
IFB NO. Y19-760-RM

ISSUED: April 30, 2019

INVITATION FOR BIDS

FOR

BATES ROAD OVER CRANE STRAND CANAL BRIDGE DEFICIENCIES REPAIRS

**PART H
TECHNICAL SPECIFICATIONS**

**PART H
Volume II**

.....

TECHNICAL PROVISIONS

FOR

BATES ROAD OVER CRANE STRAND CANAL BRIDGE NO. 754003 DEFICIENCY REPAIRS

ORANGE COUNTY, FLORIDA



PREPARED FOR:

**ORANGE COUNTY PUBLIC WORKS DEPARTMENT
ROADS AND DRAINAGE DIVISION
4200 JOHN YOUNG PARKWAY
ORLANDO, FLORIDA 32839-9205**

PREPARED BY:



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APRIL 2019

PART H
TECHNICAL PROVISIONS

for:

BATES ROAD OVER CRANE STRAND CANAL
BRIDGE NO. 754003
DEFICIENCY REPAIRS
ORANGE COUNTY, FLORIDA

ACKNOWLEDGMENTS

As always, Inwood has enjoyed the opportunity to serve Orange County on this assignment, and would like to express our appreciation for the continued support of the County Commissioners.

Orange County Board of County Commissioners

- Jerry L. Demings, County Mayor
- Betsy VanderLey, District 1
- Christine Moore, District 2
- Mayra Uribe, District 3
- Maribel Gomez Cordero District 4
- Emily Bonilla, District 5
- Victoria P. Siplin, District 6



CERTIFICATION

The engineering material and data contained within the following Technical Provisions was prepared by Inwood Consulting Engineers for the sole use by the Orange County Roads and Drainage Division.

_____, P.E.
Kevin B. Fischer, P.E.
Florida Registration No. 60074
Date:

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ORANGE COUNTY TECHNICAL PROVISIONS

✦ Orange County **Technical Provisions (TP's)** pertinent to this contract are listed below ✦

| TP No. | Technical Provision Description |
|---------------|--|
| 101 | Mobilization |
| 102 | Maintenance of Traffic |
| 104 | Prevention, Control and Abatement of Erosion and Water Pollution |
| 901-1 | Double Tee-Beam Repair |
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BRIDGE NO. 754003
DEFICIENCY REPAIRS
ORANGE COUNTY, FLORIDA

SCOPE OF WORK

Orange County existing Bridge No. 754003, Bates Road over Crane Strand Canal, has been identified as requiring repairs to deficiencies that were observed and documented during bridge visual inspections in 2017. The deficiency repair plans and Technical Provisions have addressed repair procedures for each deficiency including the materials required and sequence of repair steps. Temporary Traffic Control details have also been included for the repairs that will require shifting of either the pedestrian or vehicular traffic as indicated.

The deficiencies to be repaired at this bridge site as part of this contract are as follows:

1. *Deck Concrete Topping Repair* - The bridge superstructure consists of concrete double-tee beams and a concrete topping and riding surface. This riding surface has sustained numerous cracks and previously repaired spalls have failed that will require restoration. The cracks will be repaired by application of an epoxy resin after the deck surface at the crack has been properly prepared. The spalls will be repaired by preparing a clean squared off surface around the perimeter of the failed spall repair, installation of wire mesh reinforcement and application of a repair mortar.
2. *East Approach Slab Repair* - The east approach slab of the bridge has undergone long term settlement. The slab requires a restoration of the riding surface interface with the bridge deck. An asphalt overlay from a previous repair that covers a portion of the slab shall be removed along with the top 1" of concrete within the repair area and a new asphalt overlay shall be applied at the interface of the slab and the bridge.
3. *Double-Tee Beam Repairs* - Two of the double-tee beams have local concrete section losses from spalls that have exposed either wire mesh reinforcement or a prestressing strand. Beam 3-3 has exposed reinforcement in the bottom side of the top flange that shall be protected from corrosion through application of an epoxy compound. Beam 3-10 has an exposed prestressing strand in the right web that shall be protected with application of an epoxy bonding compound then the flange shape shall be restored with a concrete based repair mortar.
4. *Prestressed Concrete Pile Repairs* - The prestressed concrete piles at Intermediate Bent 2 have undergone scaling and will need to be protected by adding concrete pile jackets to each pile at this bent. A temporary floating turbidity barrier shall be utilized to contain turbidity that may occur during pile jacket installation.
5. *Pedestrian Sidewalk Connection to Bridge Repair* - The anchor bolt connection for the structural steel framing system that connects the open grating pedestrian sidewalk has failed at the Intermediate Bent 2 cap due to a concrete spall. The connection and cap shape shall both be restored by constructing a reinforced concrete cap extension in the vicinity of the spall.
6. *Pedestrian Sidewalk Panel Weld Repair* - A welded connection between two of the sidewalk panels has failed which will need to be repaired through a new butt weld with a backer bar.

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INDEX OF DRAWINGS

(Prepared by Inwood Consulting Engineers)

| Sheet | Description |
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| | Bates Road over Crane Strand Canal (Bridge No. 754003) Deficiency Repair Plans |
| 1 | Key Sheet |
| 2 | Summary of Pay Items |
| 3 | Temporary Traffic Control Details |
| B-1 | Plan |
| B-2 | Deck Spall Repair Details |
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| B-4 | Double Tee-Beam Repair Details |
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| B-6 | Pedestrian Sidewalk Repair Details (1 of 2) |
| B-7 | Pedestrian Sidewalk Repair Details (2 of 2) |

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SCHEDULE OF PRICES (a.k.a. BID FORM)

SCHEDULE OF PRICES

BRIDGE NO. 754003, BATES ROAD OVER CRANE STRAND CANAL: DEFICIENCY REPAIRS

| Item No. | Pay Item No. | Description | Units | Quantity | Unit Cost | Total |
|--------------------------------|--------------|--|-------|----------|-----------|-------|
| 1 | 101-1 | MOBILIZATION (10% OF ALL OTHER ITEMS) | LS | 1 | | |
| 2 | 102-1 | MAINTENANCE OF TRAFFIC | LS | 1 | | |
| 3 | 104-11 | PREVENTION, CONTROL AND ABATEMENT OF EROSION AND WATER POLLUTION | LS | 1 | | |
| 4 | 457-1-11 | STANDARD INTEGRAL PILE JACKET, NON-STRUCTURAL | LF | 40 | | |
| 5 | 901-1 | DOUBLE-TEE BEAM REPAIR | LS | 1 | | |
| 6 | 901-2 | CONCRETE BRIDGE DECK REPAIR | LS | 1 | | |
| 7 | 901-3 | PEDESTRIAN SIDEWALK REPAIR | LS | 1 | | |
| 8 | 901-4 | APPROACH SLAB REPAIR | LS | 1 | | |
| TOTAL PRICE (BASE BID): | | | | | | |

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**BATES ROAD OVER CRANE STRAND CANAL
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“**Standard Specifications**” shall mean the Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction, dated January 2019, and supplements thereto, and Orange County Road Construction Specifications. The project shall be constructed in accordance with these specifications and of the Florida Department of Transportation (FDOT) “**Standard Specifications for Road and Bridge Construction**” (dated January 2019), and “**Supplemental Specifications for Road and Bridge Construction**” (dated January 2019), hereafter referred to as the “Standard Specifications,” and “**Orange County Road Construction Specifications**” (latest edition). “**Additional Specifications**” (if any) may also be provided herein by the Engineer in an effort to more clearly define the Work under this Contract.

When reference is made to a Division, Section, or Article, it shall mean a Division, Section, or Article of said “**Standard Specification**”. Wherever the Standard Specifications indicate a mailing address for a State office or Agency, the office or agency and the address shown area hereby deleted and replaced by the following:

| | |
|------------------------------------|-------------------------------|
| Orange County Roads and Drainage | 4200 South John Young Parkway |
| Division – Public Works Department | Orlando, Florida 32839 |

Where duplication of specifications occur, the Florida Department of Transportation (FDOT) “Standard Specifications for Road and Bridge Construction (latest edition)” shall apply unless reference is made to a material or equipment specification as required by Orange County. Where discrepancies occur between the “Standard Specifications”, “Supplemental Specifications”, “Orange County Specifications” and the Engineer’s “Additional Specifications”, provisions of Section 5-2 of the Standard Specifications for Road and Bridge Construction (latest edition) shall apply.

Each reference to Basis of Payment in said “Standard Specifications” is superseded by the conditions contained in the Technical Provisions and all other conditions related to Basis of Payment contained in these specifications.

The work specified in this contract represents the type of services to be accomplished. Work under this contract is limited to specified areas as listed in the scope of work. Areas have been inventoried and calculated as to quantities. Any discrepancies or disagreements concerning quantities and limits of work shall be immediately reported in writing (shall reflect the new measurements taken by the Contractor and the contract measurements) to the County representative. Discrepancies or disagreements will be mutually resolved prior to beginning work in any area in question. The County will make the final determination on any unresolved matters.

The plans/drawings depict the general layout for work to be performed under this contract. The Contractor shall layout the work from benchmarks, control points and construction base lines established at the site, or supplied by County. All work of every description shall be laid out and checked by the Contractor who shall be held solely responsible for its correctness. A detailed quote including quantities and materials needed for requested projects (linear foot underdrain, PVC pipe, square yards of concrete (sidewalk, driveways, curb), asphalt, etc.), conflicts (utilities, structures, trees, mailboxes, etc.) and recommendations shall be submitted to the County's Representative for review no later than five (5) days after request from the County. The Contractor shall be responsible for direction of flow, high points, etc. The County's Representative must review submitted quote and authorize the Contractor to proceed with the layout of the project. The detailed layout for the project shall be submitted for review prior to starting operations and no later than three (3) days after notification, unless otherwise authorized by the County.

All measurement for payment shall be based on the completed and accepted work performed in strict accordance with drawings and specifications. All work completed under this contract shall be measured by the Contractor in the presence of the County's Representative. The quantities listed in the summary of Pay Items are estimated.

Unless otherwise specified herein, the Contractor shall be responsible for any testing and densities required as per Orange County and FDOT specifications at no cost to the County.



TECHNICAL PROVISIONS

TP 101 - Mobilization

MOBILIZATION

Mobilization shall include all items detailed in Article 101 of the Standard Specifications, the Special Provisions and on the plans, except as directed by the Engineer.

Preservation of Property Corners including all items detailed in Section 7-11 of the Standard Specifications shall be included in the contract price for mobilization.

Basis of Payment

The work and incidental costs covered under Mobilization will be paid for at the contract lump sum price and will be paid in partial payments in accordance with the following:

| Percent of Original Contract Amount Earned | Allowable Percent of the Lump Sum Price for the Items* |
|--|--|
| 5 | 25 |
| 10 | 50 |
| 25 | 75 |
| 50 | 100 |

*Partial payments as detailed above will be limited to 5% of the original Contract amount for the roadway pay items. Any amount of mobilization in excess of 5% of the roadway pay items will be paid upon completion of all work.

No special compensation will be made to the Contractor to defray costs of any of the work or delays by making surveys and measurements, tests or inspections, but such costs shall be considered as having been included in the price stipulated for the several items of work to be done under this contract. The Contractor shall bear all costs of relocating and/or re-establishing damaged or lost monuments/control structures. Any claims for extras based on substrata or ground water table conditions shall not be allowed.

Payment shall be made under:

Pay Item:

| | | |
|-------|--------------------------------------|----------|
| 101-1 | Mobilization (5% of all other items) | Lump Sum |
|-------|--------------------------------------|----------|

Pay Item Note No. 101-1

Includes all applicable survey costs and costs necessary for a video survey. The work site/area shall be videoed (CD) prior to work commencement and after work is completed. This video will be taken by the Contractor, and shall be submitted on CD to the County with the final pay request. Includes all efforts necessary to construct and dismantle a temporary staging area as needed to accommodate typical wet season rainfall events occurring during construction.



TECHNICAL PROVISIONS

TP 102 – Maintenance of Traffic

MAINTENANCE OF TRAFFIC

All Maintenance of Traffic work shall conform to the requirements of Section 102 of the Standard Specifications, Index 600 of the FDOT Design Standards, the plans, and/or as herein modified, except as directed by the Engineer.

The road shall be kept open to two-way traffic on a paved surface during construction except when full closures are allowed by the plans or by the Engineer. The Contractor shall not be permitted to isolate residences or places of business. Access shall be provided to all residences and all places of business whenever construction interferes with the existing means of access.

The Contractor shall furnish, erect and maintain all necessary traffic control devices, including flagmen, pilot cars and variable message boards, in accordance with the *Manual on Uniform Traffic Control Devices for Streets and Highways*, published by the U.S. Department of Transportation, Federal Highway Administration. The Contractor shall provide and maintain in a safe condition the entire project limits included, but not limited to pre existing conditions, driving lanes, temporary approaches, crossings, and intersections with trails, roads, streets, business parking lots, residences, garages and completed work. Contractor shall coordinate with Orange County to notify residents of this closure. The Contractor shall take all necessary precautions for the protection of the work and the safety of the public in accordance with Section 102.

The Contractor shall present his signed and sealed Maintenance of Traffic Plan to the Engineer at the preconstruction conference, and shall be fully and solely responsible for the adequacy of the Maintenance of Traffic plan regardless of the source. The plan shall be signed and sealed by a professional engineer licensed in the State of Florida.

The Contractor shall be responsible for installation of signs for all business along the project corridor. Signs should be manufactured and installed in accordance with FDOT design standards. No special compensation will be made to the contractor to defray costs of any of the work or delays for complying with the requirements of installing business signs, but such costs shall be considered as having been included in the price stipulated for the Maintenance of Traffic pay item.

A safe pedestrian way shall be maintained at all times during construction.

Basis of Payment

All materials, work and incidental costs related to Maintenance of Traffic will be paid for at the contract lump sum price. All material, labor and equipment necessary for the construction and maintenance of the entire project limits included, but not limited to pre-existing conditions, driving lanes, temporary approaches, crossings, intersections with trails, roads, streets, business

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TP 102 – Maintenance of Traffic

parking lots, residences, garages, temporary driving lanes, side streets, driveway connections, temporary fencing, and completed work, as may be directed by the Engineer shall be included in the contract price.

Payment will be made under:

Pay Item:

| | | |
|-------|------------------------|----------|
| 102-1 | Maintenance of Traffic | Lump Sum |
|-------|------------------------|----------|

Pay Item Note No. 102-1

Includes all necessary traffic control devices including flagmen, pilot cars and variable message boards, in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways (latest edition). Contractor shall secure construction site (i.e. temporary pedestrian safety fencing, barricades, signs, etc.) in order to prevent pedestrians from accessing work areas.

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TP 104 – Prevention, Control and Abatement of Erosion and Water Pollution

PREVENTION, CONTROL AND ABATEMENT OF EROSION AND WATER POLLUTION

Prevention, control and abatement of erosion and water pollution shall conform to the requirements of Section 104 of the Standard Specifications, National Pollution Discharge Elimination System (NPDES) requirements, except as modified by these Technical Provisions or as directed by the Engineer.

The Contractor shall present at the Preconstruction Conference its Storm Water Pollution Prevention Plan (SWPPP) and a separate schedule to manage erosion and water pollution. This schedule shall include a complete outline of the proposed construction of all erosion and pollution control and abatement items required.

The Contractor shall be responsible for the preparation and submittal of the Notice of Intent (NOI) and Notice of Termination (NOT) to the Florida Department of Environmental Protection (FDEP) and shall obtain the FDEP Generic Permit for Stormwater Discharge from Large and Small Construction Activities.

All roadways, driveways etc., must be kept clean and hazard free at all times. **Roadways must be swept daily to ensure the safety of the motoring public and protect existing drainage systems.** This operation shall be conducted in such a manner that shall minimize the potential of creating a traffic hazard and minimize air pollution.

Basis of Payment

All work and incidental costs required to comply with the articles of this specification will be paid at the contract lump sum price for Prevention, Control and Abatement of Erosion and Water Pollution.

Payment will be made under:

Pay Item:

| | | |
|-------|--|----------|
| 104-1 | Prevention, Control and Abatement of Erosion and Water Pollution | Lump Sum |
|-------|--|----------|

Pay Item Note No. 104-1

Includes the cost of all items required for erosion control including, but not limited to, synthetic bales, turbidity barriers, silt fence, and temporary grassing, as shown in the plans or as directed by the County.

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TP 901-1 – Double-Tee Beam Repair

DOUBLE-TEE BEAM REPAIR

Work specified in this Section consists of the repair of Beams 3-3 and 3-10. Work shall conform to the requirements of Sections 926 and 930 of the Standard Specifications and with the notes and details shown in the plans.

Materials

This work includes all incidental items and work associated with the repair of Beam 3-3 including surface preparation and application of the epoxy compound as indicated in the plans. This work also includes all incidental items and work associated with the repair of Beam 3-10 including surface preparation, application of the epoxy bonding compound, and placement of the beam repair concrete as indicated in the plans.

Basis of Payment

Double-Tee Beam Repair will be paid for at the contract lump sum price, completed and accepted.

Payment shall be made under:

Pay Item:

| | | |
|-------|------------------------|----------|
| 901-1 | Double-Tee Beam Repair | Lump Sum |
|-------|------------------------|----------|

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TP 901-2 – Concrete Bridge Deck Repair

CONCRETE BRIDGE DECK REPAIR

Work specified in this Section consists of the crack and spall repairs on the concrete bridge deck. Work shall conform to the requirements of Sections 926, 930 and 931 of the Standard Specifications and with the notes and details shown in the plans.

Materials

This work includes all incidental items and work associated with the bridge deck crack repairs including cutting deck grooves, cleaning the deck surface and pouring the epoxy resin. The work also includes items and work associated with the bridge deck spall repair including removal of the existing deck concrete and previous spall repairs as necessary, cleaning the deck surface, the epoxy bonding compound, welded wire reinforcement, the deck repair concrete and surface finishing as indicated in the plans.

Basis of Payment

Concrete Bridge Deck Repair will be paid for at the contract lump sum price, completed and accepted.

Payment shall be made under:

Pay Item:

| | | |
|-------|-----------------------------|----------|
| 901-2 | Concrete Bridge Deck Repair | Lump Sum |
|-------|-----------------------------|----------|

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TP 901-3 – Pedestrian Sidewalk Repair

PEDESTRIAN SIDEWALK REPAIR

Work specified in this Section consists of the spall repair on the Intermediate Bent 2 cap and weld repair to the pedestrian sidewalk steel grating. Work shall conform to the requirements of Sections 926, 930, 931 and 937 of the Standard Specifications and with the notes and details shown in the plans.

Materials

This work includes all incidental item and work associated with the repair of the Intermediate Bent 2 cap and the pedestrian sidewalk including cap surface preparation, hole drilling and placement of adhesive bonding agent for dowel installation, cleaning of the bent cap surface, application of the epoxy bonding compound, placement of the bent cap repair concrete and repair of the sidewalk panel weld as indicated in the plans.

Basis of Payment

Pedestrian Sidewalk Repair will be paid for at the contract lump sum price, completed and accepted.

Payment shall be made under:

Pay Item:

| | | |
|-------|----------------------------|----------|
| 901-3 | Pedestrian Sidewalk Repair | Lump Sum |
|-------|----------------------------|----------|

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TP 901-4 – Approach Slab Repair

APPROACH SLAB REPAIR

Work specified in this Section consists of repair of the East Approach Slab. Work shall conform to the requirements of Section 334 of the Standard Specifications and with the notes and details shown in the plans.

Materials

This work includes all incidental item and work associated with the repair of the east approach slab including grinding of the existing approach slab concrete pavement and removal of the existing asphalt overlay repair, placement of the proposed asphalt overlay and roadway striping as indicated in the plans.

Basis of Payment

Approach Slab Stabilization and Repair will be paid for at the contract lump sum price, completed and accepted.

Payment shall be made under:

Pay Item:

| | | |
|-------|----------------------|----------|
| 901-4 | Approach Slab Repair | Lump Sum |
|-------|----------------------|----------|

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TECHNICAL PROVISIONS

for

BATES ROAD OVER CRANE STRAND CANAL
BRIDGE NO. 754003
DEFICIENCY REPAIRS
ORANGE COUNTY, FLORIDA

GEOTECHNICAL ENGINEERING TECHNICAL MEMORANDUM



Technical Memorandum

Date: February 15, 2019

To: Mr. Thomas T. Walker, P.E.

From: Gene Williford, P.E. / GEC
Craig G. Ballock, P.E. / GEC

Subject: **BATES ROAD BRIDGE REPAIR**
Field Inspection Report
Orange County, Florida
Inwood Project No. ORC-018-40
GEC Project No. 4299G

Geotechnical and Environmental Consultants, Inc. (GEC) is pleased to present this Technical Memorandum for the above-referenced project. The purpose of this exploration was to investigate potential causes of observed approach slab settlement.

Project Site Location and Field Exploration

The project site is located along Bates Road Bridge approximately 450 feet east of the intersection of Bates Road and Glyn Street in Orlando, Orange County, Florida. More specifically, the project site is at the existing Bates Road Bridge over the Crane Strand Canal (Bridge No. 754003). It is our understanding that based on previous field bridge inspections, the approach slab at the southeast corner of the bridge has settled adjacent to the bridge deck.

GEC performed a field visit to the project site on February 6, 2019 to evaluate and document any observations of potential causes of the approach slab settlement. In addition, GEC conducted a geophysical exploration including pavement cores, hand auger borings, pavement cross-slope measurements and Ground Penetrating Radar (GPR) along the bridge/roadway alignment. The intent of this geophysical exploration was to attempt to identify any voids or areas of loose/disturbed soils beneath the approach slab.

Field Observations

A GEC representative was present at the above referenced site on February 6, 2019 and observed the following:

- Apparent approach slab settlement to the south relative to the existing bridge deck.
- Settlement of the asphalt toward the south directly adjacent to the approach slab.
- Longitudinal cracking along the eastbound travel lane east of the bridge.
- Longitudinal cracking along the westbound travel lane west of the bridge.
- Washout beneath the bridge wrap-around concrete slab on the southeast corner of the existing bridge.

GEC measured cross-slopes along the eastbound and westbound lanes east of the existing bridge. The cross-slopes ranged from 1.1 %, near the bridge deck, to 6.9% approximately 20 feet from the end of the approach slab. The results of the cross-slope measurements are shown on a site aerial in the **Appendix**.

In addition, a 4-inch pavement core was completed approximately 8 feet east of the bridge deck within the bridge approach slab. The approach slab concrete in this area is approximately 9.4-inches thick. A hand auger boring was completed through the core hole to a depth of 10 feet below the bridge deck. The hand auger boring encountered silty fine sand (SM) to a depth of 2 feet underlain by fine sand to fine sand with silt (SP, SP-SM) to the boring termination depth. Traces of wood/roots were encountered in the hand auger boring from 8 to 10 feet below the bridge deck. No voids were observed at the pavement core location.

Photographs of the project site from the field reconnaissance are attached in the **Appendix**.

GPR System

The GPR system provides a real-time graphic record of subsurface features without disturbing the materials being explored. The radar system is composed of a transmitting/receiving antenna and a microprocessor control unit with a hard disk drive for storage of data. As the radar antenna is pulled along the ground surface, radar pulses are transmitted downward into the underlying soil. These pulses are reflected back to the antenna from interfaces between materials with significantly different electrical properties (dielectric contrasts), such as clay and sand. A continuous stream of these reflective waveforms is processed by the control unit and instantaneously sent to the control unit monitor. A subsurface profile, referred to as a "linescan", is developed as the reflected waveforms are displayed on the monitor. Field data (linescan records) are viewed in 2-D on the control unit monitor.

The effectiveness of a GPR study is generally limited by the penetration depth of the radar signal. The maximum penetration depth of the radar pulse is determined by the limitations of the radar equipment and by propagation losses in the medium being probed. Generally, highly conductive materials, such as clay and metal, allow signal penetration to a depth of only a few

inches, and low conductive materials, such as dry sands, allow much greater penetration depths (more than 20 feet below ground surface). Actual signal penetration depths are typically between these two extremes (equipment limitations and radar pulse propagation) and are dependent on the underlying soil and groundwater conditions within the study area.

GPR is a geophysical method that, as with all geophysical methods, is an indirect means of identifying buried objects and can have limitations with regard to interpretation of the GPR results. Factors that can limit accurate interpretation of GPR data include, but are not limited to, diameter and composition of underground utilities, soil conditions within the study area, and depth to the groundwater table. Due to the limitations with GPR, depths and thickness of asphalt/concrete should be considered approximate.

GPR Methodology

For this exploration, GEC utilized a Geophysical Survey System, Inc. (GSSI) SIR 3000 control unit equipped with a 900 megahertz (MHz) antenna. Equipment calibration activities were performed in accordance with manufacturer recommendations prior to initiating the GPR study.

The GPR study consisted of longitudinal transects on approximate 5-foot spacing along the travel lanes and transverse transects on approximate 20-foot intervals across the travel lanes. Representative 2-D GPR linescan records obtained during the GPR study are included in the **Appendix**.

GPR Results

No apparent signs of shallow voids beneath the approach slab or adjacent asphalt pavement were identified during the GPR study. The linescan within the westbound travel lane (Linescan 93) shows a consistent asphalt and base layer along the alignment with the exception of approximately 20 feet east of the approach slab where it appears that additional asphalt thickness has been placed. The linescan within the eastbound travel lane (Linescan 91) shows what appears to be a disturbed base layer along the majority of the linescan.

As shown on the linescan the GPR did identify steel reinforcement (Linescan 96) within the bridge approach slab. Based on this linescan it is evident that the approach slab has settled as shown by the change in depth of the top of the steel reinforcement. Based on the GPR Linescans, it appears that the approach slab has settled approximately 2-inches. The change in depth of the steel reinforcement is also evident in Linescan 91.

Recommendations and Conclusions

Based on the results of the field reconnaissance and exploration and GPR study, there are no obvious signs of shallow voids beneath the bridge approach slab or adjacent asphalt pavements. The southeastern approach slab and adjacent asphalt appear to be settling to the south. Based on our exploration, it appears that this settlement may be due to migration of the roadway embankment to the south toward the Crane Strand Canal. The GPR data also indicates the base material within the eastbound lane and the small portion of the westbound lane adjacent to the approach slab has been disturbed as depicted on GPR 2-D Linescan. This disturbance of the base material is likely due to the apparent migration of the roadway embankment to the south.

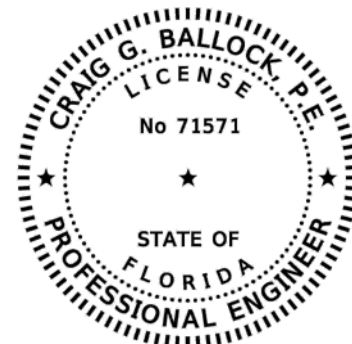
As no obvious signs of shallow voids are apparent; repair of the bridge approach slab and adjacent pavements with the use of flowable fill/grout or other void filling method does not appear warranted. It is recommended that horizontal stabilization of the roadway embankment be completed. This can be done with a permanent sheet pile or other cut-off wall installed to a firm layer to prevent any further horizontal movement of the embankment. We recommend that soil borings be performed along the approach slab and adjacent asphalt pavement to be used in design of the retaining wall.

GEC appreciates the opportunity to be of service to you on this project. If you should have any questions concerning the contents of this data report, or if we may be of further assistance, please contact us.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
919 Lake Baldwin Lane
Orlando, Florida 32814
Certificate of Authorization No. 5882



V. Eugene Williford IV, P.E.
Geotechnical Engineer
Florida License No. 82275



Craig G. Ballock, P.E.
Senior Geotechnical Engineer
Florida License No. 71571

This Report has been digitally signed and sealed by Craig G. Ballock, P.E. on the time and date stamp shown using digital signature. Printed copies of this document are not considered signed and sealed, and the signature must be verified on any electronic copies.

APPENDIX

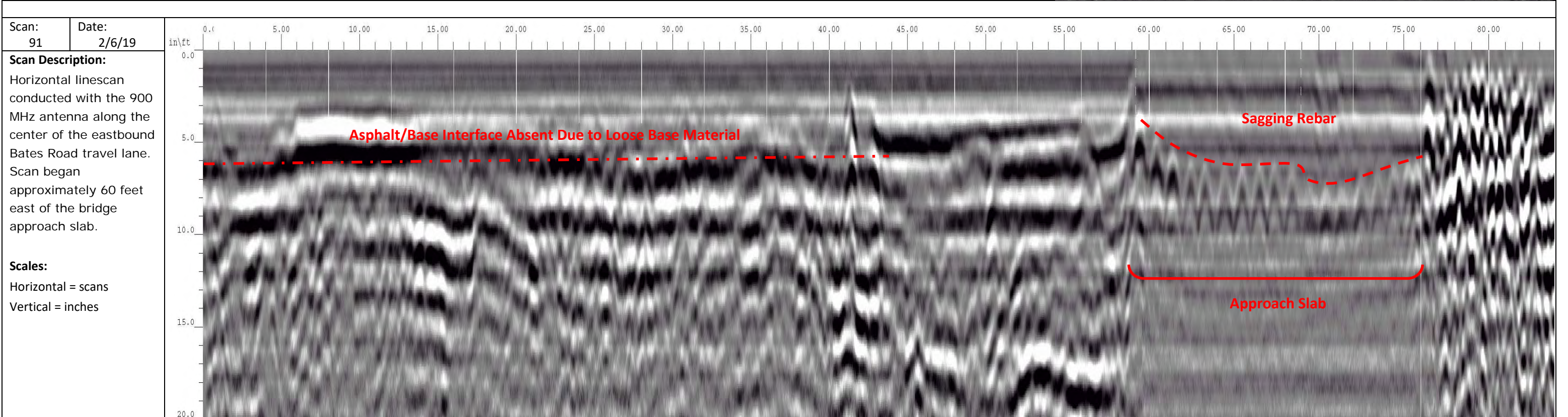
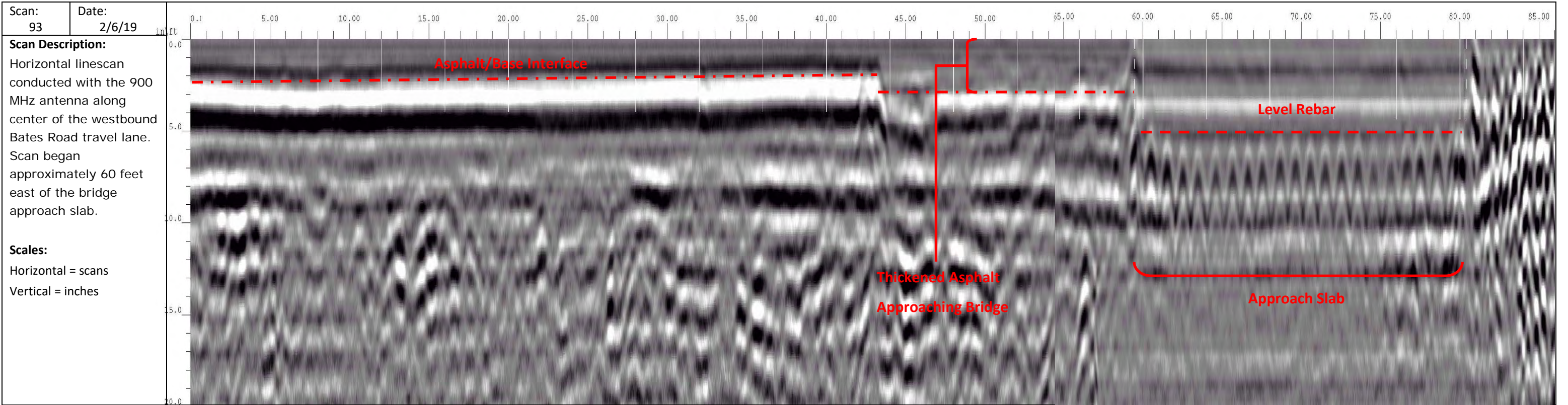
| | | | |
|---|--|--|----------------------------------|
| Client Name: Inwood and Orange County | Project Name: Bates Road Bridge Repair | Project Location: Orange County, Florida | GEC Project No.: 4299G |
|---|--|--|----------------------------------|



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| Client Name: Inwood and Orange County | Project Name: Bates Road Bridge Repair | Project Location: Orange County, Florida | GEC Project No.: 4299G |
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| Client Name: Inwood and Orange County | Project Name: Bates Road Bridge Repair | Project Location: Orange County, Florida | GEC Project No.: 4299G |
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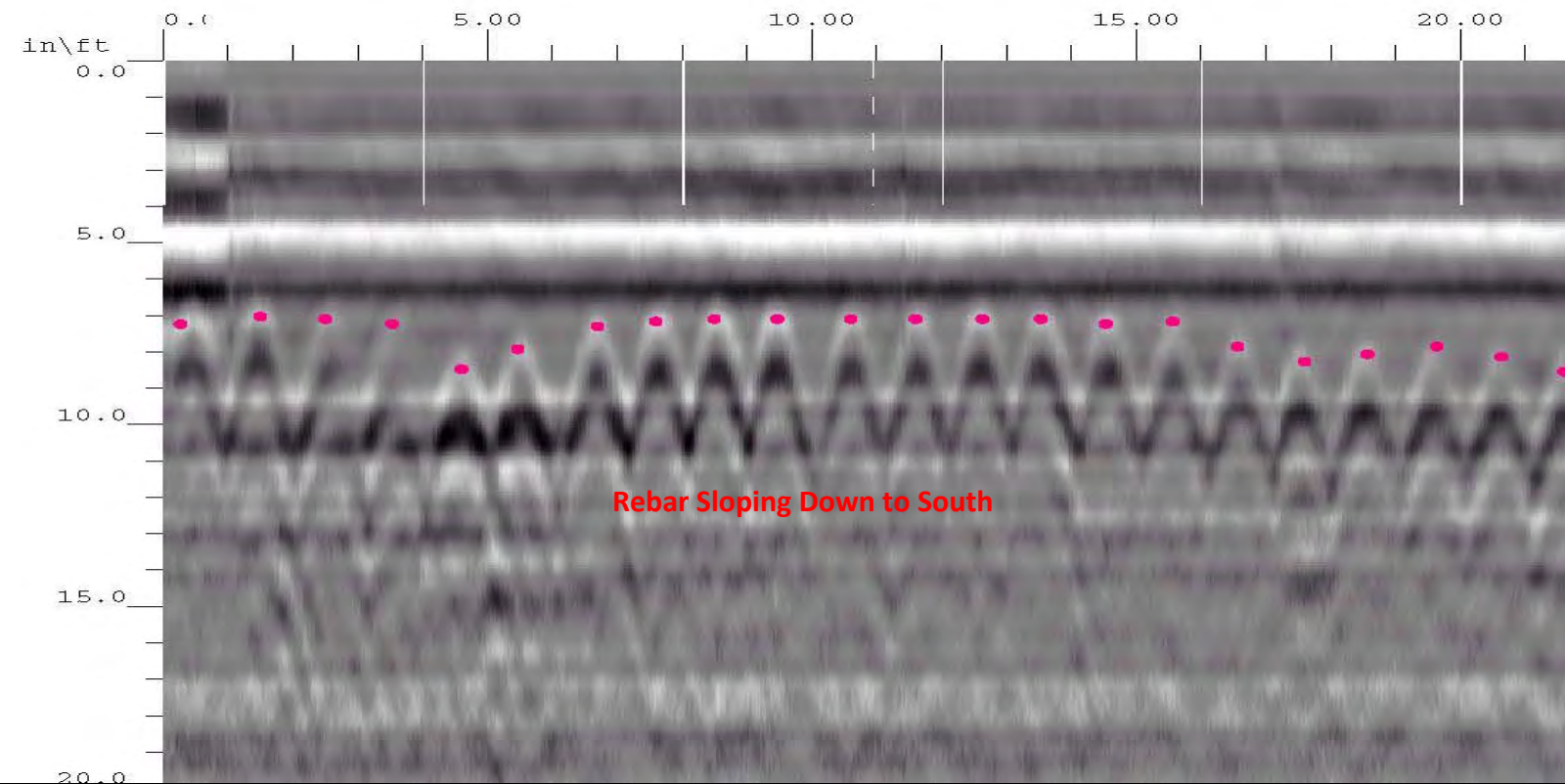


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| Client Name: Inwood and Orange County | Project Name: Bates Road Bridge Repair | Project Location: Orange County, Florida | GEC Project No.: 4299G |
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Scan: 96
Date: 2/6/19

Scan Description:
Horizontal linescan conducted with the 900 MHz antenna from north to south across the Bates Road travel lanes. Scan began approximately 8 feet east of the bridge deck, within the approach slab.

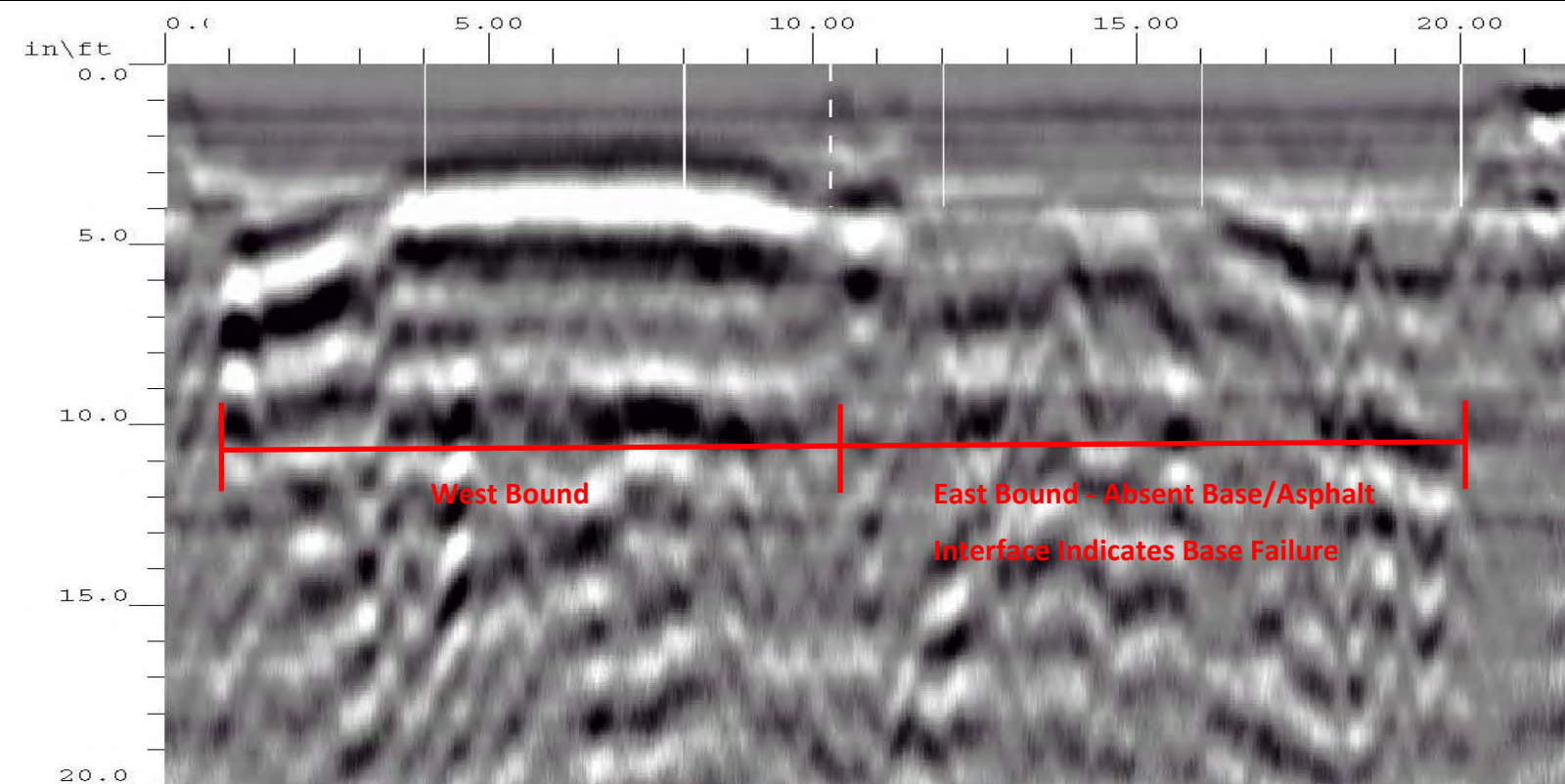
Scales:
Horizontal = scans
Vertical = inches



Scan: 98
Date: 2/6/19

Scan Description:
Horizontal linescan conducted with the 900 MHz antenna from north to south across the Bates Road travel lanes. Scan began approximately 25 feet east of the approach slab.

Scales:
Horizontal = scans
Vertical = inches

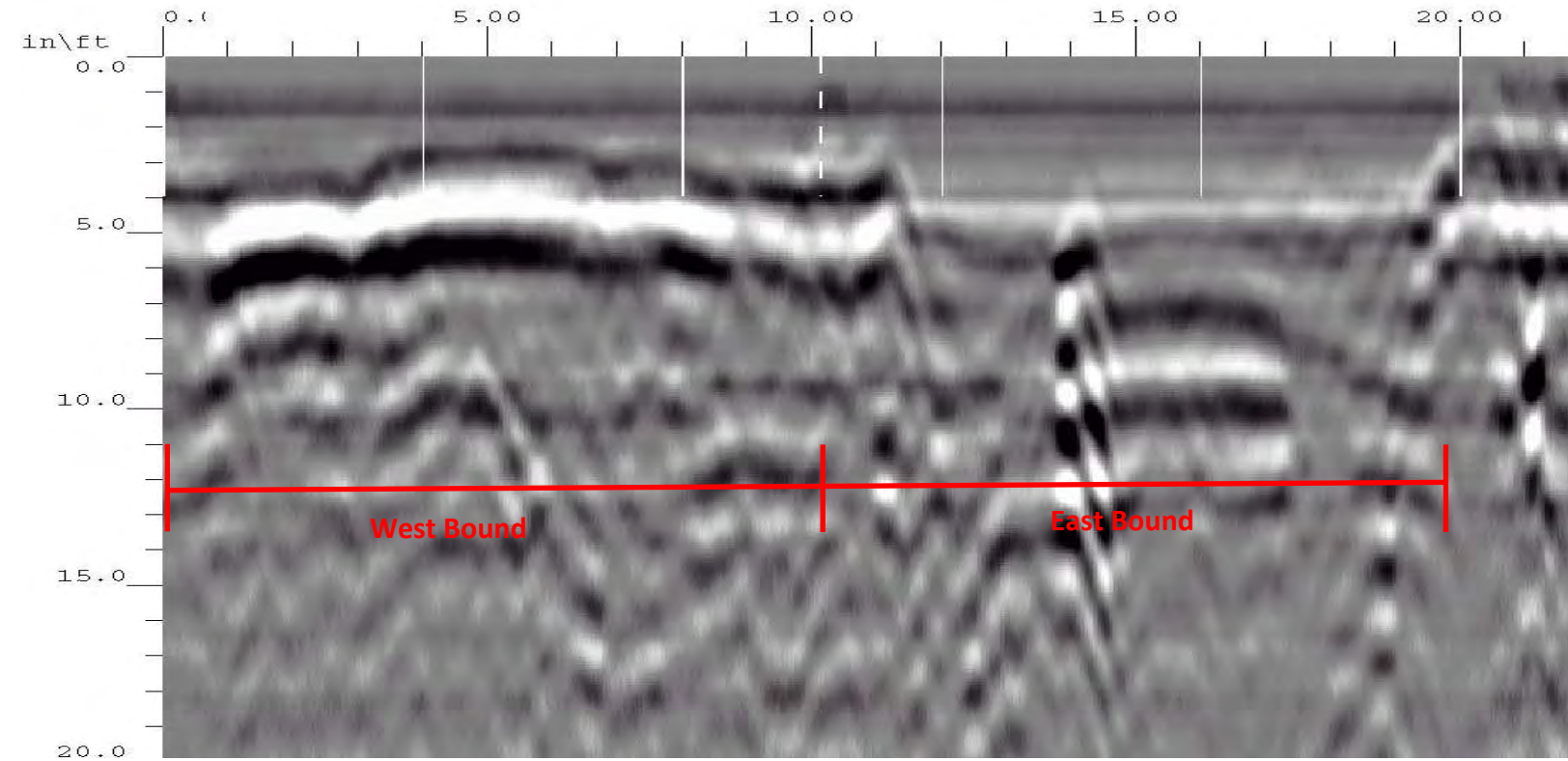


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| Client Name: Inwood and Orange County | Project Name: Bates Road Bridge Repair | Project Location: Orange County, Florida | GEC Project No.: 4299G |
|---|--|--|----------------------------------|

Scan: 100
Date: 2/6/19

Scan Description:
 Horizontal linescan conducted with the 900 MHz antenna from north to south across the Bates Road travel lanes. Scan began approximately 60 feet east of the approach slab.

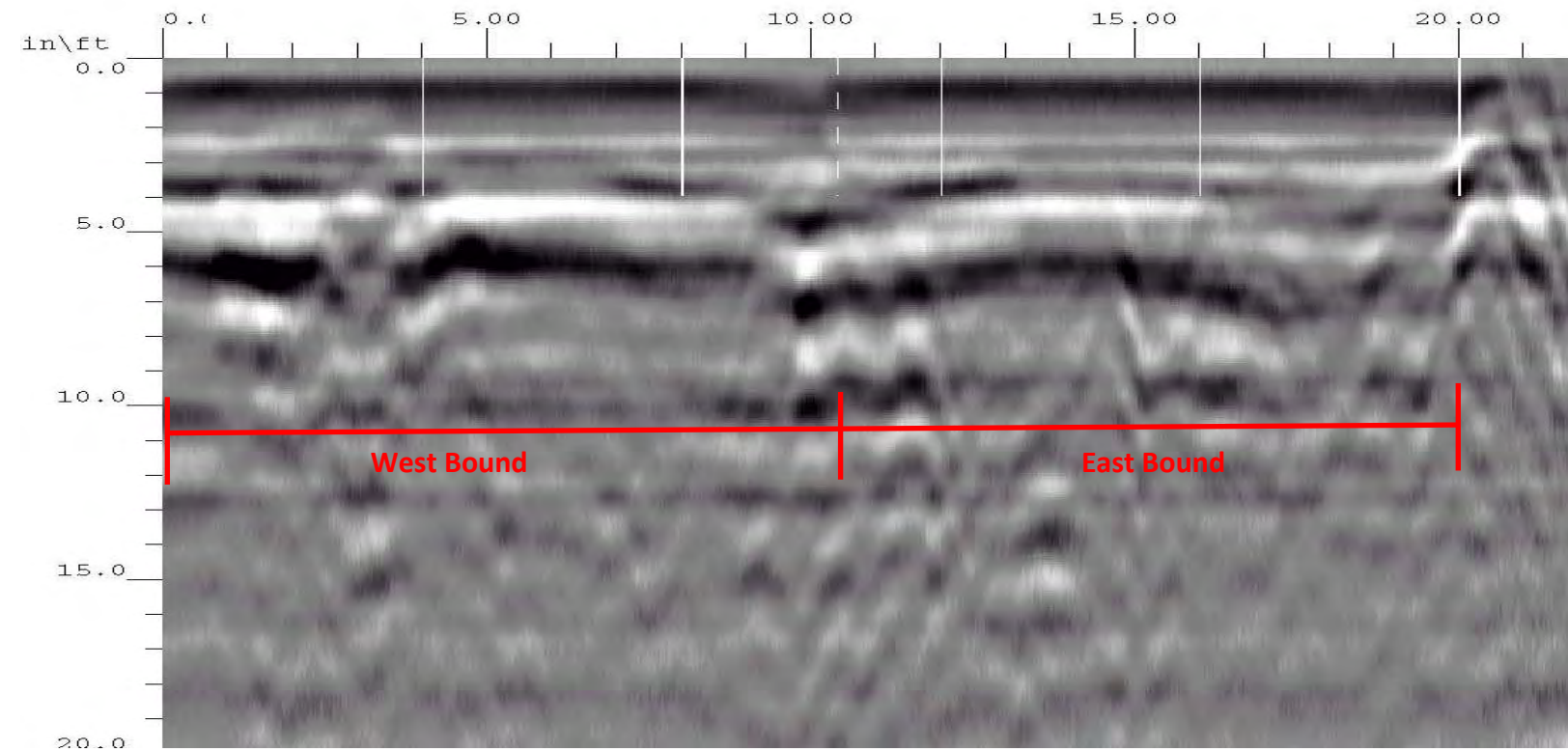
Scales:
 Horizontal = scans
 Vertical = inches



Scan: 101
Date: 2/6/19

Scan Description:
 Horizontal linescan conducted with the 900 MHz antenna from north to south across the Bates Road travel lanes. Scan began approximately 120 feet east of the approach slab.

Scales:
 Horizontal = scans
 Vertical = inches



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| Client Name: Inwood | Project Name: Bates Road Bridge Repair | Project Location: Orange County, Florida | GEC Project No.: 4299G |
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|--------------------|------------------------|
| Photo: 1 | Date: 2/6/19 |
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Description:

Looking west at approach slab/bridge deck with asphalt patch.



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| Photo: 2 | Date: 2/6/19 |
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Description:

Looking west at differential elevation between bridge and approach slab.



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| Client Name: Inwood | Project Name: Bates Road Bridge Repair | Project Location: Orange County, Florida | GEC Project No.: 4299G |
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|--|------------------------|
| Photo: 3 | Date: 2/6/19 |
| Description: Looking north at differential elevation between bridge and approach slab. | |



| | |
|--|------------------------|
| Photo: 4 | Date: 2/6/19 |
| Description: Looking north at washout of concrete wrap-around slab on the southeast corner of the existing bridge. | |

