction
- Miscellaneous Contract Requirements
- Questions, Clarifications, and Interpretations
- Site Visit

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INTRODUCTIONS – KEY PERSONNEL

OWNER:

Middle Georgia Regional Airport – Macon-Bibb County

Doug Faour, *Director Of Aviation*
***Heather Lowe**, Airport Manager*
Joshua Harrell, *Airport Operations Manager*
***Jim Mears**, Air Traffic Control Tower Chief*

ENGINEERING CONSULTANT:

Passero Associates

Stan Price, *Senior Project Manager*
TJ Collins, *Senior Project Engineer (Teams)*
Logan Smith, *Aviation Staff Engineer*
David Smith, *Resident Project Representative*
Richard Walls, *Electrical Engineer (Teams)*
Trip Thomas, *RunwaySafe (EMAS) (Teams)*

FUNDING AGENCIES:

FAA

Joseph Robinson, *Aviation Planner & PFC Specialist*
Gaethan Amedee, *Program Manager*

GDOT

Lynn Thompson, *Project Manager*

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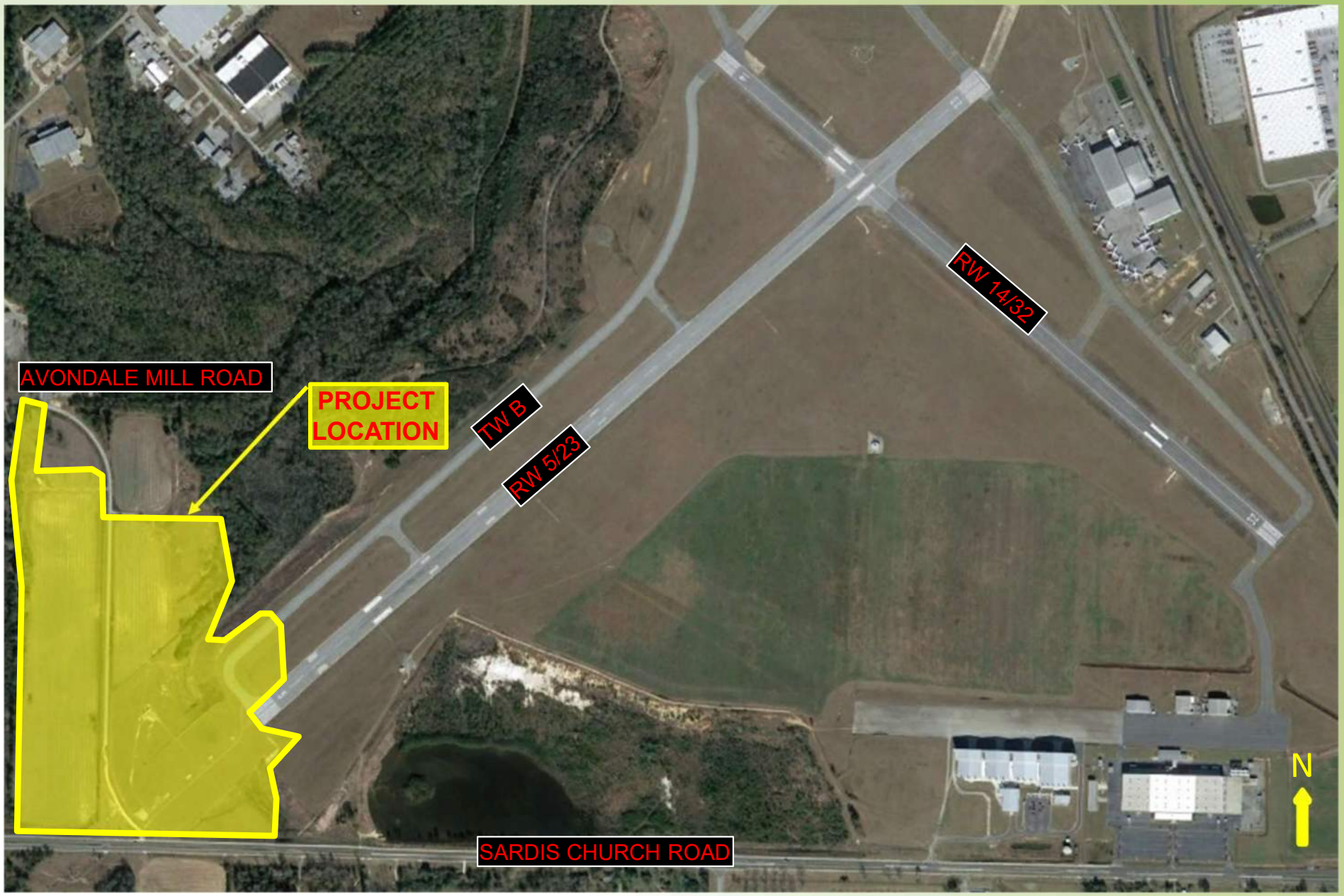
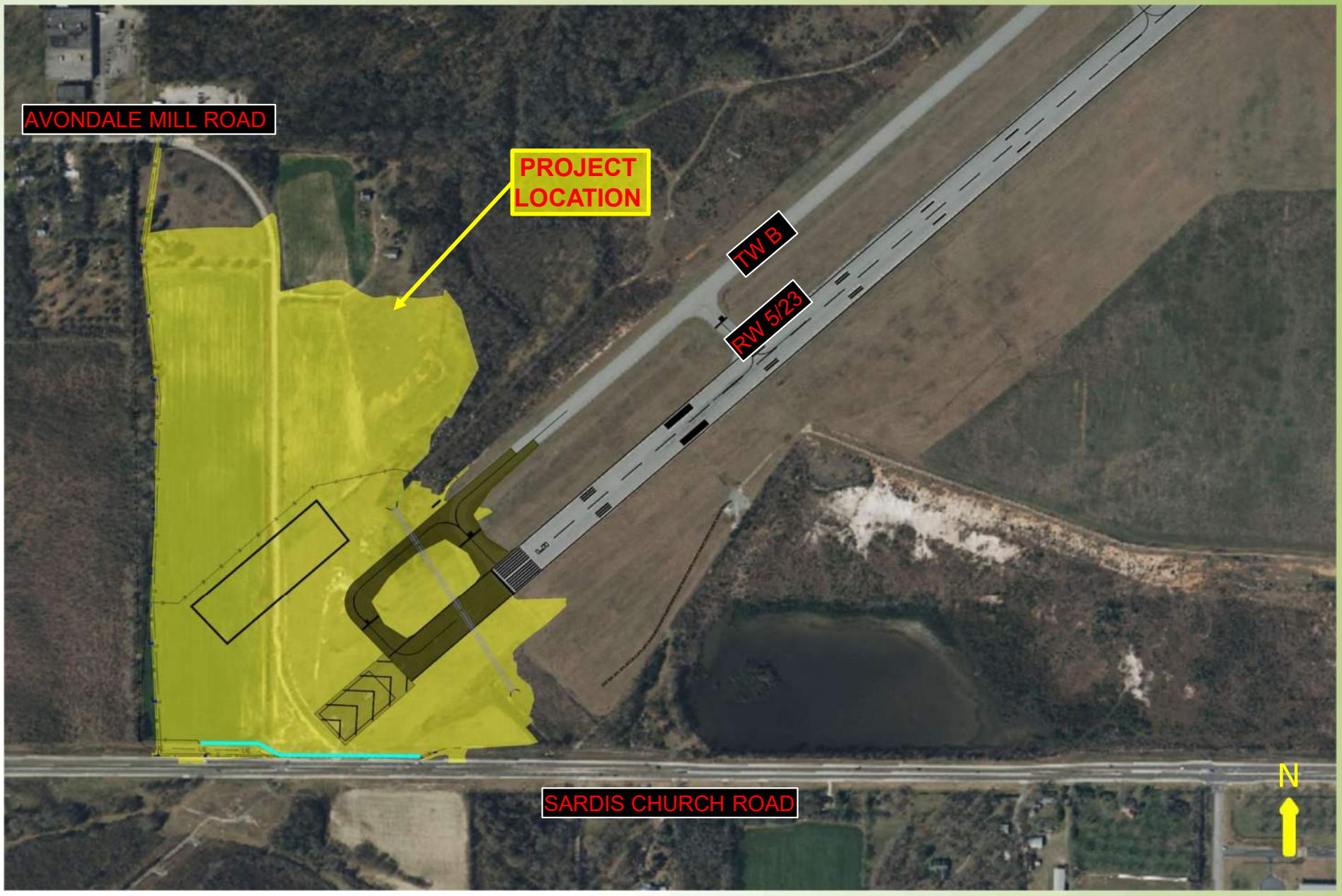
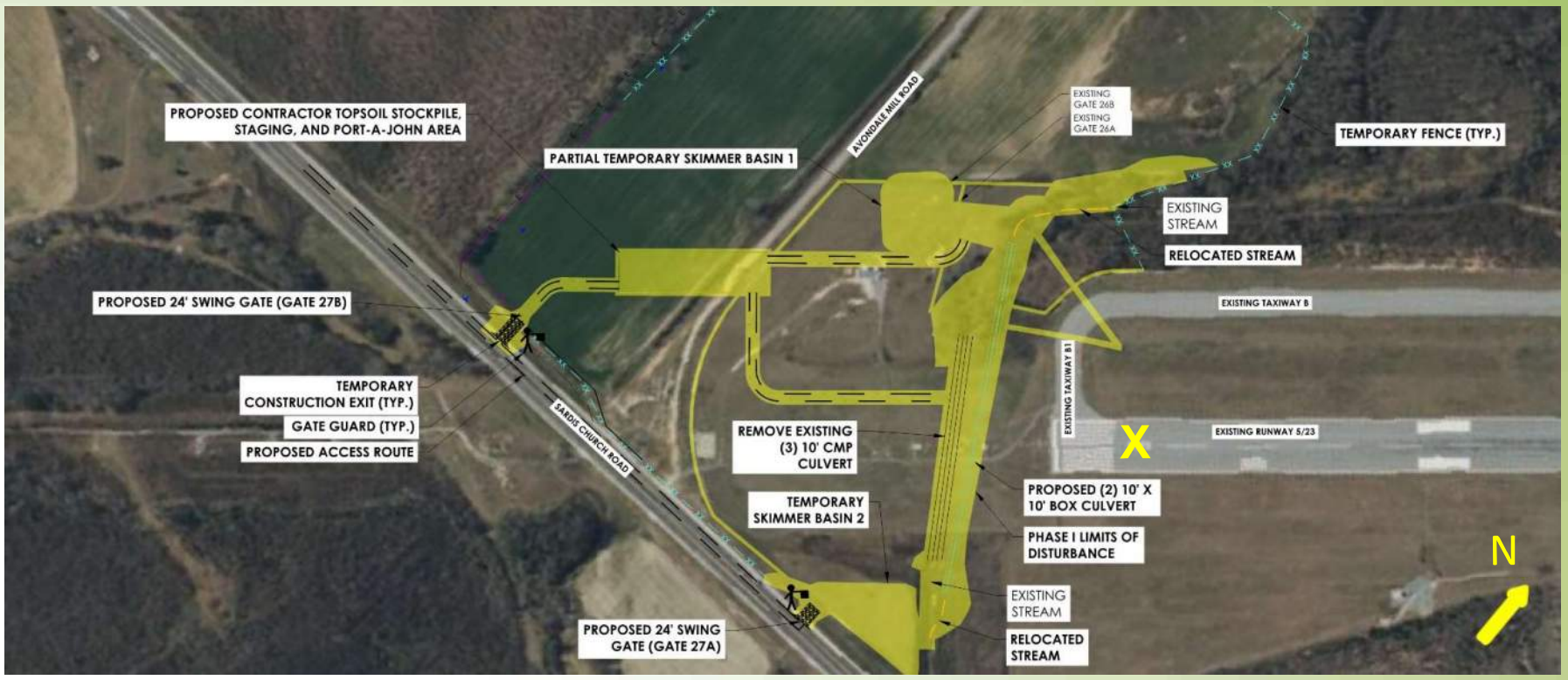
PROJECT ELEMENTS



PROJECT ELEMENTS



PROJECT PHASING – BASE BID (PHASE I)
BOX CULVERT INSTALLATION, STREAM RELOCATION, SKIMMER BASIN CONSTRUCTION, FENCE INSTALLATION, DEMOLITION



BASE BID (PHASE I) PROJECT SCOPE:

- **Install Permanent Fence –** 1,010 LF
- **Install Temporary Fence –** 5,205 LF
- **Remove Existing MALSR and MALSR Shelter**
- **Relocate Existing Stream –** 465 LF
- **Remove Existing CMP Culvert and Replace with (2) 10' x 10' Box Culvert -** 1,000 LF Each
- **Install Partial Temporary Skimmer Basin 1 and Complete Temporary Skimmer Basin 2 –** Approximately 24,000 CY

NOTES: **Runway 5/23 is Closed**
Contract Time = 75 Calendar Days

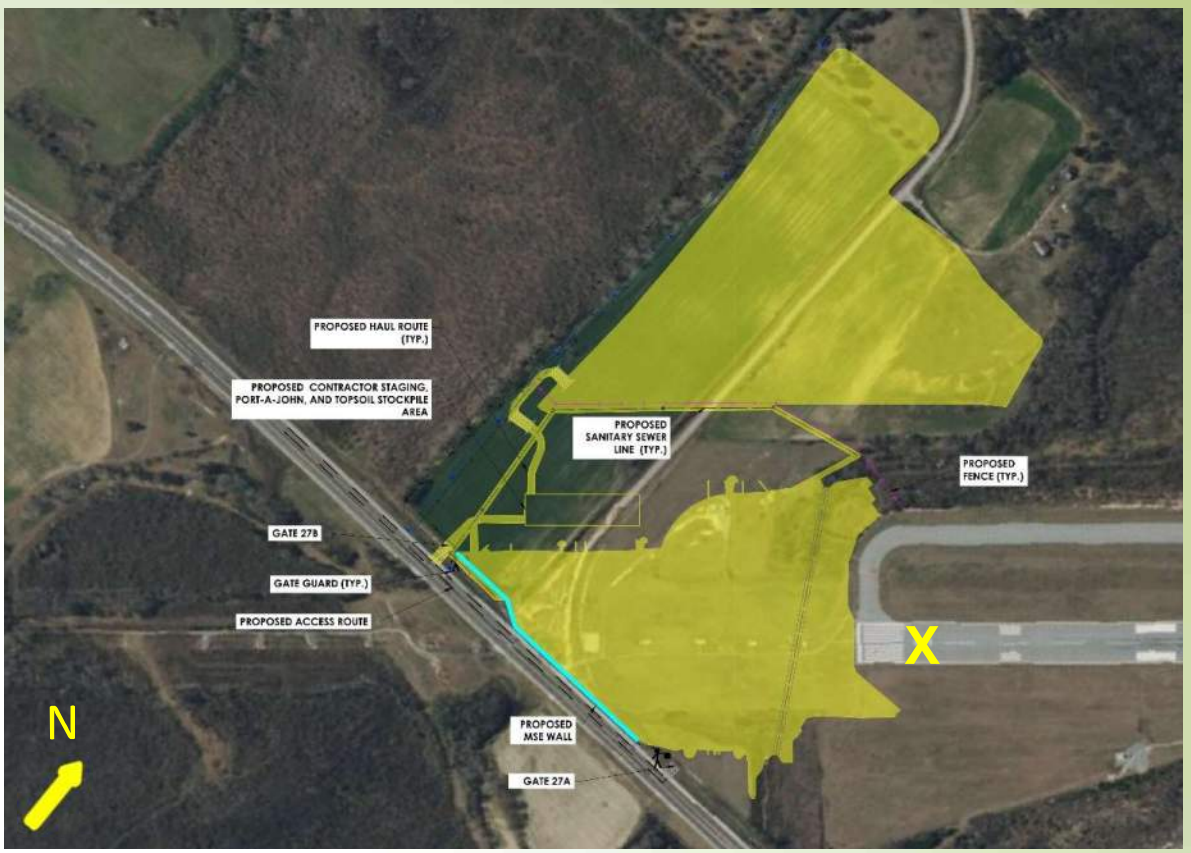
PROJECT PHASING – BASE BID (PHASE II)
EROSION CONTROL INSTALLATION, WATER, ELECTRIC, AND GAS UTILITY RELOCATIONS, FILL MATERIAL EXCAVATION AND STOCKPILING

BASE BID (PHASE II) PROJECT SCOPE:

- **Install Erosion Control Structures**
- **Relocate Existing 12" DIP Water Line –** 4,130 LF
- **Relocate Existing Overhead Electric Line –** Allowance Provided
- **Relocate Existing Gas Line –** Allowance Provided
- **Install Diversion Ditches and Temporary Skimmer Basin 1**
- **Stockpile Excavated Material Outside of Runway Object Free Area**

NOTES: **Runway 5/23 is Open**
Contract Time = 60 Calendar Days

PROJECT PHASING – BASE BID (PHASE III)
CLEARING AND GRUBBING, MSE WALL CONSTRUCTION, MASS GRADING, CLOSED DRAINAGE CONSTRUCTION, SANITARY SEWER RELOCATION, PERMANENT FENCE INSTALLATION



BASE BID (PHASE III) PROJECT SCOPE:

- **Clearing and Grubbing -** 8 AC
- **Mass Grading –** Approximately 615,000 CY
- **Install Closed Drainage**
- **Install Proposed MSE Wall -** Approximately 28,000 SF Wall Face
- **Relocate Existing 36" PVC Sanitary Sewer Line –** 2,048 LF
- **Install Remaining Permanent Fence** (2,690 LF) **and Remove Temporary Fence**

NOTES: **Runway 5/23 is Closed**
Contract Time = 220 Calendar Days

PROJECT PHASING – ADDITIVE ALTERNATE 1 (PHASE IV)
BASE AND PAVING FOR RUNWAY AND TAXIWAY EXTENSION, ELECTRICAL IMPROVEMENTS FOR RUNWAY AND TAXIWAY EXTENSION, INCLUDING EDGE LIGHTS, SIGNS AND MALSR MODIFICATIONS, RUNWAY AND TAXIWAY MARKING

ADDITIVE ALTERNATE 1 (PHASE IV) PROJECT SCOPE:

- **Install New Runway and Taxiway Pavement –** 3,400 Ton Surface Course, 10,200 Ton Binder Course, 28,400 SY Crushed Aggregate Base Course (10-Inch Depth)
- **Install New Edge Lights and Signs**
- **Install New MALSR and Relocate MALSR Shelter**
- **Remove and Replace All Runway 5/23 Markings –** 107,200 SF

NOTES: **Runway 5/23 is Closed**
Runway 14/32 is Closed for Night Work Only (5 Calendar Day)
Contract Time = 60 Calendar Days

PROJECT PHASING – ADDITIVE ALTERNATE 2 (PHASE V)
INSTALLATION OF EMAS PAVEMENT, INSTALLATION OF EMAS, EMAS MARKINGS

ADDITIVE ALTERNATE 2 (PHASE V) PROJECT SCOPE:

- **Install EMAS**
- **Install New Setback Pavement –** 2,200 Ton Surface Course, 9,300 SY Crushed Aggregate Base Course (10-Inch Depth)
- **Install New EMAS Markings**

NOTES: Runway 5/23 is Closed
Contract Time = 60 Calendar Days

CONTRACT TIME

CONTRACT TIME

- **BASE BID**
  - Phase I – 75 Calendar Days
  - Phase II – 60 Calendar Days
  - Phase III – 220 Calendar Days
  - Total Base Bid Contract Time – 355 Days

- **ADDITIVE ALTERNATE 1**
  - Phase IV – 60 Calendar Days

- **ADDITIVE ALTERNATE 2**
  - Phase V – 60 Calendar Days

TOTAL CONTRACT TIME – 475 Calendar Days

LIQUIDATED DAMAGES

- $1,000 per day for each calendar day in excess of the contract time.
- Night work - $500 for every 15 minutes after 5:00 am that runway is not reopened.

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BID SCHEDULE AND BID SUBMITTAL

Advertisement	Plan Available	Pre-Bid	Last Day for Questions	Addendum	Bid Opening
Friday, May 17, 2023	Friday, May 26, 2023	Tuesday, June 6, 2023 @ 2:00 P.M.	Monday, June 19, 2023	Wednesday, June 21, 2023	Thursday June 29, 2023 @ 12:00 Noon

BID PROPOSALS

- All bidders are required to complete & return a copy of the proposal section of the contract documents to the Procurement Office of Macon-Bibb County, 700 Poplar Street, 3rd Floor, Suite 308, Macon, GA 31201. A 5% bid guaranty is required.

CONTRACT AWARD

- Submitted bid prices are required to be held for 120 calendar days.
- The project will be awarded in the combination of Base Bid and Alternates that is most advantageous to the Owner.

Further information on proposal requirements, award and execution of the contract are included in the contract documents.

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ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COSTS

- The project cost, including the Base Bid and all Alternates, is estimated to be between $20,000,000 and $25,000,000.

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SAFETY ON THE AIRPORT DURING CONSTRUCTION

- Access inside the airport security fence is needed; therefore, **badging of Contractor key personnel shall be required.** The Contractor should apply for badging as soon as is practical to avoid any delay.

- The FAA advisory circular covering **Operational Safety On Airports During Construction** contains all the safety requirements you should know to safely conduct your daily construction operations for the duration of the project. A link to this circular is contained on Page FAA AC-1 in the project specifications.

- **Plan sheets PH101-PH107** include additional project safety information.

- **Middle Georgia Regional Airport is a towered, multiple runway airport that is always active, 24 hours per day. Aircraft shall have priority at all times.**

- Safety procedures will be discussed in detail with the Contractor at the pre-construction meeting.

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SPECIFIC PROJECT REQUIREMENTS/CLARIFICATIONS

- Due to the funding schedule, the bid cannot be delayed.
- At certain times during the project, tenants of the airport may have larger planes landing that require the use of Runway 5-23. During these times, the Contractor will be required to open the runway. A minimum of 24-hours notice will be provided to the Contractor prior to the opening of the runway.
- We will release the bid form in Excel format if desired. Please email sprice@passero.com and request the file. The Excel file will be released after Addendum 1 changes are made.
- Unit prices for each Allowance bid item will be provided on revised Bid Form that will be issued as a part of Addendum 1.
- The geotechnical report will be issued in Addendum 1.
- EMAS materials and installation should be included in the Contractor's bid. Contractors should contact RunwaySafe directly for pricing. RunwaySafe contact: Trip Thomas, (856) 975-5854, trip.thomas@runwaysafe.com.

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SPECIFIC PROJECT REQUIREMENTS/CLARIFICATIONS

- RunwaySafe has provided suggested installation time and manpower estimates in Specification Section P-555. These estimates are suggested and labeled as such. There will be no additional compensation if the suggested timeframe and manpower estimates shown in P-555 are used, and the actual installation exceeds the estimates.

- The GDOT Asphalt Cement Index will not be applicable to this project.

- Any unsuitable material that is excavated will be removed from the airport and disposed of properly by the Contractor.

- If unsuitable material is excavated, fill material from the same source used for the runway extension may be placed and compacted in the unsuitable excavation area. The replacement material will be paid for under P-152-4.2, Embankment in Place.

- Due to the uncertainty of both Alternates being awarded, bid items for P-401 Test Section have been added to the Bid Forms for Alternates 1 and 2 to allow for the capture of costs associated with the two, separate mix designs.

- The MSE Wall specification will be issued as a part of Addendum 1.

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SPECIFIC PROJECT REQUIREMENTS/CLARIFICATIONS

- The Plans and Specifications are designed as if the Base Bid and Alternate 1 will be awarded. Based upon this premise, negative quantities for some electrical items are shown in Alternate 2. These are items that are shown as required for Alternate 1 but will not be required if Alternate 2 is awarded, so are shown as deductions (negative quantities) in Alternate 2.

- The 10'x10' box culverts shall be pre-cast concrete. The GDOT cast-in-place details shown in the plans are provided to show design intent only.

- We anticipate that Addendum 1 will be issued by Friday, June 9th.

- Specification Section P-152 will be clarified related to borrow material and payment for borrow material. The Contractor will not be required to purchase borrow material from Macon-Bibb County, but the borrow material is available for purchase from the County for $1.50/CY if desired.

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SPECIFIC PROJECT REQUIREMENTS/CLARIFICATIONS

REVISED SECTION OF P-152-1.3

152-1.3 *Sources of supply for borrow material are available onsite. The Contractor may purchase a portion of, all, or none of the borrow material required to complete the project from Macon-Bibb County for a cost of $1.50 per cubic yard of excavated material. If used, the borrow material shall be excavated from the area identified on Sheet PH102 – Project Layout Plan as the borrow area and shall conform to the general grading concept shown on the plans. The number of cubic yards of borrow excavation material paid to Macon-Bibb County shall be measured as described in Paragraph 152-3.0. The Contractor shall provide an as-constructed survey with a digital terrain model (DTM) in accordance with Item C-103, Paragraph 103-4.2.*

The cost of loading and transporting the borrow material from its existing location shall be included under Item P-152-4.2, Embankment in Place (Onsite Borrow), Placed and Compacted, Complete. The cost of restoring the area disturbed by borrow material excavation shall be included under T-901-5.1, Permanent Seeding, T-905-5.1, Topsoiling (On-Site Stripping and Final Placement), and T-908-5.1, Mulching.

If offsite borrow material is used, there will be no pay for Unclassified Excavation for the quantity of offsite borrow material. All costs associated with offsite borrow will be included in Item P-152-4.2.

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SPECIAL CONTRACT REQUIREMENTS

- **<u>Wage & Labor Provisions and Certified Payroll Per Davis Bacon Act are included in this contract:</u>** The Contractor shall comply with wage & labor provisions, pay minimum wages in accordance with the current schedule of wage rates established by the U.S. Department of Labor, & submit U.S. Department of Labor Form WH-347 weekly to the Engineer. Failure to comply may result in delay of payments.

- **<u>Disadvantaged Business Enterprise requirements are included in this contract:</u>** The requirements of 49 CFR Part 26, regarding DBE, apply to this contract. The owner has established **a DBE goal of <u>9.79%</u>** participation for small business concerns owned & controlled by certified socially and economically disadvantaged enterprise. The bidder shall make & document good faith efforts, as defined in Appendix A of 49 CFR Part 26, to meet this established goal.

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QUESTIONS, CLARIFICATIONS & INTERPRETATIONS

A Bidder requiring a clarification or interpretation of the project documents shall make a written request to the Engineer by email at the following address:

Email address: sprice@passero.com

The Engineer must receive the written request by 5:00 P.M. on Monday, June 19, 2022. All written requests received by that date shall be responded to and the response shall become part of the Contract Documents.

Please note that any verbal response given to questions by the Engineer will be considered unofficial and will not become part of the Contract Documents. Therefore, please submit all contract questions in writing regardless of any verbal communication.

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QUESTIONS, CLARIFICATIONS & INTERPRETATIONS

During the bidders' review of the Contract Documents, any problems related to the following questions should immediately be brought to the attention of the Engineer:

- **Did you identify any discrepancies between the plans & specifications?**

- **Are all items of work and required submittals to complete the job described adequately in the contract documents?**

- **Are you aware of any item(s) required to complete the job that was not identified in the bid forms?**

Please submit any such items in writing as previously described.

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QUESTION & ANSWER

Question/Answer.

Site visit after Pre-bid Meeting

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