

SPECIFICATIONS AND REQUIREMENTS

Subsurface Facility and Utility Locating Services

1. SCOPE OF WORK OVERVIEW

Broward County requires Subsurface Facility/Utility Locating Services that accurately and comprehensively identify and mark all of our underground facilities/utilities. The Contractor shall receive locate request Tickets through the Sunshine State One Call of Florida, Inc. (SSOCOF) system. The County screens all Tickets first using Bytronics and then dispatches Tickets that have Underground Facilities within the Locate Ticket description area.

The County reserves the right to inspect the contractor's equipment and to perform such investigations as may be deemed necessary to ensure that competent personnel and management will be utilized in the performance of the contract.

2. BIDDER EXPERIENCE

- A. Bidder must have been actively engaged in the field of utility locating and marking for a period of no less than a minimum of three (3) years experience in providing underground facility/utility location services within the State of Florida and shall have office facilities located within Broward, Palm Beach or Miami-Dade Counties.
- B. Prior to award, Bidder must provide evidence of past experience in properly handling fiber-optic cable and related splice enclosures, as such equipment is likely to be encountered when the locating technician is required to enter a fiber optic pull box in order to locate conduit containing fiber-optic cable, or a pull box which contains both twisted-pair copper interconnect cable and fiber-optic cable. Bidder must have experience in properly handling Traffic Signalized Intersections, Lighting and other associated electrical conductors. Bidder shall provide a minimum of three (3) references for projects completed for the aforementioned scope.
- C. Prior to award, Bidder must provide evidence of past experience in properly handling Water, Waste Water and Storm Drain utilities both Metallic and Non-Metallic pipes. Bidder shall provide a minimum of three (3) references for projects completed for the aforementioned scope.

3. PAY ITEMS

- A. **Standard Locate and Mark (Group 1, Item 1; Group 2, Item 1; Group 5, Items 1 & 2)**
 - 1. See Definitions, Section 11.O of these specifications.
 - 2. Payment shall be made as stated in Section 9.
- B. **Emergency Locates (Group 1, Item 2; Group 2, Item 3; Group 5, Item 3)**
 - 1. See subsection 6.G of these specifications.
- C. **In-Plant Locate and Mark (Group 2 – item 2)**
 - 1. To include all Broward County Water & Wastewater Services (WWS) and Traffic Engineering Division (TED) facilities in the area specified in the SSOCOF Ticket, or white-lined by the Excavator. The location will be defined by the Broward County Property Lines within the designated facility.
 - 2. In-Plant locates will be accomplished with the use of Ground Penetrating Radar (GPR).
- D. **Furnish and Install Rigid Standard Route Markers (SRM) (Group 3, Item 1)**
 - 1. Bidder shall furnish and install rigid-type Standard Route Markers (SRM) as directed by the County in order to clearly mark the location of the underground conduit system.
 - 2. An SRM is a rigid, tubular, in-ground driven post used for visual (non-electronic) location and notification purposes of existing underground conduit. The SRM shall be fabricated and installed in accordance with of the **2018** Florida Department of Transportation (FDOT) Standards Specifications for Road and Bridge Construction, Section 630 pertaining to SRM's.

- a) In general, the SRM shall be a white post with a top fitting cover that is orange with white lettering and graphics. More specific information regarding materials, dimensions and performance characteristics of the SRM post are outlined in the 2018 FDOT Standard Specifications for Road and Bridge Construction.
 - b) SRM's shall be installed in accordance with FDOT specifications, generally a maximum of 500 feet apart, aligned such that a clear line of sight is maintained from one marker to the next.
3. Payment shall be made per each SRM furnished and installed along the located conduit route. Payment for the furnishing and installation of the SRMs shall be separate and in addition to the unit price for locating and paint marking of the underground conduit(s). Bid pricing shall include all labor, materials, equipment, and maintenance of vehicle/pedestrian traffic for a complete installation.

E. Furnish & Install Utility Locating Pavement Markers (Existing Concrete/Pavement)(Group 3, Item 2)

- 1. Bidder shall furnish and install Utility Locating Pavement Markers (ULPMs) in existing concrete or asphalt pavement as directed by the designated County agency in order to clearly mark the location of the underground conduit system.
- 2. Markers:
 - a) The pavement marker shall be round, medallion or disc type marker between 2" and 2.5" in diameter, 0.125" in thickness, with a slightly recessed top surface, to be installed into the existing concrete or pavement with a countersink drill bit system, such that the anchoring stem of the marker is a minimum of 0.500" diameter and 0.675" deep (measured from the top surface of the marker).
 - b) The marker shall be made of bronze, with a minimum 10-year warranty/guarantee against outdoor weathering.
 - c) Material shall be tested and approved for a minimum operating temperature range between -50 degrees (F) and 150 degrees (F).
 - d) Markers shall be available in a variety of colors, but orange and red are required.
 - e) The top face of marker shall be able to be custom imprinted by the fabricator with a minimum 35-character utility owner message (e.g., "WARNING ITS COMMUNICATION/FIBER OPTICS") circulating around the circumference of the marker, and a minimum 24-character contact information message (parallel lines of text) internal to circulating message.
 - f) ULPMs shall be installed at spacing identified by the County, which could range from 4 feet to 500 feet apart, depending on the curvature and configuration of the conduit path.
- 3. Payment for the furnishing and installation of the ULPMs shall be separate and in addition to the unit price for locating and paint marking of the underground conduit(s).
- 4. Bid pricing shall include all labor, materials, equipment, and maintenance of vehicle/pedestrian traffic for a complete installation.

F. Taking of Global Positioning System (GPS) Coordinates (Group 3, Item 3)

- 1. See subsection 6.N of these specifications.

G. Soft Dig Locate (Group 4, Item 1)

- 1. Pay Item shall not be used in conjunction with any other pay item in this contract. This item is for, when requested/ordered, the express purposes of physically locating, exposing and verification of buried infrastructure.
- 2. The cost shall be a unit cost for each soft dig excavation hole. It will include Maintenance of Traffic (i.e. signing, lane closure, etc.), all labor, materials, equipment and incidentals necessary to determine and record the horizontal and vertical location of the buried infrastructure. The price shall include backfilling to density, pavement repair, sodding and cleanup and restoration.

3. A soft dig service to locate buried infrastructure for various County departments.
4. The soft dig method shall be capable of opening a hole a minimum of eight (8) inches in diameter and to a maximum depth of twenty-five (25) feet.

H. Standard Locate and Mark (Group 5, Item 1)

Locate and mark all Port Everglades (PEV) owned facilities in the area specified for small projects up to 500 feet.

I. Standard Locate and Mark (Group 5, Item 2)

Locate and mark all Port owned facilities in the area specified for large projects greater than 500 feet.

J. Locate with Ground Penetrating Radar (GPR) (Group 5, Item 4)

Locate with use of ground penetrating radar (GPR) and mark utilities.

K. Locate with Vacuum Digging (Group 5, Item 5)

Locate with vacuum digging (pot holing) and mark utilities in unpaved areas.

L. Locate with Vacuum Digging (Group 5, Item 6)

Locate with vacuum digging (pot holing) and mark utilities in paved areas.

M. Placement of Electric Markers (Group 5, Item 7)

Placement of electric markers after line has been exposed. Markers to be provided by Port Everglades.

4. DUTIES AND RESPONSIBILITIES OF CONTRACTOR

- A. The qualified Contractor is responsible for all the cost of performing locating functions for the tickets issued to them and are required to ensure proper marking (locates).
- B. Provide office and field equipment (desktops and laptops) that are compatible to Broward County's equipment through Digtrack Ticket Management system and IRTHNet One Call Ticket Management and Map Screening applications.
 - (1) Provide access to the County to the Contractor's database for electronic delivery of all locate request tickets to a single electronic address. The contractor shall dispatch tickets to their personnel to perform locates within defined timeframes.
 - (2) Provide electronic data with a format that utilizes IRTHNet and Bytronics (no substitutions) and shall allow for integration with current County IRTHNet software or any revisions thereof.
 - (3) Work closely with County to provide uninterrupted electronic communications in the event of scheduled upgrades, or migrations that may occur within the County's Information technology system.
 - (4) Establish compatible electronic communications to the current County database within five (5) County business days of notification of contract award.
- C. Provide sufficient qualified staff to perform services as defined.
- D. Receive and record locate ticket from Broward County during standard Broward County business days and office hours (approximately 8:00 a.m. to 4:00 p.m. for TED and WWS, 8:00 a.m. to 5:00 p.m. for PEV).
- E. Follow the Scheduler's instructions noted on the locate ticket.
- F. Utilize digital facility Geographic Information System (GIS) plans and/or Computer-Aided Design (CAD) maps provided by the County, in addition to hard copy prints, as a source of information for their field technicians.
 1. It is important when a Locate Ticket is issued to the Contractor that the person assigned that Ticket shall travel to the Ticket's location for proper disposition of the Ticket. New locations added may not be reflected on the current GIS map database yet from lag time it take to update the database map.

- G. Promptly notify the County in writing, of any discrepancies or omissions in any of the County records, or other information provided to the Contractor by the County.
- H. Equip field personnel with laptops or other suitable portable electronic equipment capable of managing information in digital format. Receive and safeguard all County location maps or records made available for locating purposes in a clean dry area in their facility.
- I. Maintain records appropriate to support invoicing and recording requirements set forth in this contract. Contractor agrees to the records retention period also set forth in said contract. Said records shall include a set of digital photographs, which shall be filed under the ticket number, and shall be date/time stamped for each of the areas marked and/or flagged.
- J. Use equipment and technology current at the time of award and every means necessary to locate and mark Broward County's underground systems. All Locating equipment or devices being used by the Contractor are subject to the County's approval prior to or during the execution of this contract.
- K. Provide personnel that are proficient in the use of approved locating devices, methods, marking procedures, communicative skills, and record keeping requirements necessary to perform the Locating and marking task. They shall represent the Contractor in a courteous and professional manner at all times. Contractor agrees to take appropriate corrective measures in any situation where personnel are deemed unsatisfactory by the County, in accordance with recommendations made by the designated County agency.

5. **DUTIES AND RESPONSIBILITIES OF COUNTY**

- A. Provide access to the current database for communications from the Contractor on locate status.
- B. Provide the Contractor with a set of keys needed to open all traffic control cabinets to identify and connect to all underground feeds entering the cabinets. These keys will be returned to the County upon expiration or termination of this contract.
- C. Provide the Contractor with reasonable training on the procedures used in identifying the facilities and practices to be applied when operating inside the traffic control cabinets.
- D. Provide the Contractor with computerized GIS and/or CAD maps and drawings of all documented Broward County WWS, TED and PEV underground structures. To the extent permitted by law, such information shall not be disclosed or given to any person(s) not approved by the County. The Contractor understands that the maps furnished by the County shall be the **approximate general location of County buried facilities and that accuracy is not guaranteed (only that there are facilities in the general area)**. In areas where County maps/GIS and/or CAD maps do not show underground systems and underground systems do exist, the Contractor will not be held responsible, unless the underground systems are a continuation of facilities identified on County maps/GIS and/or CAD. These events need to be recorded by the Contractor and relayed to the County agency responsible for the underground systems. Where County maps do show underground systems, the Contractor will be responsible for locates as described in this contract. The Contractor must use its equipment, knowledge and experience to locate all facilities on the ground at locate sites.

6. **LOCATE REQUEST TICKET PROCESSING**

- A. County will assign locate request tickets to Contractor.
- B. Response Time:
The Line Locate Contractor will be responsible for making arrangements with all excavators for locate requests.
 - (1) All standard locate requests shall be processed, and a positive response posted to the system, within two (2) County business days of receipt from the County. Requests for an underwater excavation shall be processed, and a positive response posted to the system, within ten (10) days of receipt from the County.
 - (2) After such time as stated above, if no response is posted to the system, the ticket becomes "late" and the system will automatically resend that ticket to the Member operator at the current rate for such late ticket. County will deduct late ticket amounts from the current month's payment to the contractor.

(3) Emergencies shall be processed with (2) hours of receipt from the County. The Contractor shall immediately contact all applicable Excavators requiring a meeting. The meetings shall be held between the Contractor and Excavator, as required, when the extent and location of an excavation is undeterminable from the written or verbal communications (language on the ticket), or when requested by the designated County agency, Excavator or the Contractor. The Contractor shall document the meeting(s) and outcome in "Positive Response".

(4) Response codes to SSOCOF must be entered into the system by the Contractor within two (2) County business days of receiving the locate ticket.

(5) All marking delay requests must be documented by the Contractor with the excavator within two (2) County business days of receiving the locate ticket with copy to the designated County agency.

C. Meetings shall be held between the Contractor and Excavator as required when the extent and location of an excavation is undeterminable from the written or verbal communications (language on the ticket), or when requested by the designated County agency, Excavator or the Contractor. The Contractor shall document the meeting(s) and outcome in "Positive Response".

D. A locate ticket will include:

(1) Any and all facility locating up to 500 feet necessary to identify conflicts with proposed excavation, irrespective of quantity or types of Broward County underground infrastructure identified within this 500 feet.

(2) The actual locating of 500 feet shall be limited to a single street, center line of street or right of way line, inclusive of both sides of the street and shall include any intersections, and up to one hundred fifty (150) feet in either direction of the intersections. Except within the Port jurisdictional boundary where locates will sometimes be in off street areas such as dock side, or container yards, etc.

(3) When the Contractor believes a request is in excess of the 500-foot limit, the Contractor will instruct the Excavation Site Contractor to white-line the proposed excavation site, as provided in FLA. STATUTE 556. The Contractor will immediately inform the County electronically (e-mail) of the action taken and provide the actual number of locate units for that site. This document must be submitted with the Contractor's invoice for which it applies; else, the charge will not be reimbursed.

E. Locate tickets which are originated by different excavating contractors in the same geographic areas within two (2) County business days are considered requests for the same facilities and the Contractor will be compensated for one physical locate in this area for all related tickets. Ticket revisions will not incur separate/additional charges as they are simply updates to the original ticket.

F. All facilities located on concrete or asphalt surfaces shall be marked with the appropriate color paint, and facilities located in dirt or grassy areas will be marked with paint plus the appropriate color flags as dictated in Florida Statute 556.

1. Offset marks shall also accompany where markings are in dirt/grass and also where the markings will be disturbed or removed by the proposed excavation.

G. **Emergency Locates:**

An emergency locate ticket received after the close of business or during weekends or holidays must be performed within **two hours or less** from time received. Emergency tickets cannot wait until the next business day. The Contractor will provide a 24-hour contact number for such requests. Contractor will report to the locate site with necessary appropriate equipment and personnel to complete the request. Emergency locate requests can be done verbally by phone and/or email with a follow up ticket request to be done during business hours.

H. Those locations where field visits indicate that no underground facilities exist should be so coded indicating that there is **no conflict** to show the Contractor has visited the site.

- I. Guidelines for marking of underground facilities shall be as follows: markings shall include a tolerance zone consisting of three markings. The first mark shall be made along the horizontal route from the center line of the underground facilities. The other two marks shall be perpendicular to the first marking at a distance of twenty-four (24) inches plus one half (½) the diameter of the underground facility.
- J. Contractor may provide additional services such as maintenance of marks and stakes if specifically requested to do so by Broward County. Prior to the Contractor's commencement of the additional services, Broward County must specifically approve such additional services and the costs charged will be at the rates specified in the Bid sheets for the applicable Pay Items.
- K. In the event the Contractor is unable to physically locate County utilities after exhausting all the approved methods for locating underground facilities, Contractor shall contact the excavating contractor to inform of the presence of any identifiable, but un-locatable facilities. The Contractor will also advise the excavating contractor, via electronic communication (e-mail) that any location information supplied may not be within the definition of Reasonable Accuracy. The contractor shall immediately inform the designated County agency electronically (e-mail) of the action taken.
- L. County expects the Contractor to locate or clear facilities as described in the assigned SSOCOF tickets. These are the only acceptable disposition codes:
 - 1 – Marked
 - 2E – Marked with Exceptions - marked within the confines of the White-lined area
 - 4 – Clear, no facilities
 - 5 – No conflict, utility is outside of the requested work site.***Any other codes require advance written approval from the designated County agency, which must be submitted with the invoice.***
- M. Any other provisions of this contract to the contrary notwithstanding, the Contractor reserves the right to decline any locate tickets in areas which the Contractor deems impractical to serve due to inaccessibility or other reasonable conditions. County will monitor these situations and modify procedures, if necessary, for future assignments.
- N. The Contractor shall have the capability to take Global Positioning System (GPS) coordinates. The GPS coordinates are to be the Geographic Coordinate Reference GCS_North_American_1983_HARN using the Florida East State Plane System (NAD_1983_HARN_StatePlane_Florida_East_FIPS_0901_Feet) and the readings are to have an accuracy rate for the facilities in the Sub-Meter Accuracy range. For a one site excavation, a single GPS locate for each Broward County underground WWS, TED and PEV shall be performed. When excavations traverse an area up to the 300-foot limit a set of two GPS points shall be performed establishing a straight line. GPS data shall be compiled in electronic format and forwarded to the appropriate County unit for integration into the County's Oracle-based Computerized Maintenance Management System.

7. DAMAGE TO FACILITIES

- A. Contractor shall investigate all incidents of buried facility damage when the accuracy of the County's facilities is suspect or questionable and will submit to the designated County agency a written report of said investigation with photos of the area, within five (5) County business days following the actual damage notification. The Contractor will maintain a copy of such written reports for period of five (5) years. The Contractor will provide testimonial support in cases deemed necessary by the County.
- B. Contractor shall be responsible for all costs incurred to repair damages to County facilities that were incorrectly located by the Contractor, regardless of reason. The designated County agency shall document the damages and formally inform Contractor of the cost to repair the facilities. County will deduct the repair costs from future payments to the Contractor until the obligation is fulfilled.
- C. The County may elect to use a separate company to do a parallel investigation to determine the precise details of the incident and to determine responsibility for the damages that were incurred during excavation work.

8. RECORD KEEPING and REPORTING

- A. The Contractor agrees to maintain records to support all work performed and all items billed to the County and shall retain all such records for a period of five (5) years.
- B. The Contractor must retain all digital files or other written messages for five (5) years.
- C. The County may request from the Contractor, at no additional cost, audit details of all or randomly selected tickets received for each billing period.
- D. The Contractor shall prepare a formal report of incidents or damages concerning accuracy of the Locate process including names, measurements, addresses, methods, pictures, or other pertinent information relative to the incident. Reports shall be furnished to the designated County agency within five (5) County business days of the reported error.

9. INVOICING AND PAYMENTS

- A. Separate invoicing by the Contractor shall be performed on a monthly basis to each designated County agency.
- B. Contractor must submit invoices by the 8TH of the following month.
- C. Acceptable Billing Codes
 - 1 – Marked
 - 2E – Marked with Exceptions - marked within the confines of the White-lined area
 - 4 – Clear, no facilities
 - 5 – No conflict, utility is outside of the requested work site.

Any other codes require advance written approval from the designated County agency, which must be submitted with the invoice.

- D. The Contractor's invoice shall include the following sections and data items:

(1) HEADER

- a. Broward County purchase order number
- b. Invoice Date
- c. Invoice Number (Contractor's next sequential number for this purchase order)
- d. Bill Period during which the services were performed
- e. The total number of tickets (QTY) and units received during the Bill Period
- f. Total number of located, marked or cleared tickets (QTY) and units for the Bill Period
- g. Total number of tickets (QTY) and units received during the Bill Period but were not located and marked. Provide details in backup documentation and include SSOCOF Disposition Code for the requests that were not marked.

(2) BODY

- a. Commodity Code Item Number (Refer to Bid Sheet)
- b. Commodity Code Description (Refer to Bid Sheet)
- c. Number of tickets located
- d. Number of Units (as listed in located ticket)
- e. Unit Price
- f. Total Due per Commodity Code
- g. Total Due (current invoice)
- h. **Number of tickets received from Broward County Traffic Engineering Division within the billing period**

(3) SUMMARY

- a. Overdue Balance
- b. Total Balance Due Contractor
- c. Remittance Address

- E. Include a Microsoft Excel or equal format itemized attachment in the invoice package that includes the following data for tickets located or cleared during the Bill Period. **Note that this information must match ticket detail in the SSOCOF system; else, the ticket is not eligible for compensation. A sample template will be provided by the County.**
 - (1) Ticket Number
 - (2) Number of Units (as shown in ticket details)

- (3) Date received
- (4) Location with cross street (as shown in ticket details)
- (5) Date located (or N/A if not located)
- (6) Reason Code (if "Date Located" is N/A)
- (7) Type of Request
- (8) Sub-totals and totals for each
- (9) **Total number of tickets received per day from Broward County Traffic Engineering Division**

F. Each designated County agency will review the invoice package and inform the Contractor of any disputed charges. Contractor will be provided the opportunity to provide additional justification for payment before County calculates the final remittance amount and processes payment. The Contractor will be advised to submit a revised invoice if numerous discrepancies are noted.

10. **DISCREPANCIES**

Due to the nature of WWS and PEV underground facilities, having an accurate source of information of its location is vital for an effective and efficient protection. The reality is that many times, a significant percentage of this information is outdated or incorrect.

When a discrepancy is encountered in the field, the risk of an incorrect marking is substantially increased, thus jeopardizing the underground facilities. In this case, the correct line of action would be to locate the line using GPR, Vacuum Excavation or other suitable means.

Once the facility is properly located, it is imperative to record its exact location via G.P.S. and correct the Facility System Plan. Therefore, avoiding the cost of GPR and soft digging the next time the same facility needs to be located.

11. **DEFINITIONS**

- A. **"County Business Day"**: Any day, 8:00 a.m. to 4:00 p.m., other than Saturday, Sunday or any legal federal, state or local holiday.
- B. **"Damage Investigation"** An unbiased 3rd party to investigate damage incidents involving Broward County facilities.
 - 1. Locating firms markings accuracies (within tolerance)
 - 2. Excavator responsible for damaging facilities
 - 3. Respond to damage when called
 - 4. Collect all evidence relative to damage incident
 - 5. Document management
 - 6. Avoid case getting "COLD"
 - a. Locate Ticket not requested
 - b. Locate Ticket not accurate
 - c. Inaccurate markings
 - d. Insufficient markings
 - e. No markings
 - f. Incorrect ticket closure
 - g. One-call Center error
 - h. Insufficient excavation practices
 - i. Insufficient white lining
 - j. GIS/CAD map omission
- C. **"Excavation"**: Any operation in which earth, rock or other material on or below the surface of the ground is moved or otherwise displaced by any means (except the tilling of soil less than twelve (12) inches in depth for agricultural purposes, or road and ditch maintenance that does not change the original road grade or ditch flow line).
- D. **"Excavation Site"**: The area where an Excavator intends to perform or actually performs Excavation.

- E. **“Excavator”**: Any person who engages directly in Excavation and/or the designee of Excavation, and who requests the location of Broward County Underground Facilities.
- F. **“Excavator Notification”**: Notification given to the Excavator that the underground facilities are not present at the Excavation Site.
- G. **“Facility Owner”**: The owner of a specific Underground Facility. For purposes of this contract, the Facility Owner is Broward County.
- H. **“Identified, But Un-locatable”**: An Underground Facility, the presence of which is known but which cannot be field marked with Reasonable Accuracy (as defined in 11-S).
- I. **“Locatable Underground Facility”**: An Underground Facility which can be field marked with Reasonable Accuracy (as defined in 11-S) by using devices capable of identifying and locating Broward County Underground Facilities within the required range of accuracy, or by use of Broward County Maps, Records, and GIS.

- A. Traffic Engineering Division;
 - a. Traffic Signal Intersections
 - b. Communications cables both copper and fiber optic types
 - c. School Flasher
 - d. Electrical
 - e. Street Lighting
 - f. Variable message signs
 - g. CCTV stations
 - h. Misc.

- B. Water/Waste Water Services both Metallic and Non-Metallic pipes:
 - a. Potable Water
 - b. Raw water
 - c. Sewer both gravity and force main
 - d. Re-use
 - e. Brine
 - f. Electric services to Pump and/or Lift Stations
 - g. Misc.

- C. Port Everglades;
 - a. Port Owned Electric
 - b. Potable Water
 - c. Sewer both Gravity and Force Main
 - d. Drainage Pipes
 - e. Communications
 - f. Misc.

J. **“Locates with Radio Frequency”**: None

K. **“Locates with Sonde”**: The Sonde, when used shall be able to be inserted into a conduit with cable

L. **“Locates with Ground Penetrating Radar (GPR)”**:

GPR technology allows location of underground facilities made of non-conductive materials such as concrete, clay, PVC and others. It can be used as a second option to locate underground facilities.

GPR requires expensive equipment and a highly trained specialist to operate it. It also requires significantly more time than Standard Locates.

As with all technology, it has its limitation. In some cases factors such as depth of the Facility, water content of the soil, water table and type of soil, may limit the ability of the equipment to effectively locate the underground Facility.

Contractor's GPR must have capability to penetrate to a minimum depth of fifty (20) feet.

A commercial GPR system, called the CART (Computer Assisted Radar Tomography) Imaging System, has been tested for more than a year in surveys in major cities of the US and Europe. The CART system uses a highly-efficient GPR array (developed by Mala Geoscience), which can be towed by a vehicle or pushed in front of a modified commercial lawnmower at speeds of up to about 1km/h (30 cm/s).

The CART systems rely on precise geometry control provided by a self-tracking laser theodolite. GPS (global positioning system) was also considered, but is not yet accurate and fast enough in city environments to control precise radar surveying. As the CART array moves along the ground, a laser theodolite locks on and follows a prism mounted next to the array. The CART system records the geometry data independently from the radar data and merges the two data streams using information provided by an internal trigger wheel that controls firing of the radar antennas.

As part of standard CART surveys, the laser theodolite is also used to map surface features such as curbs, maintenance access structures, valve covers, fire hydrants and light posts to provide a reference map for the final 3D radar images.

The CART's 3D images clearly show the approximate size, shape and depth of buried pipes and other underground structures, such as trench walls or concrete footings. CART images also contain information about the material composition of buried structures (metal vs. plastic) and soil conditions. Special image processing software is used to extract and highlight utility lines and conduits.

M. **“Locate with Vacuum Digging”:**

When Standard Locate techniques and GPR fails, the alternative is to locate the underground Facility with a process of trial and error by performing a series of soft digs until the Facility is exposed. Soft Digging can also be used when the inverted elevation of a Facility is required.

N. **“Locate Request”:** Notice of proposed Excavation made by an Excavator to the One-Call Locator Service Center.

O. **“Marking”:** The application of paint, flags and/or stakes to clearly identify on a horizontal plane the location of Broward County's Underground Facilities within the tolerances set forth under the current State Laws of Florida governing **UNDERGROUND FACILITY DAMAGE PREVENTION AND SAFETY**. 1. Use of flags or paint strips of a minimum of two (2) inches by twelve (12) inches, or other clearly identifiable materials at distances of every fifteen (10) feet, and at each divergence from a straight line of the cable path in accordance with current marking standards of the American Public Works Association to show the field locations of underground facilities with Reasonable Accuracy (as per Specification and Requirements).

- **Marking cable path's divergence shall begin 10 feet from a straight path and marked every 2 feet through the divergence until a straight path is established by 10 feet.**

2. Offset marking shall be used in addition to the regular standard marking when an excavation area is to be performed where the cable/conduit path is located where the possibility exists that the markings shall be covered or disturbed and/or the markings will no longer be visible.

P. **“Member Operator”:** Agencies of the Broward County Board of County Commissioners.

Q. **“Photographs (Pictures)”:** Taking pictures of locate marks which shall include a reference point in the picture for future identification where the marks were located. Pictures should be attached to the locate ticket.

R. **“Positive Response”:** A system use in the Sunshine811 “IRTHNet One Call” where response codes (Close Codes) are entered and/or additional information can be added as necessary.

1. The contractor shall use the Positive Response system to log all contracts with the Excavator / Ticket originator on what has transpired with the locate Ticket.
 - a. Locate Delays
 - b. Changes to the ticket
 - c. Agreements to how the location will be marked
 - d. Continuation of marking
 - e. Any other reason that the facility has not been marked.

S. **“Reasonable Accuracy”:**

- (1) Locating the approximate horizontal location of an Underground Facility (as defined in 11-Y) to the specifications required by applicable law.
- (2) By definition, a tolerance zone shall exist encapsulating an area within twenty-four (24) inches of the outside dimensions of both sides of an Underground Facility.
- (3) GIS and CAD drawings.

T. **“Standard Locate”:** Most of the locates are “standard” and can be defined as those locates that can be done with the use of Radio Frequency (RF) locators, and/or based on the accurate information provided in the Facility system plans (GIS maps). For locates where the aforementioned method(s) cannot be utilized, Ground Penetrating Radar (GPR) and/or the use of a Sonde inserted in the conduit with the cable and/or Vacuum Digging may be necessary and shall be included in the price bid for this item.

ESTIMATED USAGE OF LOCATE METHODS:

- Inductive Radio Frequency/(GIS Maps): 97%
- Sonde Insertion: 1.5%
- Vacuum Digging: 0.5%
- Ground Penetrating Radar (GPR): 1%

(1) **“Standard Locate – Traffic Engineering and Port Everglades” – Traffic Signals, Warning Beacons, Interconnect Conduit, Street Illumination Lighting and School Flashing Devices:** Most of the locates are “standard” and can be defined as those locates that can be done with the use of Conductive Radio Frequency (RF) locators, and/or based on the information provided in the facility system plans. CAD Maps, GIS, and/or guided by superficial facility components such to include but not limited to: electrical conduit, optical cable, electrical/communications I junction boxes, pull boxes, communications cable, signal control boxes, electrical switches and relays. In the event that a facility is found to be without a non-conductive material such as an empty conduit or a Fiber Optic Cable without a trace wire, the contractor shall immediately inform the excavating contractor in order to get an extension to the locate request, and a trace wire will be provided by the Traffic Engineering Division within two (2) County business days following this request.

(2) **“Standard Locates – Water and Sewer and Port Everglades” - Needs to meet one or more of the following conditions:**

- Facility made of conductive material
- Facility is non-conductive material
- Accurate facility system information is available and sufficient superficial facility components are present, to produce and locate with an acceptable degree of confidence

Most of the locates are “standard” and can be defined as those locates that can be done with the use of Inductive Radio Frequency (RF) locators, and/or based on the accurate information provided in the Facility system plans, AutoCAD Maps. GIS, and/or guided by superficial Facility components to include but not limited to:

- Force mains
- Sanitary sewers
- Potable water pipe
- Hydrants
- Valves and maintenance access structures

U. **“Sunshine State One Call of Florida (SSOCOF)”:**

The State of Florida service by which an excavator can notify utility companies of proposed excavations and request field marking of underground facilities.

V. **“The System”:** Electronic State of Florida service using IRTNet called the Sunshine State One Call of Florida (SSOCOF).

W. **“Ticket”:** The electronic request to physically locate County facilities.

- X. **“Unit”**: Standard locate fee charged per 500 feet. Tickets will include 1-11 units. Only one Standard Locate Fee can be charged per 500 feet, where County maps/GIS and AutoCAD have identified any type of Broward County underground infrastructure, irrespective of quantity.
- Y. **“Underground Facility”, i.e. “Facility”**: Any item buried or placed below the surface of the ground for use in connection with the storage or conveyance of potable water, sewage, raw water, reuses water or electronic communications.