Gainesville, Georgia
Since 1821

GHMPO

Green Street Corridor Study

May 2016

SEI
SOUTHEASTERN ENGINEERING, INC.

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INTRODUCTION

The City of Gainesville is the county seat of Hall County located in the foothills of the Blue Ridge Mountains in northeast Georgia. The area was initially settled in the early 1800s as Mule Camp Springs. The area was renamed Gainesville on April 21, 1821 in honor of General Edmund P. Gaines. The creation of Sidney Lanier Lake in 1956 made Gainesville's waterfront area one of the nation's most popular inland water destinations. With today's population around 33,000, Gainesville is known as the economic center of northeast Georgia due to a large number of employment centers, such as poultry processing plants and the Northeast Georgia Medical Center.

Green Street/State Route 11/State Route 60 (Green Street or North Green Street), located entirely within the city limits, is more than 150 years old and began as an Indian trail and then wagon trail to north Georgia. It is currently a four lane undivided state highway carrying heavy traffic volumes through the heart of the City. Due in large part to the age of the corridor, much of the subsurface utilities and subsurface conditions are unknown. The Green Street Corridor (Corridor) experiences congested conditions on a daily basis indicating that capacity improvements for this corridor are needed. Based on visual observations of the corridor, traffic flow is highly directional during peak periods with the flow predominately southbound in the morning and northbound in the evening. In addition, during a mid-day peak period, extending from about 11:00 am to 1:00 pm, traffic is heavy and evenly split in both the north and southbound directions. Before developing any type of recommendations to improve the Corridor, the City of Gainesville and the Gainesville-Hall Metropolitan Planning Organization (GHMPO) sought to identify potential constraints that could impact the feasibility of any proposed future improvements. Southeastern Engineering, Inc. (SEI) was engaged to examine and document the existing conditions along the Green Street Corridor that will help inform future decision making. A detailed survey, pavement evaluation, drainage assessment, and environmental screening for the corridor were conducted.

PROJECT AREA MAP

As shown in the Project Area Map, the project study area includes the length of Green Street and extends approximately 20 feet outside of existing right of way on both sides of the road. Green Street's southern extent begins where Academy Street NW, Academy Street East, and Athens Highway/State Route 60 merge. Green Street continues north for approximately 0.6 mile and then splits into Riverside Drive and Thompson Bridge Road.

SURVEY

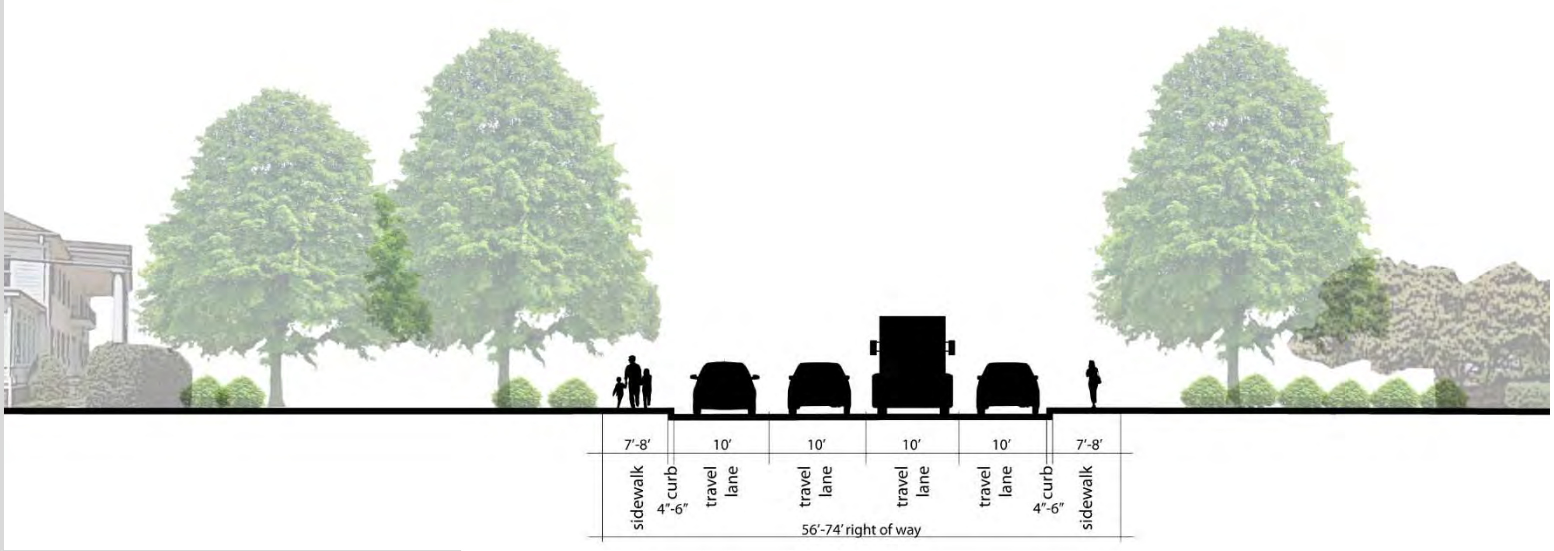
SEI conducted a detailed field run topography, existing right of way, utility survey, and parcel boundary line determination along Green Street between approximately Academy Street to the south and Riverside Drive to the north. The location width extended approximately 20 feet beyond the right of way along both sides of the street. Horizontal datum was based on Georgia State Plane coordinates and elevations were based on NAVD88. A set of plans showing existing conditions are attached as Appendix D.

EXAMPLE OF AREA WHERE TOP OF CURB AND PAVEMENT ARE LEVEL

EXISTING TYPICAL SECTION

Existing right of way varies from 56 to 74 feet along the mainline. The predominant typical section for the majority of the corridor is four 10-foot general purpose travel lanes (two in each direction), 4 to 6 inch header curb, and 7 to 8 foot sidewalk at the back of curb. The sidewalk section in front of the First Baptist Church is narrower and includes a grass strip between the back of curb and sidewalk. This typical section is minimal to substandard for a state route carrying the existing volume of traffic. Based on Georgia Department of Transportations (GDOTs) Geocounts website, the corridor carries approximately 32,600 vehicles per day (vpd) with a large percentage being trucks at 16%. This is compared to the national truck average of 7%.

In addition to the narrow travel lanes, repeated pavement overlays have made the pavement nearly level or level with the top of the curb in certain areas which has a negative effect on drainage. Sidewalks are located at the back of the curb so pedestrians have no buffer between them and vehicles traveling the roadway.



UTILITY COORDINATION

In an effort to locate above and below ground utilities, a utility survey and coordination with utility owners along the corridor was conducted.

FINDINGS

A field survey of above ground and marked underground utilities was conducted for the corridor. This information was submitted to the utility providers for verification and markup. All utility providers except AT&T responded and their comments have been incorporated into the attached existing conditions plans. Utility providers in the corridor include:

- Gas – Liberty Utilities
- Power – Georgia Power
- Water – City of Gainesville
- Sanitary Sewer – City of Gainesville
- Storm Sewer – City of Gainesville and Georgia Department of Transportation
- Communications – AT&T

Utilities in the corridor are varied and ***numerous***. Underground utilities are found through the entire corridor cross section, with some being outside of the existing right of way and others running down the middle of the roadway. The majority of the storm sewer and sanitary sewer is clay pipe. An 8 inch clay sanitary sewer pipe runs down the middle of the roadway. Based on the observed condition of the clay pipe in the storm sewer system, it can be assumed the sanitary sewer pipe is in a similarly compromised condition. Two water lines run through the middle of the roadway. Overhead utilities are found along both sides of the road and crossing the road and the mature vegetation along the corridor are in conflict with many lines. A number of trees and shrubs have been significantly trimmed to avoid overhead lines. Future utility locations and landscaping should be coordinated to prevent ongoing and future conflict. A set of existing condition plans that show utilities are included in Appendix D.

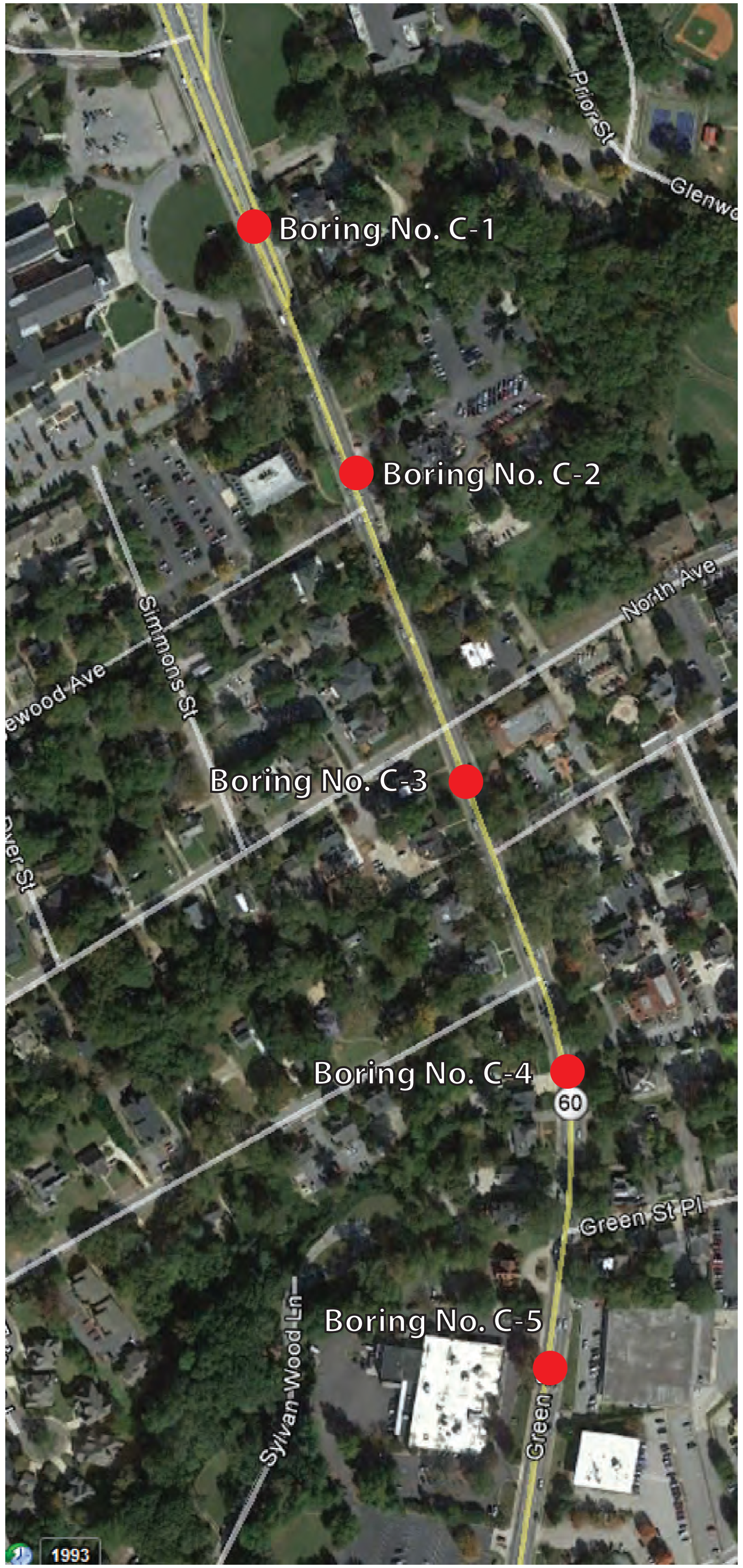
SUBSURFACE CORING AND PAVEMENT EVALUATION

To examine pavement and subsurface conditions along the corridor, a pavement evaluation was conducted. A visual survey of the pavement condition and a total of five borings were completed. The five separate boring locations within the travel lanes were chosen to determine the thicknesses and condition of the existing pavement sections. Pavement conditions ranged from good to poor based on load cracking, block/transverse cracking, patching, and edge distress. Borings were hand augered to refusal and ranged from 1.5 to 5 feet in depth as illustrated in the Boring Logs located on the next page. The borings encountered varying depths of asphalt, concrete, graded aggregate base (GAB), and fill material. Asphalt depth ranged from 7 to 9.5 inches and appears to have been overlaid multiple times. No bricks were encountered in the five borings. Due to pavement conditions, it is likely more cost effective and efficient to perform a full depth replacement of the entire road rather than deep patching and resurfacing only. The Pavement Evaluation Summary is attached to this report in Appendix B.

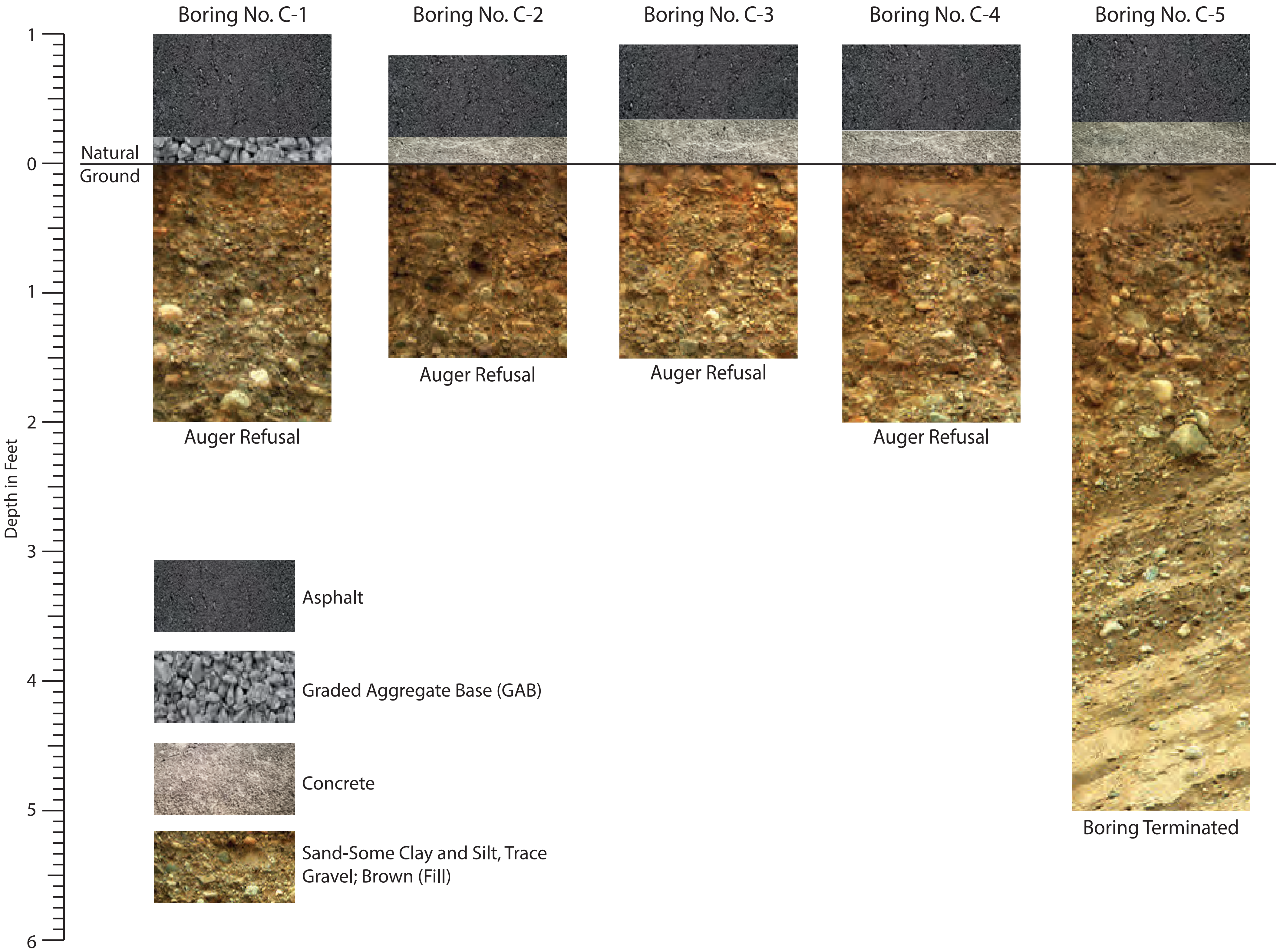
EXAMPLE OF EDGE DISTRESS

EXAMPLE OF PAVEMENT CRACKING

HEAVY TRUCK TRAFFIC IS COMMON ALONG CORRIDOR



Green Street, Gainesville
BORING LOG



DRAINAGE ASSESSMENT

The purpose of the drainage assessment was to ascertain the condition and functionality of the existing storm system along the Green Street Corridor. Recurrent flooding of the roadway has been reported. The existing system along the corridor spans GDOT right of way, City of Gainesville right of way, and private properties. Drainage basin mapping including structure numbers, plan and profile sheets, and calculations used in the drainage assessment are included in Appendix C.

MULTIPLE PIPE CONNECTIONS NEAR OUTFALL BEHIND THE TIMES BUILDING

METHODOLOGY

In an effort to evaluate the existing drainage system, SEI collected GIS data, field run survey, requested pipe cleaning, conducted a video inspection, and used dye testing to map the system. The Civil 3D/Hydraflow Storm Sewer drainage analysis software was then used to model the system.

The first step to evaluate the drainage system along the Corridor was to obtain digital GIS information from Hall County and the City of Gainesville to prepare a base map. Using this GIS data, SEI developed a base map of the adjacent properties along Green Street including topography and the storm drainage system inventory. This base map was subsequently amended with field run route survey data.

SEI staff met with City of Gainesville and GDOT staff to ascertain the nature of past drainage problems or complaints along the Corridor. GDOT representatives stated that the majority of the past known problems were encountered in front of the Post Office (364 Green Street) and in front of the First Baptist Church (751 Green Street). The pipe system under the road that extends from the Post Office over, into, and through the Times property (345 Green Street) has been repeatedly cleaned with the last cleaning occurring as recently as two years ago. At that time, it was stated that the 8 inch and 12 inch pipes were clogged with leaves and other landscaping debris. GDOT

SINKHOLE NEAR GREEN STREET CIRCLE

stated there have been no reported flooding issues at this location since the last jet cleaning.

It was noted that the roadway is very flat, and there are likely not enough storm inlets which is causing multiple ponding areas along the corridor following rainfall events. Known problem areas along the corridor were visited where structures and pipes that required cleaning or maintenance prior to the planned video inspection were identified.

EXAMPLE OF PIPE PARTIALLY BLOCKED BY DEBRIS

The next step in the process was to identify storm drain system discrepancies between the GIS database and the route survey. SEI reached out to GDOT and City staff who cleaned several pipe segments to facilitate a video pipe inspection for systems where inconsistencies were identified. Following the video inspection, dye testing was conducted to confirm any uncertain outfalls.

Field investigations were also conducted to identify and GPS locate storm structures and outfalls from Green Street outside of the limits of the route survey.

The first round of video inspection was conducted at:

- Athens Highway between Academy Street and Brenau Avenue, east of the Hall County Chamber of Commerce
- Forrest Avenue, 240 feet west from Green Street
- Green Street between Ridgewood Avenue and North Avenue, continuing east down North Avenue
- Green Street in front of the First Baptist Church, south of Holly Drive
- The south end of Green Street Circle

Results of the initial video inspection led to a second round of inspections at:

- Systems crossing Green Street from the Post Office and Brenau University, draining west on the north and south sides of the Times building.
- Cross drain under Green Street at Forrest Avenue including the remainder of the system draining west down Forrest Avenue
- Outfall pipe system on the north side of North Avenue, east of Green Street
- Pipe system crossing Riverside Drive to Thompson Bridge Road

The culmination of this data has been integrated into an as-built model of the existing storm system using the Civil 3D/Hydraflow Storm Sewer drainage analysis software. Results of this analysis as well as plan and profile of the pipe system and contributing drainage areas to the storm structures can be found in Appendix C of this report.

ASSUMPTIONS

The following assumptions were made in creating the stormwater model:

Mannings Roughness Coefficients n-values: Standard Manning's n-values for pipe materials were used for pipes that appeared to be in good or like new condition. Any pipe that was badly pitted, cracked/egged, clogged, or had large gaps between pipe sections was considered to have a higher Manning's n-value than normal. These pipes and their respective n-values are noted on the plan sheets in Appendix C.

Runoff coefficients: Runoff coefficients used for this exercise were standard rational method.

Impervious area: 0.95

Pervious area: 0.20

Weighted coefficients were calculated for each inlet drainage area. Those numbers can be found in Appendix C.

T_c: Time of concentration, for most structures, was assumed to be 5 minutes.

Storm Event: Models were run using the 100-year storm event. The 100-year storm event was chosen because drainage structures that cross under roadways are typically modelled for the 100-year storm event and to examine a "worst-case" scenario.

Other: Due to the nature of this exercise, some other assumptions had to be made, including, but not limited to, determining whether a pipe tie-in has any flow, the direction of pipes to/from inaccessible structures, etc. These assumptions can be found listed on the plan sheets.

***Storm Event** -- A 100-year storm refers to rainfall totals that have a one percent probability of occurring at that location in that year. Encountering a "100-year storm" on one day does not decrease the chance of a second 100-year storm occurring in that same year or any year to follow. In other words, there is a 1 in 100 or 1% chance that a storm will reach this intensity in any given year.*

OBSERVATIONS

System Functionality

Plans, delineations of the following systems, and notes for numerous structures are included in Appendix C.

Storm System A: Based upon the system model, it appears System A should be adequately functioning. Hydraulic Grade Lines (HGLs) stay mostly within the pipes and only a couple of inlets create gutter spreads over 8 feet. Video inspection revealed that some pipes had areas of minor cracking and ponding water inside of them. On the northern end of the system, some pipe segments are partially blocked and would benefit from an intense cleaning. See Appendix C: Figures C3, C4, and C6.

Storm System B: Based on the system model, Storm System B is not functioning properly. Along the "x.1" (north) fork of the system, the HGL jumps drastically out of the top of the system. Part of this may be due to assumptions made with regard to the direction and inverts of structures in this system. Many of these were located using a handheld GPS unit and some were blocked and could not be opened to get proper sizes, types, and inverts of pipes. The problem with this system could also stem from the 12 inch pipes between B1.6 and B1.8. This is where the HGL begins its drastic ascent and a capacity calculation shows that these pipes may not be able to handle the amount of runoff being directed to them.

Gutter spread on this system is reasonable, except at structure B1.7. This structure is located in a very flat area and the gutter spread is well above desired limits.

Video inspection of the south branch of this system shows badly egged and cracked clay pipe that will likely need to be replaced rather than repaired. See Appendix C: Figures C5, C6, and C7.

Storm System C: System C's HGL rises very rapidly in the model. This is due to the 15 inch pipe that is between a 24 inch pipe upstream and 30 inch pipe downstream. Having a larger pipe drain to a smaller pipe is causing a flow issue. There is also a significant amount of estimated flow (approximately 21 cumulative acres) that culminates at the low point of Forrest Avenue at structures C1 and C1.1.

Gutter spread for this system is beyond acceptable limits. Inlets C1 and C1.1 both have large spreads (over 16 and 27 feet respectively) but these are not directly on Green Street and assumptions were made regarding drainage area and other structures that might be in the area. The only inlet on Green Street in this system with gutter spread issues, C4, is in an area that is very flat. The

Hydraulic Grade Line

HGL *-- used to determine if you can accommodate design flows in the drainage system without causing flooding at some location or causing flows to exit the system at locations where this is unacceptable. It is the probable water levels that may occur during a storm event.*

Gutter spread *-- A curb and gutter form a triangle than can carry runoff outside the travel lane without interrupting traffic. When the volume that triangle can carry or an inlet can accept is exceeded, gutter spread occurs. Spread is defined as the width of gutter flow, measured laterally from the face of the curb. Allowable spread depends on the classification of the roadway and other design factors including shoulder widths and ADA requirements.*

likely solution, without regrading in this area, would be to add additional structures next to C4.

Video inspection shows the clay pipes under Green Street to be in poor condition. Several lines in this system are cracked and egged clay in need of repair. “Egging” is when pipes develop an egg like shape usually in response to pressure. Other factors contributing to the poor condition of the system include a concrete intrusion, a large hole in a pipe wall patched with a piece of metal, and a 10 inch gap between pipe segments. See Appendix C: Figures C8 and C9.

Storm System D: Almost all of System D had to be modeled using assumptions. Video inspection revealed that the system is largely hidden and/or inaccessible. The outfall pipe appears to curve both horizontally and vertically. The two upstream structures, D3.1 and D3.2, together are collecting more than six acres of drainage area, which is far above their functional capacity. See Appendix C: Figures C10 and C11.

CONCRETE INTRUSION

EXAMPLE OF EGGED CLAY PIPE COMMONLY FOUND ALONG CORRIDOR

Storm System E: Overall, System E appears to be functioning adequately. The model shows the HGL to be within the pipes and only two structures have gutter spreads that are above desired limits. The biggest concern of this system is where it crosses Green Street. Video inspection revealed multiple hidden boxes, from an apparent road widening. There is also a section of 12 inch pipe connected to two sections of 15 inch pipe and shored up with bricks. See Appendix C: Figures C12 and C13.

Storm System F: Storm System F appears to be functioning adequately. See Appendix C: Figures C14 and C15.

EXAMPLE OF COMMONLY FOUND CRACKED CLAY PIPE

Storm System G: For the most part, System G appears to be adequately functioning. The pipes are in good condition aside from a sunken portion between G5 and G6. The HGL is acceptable along the main line portion of the system. The side system at the north, however, appears to be undersized for the amount of water being conveyed. Increasing the sizes of the G1.1 split would improve capacity.

Gutter spread is acceptable at many structures. However, structures G1, G4, G8, G1.1, and G1.2 all are well above the desired gutter spread in this area. See Appendix C: Figures C14 and C15.

Overall Gutter Spread Notes

- There are an insufficient number of structures to move water off the road.
- Despite 3.5 to 4.0% cross slopes, the longitudinal grade of Green Street is less than 1% through the majority of the corridor. The lack of consistent positive roadway slope causes excessive ponding.
- Overlays and inadequate curb cut/entrance connections are contributing to ponding.

Overall System Functionality

- Structure capacity is inhibited by pavement overlays and non-standard drainage structures.
- Lack of maintenance and cleaning was observed in many structures and pipes. Many of them lack adequate access for proper cleaning.
- Dilapidated clay pipe was commonly found.
- Undersized and mismatched pipe materials were commonly found.
- Poor and failing pipe connections were commonly found.
- Curved pipe runs were found.

INLET PARTIALLY COVERED BY ASPHALT AND INACCESSIBLE

SUMMARY

It is evident as a result of this assessment that the existing stormwater conveyance infrastructure along the Green Street Corridor is failing and does not effectively promote positive and efficient stormwater conveyance off of the travel lanes of Green Street. At a minimum, the following issues would need to be addressed to have a fully functioning system:

- Inlet spacing should be limited to no more than ½ acre basin areas and longitudinal road grades should be reset to provide positive drainage along the curb line. Additional structures are needed.
- Existing clay pipe would need to be removed and replaced with current GDOT standard material, typically reinforced concrete pipe

(RCP), not only along Green Street but also along Forrest Avenue and North Avenue.

- Buried/abandoned structures should be uncovered and/or removed from connected pipe runs.
- All storm structures and inlets should be made fully accessible for maintenance and cleaning.
- Proper stormwater maintenance agreement documentation should be verified or instated where stormwater from public right of ways crosses private properties.

ENVIRONMENTAL AND ZONING

The application of, and required level of compliance with, many environmental regulations depends on the funding source (local, state, or federal), type of project, and/or potential impacts. Federal funding, usually from the U.S. Department of Transportation for roadway projects, requires compliance with the National Environmental Policy Act (NEPA). State funding in Georgia over certain limits or with potential cultural impacts, as found along Green Street, requires compliance with Georgia's version of NEPA and the Georgia Environmental Policy Act (GEPA). Local funding comes with the fewest regulations, but does not exempt a project from compliance and a community's commitment to being good stewards of their environment and community.

SOCIAL ENVIRONMENT

Pedestrian Facilities

Pedestrian facilities include sidewalks along both sides of the roadway and crosswalks at Academy Street and Ridgewood Avenue. For the majority of the corridor, sidewalk width varies from 7 to 8 feet with no buffer between the sidewalk and back of curb. In many areas the curb is level with the asphalt or only 1 to 2 inches high. Pedestrians and vehicles traveling in the outside lanes are in very close proximity with no protection. Near the northern terminus of the project, a one foot landscaped strip has been constructed between the sidewalk and curb line. A number of American with Disabilities (ADA) compliance issues are also present. For example, cracking, vertical displacement, poles in the sidewalk, and a lack of detectable warning surfaces at ramps were noted. No pedestrian facilities are available at most intersections along the corridor. Notably, the northern terminus of the corridor, where Green Street splits into Thompson Bridge Road and Riverside Drive, lacks pedestrian crossing accommodations. This intersection presents a broad expanse of pavement between the First Baptist Church, the Gainesville Civic Center, and City Park with no pedestrian facilities.

No transit stops are present along the corridor and it does not appear to be serviced by the bus system. During field visits, a number of pedestrians were observed using the corridor to walk, walk pets, and to jog.

Two designated parks are located along the corridor. Triangle Park is a small park located at the southern end of the corridor where Academy Street and Athens Highway merge to form Green Street. City Park is located just past the northern terminus of the project and includes active recreational facilities such as ball parks and playgrounds. There is also a park-like area at the entrance to Brenau University at the southern terminus of the project. This area provides a scenic gateway into the campus.

Demographics/Environmental Justice (EJ)

According to the U.S. Census Bureau Census Explorer, the project area is located primarily in census tract 9. The area of the corridor south of Park Street and east of Green Street is located in census tract 8. The median income for census tract 8 is $26,939 and the median income for census tract 9 is $35,915. These incomes are below the Hall County median income of $50,853 and the Georgia median income of $49,179. The ethnicity breakdown varies by census tract as well. Census tract 8 includes a population who identified themselves in the census as 27% white, 41% African American, 26% some other race which includes Hispanic, and small percentages of other ethnicities. Census tract 9 includes a population that identified themselves in the census as 70% white, 10% African American, 15% some other race, and, again, small percentages of other ethnicities. While the corridor does traverse census tracts with lower than average median incomes and higher than average minority populations, the primary land use along the corridor is office and retail.

The Green Street Corridor is a public road open and available for use by all residents. Any improvements made to the corridor would benefit all users regardless of income, race, or age and would not displace or unduly impact any concentrations of Environmental Justice (EJ) communities.

CULTURAL ENVIRONMENT

Historic District

The earliest settlers came to this area of Georgia in the 1780s. Gainesville was established as Mule Camp Springs in the early 1800s. The name was then changed and Gainesville was laid out as the county seat of the newly created Hall County in 1821. The first railroad through Gainesville was built in 1871 and tourism and industry quickly followed the railroad, making Gainesville the transportation and commercial center of northeast Georgia. As the population rapidly grew in the 1880s and 1890s, new residential development began along the Green Street Corridor. At the time, this area was a broad, flat plateau well away from the rapidly developing commercial and industrial development in downtown Gainesville. Since then, Gainesville has grown to surround this area and the Green Street Corridor is located in the heart of the City.

The majority of the Green Street Corridor lies within the designated boundaries of two National Register of Historic Places (NRHP) Districts: the Green Street Historic District and the Green Street-Brenau Historic District.

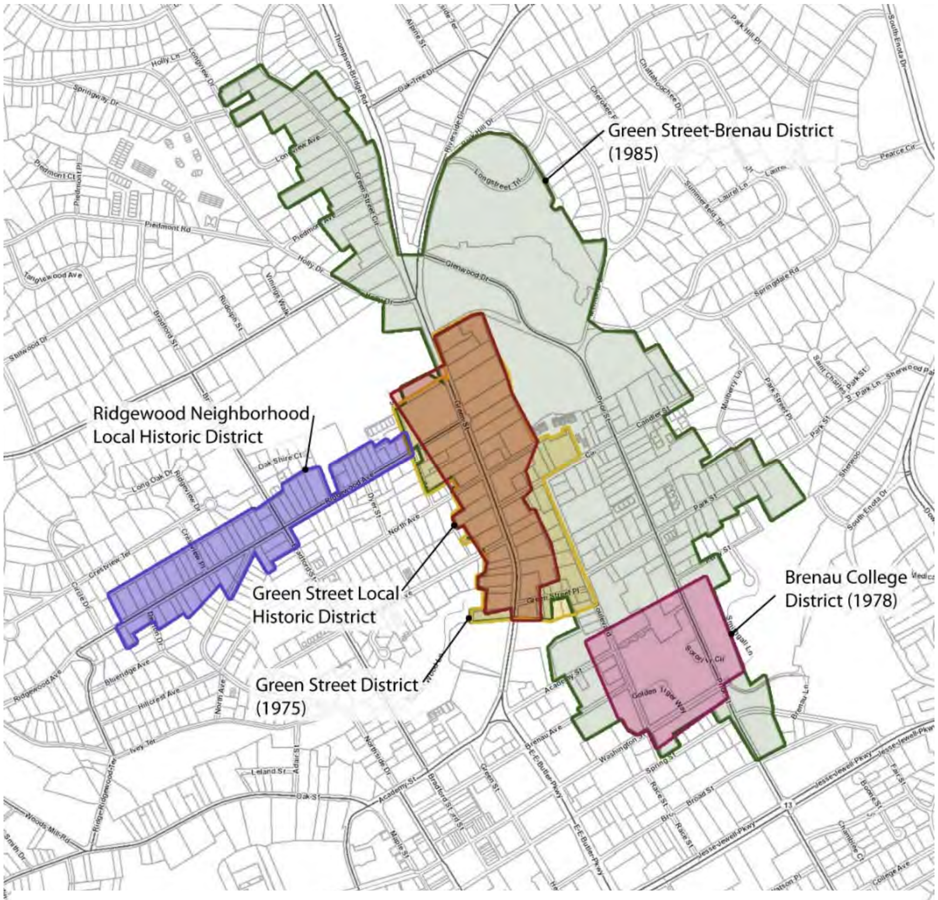
The Green Street Historic District was established in 1975 and the Brenau College Historic District was established in 1978. In 1985 these two districts were combined into the Green Street-Brenau Historic District.

At the time of listing, the District included approximately 125-150 acres and 270 structures. The District is a large area which contains three distinct residential sections: City Park, Candler Street School, and the historic portion of the Brenau College campus. It is located on a relatively flat plateau which drops off to the north in the area of City Park. The Green Street Corridor bisects the District and forms its spine. The overall character and appearance of the District is a tree lined residential area primarily laid out on a gridiron pattern. The City Park area and the Green Street Circle area are exceptions to this lay out. Landscaping in the District is extensive and contributing. The District is significant in the areas of architecture, education, local history, and social history. The District illustrates and documents the evolution of the styles and types of residential architecture from the Victorian period to the early 1930s. Houses in the District date from the 1880s to the 1930s. The range of styles include the high Victorian, neoclassical revival, turn of the century vernacular, colonial revival, and bungalow to bungalow influences. A fairly complete range of residential styles from the period 1880 to the end of the historic period is represented. A number of local builders and architects are also represented. The southern end of the Green Street Corridor, around Boulevard, Academy, Prior, and Washington Streets are the historic buildings associated with the Brenau College campus. South of the District boundaries is Gainesville’s central business district; to the east, west, and north are non-historic residential developments interspersed with some strip type modern commercial development. The District documents the development in

National Register of Historic Places (NRHP)

NRHP -- the official list of the Nation's historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the National Park Service's NRHP is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.

Gainesville of a cohesive middle and upper class neighborhood created in response to rapid growth and commercial and industrial development. It illustrates a typical pattern in which middle and upper class residential areas were frequently developed on the most desirable land in town; in this case high and flat land near town.



Historic Districts

The current boundaries of the Green Street-Brenau College Historic District could likely be extended. A number of resources that were considered non-contributing elements of the District at the time of the 1985 listing are now 50 years old or older, maintain historic integrity, and would now be considered contributing resources. The entirety of the Green Street Corridor should be considered potentially eligible for the NRHP.

In terms of local history, the District is significant for containing the homes of many of Gainesville's historic businessmen, merchants, politicians, lawyers, doctors, educators, and other middle class citizens. The smaller houses on the cross streets such as Boulevard and Prior Street, housed tradesmen and salesmen. Individually and collectively the people who lived in the district contributed to the history and development of the City of Gainesville and shaped it into the place it is today.

In addition to being NRHP listed, the Green Street District is considered a local historic district. In 2001 the Gainesville Historic Preservation Commission

(GHPC) was established to help preserve irreplaceable and unique character elements, while allowing new construction to include architectural designs that are compatible with the neighboring historic buildings and landscapes. Local designation as a historic resource provides for design review of material exterior changes through the Certificate of Appropriateness (COA) process. Any exterior material changes such as new construction, demolition or relocation, building addition, signage, and parking lots require a COA. The City has adopted the *Gainesville Historic Preservation Manual and Design Guidelines* to help owners and occupants make appropriate decisions about exterior material changes. Of the 111 locally designated individual properties in the City of Gainesville, 60 are located within the Green Street local historic district.

Section 4(f)

Section 4(f) applies to projects that receive federal funding from or require approval by an agency of the U.S. Department of Transportation. Section 4(f) refers to the original section within the U.S. Department of Transportation Act of 1966 which established the requirement for consideration of park and recreational lands, wildlife and waterfowl refuges, and historic sites in transportation project development. The law, now codified in 49 U.S.C. §303 and 23 U.S.C. §138, is implemented by the Federal Highway Administration (FHWA) through the regulation 23 CFR 774. Section 4(f) is considered by many to be a complex law and navigating the required process can be time consuming. Section 4(f) properties include publicly owned public parks, recreation areas, and wildlife or waterfowl refuges, or any publicly or privately owned historic site listed or eligible for listing on the National Register of Historic Places. Before approving a project that uses Section 4(f) property, FHWA must either

(1) determine that the impacts are de minimis, or

(2) undertake a Section 4(f) Evaluation.

If the Section 4(f) Evaluation identifies a feasible and prudent alternative that completely avoids Section 4(f) properties, that alternative must be selected. If there is no feasible and prudent alternative that avoids all Section 4(f) properties, FHWA has some discretion in selecting the alternative that causes the least overall harm. FHWA must also find that all possible planning to minimize harm to the Section 4(f) property has occurred. Use of a Section 4(f) property occurs:

(1) when land is permanently incorporated into a transportation facility; or

(2) when there is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose; or

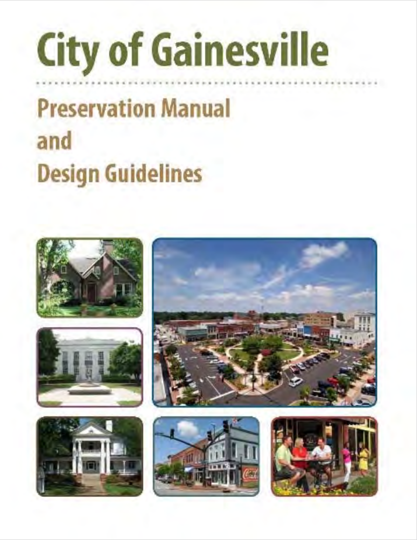
(3) when there is a constructive use (a project's proximity impacts are so severe that the protected activities, features, or attributes of a property are substantially impaired).

The regulation lists various exceptions and limitations applicable to this general definition.

ZONING AND LAND USE

The land use along the corridor includes primarily residential structures that have been converted to office and commercial businesses. A variety of uses including the Times (newspaper office), a post office, the Jacobs Building, the Georgia Department of Veterans, Greater Hall Chamber of Commerce, a church, two city parks, and the Gainesville Civic Center are also located along the corridor.

The underlining zoning for the entire project area is Residential - Office (R-O). This zoning category is intended to encourage a mixture of office, single family residential, and specialty retail. The R-O district is set aside to allow for a transition with office/retail and Residential districts while allowing for the protection of the historical structures located along Green Street. The minimum requirements for the R-O district stipulate a 10,000 square foot minimum lot with 40 foot of frontage along a public street. The principle building is required to be set back 30 feet from the front, 10 feet from the side, and 20 feet from the rear of the property line.



City of Gainesville

Preservation Manual
and
Design Guidelines

The City of Gainesville's Unified Land Development Code, Chapter 9-8-8. – Historic Preservation Overlay Zone applies to the project area. The Overlay Zone provides procedures for the protection of historic resources in Gainesville. Property owners are required to provide ordinary maintenance and repairs for the historical structures that does not change the material, design, or exterior appearance. Any material exterior work projects relating to these historical structures require a Certificate of Appropriateness from the GHPC. As mentioned above, the City has adopted the *Gainesville Historic Preservation Manual and Design Guidelines* to help owners and occupants make appropriate decisions about exterior material changes. If an undue hardship exists, an appeals process is in place to provide review. At the south end of the project area, the post office and The Times newspaper building are not included within the Green Street Historical Overlay.

NATURAL ENVIRONMENT

Gainesville is located in the Piedmont Geologic Region, an area underlain with igneous and metamorphic rock. The soils in this region have been formed by the physical and chemical weathering of the parent rock and migration of eroded Blue Ridge lithologies into the Piedmont. According to the USDA web soil survey of Hall County, the soils beneath Green Street are predominately of the Madison sandy loam series. The Madison series consists of well drained, moderately permeable soils, and are found on gently sloping to steep uplands in the Piedmont. Soil maps are included in Appendix A.

The climate for Gainesville can be characterized as a subtropical climate with mild, and yet extremely varying winters and hot summers. Winter temperatures are generally in the mid-40s to 50s F° with lows in the 30s F°. Summer high temperatures usually range in the mid to upper 80s F° to low to mid 90s F°. Gainesville receives on average 216 sunny days per year and approximately 54 inches of rain per year. Gainesville is located within the United States Department of Agriculture (USDA) Hardiness Zone 8a which is typically characterized as having a long and fruitful growing season.

Tree Inventory

Urban ecosystems play an important role in the ecology of human habitats in several ways: they filter air, water, sunlight, provide shelter for animals, and provide recreational area for people. They are a vital component to a well planned community. In the case of the Green Street Corridor, the urban ecosystem provides the backdrop to a beautiful and historic streetscape. Maintaining a strong and healthy urban ecosystem will go a long way in sustaining the historical significance of the district. A Tree Inventory was conducted along the Green Street Corridor to compare current tree inventory with historical GIS data. The tree inventory is included on attached plans.

Results

The tree survey was conducted on April 7, 2016, by Stephen Broadhead, an International Society of Arboriculture (ISA) Certified Arborist with SEI. Weather conditions on the day of the survey were overcast and cool. A total of 1.84 inches of rainfall occurred in the area during the two weeks prior to the field visit, including a recent major rain event of 0.77 inch of rainfall on April 7, 2016.

The trees along the corridor were a mixture of ornamental and hardwoods. Many of the trees were thriving and exhibited an average growth of approximately 3 to 5 inches Diameter at Breast Height (DBH) since historical GIS data was updated. Although a majority of the trees appeared to be in good health, several trees were in decline due to various factors. Factors such as impermeable surface, pruning for utilities, soil compaction, air quality, and even vehicular traffic can inhibit tree health in an urban environment. These factors should be taken into account for future plantings within the corridor.

Species selection is also important to the overall health of the ecosystem. The tree inventory within the corridor was dominated with water oaks (*Quercus nigra*), flowering dogwoods (*Cornus florida*), southern magnolias (*Magnolia grandiflora*), and post oaks (*Q. stellata*). Maintaining diversity with the species selection will ensure a strong urban ecosystem. Tree species well-suited for urban environments include red maple (*Acer rubrum*), black cherry (*Prunus serotina*), American elm (*Ulmus Americana*), bald cypress (*Taxodium distichum*), and crape myrtle (*Lagerstroemia indica*).

MATURE OAK TREE LINING ROADWAY

TRIANGLE HOLLY IN TRIANGLE PARK

Landmark Tree

In Triangle Park, located at the southern terminus of the project, stands an 85 year old American holly (*Ilex opaca*) and a Landmark Tree on the Georgia Urban Forest Council (GUFC) Landmark Tree Register called Triangle Holly. The tree was planted in 1931 as part of a civic project and maintained by the Gainesville Garden Club. The tree was nominated for the Landmark Register in 2001 by Mrs. Frank P. Lane. The tree is often decorated for the commemoration of soldiers and during the Christmas holiday season.

Waters

The U.S. Army Corps of Engineers (USACE) has jurisdiction over waters of the U.S. including streams, wetlands, lakes, ponds, etc. and is responsible for permitting any direct impacts to waters under their jurisdiction. The Georgia Erosion and Sediment Control Act of 1975, as amended, O.C.G.A. 12-7-6(b)(15) defines Waters of the State (State Waters) and establishes a state-wide comprehensive soil erosion and sedimentation control program to conserve and protect the land, water, air, and other resources of the State of Georgia. This Act establishes the buffer widths to be maintained on all features considered Waters of the State and who have a point of wrested vegetation for protection of those waterways. Warm water streams require a 25 foot undisturbed buffer be maintained along both sides of the stream measuring from the point of wrested vegetation. Cold water streams receive a 50 foot buffer. Any land disturbing encroachments into the state-mandated buffers requires a variance from the Georgia Environmental Protection Division (EPD).

A desktop review of available data and a field survey were conducted to determine the presence of jurisdictional waters of the U.S., state waters, and state water buffers. No waters were found to be located within the Green Street Corridor boundaries. The project area is located in the Upper Chattahoochee Watershed – Hydrologic Unit Code (HUC) 03130001.

The 303(d) Program of the Clean Water Act identifies waters that are impaired or in danger of becoming impaired so that protections can be established in those areas. Additional erosion control Best Management Practices (BMPs) are required on projects that discharge to an impaired stream segment. No 303(d) listed impaired stream segments are located within one mile of the Green Street Corridor. The nearest 303(d) listed resource is Lake Lanier, located approximately 4.6 miles to the southwest.

Since no waters are located along the corridor, proposed projects along the corridor should not require Section 404 permitting or Buffer Variances (BV).

Floodplains

The Federal Emergency Management Agency (FEMA) creates, stores, and updates flood hazard maps for the National Flood Insurance Program (NFIP) communities across the United States. Flood Insurance Rate Maps, known as

FIRMs, are the primary tool for identifying flood prone areas in communities. The City of Gainesville is a participating NFIP community. The Corridor is found on FIRM Map Numbers 13139C0187F and 13139C0179 which show no flood zones along the Corridor. See Floodplain Map in Appendix A. This is due to a lack of waterways and its being located higher, topographically, than the surrounding areas.

Migratory Bird Treaty Act (MBTA)

The MBTA and the Executive Order (EO) on the Responsibility of Federal Agencies to Protect Migratory Birds (EO 13186), requires the protection of migratory birds and their habitats. Actions must be taken to avoid or minimize impacts to migratory bird resources and to prevent or abate the detrimental alteration of the environment for the benefit of migratory birds, as practicable. The MBTA protects over 1,500 migratory bird species in the U.S. and its territories. There were no signs of migratory birds or habitat, such as bridges, culverts, or rock overhangs, observed within the proposed project corridor during ecological field surveys. However, the mature vegetation throughout the corridor provides good habitat for nesting, resting, and foraging for many bird species.

Other Natural Resources

No wildlife refuges, critical habitat, fish hatcheries, Essential Fish Habitat (EFH), USACE owned land, or wild and scenic rivers were identified within the corridor boundaries.

Protected Species

The Endangered Species Act (ESA) seeks to protect species that are endangered or threatened throughout a portion of their range and applies to projects regardless of their funding sources. According to the U.S. Fish and Wildlife Service’s (FWS) Information, Planning, and Conservation System (IPaC) and the Georgia Department of Natural Resources (GADNR) Rare Elements of Hall County list, a number of federal and state protected species are listed as potentially occurring within Hall County. Listed species are summarized in Table 1.

Table 1: Federal and State Protected Species Known to Occur in Hall County, Georgia

Common Name	Scientific Name	Federal Status	State Status
Faunal Species			
Indiana Bat	*Myotis sodalis*	Endangered	Endangered
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	Threatened
Bluestripe Shiner	*Cyprinella callitaenia*	None	Rare
Bald Eagle*	*Haliaeetus leucocephalus*	None	Threatened
Chattahoochee Crayfish	*Cambarus howardi*	None	Threatened
Altamaha Shiner	*Cyprinella xaenura*	None	Threatened
Floral Species			
Pink Ladyslipper	*Cypripedium acaula*	None	Unusual
Yellow Ladyslipper	*Cypripedium parviflorum*	None	Rare
Goldenseal	*Hydrastis canadensis*	None	Endangered
Black-spored Quillwort	*Isoetes melanospora*	Endangered	Endangered
Sweet Pinesap	*Monotropsis odorata*	None	Threatened
Indian olive	*Nestronia umbellula*	None	Rare
Georgia Aster	*Symphyotrichum georgianum*	None	Threatened
Ozark Bunchflower	*Veratrum woodii*	None	Rare

*Due to extensive conservation efforts, the bald eagle has been removed from federal listing. It remains state listed and is also protected by the Bald and Golden Eagle Protection Act.

In accordance with the ESA, it is unlawful for any person (or agency) to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct" any federally protected species. State listed species do not receive the same level of protection but should be considered any time they occur and are potentially impacted. Should federal or state funding or a federal permit be required for the project, coordination with FWS and GADNR would be required and an in depth habitat assessment would need to be conducted.

The majority of the vegetation in the project area is maintained landscaping and right of way and it is a heavily utilized corridor by vehicular and pedestrian traffic. Most protected species have very specific habitat requirements that are not available in the corridor. An initial assessment of the availability of protected species habitat is included in Table 2.

Table 2: Protected Species Habitat Assessment

Common Name	Habitat Assessment
Indiana Bat	Mature trees with peeling bark can provide summer roosting and resting habitat. Should any large trees be marked for removal, a survey for bats would be prudent.
Northern Long-eared Bat	Mature trees with peeling bark can provide summer roosting and resting habitat. Should any large trees be marked for removal, a survey for bats would be prudent.
Bluestripe Shiner	No streams capable of supporting this species noted.
Bald Eagle*	Bald eagles have been known to nest and forage in the Lake Lanier area. The survey corridor does not appear to contain ideal nesting habitat; however, should any large trees be marked for removal, a survey for nests would be prudent.
Chattahoochee Crayfish	No streams capable of supporting this species noted.
Altamaha Shiner	No streams capable of supporting this species noted.
Pink Ladyslipper	No habitat for this species noted.
Yellow Ladyslipper	No habitat for this species noted.
Goldenseal	No habitat for this species noted.
Black-spored Quillwort	No granite outcrops capable of supporting this species noted.
Sweet Pinesap	No habitat for this species noted.
Indian olive	Unlikely to occur in project area since no connection to other known populations.
Georgia Aster	Marginal habitat noted in utility right of way.
Ozark Bunchflower	No habitat noted.

SUMMARY

The Green Street Corridor is vital to the City of Gainesville as a transportation corridor and as a historic resource that exemplifies the growth and prosperity of the area. A poorly performing drainage system, narrow right of way and lane widths, historic designation, compromised pavement, and a corridor crowded with utilities all combine to make operational improvements challenging.

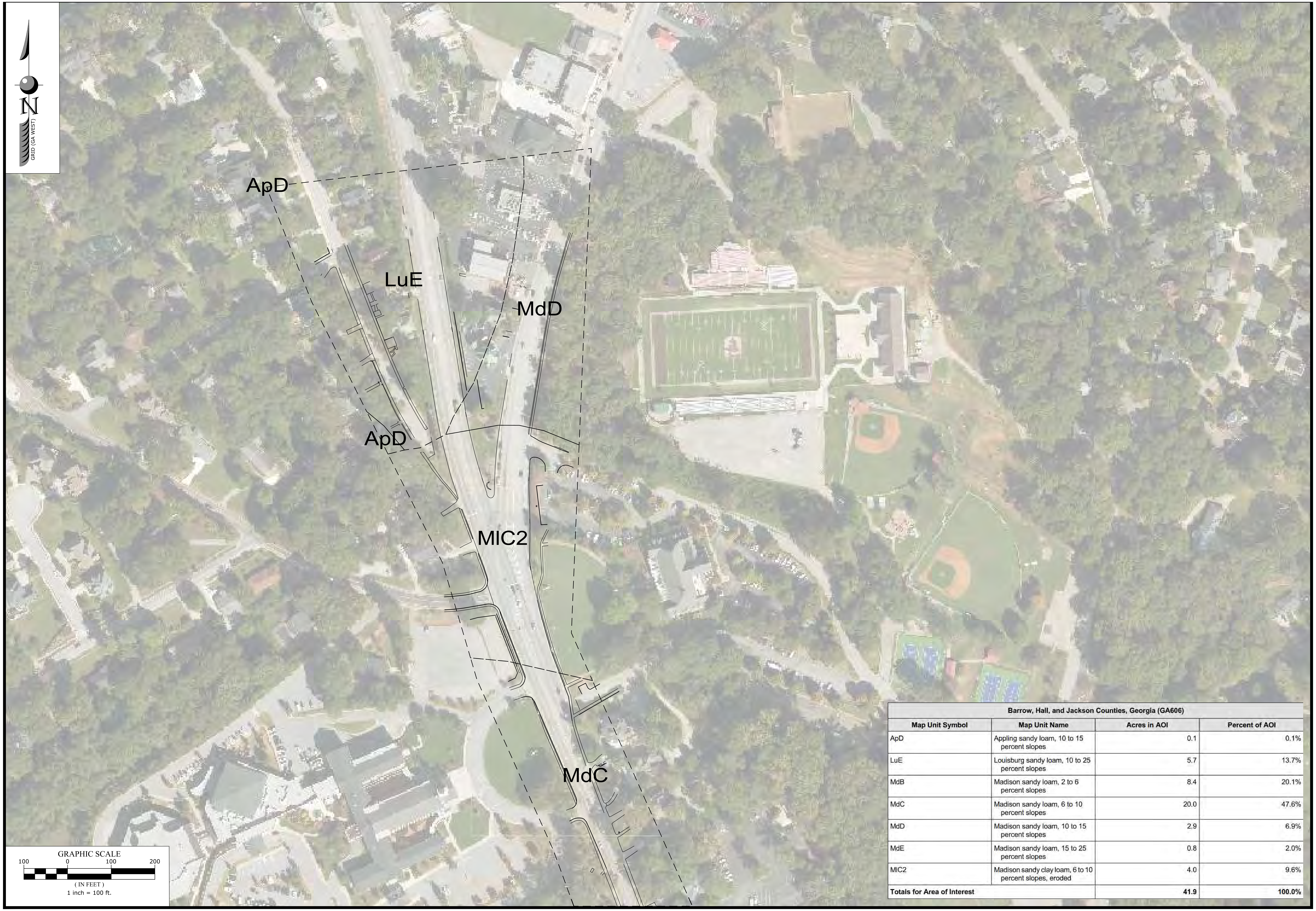
The existing stormwater drainage system is in serious disrepair and declining with time. Flooding and drainage issues are likely to continue to degrade and present safety issues. The clay pipe commonly found in the storm sewer and sanitary sewer infrastructure is in desperate need of replacement. Utilities in general are crowded, aged, and unsightly.

The narrow right of way and lane widths make the corridor unfriendly to pedestrians and vehicles, particularly heavy truck traffic. With an estimated truck percentage of 16, heavy truck traffic is significant. While the narrow lanes act as traffic calming, no left turn accommodations, medians, or pedestrian buffers are present. The narrow existing right of way does not provide adequate space for improvements and utility relocations.

The historic nature of the corridor has been recognized for decades. Well planned and designed improvements to this corridor could consider context and maintenance and provide beneficial improvements to the resources in the area. Reducing congestion and improving pedestrian facilities would attract people to work, shop, and live in this important area.

This analysis of existing conditions lays the groundwork for the development of context sensitive conceptual alternatives for corridor improvement. Any improvements will need to take all of these factors into consideration and proceed with caution and sensitivity.

Appendix A



Barrow, Hall, and Jackson Counties, Georgia (GA606)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
ApD	Appling sandy loam, 10 to 15 percent slopes	0.1	0.1%
LuE	Louisburg sandy loam, 10 to 25 percent slopes	5.7	13.7%
MdB	Madison sandy loam, 2 to 6 percent slopes	8.4	20.1%
MdC	Madison sandy loam, 6 to 10 percent slopes	20.0	47.6%
MdD	Madison sandy loam, 10 to 15 percent slopes	2.9	6.9%
MdE	Madison sandy loam, 15 to 25 percent slopes	0.8	2.0%
MlC2	Madison sandy clay loam, 6 to 10 percent slopes, eroded	4.0	9.6%
Totals for Area of Interest		**41.9**	**100.0%**

THE UTILITIES SHOWN HEREON ARE FOR THE CONTRACTORS CONVENIENCE ONLY. THERE MAY BE OTHER UTILITIES NOT SHOWN ON THESE PLANS. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE LOCATIONS SHOWN AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL UTILITIES WITHIN THE LIMITS OF THE WORK. ALL DAMAGE MADE TO EXISTING UTILITIES BY THE CONTRACTOR SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. IT IS THE OWNER/DEVELOPER'S RESPONSIBILITY TO VERIFY EXISTING UTILITY CAPACITY PRIOR TO INITIATING DESIGN. THE ENGINEER MAKES NO GUARANTEES, NEITHER EXPRESSED OR IMPLIED, REGARDING EXISTING UTILITY LOCATION, CAPACITY OR CONDITION.

FILE NAME: \\SEI-SVR1-MAR\Data\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.07 Enviro.&History\Env\939-15-192 ENV.dwg PLOT DATE:4/26/2016 USER:STEPHEN BROADHEAD

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SOUTHEASTERN ENGINEERING, INC.
2470 Sandy Plains Road Marietta, Georgia 30066
tel: 770-321-3936 fax: 770-321-3935
www.seengineering.com

No	ISSUED DESCRIPTION	DATE

SOILS MAP

GREEN STREET CORRIDOR
STUDY PHASE 1

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: SPB
Issue Date: 4/26/16

A1

811
Know what's below.
Call before you dig.

####

Barrow, Hall, and Jackson Counties, Georgia (GA606)			
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ApD	Appling sandy loam, 10 to 15 percent slopes	0.1	0.1%
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SOILS MAP

GREEN STREET CORRIDOR
STUDY PHASE 1

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: SPB
Issue Date: 4/26/16

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SOILS MAP

GREEN STREET CORRIDOR
STUDY PHASE 1

PROJECT LOCATED AT:
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HALL COUNTY

Project No.: 939-15-192
Designed By: SPB
Issue Date: 4/26/16

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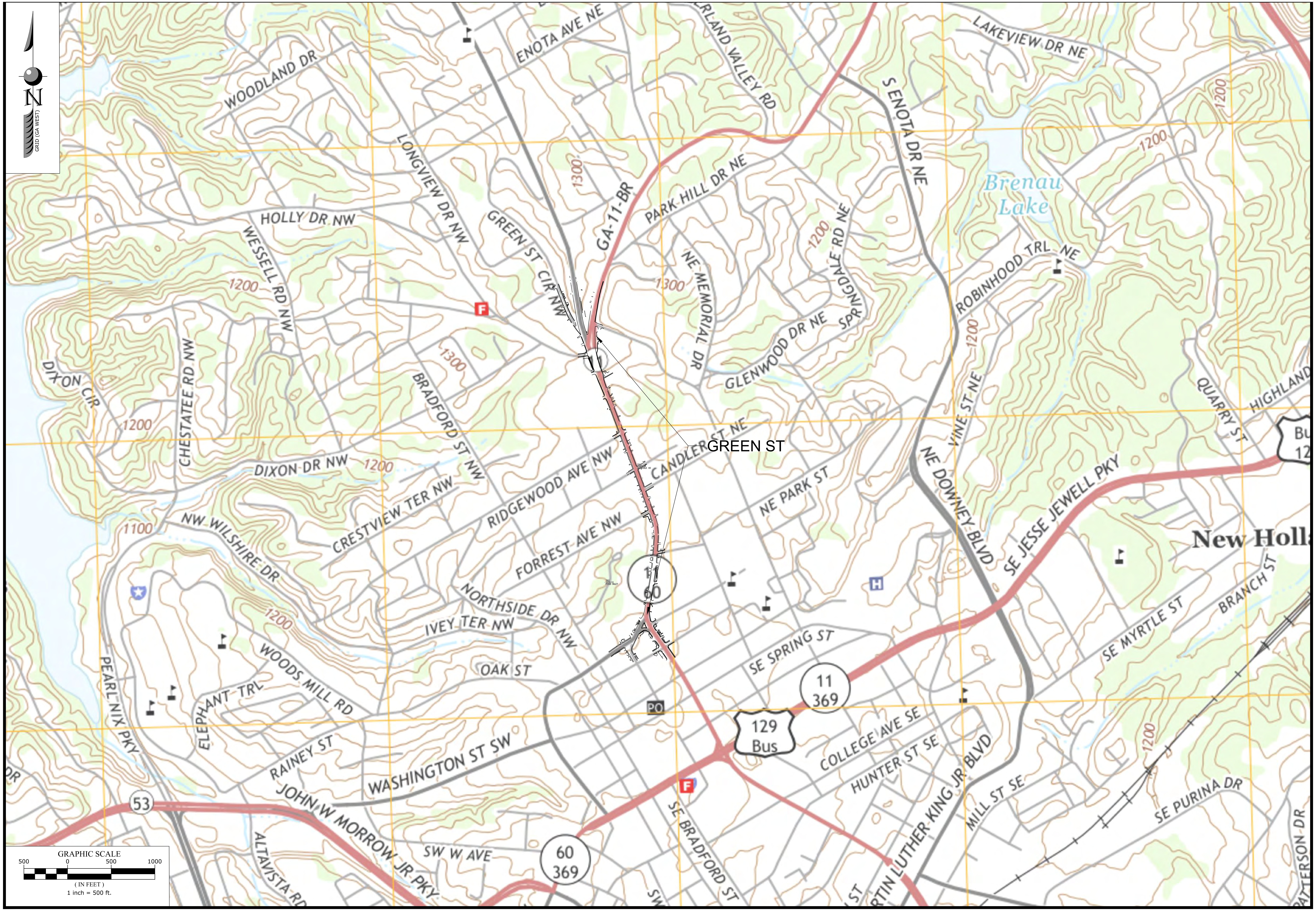

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USGS 7.5' TOPOGRAPHIC MAP
GAINESVILLE QUAD

GREEN STREET CORRIDOR
STUDY PHASE 1

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: SPB
Issue Date: 4/26/16

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NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0187F

FIRM

FLOOD INSURANCE RATE MAP

HALL COUNTY,
GEORGIA
AND INCORPORATED AREAS

PANEL 187 OF 377

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GAINESVILLE, CITY OF	130263	0187	F
HALL COUNTY	130466	0187	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
13139C0187F

MAP REVISED
SEPTEMBER 29, 2006

Federal Emergency Management Agency

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No	ISSUED DESCRIPTION	DATE

FEMA FLOOD MAP

GREEN STREET CORRIDOR
STUDY PHASE 1

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: SPB
Issue Date: 4/26/16

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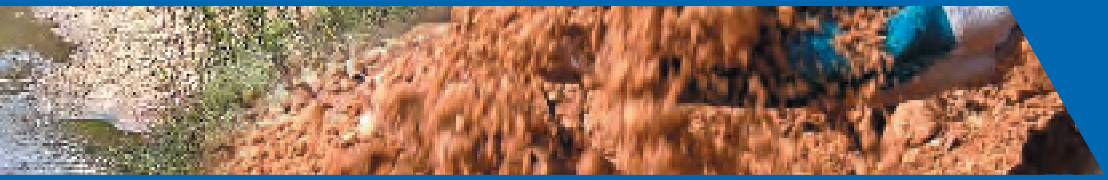
Appendix B

REPORT

Pavement Evaluation Summary

Green Street
From Academy Street To Riverside Drive
Hall County
Gainesville, Georgia

Project Number
2015.1061.01



February 24, 2016

We're here for you
UNITED CONSULTING

We're here for you
UNITED CONSULTING

February 24, 2016

Ms. Jennie Agerton
Southeastern Engineering, Inc.
2470 Sandy Plains Road
Marietta, Georgia 30066

Via Email: jagerton@seengineering.com

RE: Report of Pavement Evaluation Summary
Green Street
From Academy Street SW to Riverside Drive
Gainesville, Hall County, Georgia
UC Project No. **2015.1061.01**

Dear Ms. Agerton:

United Consulting is pleased to submit this report of the Pavement Evaluation Summary for the above referenced project site. The pavement evaluation for Green Street was performed in accordance with Georgia Department of Transportation Guidelines. However, the pavement design recommendation was excluded from our scope of work.

We appreciate the opportunity to assist you with this project and look forward to working with you on future projects. If you have any questions regarding this report, or if we can of further assistance, please feel free to contact us.

Sincerely,

UNITED CONSULTING

NO. 23121

Mehdi Moazzami, P.E.
Senior Geotechnical Engineer

Chris L. Roberds, P.G.
Senior Executive Vice President

MM/CLR/nj

http://ucblade10/sites/Geotechenv/10456/2015.1061.01/Geotechnical Documents/2015.1061.01 PES.doc

625 HOLCOMB BRIDGE ROAD • NORCROSS, GEORGIA 30071
Tel: 770/209-0029 • Fax: 770/582-2900 • Client Service: 800/266-0990
http://www.unitedconsulting.com • E-mail: united@unitedconsulting.com

PAVEMENT EVALUATION SUMMARY

For

Green Street, Hall County, Georgia

1. *LOCATION / DESCRIPTION*

This project is for the roadway improvement of Green Street from Academy Street SW and terminates near the intersection with Riverside Drive in Gainesville, Hall County, Georgia. Station 0 + 00 is located at the intersection with Riverside Drive. Station numbering increases towards the south and terminates at Station 31+50 at the intersection with Academy Street. The total length of the project is approximately 0.6 linear miles. Green Street is four-lane road (two northbound lanes and two southbound lanes). This project is located within the following station limits.

Station to Station	Location
0 + 00± to 31 + 50±	Green Street

2. *PAVEMENT CONDITION SUMMARY*

Green Street

The existing pavement for Green Street is in good to poor condition based on the findings of our field observation. The pavement distresses and core conditions from this evaluation are summarized in section 4 and 5 of this report.

3. *SUBSURFACE CONDITION SUMMARY*

The borings initially encountered about 7 to 9.5 inches of asphalt pavement. Below the pavement, boring C-1 at Station 3 + 56± encountered about 2.5 inches of graded aggregate base (GAB). Below the asphalt pavement, the remaining borings encountered about 2.25 to 4 inches of concrete. Below the concrete and GAB layers, fill soils were encountered in the borings to depths of 1.5 to 2 feet below grade. The fill encountered generally consisted sand with some silt and clay and trace amounts of gravel. The DCP N-values within the fill ranged from 6 to 18 blows for 1.75 inches of penetration. Based on the N-values recorded, we anticipate that the fill soils tested are moderate to well compacted. Most of the borings encountered refusal within the fill.

Below the fill in boring C-5, typical residual soils of the Piedmont Physiographic province were encountered. The residual soil consisted of sand with some clay and silt and had DCP N-values in the range of 14 to 18 blows for 1.75 inches of penetration.

Groundwater or saturated soils were not encountered in the borings at the time of drilling.

4. PAVEMENT RECOMMENDATION SUMMARY

The following types of construction are recommended along the roadway improvement for Green Street based on our field observation findings and asphalt core samples taken.

Road	Station to Station	Travel Direction	Recommendation
Green Street	0+00± to 31+50±, Lane 2	SB	Full Depth Replacement
Green Street	0+00± to 3+00±, Lane 2	NB	Inlay/Overlay
Green Street	3+00± to 31+50±, Lane 2	NB	Full Depth Replacement
Green Street	0+00± to 3+00±, RTL, LTL	NB	Inlay/Overlay
Green Street	0+00± to 12+00±, Lane 1	SB	Full Depth Replacement
Green Street	12+00± to 16+00±, Lane 1	SB	Inlay/Overylay
Green Street	16+00± to 31+50±, Lane 1	SB	Full Depth Replacement
Green Street	0+00± to 30+00±, Lane 1	NB	Inlay/Overlay
Green Street	30+00± to 31+50±, Lane 1	NB	Full Depth Replacement

Notation:

Though the above table may not fully correlate to the table provided in Appendix F, Level 3 and occasional Level 4 load cracking were observed outside the 100 feet evaluated sections that would justify full depth replacement of the pavement as stated above.

Mill/Inlay/Overlay Construction = Existing roadway, inlay/overlay conditions are acceptable.

Full Depth Replacement = Existing Roadway pavement cannot accommodate overlay due to poor pavement condition.

Instead of piecemeal repair of the road, it is likely more effective and cost-efficient to perform full depth replacement of the entire road.

RTL = Right turn lane
LTL = Left turn lane
SB = Southbound
NB = Northbound

5. PAVEMENT DISTRESSES

Except for the following, no other significant distresses were encountered during the field exploration of this project:

Rutting	On **Greet Street,** the maximum rutting measured was $^1/_8$ of an inch within the evaluated sections.

Load Cracking	On **Green Street,** predominantly Level 1 and Level 2, some Level 3, and scattered Level 4 load cracking was observed within the evaluated sections.
Block/ Transverse Cracking	On **Green Street,** predominantly Level 1 and some Level 2 block/transverse cracking was observed within the evaluated sections.
Edge Distress	On **Green Street,** scattered Level 2 and Level 3 edge distress cracking was observed within the evaluated sections.
Raveling	On **Green Street,** some Level 1 and Level 2 raveling was observed during this field investigation depending on the locations.
Patches, Potholes, and Local Base Failures	On **Green Street,** patches, potholes or local base failure was observed at multiple locations along the evaluated area. **See Appendix F for details.**

6. CORES

Cores were recovered from five (5) separate locations in the travel lanes of this project to determine the thicknesses and condition of the existing pavement sections. The results of the coring operation are tabulated below:

ASPHALT CORE PROPERTIES LENGTH/UNDERLYING MATERIAL

Core/ Sample Number	Location	Station/Direction/ Location	Asphalt Core Length (ins)	Core Condition	Underlying Material Type/Thickness
1	**Green Street**	**3 + 56± SB, LN 1, 5.5' RT of CL**	9.5	Fair to poor, Vertical crack from top to bottom. Horizontal crack at 3" from the top	2.5" GAB
2	**Green Street**	**8 + 47± NB, LN 2, 3.5' LT of Curb**	7.25	Fair; No visible distresses, some bleeding	2.25" Concrete
3	**Green Street**	**15 + 04± SB, LN 1, 5' RT of CL**	7	Good; No visible distresses	3.75" Concrete
4	**Green Street**	**20 + 91± NB, LN 2, 3.5' L of Curb**	8.25	Good; No visible distresses	2.75" Concrete
5	**Green Street**	**26 + 11± SB, LN 1, 5' R of CL**	8.00	Fair; No visible distresses. Some bleeding	4" Concrete

Location Notation:

Notation:
CL = Road Center of Lane
GAB= Graded Aggregate Base
LN = Designated Travel Lane
NB = Northbound
SB = Southbound
LT = Left of Center Line
RT = Right of Center Line

7. ADDITIONAL RECOMMENDATIONS

- New pavements should be constructed flush with all existing and/or new utility manholes or vaults.

- We recommend milling the asphaltic concrete pavement, as per Section 432 of the Standard Specifications.

- We recommend waterproofing the joints and cracks of the asphalt concrete pavement prior to the overlaying operation, as per Section 445 of the Standard Specifications.

- After milling and immediately prior to inlaying/overlaying, we recommend that any surface cracks shall be sealed with a Type M crack sealant, as per Section 407 of the Standard Specifications.

8. ASSUMPTIONS AND JUSTIFICATIONS

- The station locations for Green Street were not provided or staked in the field by a surveyor. United Consulting determined the approximate location of these stations by using a measuring wheel from the intersection with Riverside Drive to the intersection with Academy Street and a hand-held Global Positioning System (GPS).

- Pavement cores at station 8+47 Northbound Lane 2 and Station 26+11 Southbound Lane 1 showed signs of bleeding. Therefore, deep patching or full depth replacement should be considered within these areas.

- Overlay construction are not acceptable in other areas that are not listed above. Based on the visual observation and the core recoveries, the existing roadway has suffered significant level 3 and level 4 load cracking. These cracks traverse through the existing pavement. Full Depth Replacement is recommended for these sections. See Core 1.

9. LIMITATIONS

This report is for the exclusive use of the **Southeastern Engineering, Inc.,** its agents, and the designers of the project described herein, and may only be applied to this specific project. Our conclusions and recommendations have been prepared using generally accepted standards of Pavement Engineering practice in the State of Georgia and are valid for a period of two years from the issuance of this report. Should the implementation of the recommendations presented in this report be delayed more than two years, re-evaluation of the pavement should be performed. No other warranty is expressed or implied. Our firm is not responsible for conclusions, opinions or recommendations of others. The right to rely upon this report and the data within may not be assigned without **UNITED CONSULTING'S** written permission.

Our preliminary conclusions and recommendations are based upon design information furnished to us, data obtained from the previously described exploration and testing program and our past experience. They do not reflect variations in the subsurface conditions that may be present intermediate of our coring/ borings and in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon "on-site" observations of the conditions.

Our conclusions and recommendations are based on our site reconnaissance, anticipated existing pavement thickness, and our past experience.

UNITED CONSULTING

Reported By:	Nhan Pham
Reviewed By:	Mehdi Moazzami, Ph.D., P.E.
Q.C. Reviewed By:	Chris L. Roberds, P.G.

Appendix A – Figure 1 (1 page)

Figure 1: Coring Location Plan

Appendix B – Project Photographs – (6 pages)

Appendix C – Roadway Photographs – (19 pages)

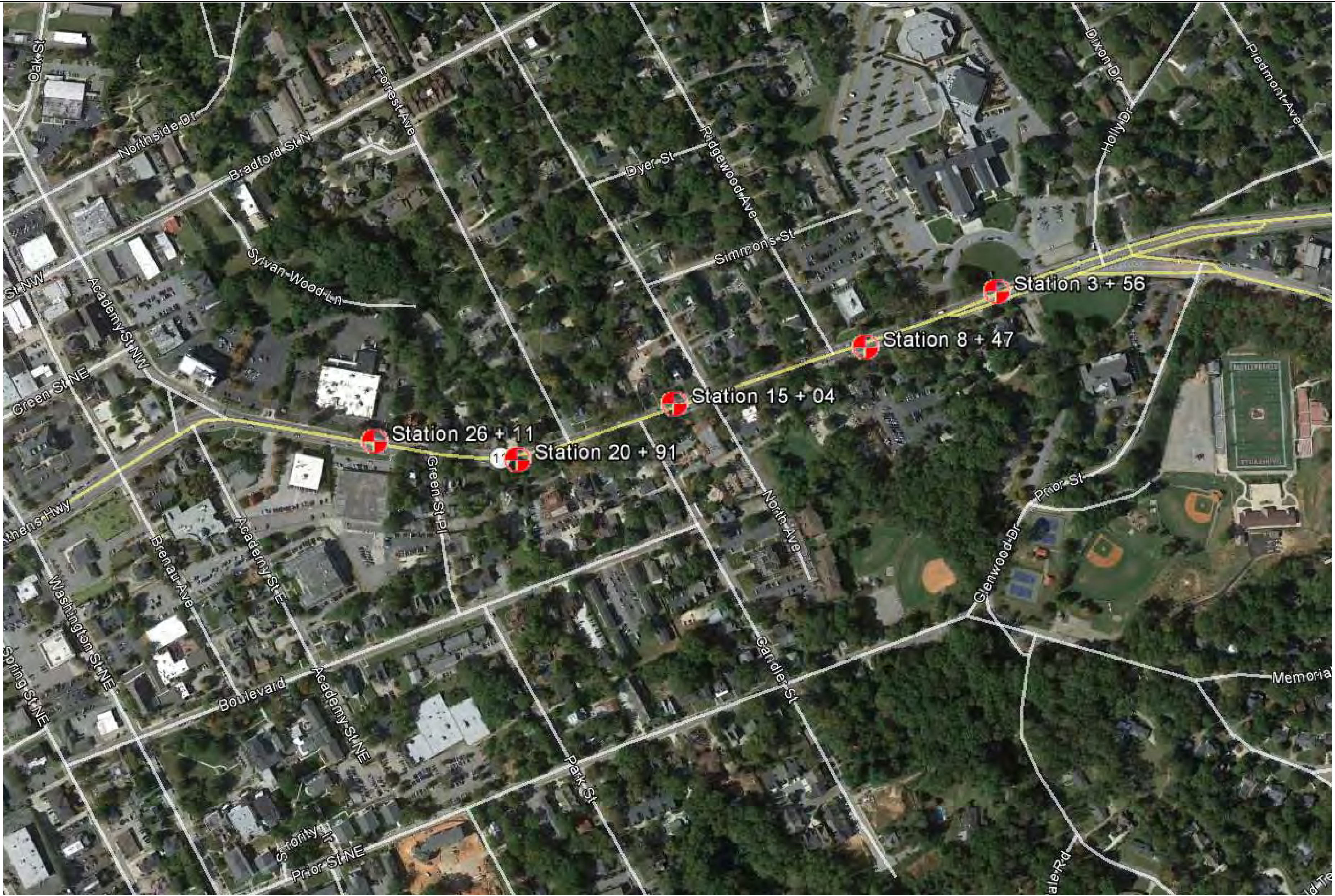
Appendix D – Example Photographs – (11 pages)

Appendix E – Core Photographs – (3 pages)

Appendix F – **Roadway Survey and Core Properties -** (5 pages)

APPENDIX A

FIGURES SECTION



SCALE: NTS

DATE: 02/10/2016

PROJECT NO: 2015.1061.01

PREPARED: NP

LEGEND: ⊕ CORING LOCATIONS

TITLE: CORING LOCATION PLAN

GREEN STREET FROM ACADEMY ST. TO RIVERSIDE DR.

FIG. 1

CLIENT: SOUTHEASTERN ENGINEERING, INC.

Z

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APPENDIX B

PROJECT PHOTOGRAPHS SECTION

PHOTOGRAPH LEGEND

Photograph Type	Label Protocol	Project Information
County Number	A three digit number	139
Route Code	State or County or other code route	1 = State Highway 2 = County Road 3 = City Street
Route Number	A four digit number followed by a two character suffix (i.e., SR 11 = 0011 XX)	0011 00 00 = SR or CR 03 = CS = City Street
Direction of Travel	E, W, N or S	E = Eastbound W = Westbound N = Northbound S = Southbound

139 1 0011 00 S AT STATION 3 + 60±
SR 11 LOOKING SOUTH

139 1 0011 00 N AT STATION 3 + 60±
SR 11 LOOKING NORTH

139 1 0011 00 N AT STATION 8 + 50±
SR 11 LOOKING NORTH

139 1 0011 00 S AT STATION 8 + 50±
SR 11 LOOKING SOUTH

139 1 0011 00 S AT STATION 15 + 00±
SR 11 LOOKING SOUTH

139 1 0011 00 N AT STATION 15 + 00±
SR 11 LOOKING NORTH

139 1 0011 00 N AT STATION 20 + 90±
SR 11 LOOKING NORTH

139 1 0011 00 S AT STATION 20 + 90±
SR 11 LOOKING SOUTH

139 1 0011 00 S AT STATION 26 + 10±
SR 11 LOOKING SOUTH

139 1 0011 00 N AT STATION 26 + 10±
SR 11 LOOKING NORTH

APPENDIX C
ROADWAY PHOTOGRAPHS SECTION

PHOTOGRAPH LEGEND

Photograph Type	Label Protocol	Project Information
County Number	A three digit number	139
Route Code	State or County or other code route	1 = State Highway 2 = County Road 3 = City Street
Route Number	A four digit number followed by a two character suffix (i.e., SR 11 = 0011 00)	0011 00 00 = SR or CR 03 = City
Direction of Travel	N or S; E or W	E = Eastbound W = Westbound N = Northbound S = Southbound
Lane of Travel	A one-digit number/ abbreviation	1, 2
With Traffic or Facing Traffic	W or F	W or F

139 1 0011 00 S 2 W AT STATION 3 + 50±,
SR 11, SOUTHBOUND, LANE 2, WITH TRAFFIC

139 1 0011 00 S 2 F AT STATION 3 + 50±,
SR 11, SOUTHBOUND, LANE 2, FACING TRAFFIC

139 1 0011 00 S 1 F AT STATION 3 + 50±,
SR 11, SOUTHBOUND, LANE 1, FACING TRAFFIC

139 1 0011 00 S 1 W AT STATION 3 + 50±,
SR 11, SOUTHBOUND, LANE 1, WITH TRAFFIC

139 1 0011 00 N 1 W AT STATION 3 + 50±,
SR 11, NORTHBOUND, LANE 1, WITH TRAFFIC

139 1 0011 00 N 1 F AT STATION 3 + 50±,
SR 11, NORTHBOUND, LANE 1, FACING TRAFFIC

139 1 0011 00 N 2 W AT STATION 3 + 50±,
SR 11, NORTHBOUND, LANE 2, WITH TRAFFIC

**139 1 0011 00 N 2 F AT STATION 3 + 50±,
SR 11, NORTHBOUND, LANE 2, FACING TRAFFIC**

**139 1 0011 00 N 2 F AT STATION 8 + 50 ±,
SR 11, NORTHBOUND, LANE 2, FACING TRAFFIC**

139 1 0011 00 N 2 W AT STATION 8 + 50±,
SR 11, NORTHBOUND, LANE 2, WITH TRAFFIC

139 1 0011 00 N 1 W AT STATION 8 + 50±,
SR 11, NORTHBOUND, LANE 1, WITH TRAFFIC

139 1 0011 00 N 1 F AT STATION 8 + 50 ±,
SR 11, NORTHBOUND, LANE 1, FACING TRAFFIC

139 1 0011 00 N 2 F AT STATION 15 + 00±,
SR 11, NORTHBOUND, LANE 2, FACING TRAFFIC

**139 1 0011 00 N 2 W AT STATION 15 + 00±,
SR 11, NORTHBOUND, LANE 2, WITH TRAFFIC**

**139 1 0011 00 N 1 F AT STATION 15 + 00±,
SR 11, NORTHBOUND, LANE 1, FACING TRAFFIC**

**139 1 0011 00 N 1 W AT STATION 15 + 00±,
SR 11, NORTHBOUND, LANE 1, WITH TRAFFIC**

**139 1 0011 00 S 2 W AT STATION 15 + 00±,
SR 11, SOUTHBOUND, LANE 2, WITH TRAFFIC**

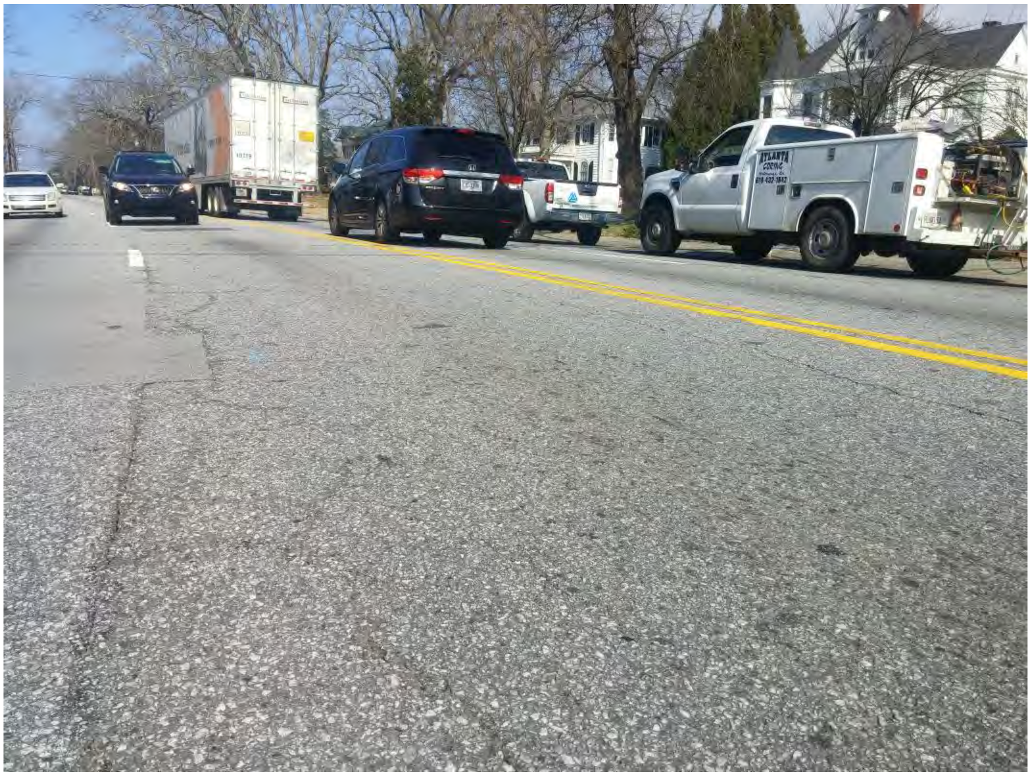
139 1 0011 00 S 2 F AT STATION 15 + 00±,
SR 11, SOUTHBOUND, LANE 2, FACING TRAFFIC

139 1 0011 00 S 1 W AT STATION 15 + 00±,
SR 11, SOUTHBOUND, LANE 1, WITH TRAFFIC

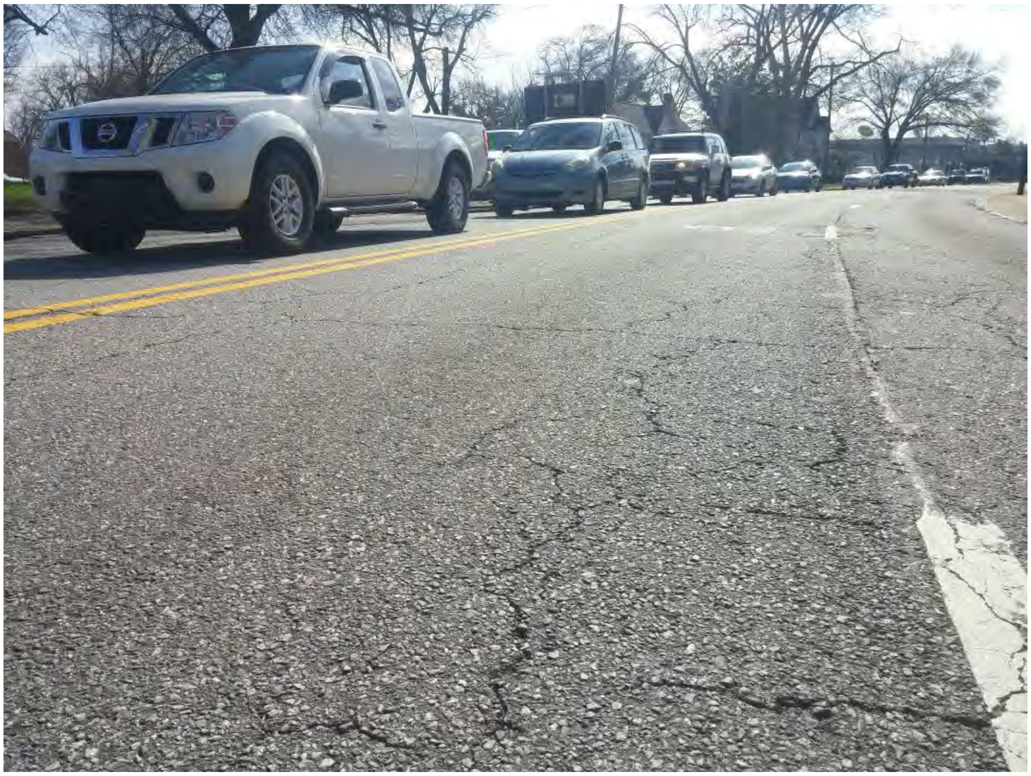
139 1 0011 00 S 1 F AT STATION 15 + 00±,
SR 11, SOUTHBOUND, LANE 1, FACING TRAFFIC

139 1 0011 00 S 2 F AT STATION 20 + 90±,
SR 11, SOUTHBOUND, LANE 2, FACING TRAFFIC

139 1 0011 00 S 2 W AT STATION 20 + 90±,
SR 11, SOUTHBOUND, LANE 2, WITH TRAFFIC



139 1 0011 00 S 1 F AT STATION 20 + 90±,
SR 11, SOUTHBOUND, LANE 1, FACING TRAFFIC



139 1 0011 00 S 1 W AT STATION 20 + 90±,
SR 11, SOUTHBOUND, LANE 1, WITH TRAFFIC

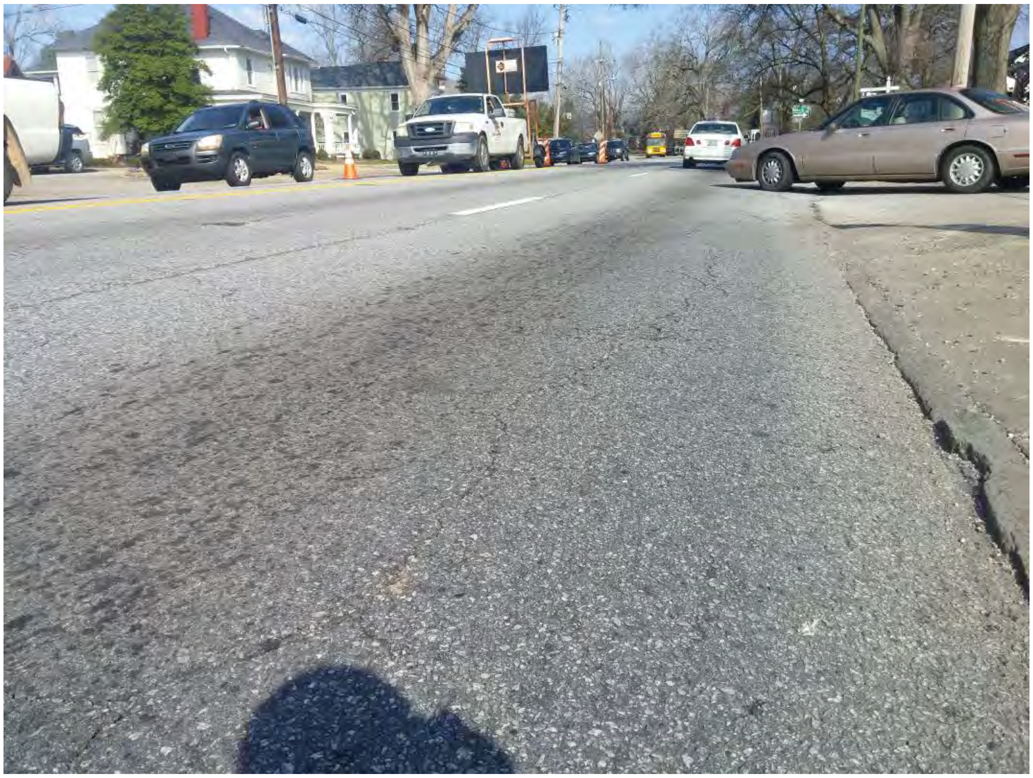
139 1 0011 00 N 1 W AT STATION 20 + 90±,
SR 11, NORTHBOUND, LANE 1, WITH TRAFFIC

**139 1 0011 00 N 1 F AT STATION 20 + 90±,
SR 11, NORTHBOUND, LANE 1, FACING TRAFFIC**

**139 1 0011 00 N 2 F AT STATION 20 + 90±,
SR 11, NORTHBOUND, LANE 2, FACING TRAFFIC**

**139 1 0011 00 N 2 W AT STATION 20 + 90±,
SR 11, NORTHBOUND, LANE 2, WITH TRAFFIC**

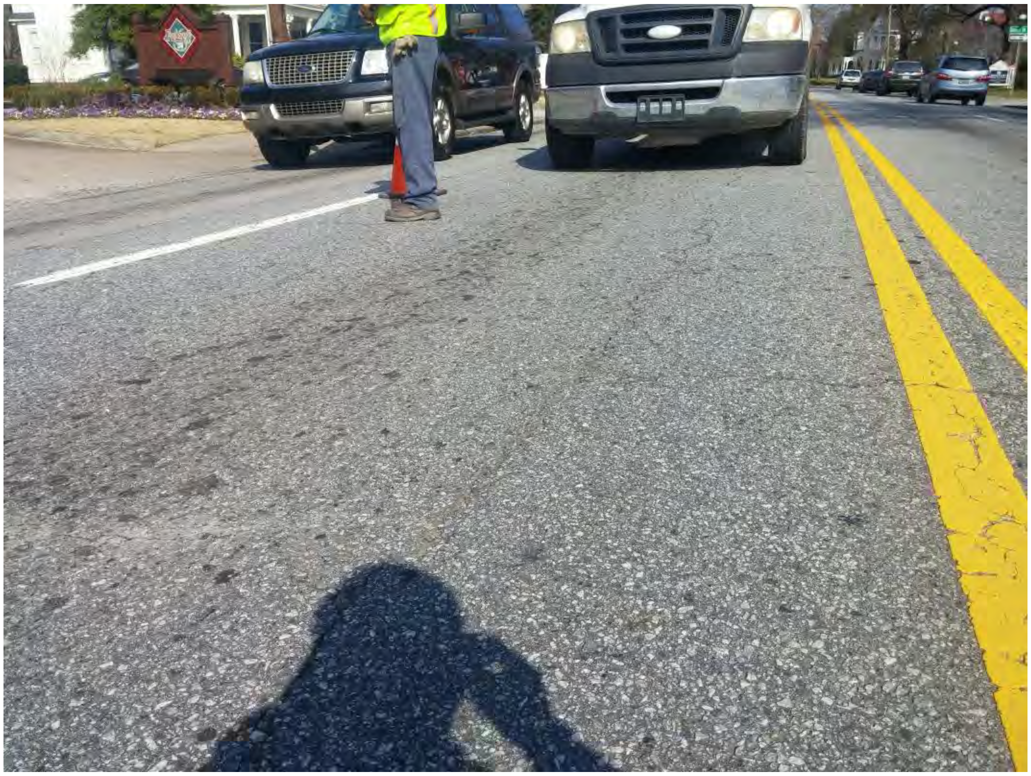
**139 1 0011 00 N 2 F AT STATION 26 + 10±,
SR 11, NORTHBOUND, LANE 2, FACING TRAFFIC**



139 1 0011 00 N 2 W AT STATION 26 + 10±,
SR 11, NORTHBOUND, LANE 2, WITH TRAFFIC

139 1 0011 00 N 1 W AT STATION 26 + 10±,
SR 11, NORTHBOUND, LANE 1, WITH TRAFFIC

139 1 0011 00 N 1 F AT STATION 26 + 10±,
SR 11, NORTHBOUND, LANE 1, FACING TRAFFIC



139 1 0011 00 S 1 F AT STATION 26 + 10±,
SR 11, SOUTHBOUND, LANE 1, FACING TRAFFIC

**139 1 0011 00 S 1 W AT STATION 26 + 10±,
SR 11, SOUTHBOUND, LANE 1, WITH TRAFFIC**

**139 1 0011 00 S 2 F AT STATION 26 + 10±,
SR 11, SOUTHBOUND, LANE 2, FACING TRAFFIC**

**139 1 0011 00 S 2 W AT STATION 26 + 10±,
SR 11, SOUTHBOUND, LANE 2, WITH TRAFFIC**

APPENDIX D

EXAMPLE PHOTOGRAPHS SECTION

Load Cracking Level 1 – SR 11, Station 4 + 00, NB, Lane 1

Raveling Associated with Load Cracking Level 3, at Station 4 + 00, SB, Lane 2

Load Cracking Level 3 – SR 11, Station 4 + 00, SB, Lane 2

Load Cracking Level 1 – SR 11, Station 4 + 00, NB, Lane 2

Patches associated with Load Cracking Level 3, SR 11, Station 7 + 00, NB, Lane 2

Load Cracking Level 3, SR 11, Station 9 + 00, SB, Lane 2

Load Cracking Level 3, SR 11, Station 15 + 00, SB, Lane 2

Load Cracking Level 4, SR 11, Station 18 + 00, SB, Lane 2

Block/ Transverse Distress Cracking Level 1, SR 11, Station 4 + 00, NB, Lane 2

Block/ Transverse Cracking Level 2, SR 11, Station 4 + 00, SB, Lane 2

Block/ Transverse Cracking Level 2, SR 11, Station 9 + 00, NB, Lane 1

Block/ Transverse Cracking Level 1, SR 11, Station 15 + 00, NB, Lane 1

Block/ Transverse Cracking Level 2, SR 11, Station 15 + 00, SB, Lane 2

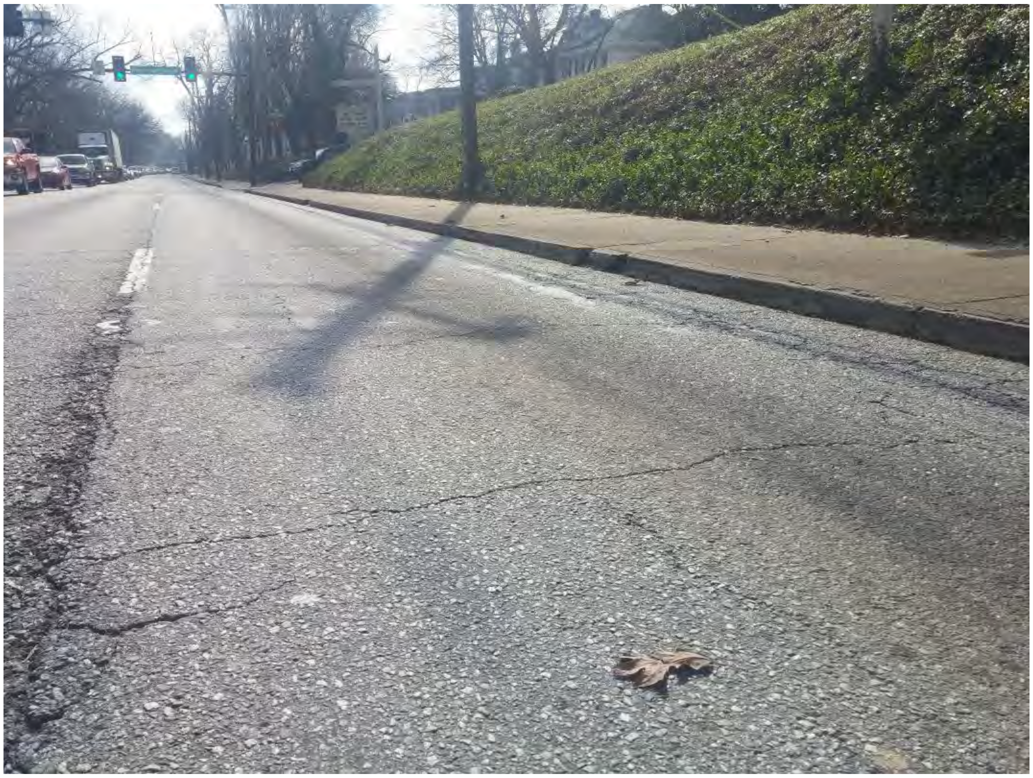
Raveling Level 2, SR 11, Station 4 + 00, SB, Lane 2

Patches from Station 3 + 00 to Station 4 + 00, SR 11, SB, Lane 2

Potholes associated with Level 4 Load Cracking, Station 15 + 00, SB, Lane 2

Raveling Level 2 and Load Cracking Level 4, SR 11, Station 15 + 00, SB, Lane 2

Potholes/Patches, SR 11, Station 15 + 00, SB, Lane 1



Raveling Level 1, SR 11, Station 9 + 00, SB, lane 2

Raveling Level 2, SR 11, Station 26 + 00, SB, Lane 2

Edge Distress Level 3, SR 11, Station 9 + 00, Northbound, Lane 2

Edge Distress Level 2, SR 11, Station 11 + 00, Southbound, Lane 2

APPENDIX E

CORE PROTOGRAPHS SECTION

CORE 1 – GREEN STREET – STATION 3 + 56±, SB, LANE 1, 5.5' RT OF CL

CORE 2 – GREEN STREET – STATION 8 + 47±, NB, LANE 2, 3.5' LT OF CURB

CORE 2 – GREEN STREET – STATION 15 + 04±, SB, LANE 1, 5' RT OF CL

CORE 4 – GREEN STREET – STATION 20 + 91±, NB, LANE 2, 3.5' LT OF CURB

CORE 5 – GREEN STREET – STATION 26 + 11±, SB, LANE 1, 5' RT OF CL

Notation:

CL = Center of Lane
LN = Designated Travel Lane
NB = Northbound
SB = Southbound
L = Left
R = Right

APPENDIX F
ROADWAY SURVEY & CORE PROPERTIES

ROADWAY DESIGNATION

For **Green Street,** the roadway designation is considered a North-south oriented roadway. Travel lanes are designated with numbers. Lane 1 = Northbound (NB), Southbound (SB), inside lane closest to the centerline or median of the existing roadway. Lane 2 = outside lane adjacent and right of Lane 1 in the direction of travel.

EXISTING PAVEMENT SURVEY

This project consisted of evaluation of the existing roadway on Green Street from Academy Street SW to Riverside Drive within the city of Gainesville, Hall County, Georgia. For the purposes of this report, the visual pavement survey for the existing travel lanes of Green Street was performed from the sidewalk. The total length of the existing pavement evaluation sections of the project is approximately 3150 linear feet. The existing roadways project construction limits were between the following stations:

Location	Staring Station	Ending Station
Green Street	0 + 00±	31 + 50±

The **Green Street** reconstruction project begins from its intersection with Academy Street SW and progresses northward to Riverside Drive within the city of Gainesville, Hall County, Georgia. We understand that the project will involve reconstruction of the pavement in the areas that pavement is not suitable for overlay and resurfacing of the areas that pavement is suitable for overlay.

The station locations for the roadways associated with this project were not provided or staked in the field by a surveyor. United Consulting determined the approximate locations of these stations by using a measuring wheel from the nearest identified stationary objects marked on the provided plans and a hand-held Global Positioning System (GPS).

Green Street

Pavement Conditions: Good to poor. The field observation findings rated the existing roadway conditions as follows: Severity rating level 1 to level 4 load cracking, level 1 and level 2, block/ transverse cracking was observed within the evaluated segmented areas. In addition, level 1 and level 2 raveling was observed within the evaluated segmented areas. Level 3 edge distresses were observed near Station 9 + 00 Northbound and Station 11 + 00 Southbound. Curb and gutters were present along the evaluated section of the pavement. Patches were observed sporadically along the Green Street alignment.

ROADWAY EVALUATION

Note: Distresses <u>not listed</u> within the following roadway evaluated segmented areas were not observed during this survey.

Rutting

On **Green Street,** rutting measurements were evaluated at various locations. Rutting measurements ranged from a minimum of zero inches to a maximum of 1/8 of an inch within the evaluated sections to be retained.

Designation for wheel paths are as follows: Drivers Wheel Path = DW, Passenger Wheel Path = PW. Northbound = NB, and Southbound = SB.

Station	**SB Lane 2**		**SB Lane 1**		**NB Lane 2**		**NB Lane 1**	
	PW	**DW**	**PW**	**DW**	**PW**	**DW**	**DW**	**PW**
3 + 50	1/8	0	0	0	0	0	0	1/8
8 + 50	1/8	0	0	0	0	0	0	1/8
15 + 00	1/8	0	0	1/8	0	0	0	1/8
21 + 00	0	1/8	0	1/8	0	0	0	0
26 + 10	0	0	0	0	0	0	0	0

Load Cracking

On **Green Street,** Level 1 to Level 4 cracking was observed from the following evaluated sections:

Station to Station		**Load Cracking (%)**			
Evaluated Test Section	**Representing**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
3 + 00 to 4 + 00, SB, Lane 1	0 + 00± to 6 + 00±	30	30	0	0
3 + 00 to 4 + 00, SB, Lane 2		25	5	70	0
3 + 00 to 4 + 00, NB, Lane 1		50	0	0	0
3 + 00 to 4 + 00, NB, Lane 2		15	85	0	0
8 + 00 to 9 + 00, SB, Lane 1	6 + 10± to 12 + 00±	50	50	0	0
8 + 00 to 9 + 00, SB, Lane 2		0	0	50	0
8 + 00 to 9 + 00, NB, Lane 1		20	10	0	0
8 + 00 to 9 + 00, NB, Lane 2		60	0	0	0
14 + 50 to 15 + 50, SB, Lane 1	12 + 00± to 16 + 00±	60	10	0	0
14 + 50 to 15 + 50, SB, Lane 2		50	25	25	0
14 + 50 to 15 + 50, NB, Lane 1		50	0	0	0
14 + 50 to 15 + 50, NB, Lane 2		40	15	0	0
17 + 00 to 18 + 00, SB, Lane 1	16 + 00± to 19 + 00±	50	50	0	0
17 + 00 to 18 + 00, SB, Lane 2		0	0	50	50
17 + 00 to 18 + 00, NB, Lane 1		50	0	0	0
17 + 00 to 18 + 00, NB, Lane 2		50	50	0	0
20 + 50 to 21 + 50, SB, Lane 1	19 + 00± to 24 + 00±	50	50	0	0
20 + 50 to 21 + 50, SB, Lane 2		0	75	25	0
20 + 50 to 21 + 50, NB, Lane 1		80	20	0	0
20 + 50 to 21 + 50, NB, Lane 2		100	0	0	0
26 + 00 to 27 + 00, SB, Lane 1	24 + 00± to 31 + 50±	50	5	0	0
26 + 00 to 27 + 00, SB, Lane 2		0	0	50	0

Station to Station		Load Cracking (%)			
Evaluated Test Section	**Representing**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
26 + 00 to 27 + 00, NB, Lane 1		100	0	0	0
26 + 00 to 27 + 00, NB, Lane 2		80	10	0	0

Block/ Transverse Cracking

On **Green Street**, Level 1 and Level 2 block/transverse cracking were observed from the following evaluated sections:

Station to Station		Block/Transverse Cracking (%)		
Evaluated Test Section	**Representing**	**Level 1**	**Level 2**	**Level 3**
3 + 00 to 4 + 00, SB, Lane 1	0 + 00± to 6 + 00±	100	0	0
3 + 00 to 4 + 00, SB, Lane 2		0	100	0
3 + 00 to 4 + 00, NB, Lane 1		100	0	0
3 + 00 to 4 + 00, NB, Lane 2		100	0	0
8 + 00 to 9 + 00, SB, Lane 1	6 + 10± to 12 + 00±	100	0	0
8 + 00 to 9 + 00, SB, Lane 2		100	0	0
8 + 00 to 9 + 00, NB, Lane 1		100	0	0
8 + 00 to 9 + 00, NB, Lane 2		100	0	0
14 + 50 to 15 + 50, SB, Lane 1	12 + 00± to 16 + 00±	0	100	0
14 + 50 to 15 + 50, SB, Lane 2		100	0	0
14 + 50 to 15 + 50, NB, Lane 1		60	0	0
14 + 50 to 15 + 50, NB, Lane 2		100	0	0
20 + 50 to 21 + 50, SB, Lane 1	19 + 00± to 24 + 00±	100	0	0
20 + 50 to 21 + 50, SB, Lane 2		100	0	0
20 + 50 to 21 + 50, NB, Lane 1		100	0	0
20 + 50 to 21 + 50, NB, Lane 2		100	0	0
26 + 00 to 27 + 00, SB, Lane 1	24 + 00± to 31 + 50±	100	0	0
26 + 00 to 27 + 00, SB, Lane 2		100	0	0
26 + 00 to 27 + 00, NB, Lane 1		100	0	0
26 + 00 to 27 + 00, NB, Lane 2		100	0	0

Raveling

On **Green Street,** 10% level 2 raveling was observed at various locations along the road.

Edge Distress

On **Green Street**, edge distress was observed within the evaluated sections.

Station to Station		Edge Distress Cracking (%)		
Evaluated Test Section	**Representing**	**Level 1**	**Level 2**	**Level 3**
8 + 00 to 9 + 00, NB, Lane 2	6 + 10± to 12 + 00±	0	0	5
26 + 00 to 27 + 00, NB, Lane 2	24 + 00± to 31 + 50±	0	5	0

Bleeding/ Flushing

On **Green Street**, bleeding or flushing was not observed within the evaluated sections at the time of this pavement evaluation.

Patches, Potholes and Local Base Failures

On **Green Street**, patches and potholes were observed at multiple locations. Some of the patches were related to utility repair work, others were due to roadway distress. The list of locations and the type of distress observed associated with the patch and potholes are as follows:

Station Location	Type of Distress
0+ 00 to 0 + 50, SB, Lane 2	Patch associated with load cracking
3 + 00 to 4 + 00, SB, Lane 2	Patch associated with load cracking
6 + 50, SB, Lane 1	Typical Patch
7 + 80, SB, Lane 2	Typical Patch
10 + 00 to 14 + 00, SB, Lane 2	Patch associated with load cracking
15 + 10, SB, Lane 2	Typical Patch
18 + 40, SB, Lane 2	Pothole associated with cracking distress
20 + 90, SB, Lane 2	Patch associated with cracking distress
24 + 45 to 26 + 10, SB, Lane 2	Patch associated with load cracking
27 + 42, SB, Lane 2	Pothole associated with cracking distress
29 + 85 to 31 + 50, NB, Lane 1	Patch associated with load cracking

ASPHALT CORE PROPERTIES LENGTH/TYPE

Core/ Sample Number	Location	Station/Direction / Location	Asphalt Core Length (ins)	Asphalt Type/ Depth (ins.) Surface
1	Green Street	**3 + 56± SB, LN 1, 5.5' RT of CL**	9.00	F=1.00, E=1.75, F=1.50, F=0.50, E=2.25, E=2.00
2	Green Street	**8 + 47± NB, LN 2, 3.5' LT of Curb**	7.25	F=2.00, F=1.00, E=2.25, E=2.00
3	Green Street	**15 + 04± SB, LN 1, 5' RT of CL**	7.00	E=1.00, F=1.50, F=1.75, E=2.75
4	Green Street	**20 + 91± NB, LN 2, 3.5' LT of Curb**	8.25	F=2.00, F=2.50, F=1.75, E=2.00
5	Green Street	**26 + 11± SB, LN 1, 5' RT of CL**	8.00	E=1.25, F=1.0, F=2.25, F=1.00, E=2.25

Notation:
LN = Designated Travel Lane
NB = Northbound
SB = Southbound
LT – Left of Lane centerline

RT = Right of Lane Centerline
CL = Road Centerline

Asphalt Type:
F= Asphalt mix with < ½ inch stone size matrix
E= Asphalt mix with < ¾ inch stone size matrix
Bin = Binder = Black mix
Base = Asphalt mix with > ¾ inch stone size matrix
OGFC/ PEM = Open Graded Friction Course or Porous European Mix

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

UNITED CONSULTING
625 HOLCOMB BRIDGE ROAD
NORCROSS, GEORGIA 30071
(770)209-0029, FAX (770)582-2800

Sheet 1 of 1

LOG OF BORING

HAND AUGER

CONTRACTED WITH: SOUTHEASTERN ENGINEERING, INC. BORING NO.: C-1

PROJECT NAME: GREEN STREEET, GAINESVILLE JOB NO.: 2015.1061.01 DATE: 2/2/2016

ELEV.	DESCRIPTION	DEPTH in FEET	PENETROMETER TESTS NO.	BLOWS PER 2"	BLOWS PER 1.75"	NOTES
	9.5" Asphalt + 2.5" GAB	0				Station 3 + 56
	Sand-some clay and silt, trace gravel; brown (Fill)		1	16	15	
		1	2	15	12	
	AUGER REFUSAL AT 2 FEET.	2				No groundwater encountered at the time of drilling.
		3				
		4				
		5				
		6				
		7				
		8				

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Sheet 1 of 1

LOG OF BORING

HAND AUGER

CONTRACTED WITH: SOUTHEASTERN ENGINEERING, INC. BORING NO.: C-2

PROJECT NAME: GREEN STREEET, GAINESVILLE JOB NO.: 2015.1061.01 DATE: 2/2/2016

ELEV.	DESCRIPTION	DEPTH in FEET	PENETROMETER TESTS			NOTES
			NO.	BLOWS PER		
				2"	1.75"	
	7.25" Asphalt + 2.25" Concrete	0				Station 8 + 47
	Sand-some clay and silt, trace gravel; brown (Fill)		1	16	13	
		1	2	30+		
	AUGER REFUSAL AT 1.5 FEET.					No groundwater encountered at the time of drilling.
		2				
		3				
		4				
		5				
		6				
		7				
		8				

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Sheet 1 of 1

LOG OF BORING

HAND AUGER

CONTRACTED WITH: SOUTHEASTERN ENGINEERING, INC. BORING NO.: C-3

PROJECT NAME: GREEN STREEET, GAINESVILLE JOB NO.: 2015.1061.01 DATE: 2/2/2016

ELEV.	DESCRIPTION	DEPTH in FEET	PENETROMETER TESTS			NOTES
			NO.	BLOWS PER		
				2"	1.75"	
	7" Asphalt + 3.75" Concrete	0				Station 15 + 04
	Sand-some clay and silt, trace gravel; brown (Fill)		1	16	18	
		1	2	25+		
	AUGER REFUSAL AT 1.5 FEET.					No groundwater encountered at the time of drilling.
		2				
		3				
		4				
		5				
		6				
		7				
		8				

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Sheet 1 of 1

LOG OF BORING

HAND AUGER

CONTRACTED WITH: SOUTHEASTERN ENGINEERING, INC.
BORING NO.: C-4
PROJECT NAME: GREEN STREEET, GAINESVILLE
JOB NO.: 2015.1061.01
DATE: 2/2/2016

ELEV.	DESCRIPTION	DEPTH in FEET	PENETROMETER TESTS			NOTES
			NO.	BLOWS PER 2"	1.75"	
	8.25" Asphalt + 2.75" Concrete	0				Station 20 + 91
	Sand-some clay and silt, trace gravel; brown (Fill)		1	13	16	
		1	2	30+		
	AUGER REFUSAL AT 2 FEET.	2				No groundwater encountered at the time of drilling.
		3				
		4				
		5				
		6				
		7				
		8				

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Sheet 1 of 1

LOG OF BORING

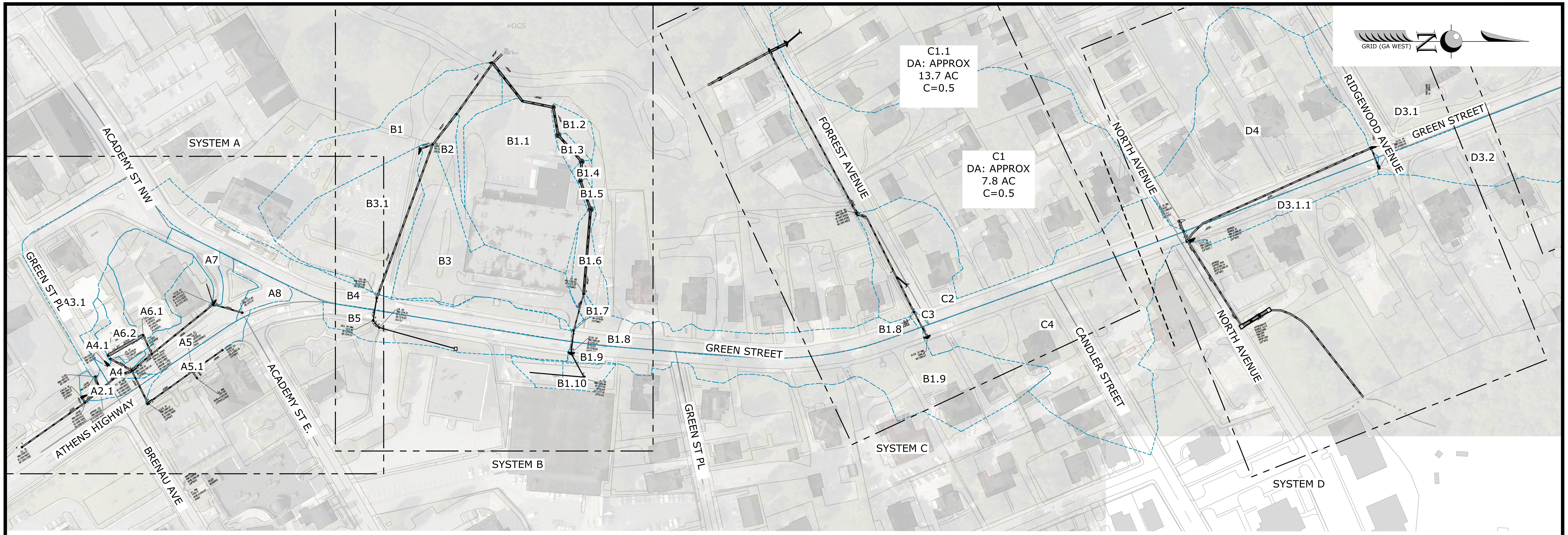
HAND AUGER

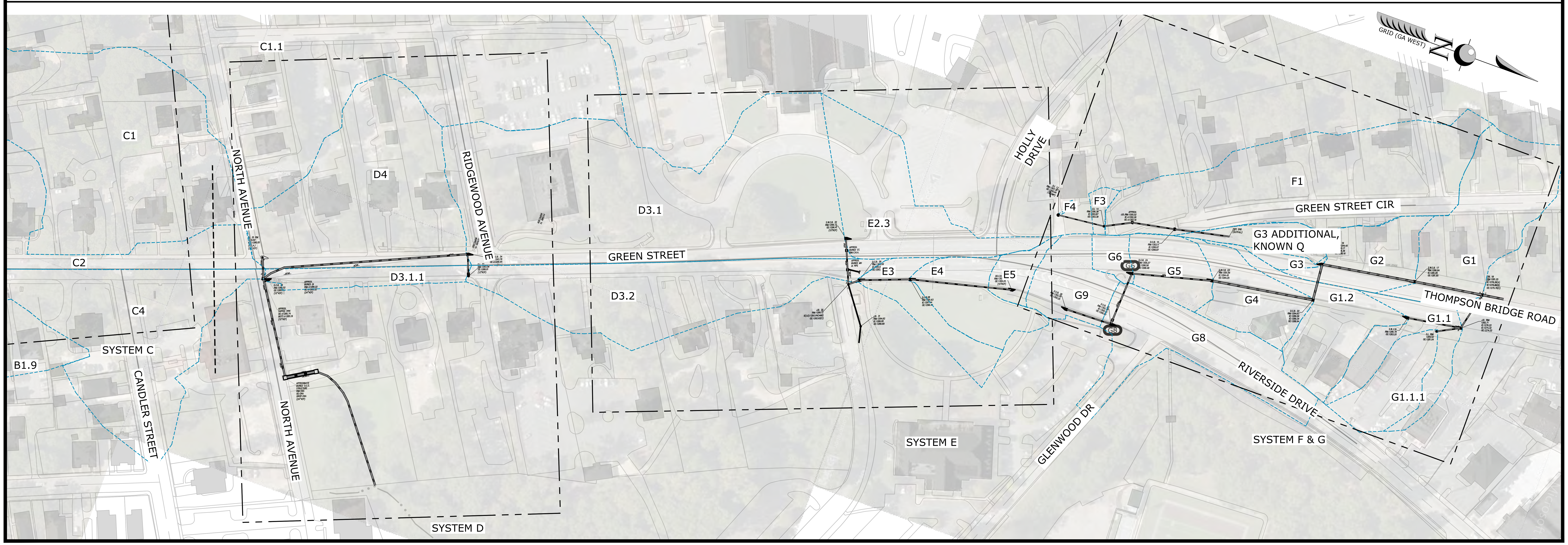
CONTRACTED WITH: SOUTHEASTERN ENGINEERING, INC. BORING NO.: C-5

PROJECT NAME: GREEN STREEET, GAINESVILLE JOB NO.: 2015.1061.01 DATE: 2/2/2016

ELEV.	DESCRIPTION	DEPTH in FEET	PENETROMETER TESTS			NOTES
			NO.	BLOWS PER 2"	1.75"	
	8" Asphalt + 4" Concrete	0				Station 26 + 11
	Sand-some clay and silt; brown (Fill)		1	5	6	
		1	2	10	11	
	Sand-some clay and silt, orange and brown (Residual)	2	3	14	14	
		3	4	17	16	
		4	5	15	18	
	BORING TERMINATED AT 5 FEET.	5	6	17	15	No groundwater encountered at the time of drilling.
		6				
		7				
		8				

Appendix C





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FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\939-15-192.04_C-STRM.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO

939-15-192

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tel: 770-321-3936 fax: 770-321-3935
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PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

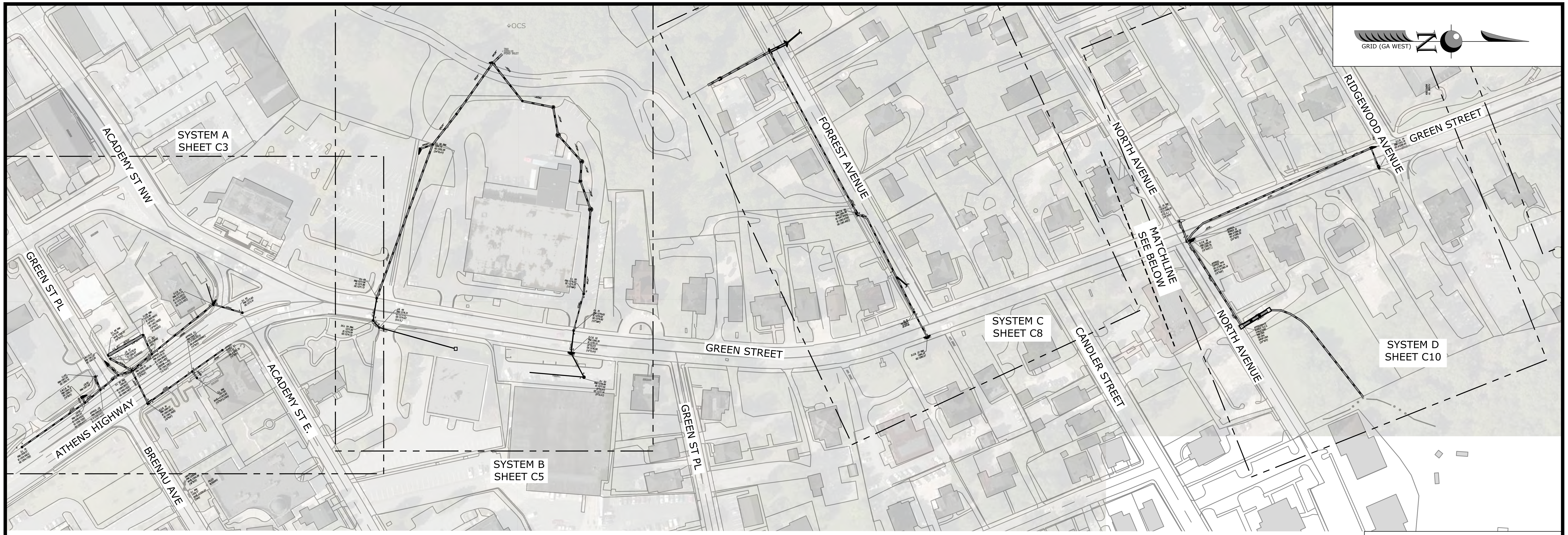
OVERALL DRAINAGE BASINS

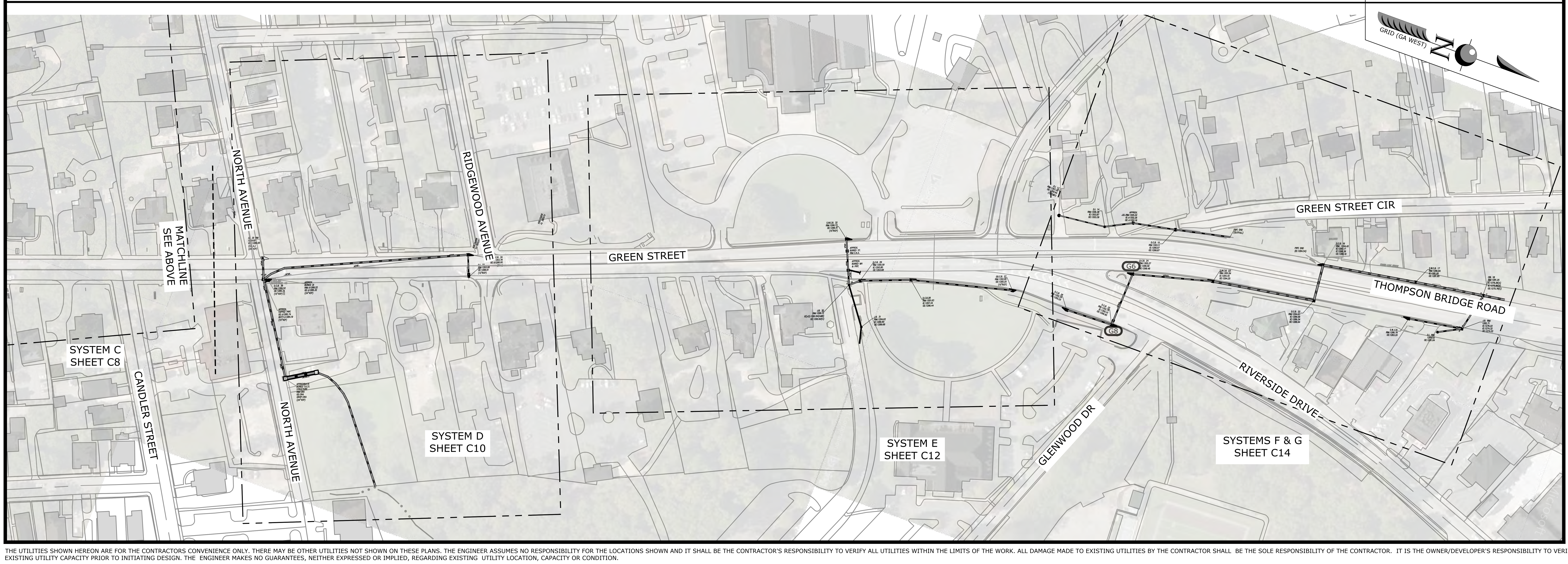
GREEN STREET DRAINAGE ASSESSMENT

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

C1





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PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

OVERALL DRAINAGE PLAN

GREEN STREET DRAINAGE ASSESSMENT

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

C2

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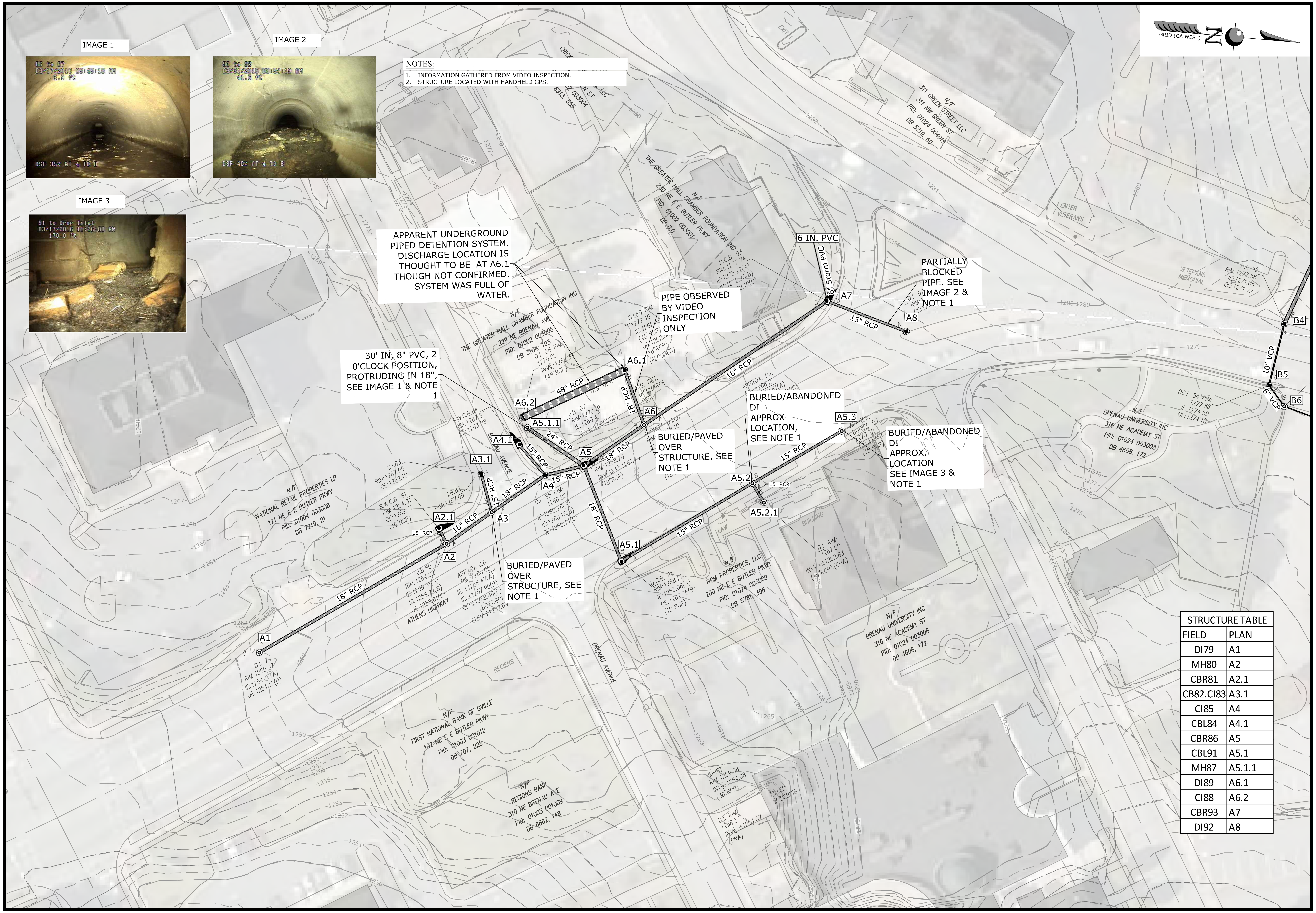
Know what's below.
Call before you dig.



NOTES:
1. INFORMATION GATHERED FROM VIDEO INSPECTION.
2. STRUCTURE LOCATED WITH HANDHELD GPS.

STRUCTURE TABLE

FIELD	PLAN
DI79	A1
MH80	A2
CBR81	A2.1
CB82.CI83	A3.1
CI85	A4
CBL84	A4.1
CBR86	A5
CBL91	A5.1
MH87	A5.1.1
DI89	A6.1
CI88	A6.2
CBR93	A7
DI92	A8

FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\939-15-192.04_C-STRM.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO

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PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

PLAN VIEW DRAINAGE SYSTEM A

GREEN STREET DRAINAGE ASSESSMENT

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

C3

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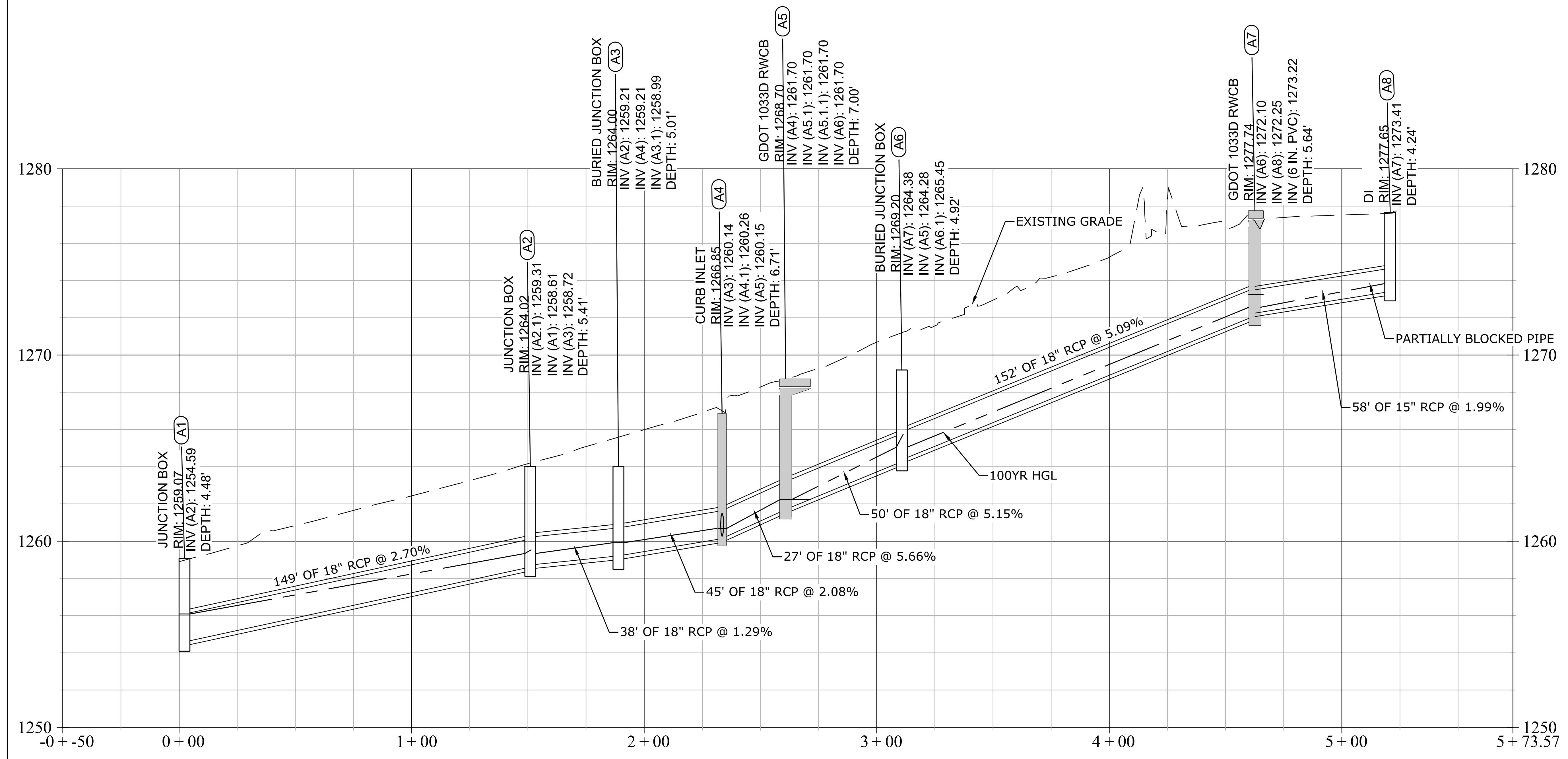
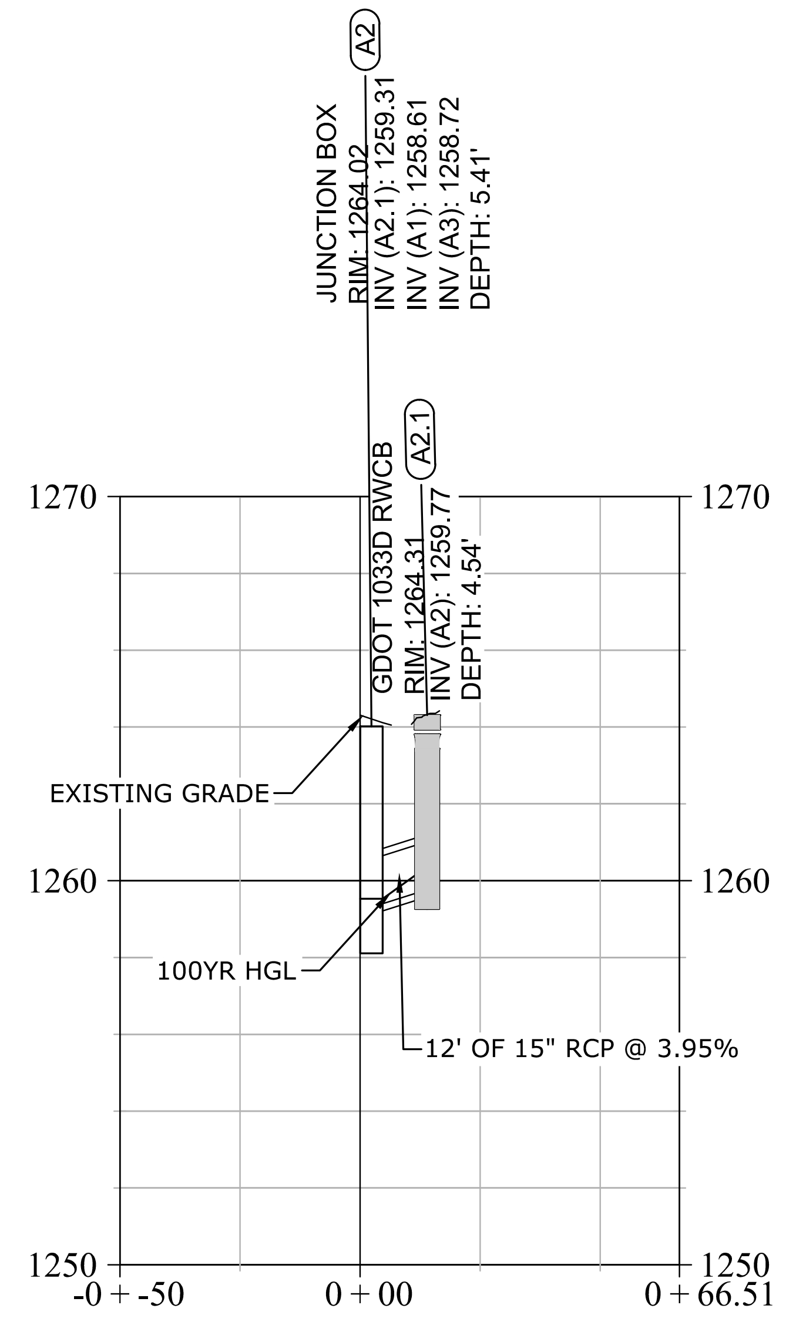
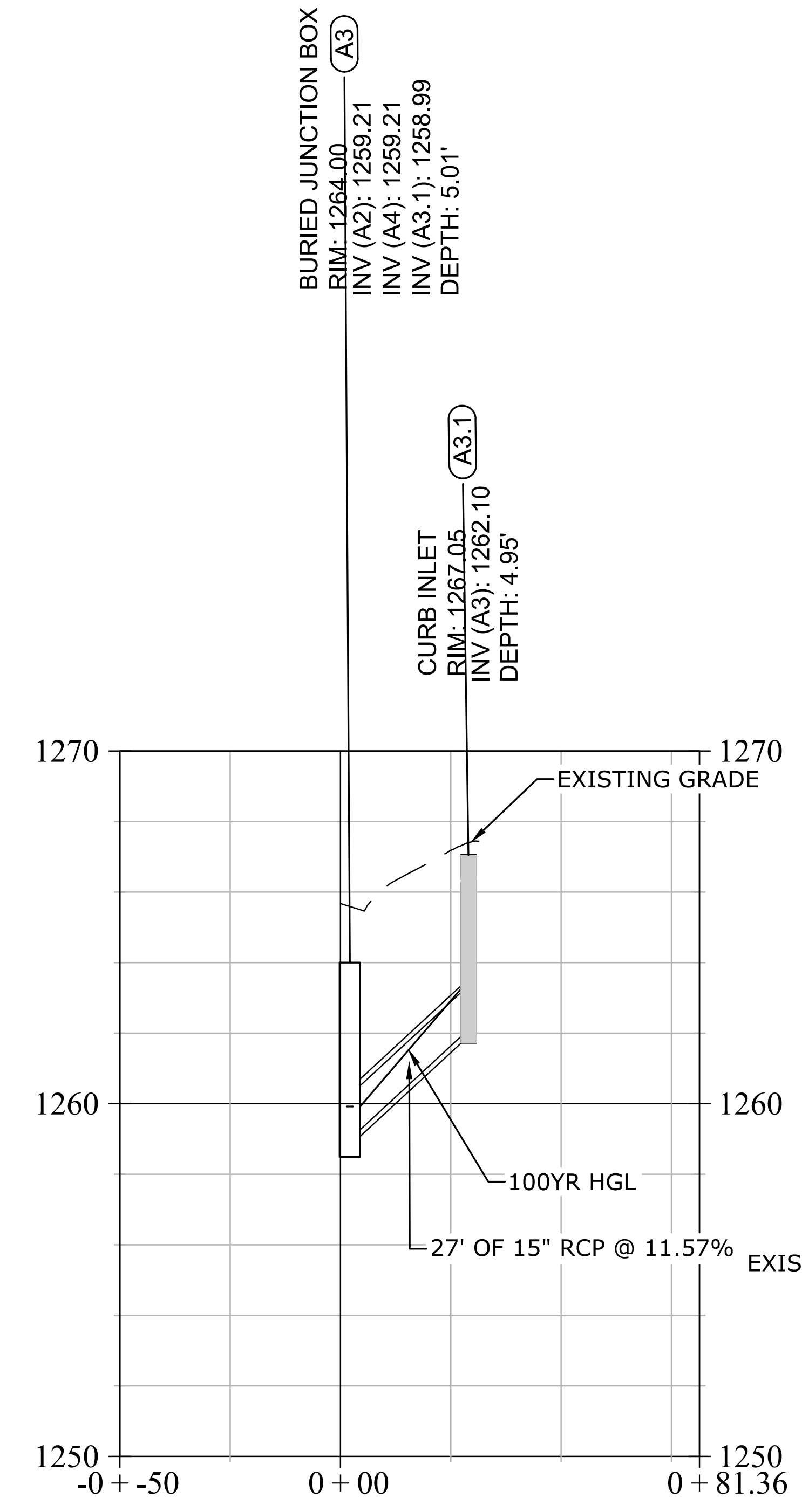


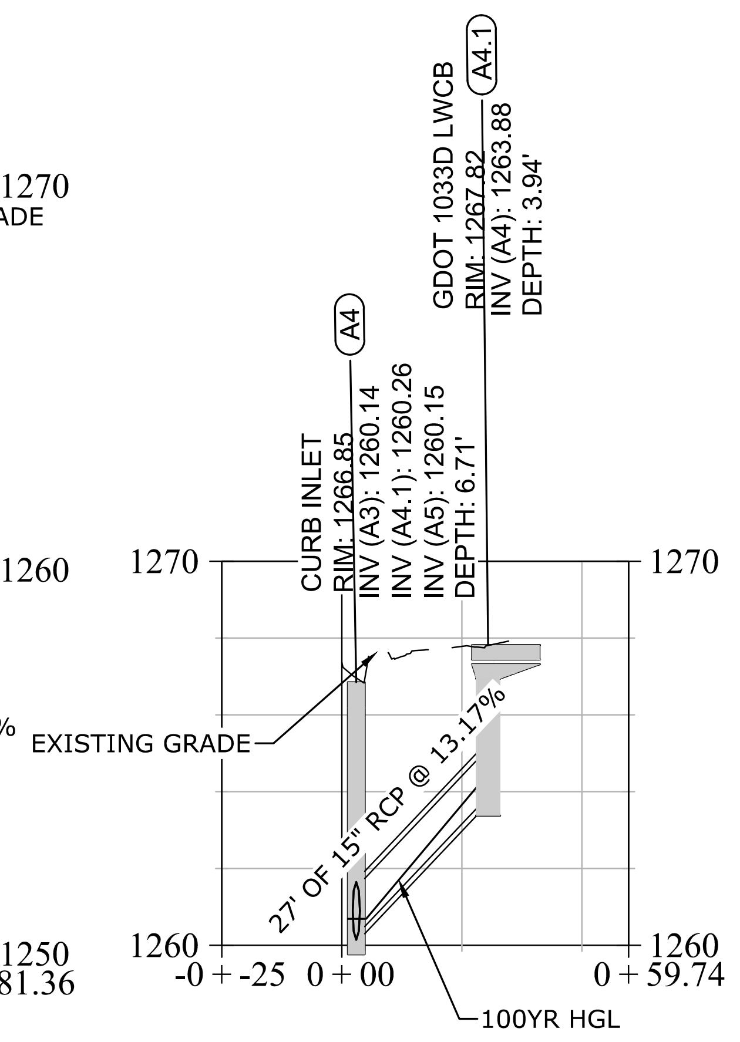
① STORM SEWER A1-A8 - PROFILE



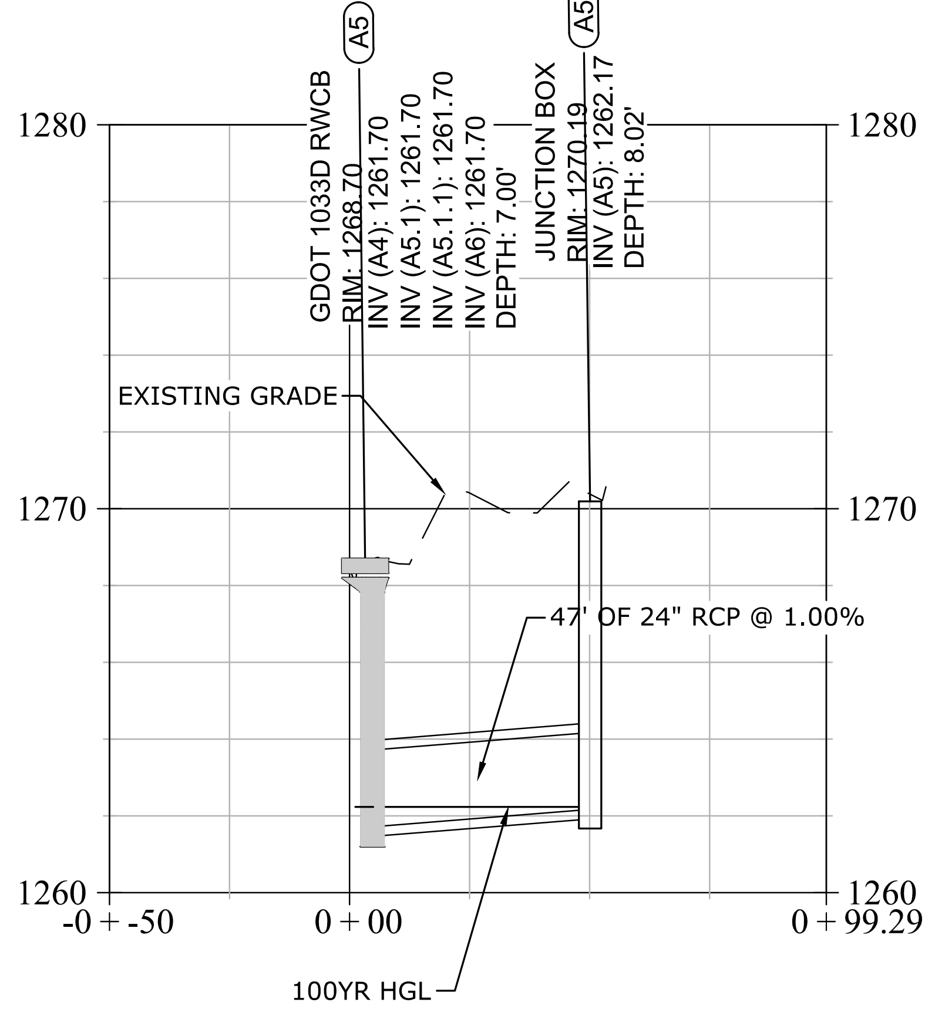
STORM SEWER
② A2-A2.1 - PROFILE



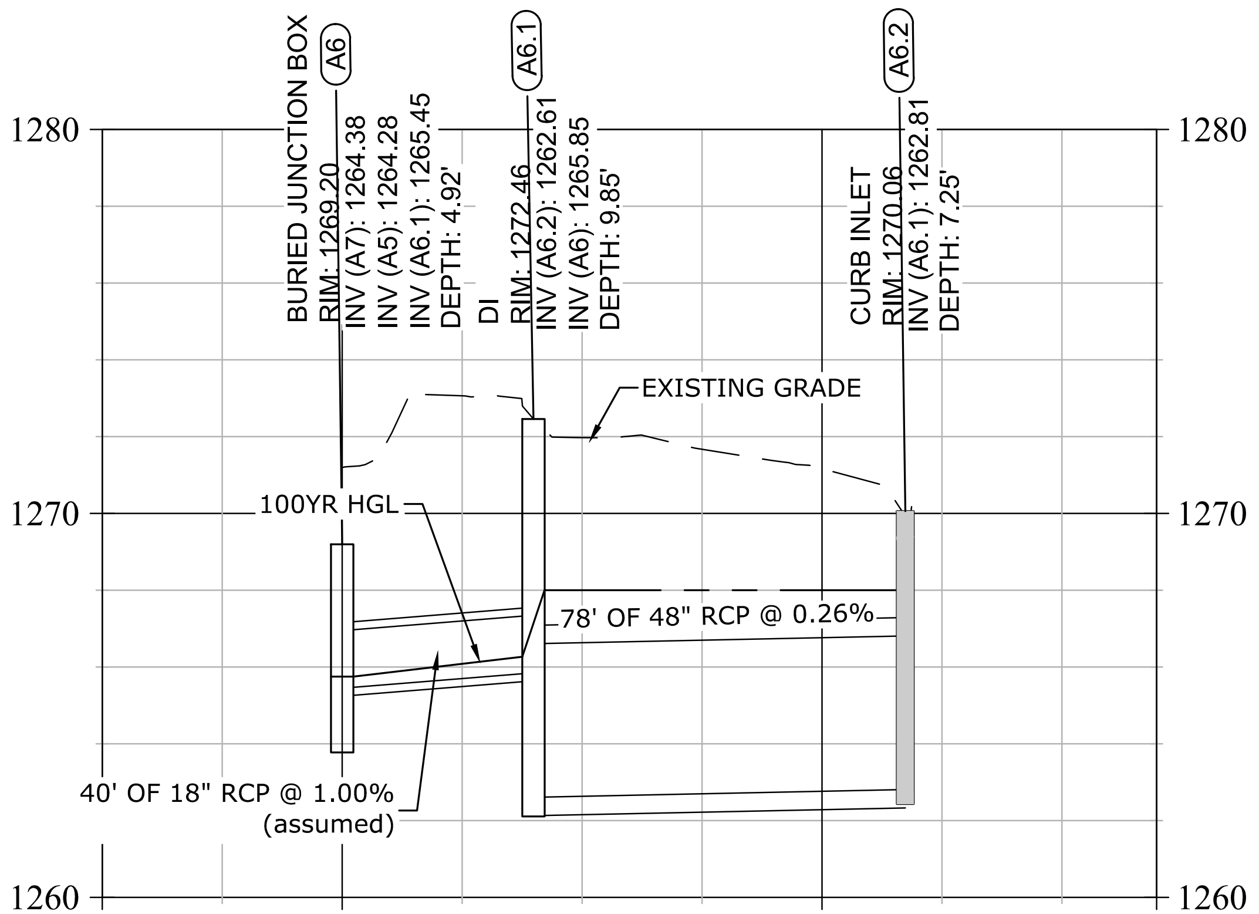
STORM SEWER
③ A3-A3.1 - PROFILE



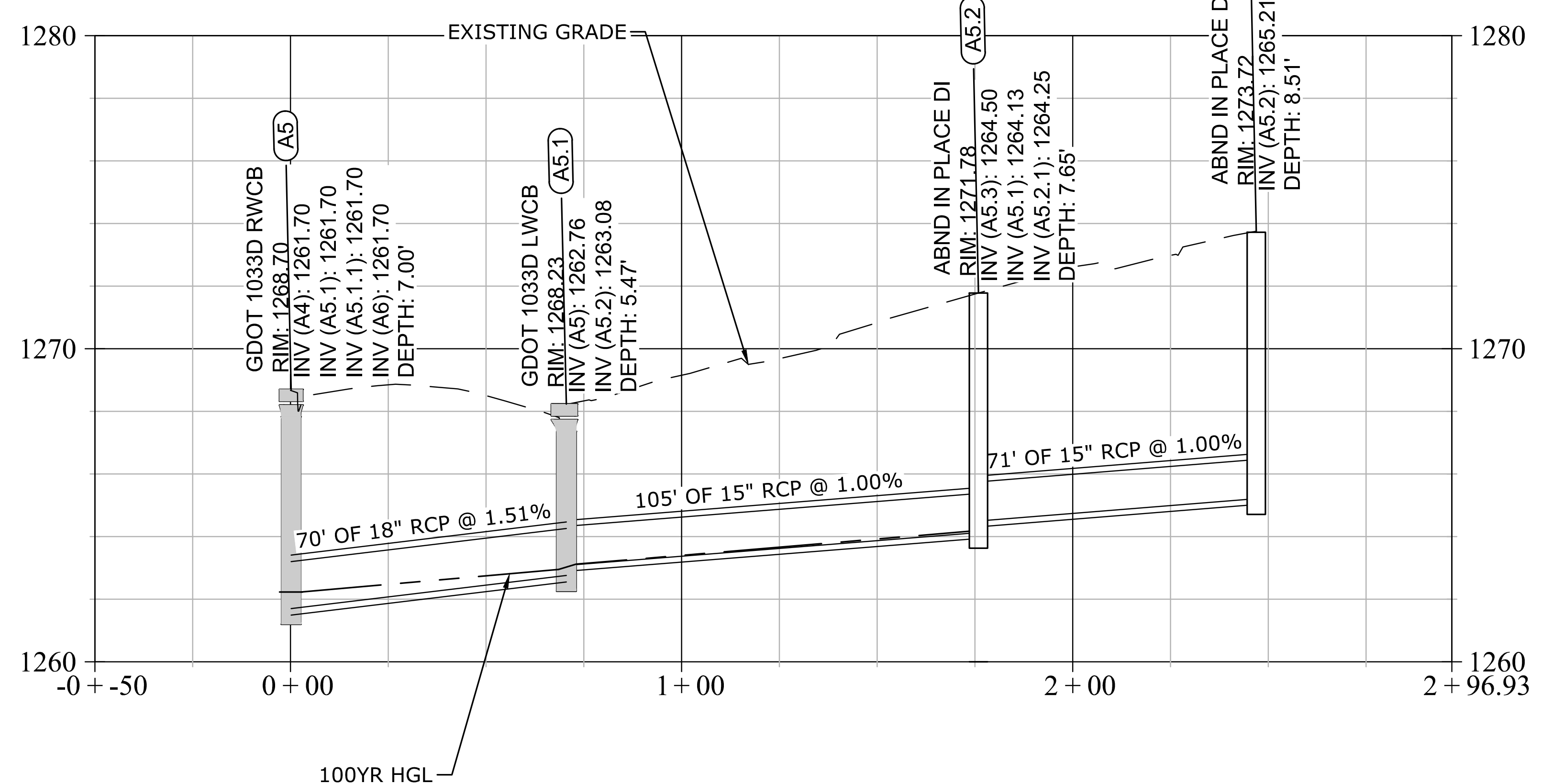
STORM SEWER
④ A4-A4.1 - PROFILE



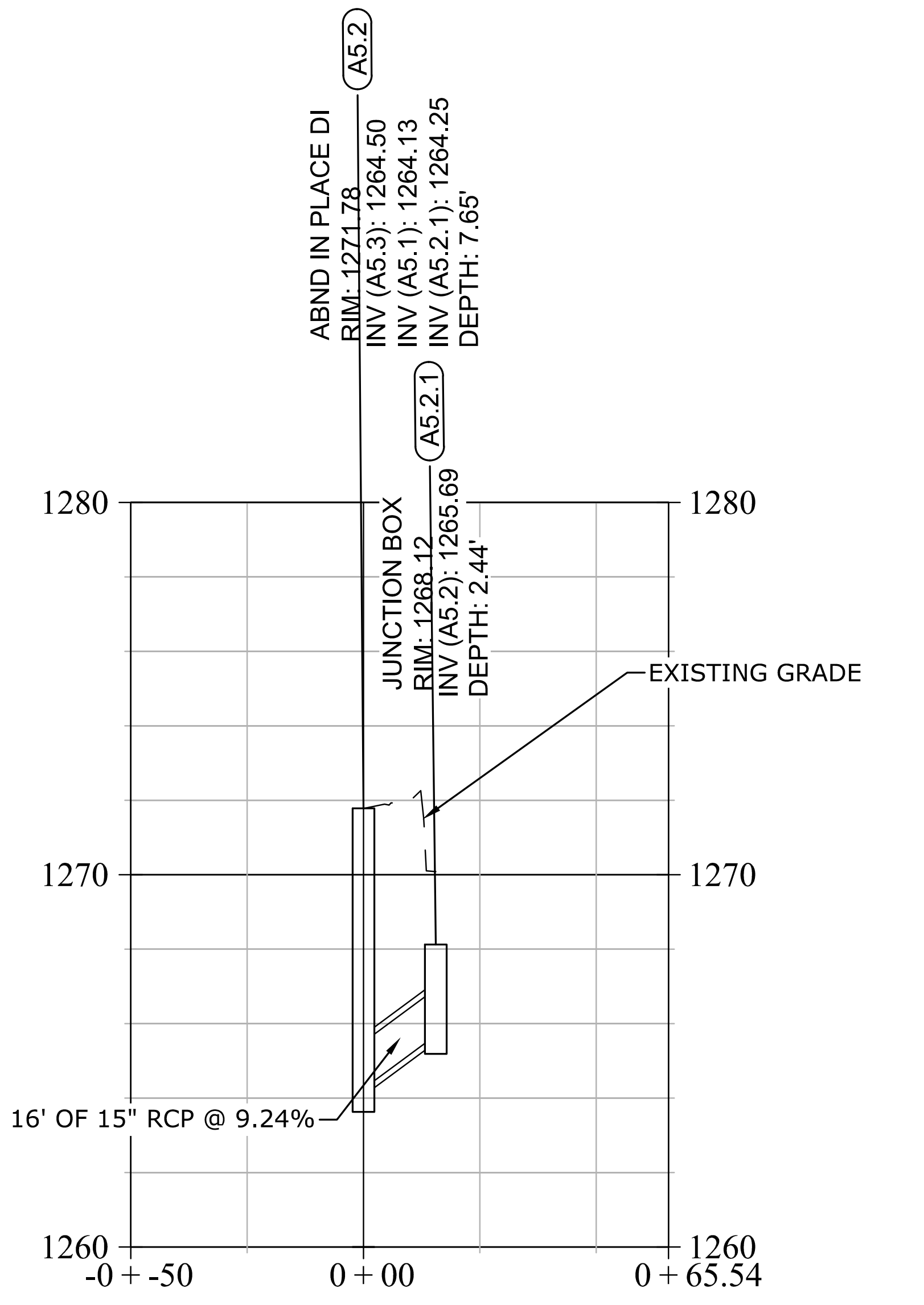
⑤ STORM SEWER A5-A5.1.1 - PROFILE



⑥ STORM SEWER A6-A6.2 - PROFILE



⑦ STORM SEWER A5-A5.3 - PROFILE



⑧ STORM SEWER A5.2-A5.2.1 - PROFILE

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FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\Linework\939-15-192_V-BASE_UTIL.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO

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PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

DRAINAGE SYSTEM A PROFILE

GREEN STREET DRAINAGE ASSESSMENT

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

C4

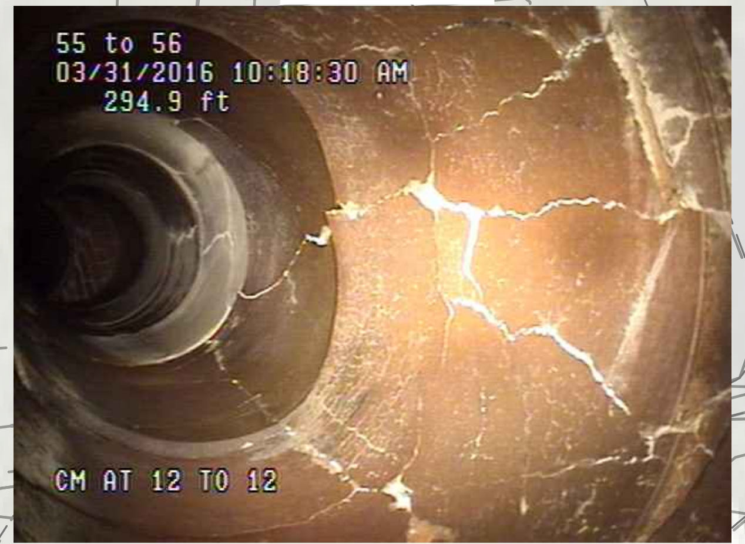
811
Know what's below.

IMAGE 1

IMAGE 2

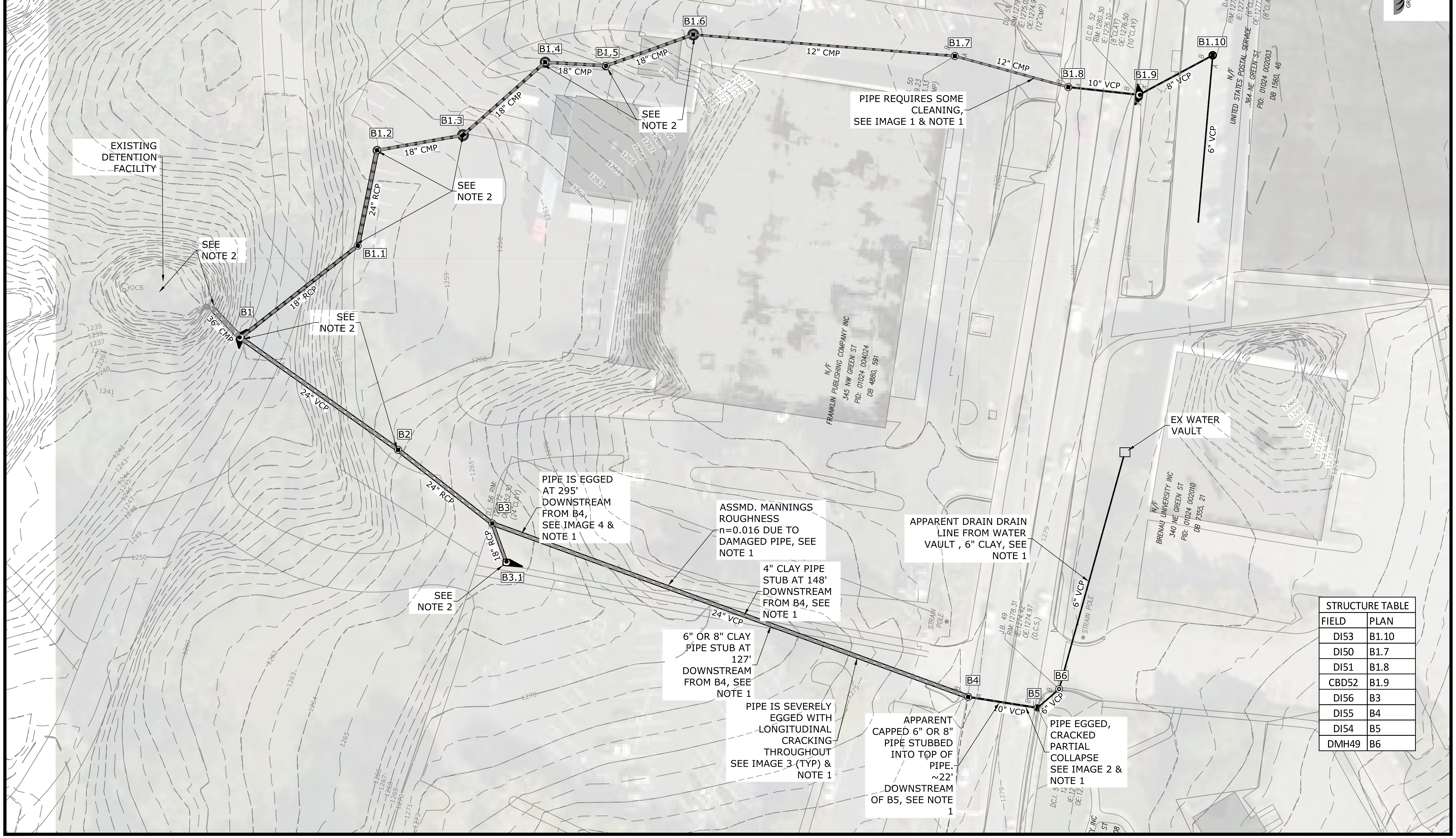
IMAGE 3

IMAGE 4



NOTES:

1. INFORMATION GATHERED FROM VIDEO INSPECTION.
2. STRUCTURE LOCATED WITH HANDHELD GPS.



STRUCTURE TABLE	
FIELD	PLAN
DI53	B1.10
DI50	B1.7
DI51	B1.8
CBD52	B1.9
DI56	B3
DI55	B4
DI54	B5
DMH49	B6

FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\939-15-192.04_C-STRM.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO

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PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

PLAN VIEW DRAINAGE SYSTEM B

GREEN STREET DRAINAGE ASSESSMENT

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

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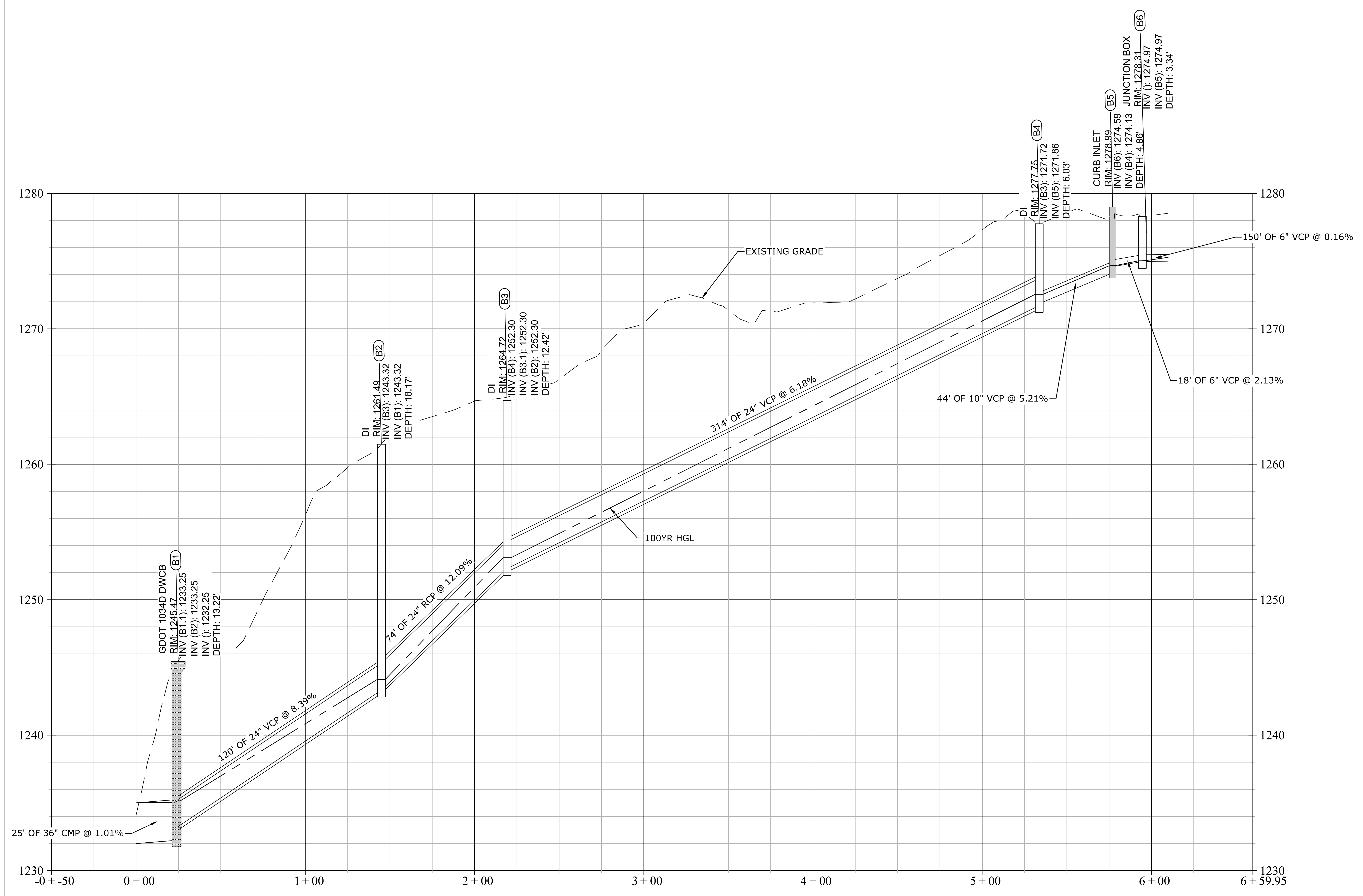
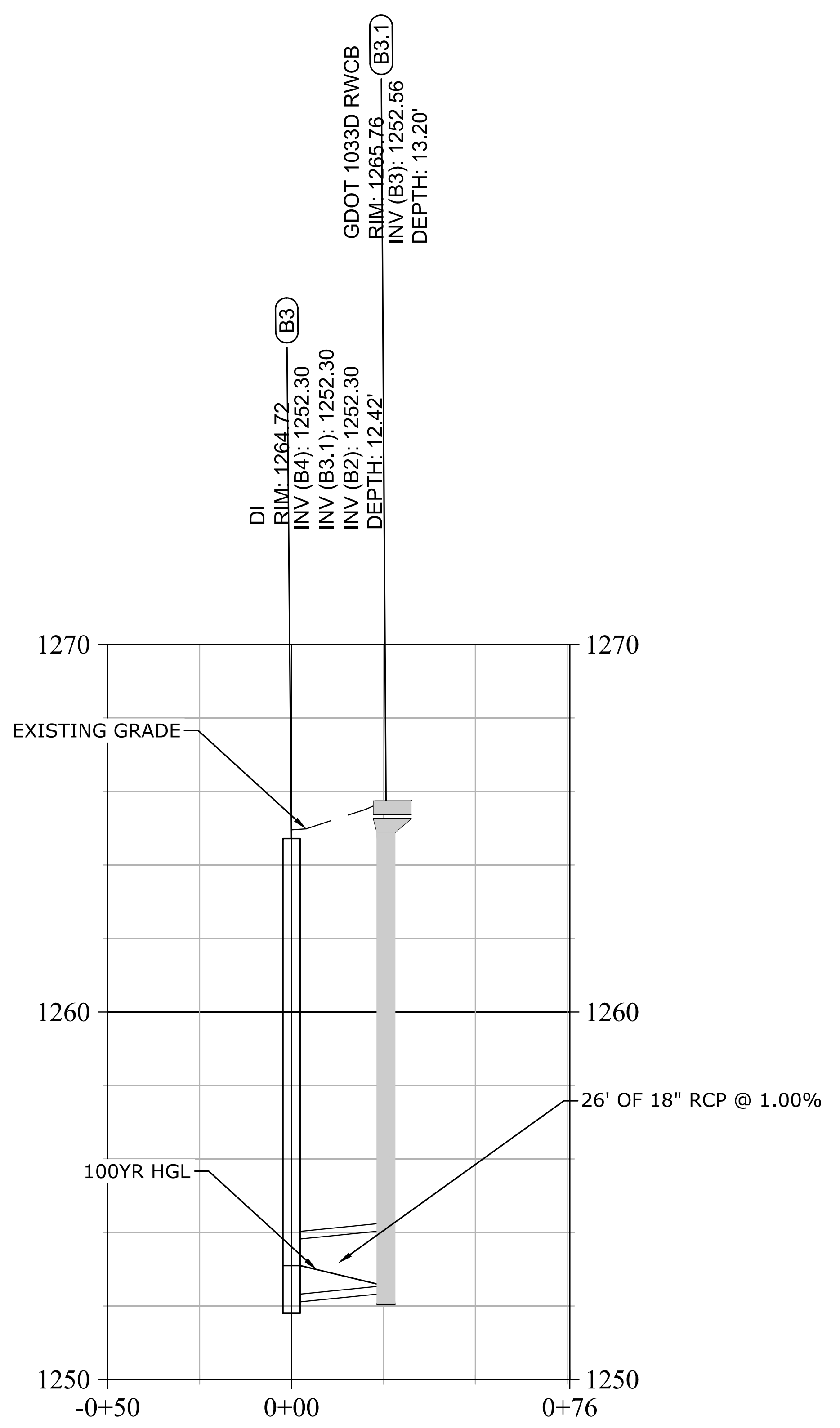


⑨ STORM SEWER OUTFALL-A6 - PROFILE



⑩ STORM SEWER
B3-B3.1 - PROFILE

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PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

DRAINAGE SYSTEM B PROFILE
GREEN STREET DRAINAGE ASSESSMENT
PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016
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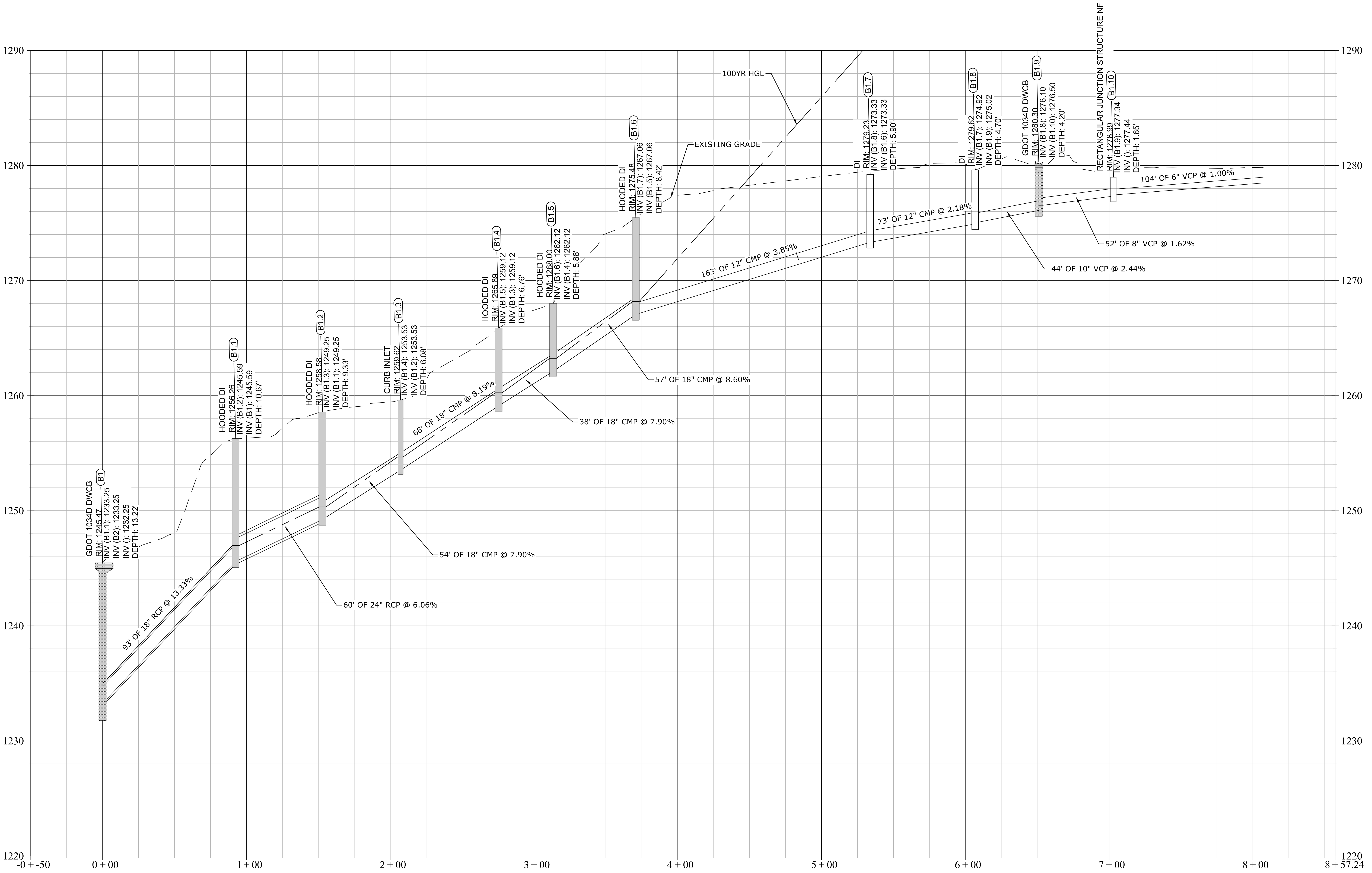
811
Know what's below.

FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\Linework\939-15-192_V-BASE_UTIL.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO

THE UTILITIES SHOWN HEREON ARE FOR THE CONTRACTORS CONVENIENCE ONLY. THERE MAY BE OTHER UTILITIES NOT SHOWN ON THESE PLANS. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE LOCATIONS SHOWN AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL UTILITIES WITHIN THE LIMITS OF THE WORK. ALL DAMAGE MADE TO EXISTING UTILITIES BY THE CONTRACTOR SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. IT IS THE OWNER/DEVELOPER'S RESPONSIBILITY TO VERIFY EXISTING UTILITY CAPACITY PRIOR TO INITIATING DESIGN. THE ENGINEER MAKES NO GUARANTEES, NEITHER EXPRESSED OR IMPLIED, REGARDING EXISTING UTILITY LOCATION, CAPACITY OR CONDITION.



⑪ STORM SEWER B1-B1.10 - PROFILE

FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\Linework\939-15-192_V-BASE_UTIL.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO

SEI
SOUTHEASTERN ENGINEERING, INC.
2470 Sandy Plains Road Marietta, Georgia 30066
tel: 770-321-3936 fax: 770-321-3935
www.seengineering.com

939-15-192

No	ISSUED DESCRIPTION	DATE
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PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

DRAINAGE SYSTEM B PROFILE

GREEN STREET DRAINAGE ASSESSMENT

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

C7

811.
Know what's below.

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IMAGE 1

IMAGE 2

IMAGE 3

IMAGE 4

IMAGE 5

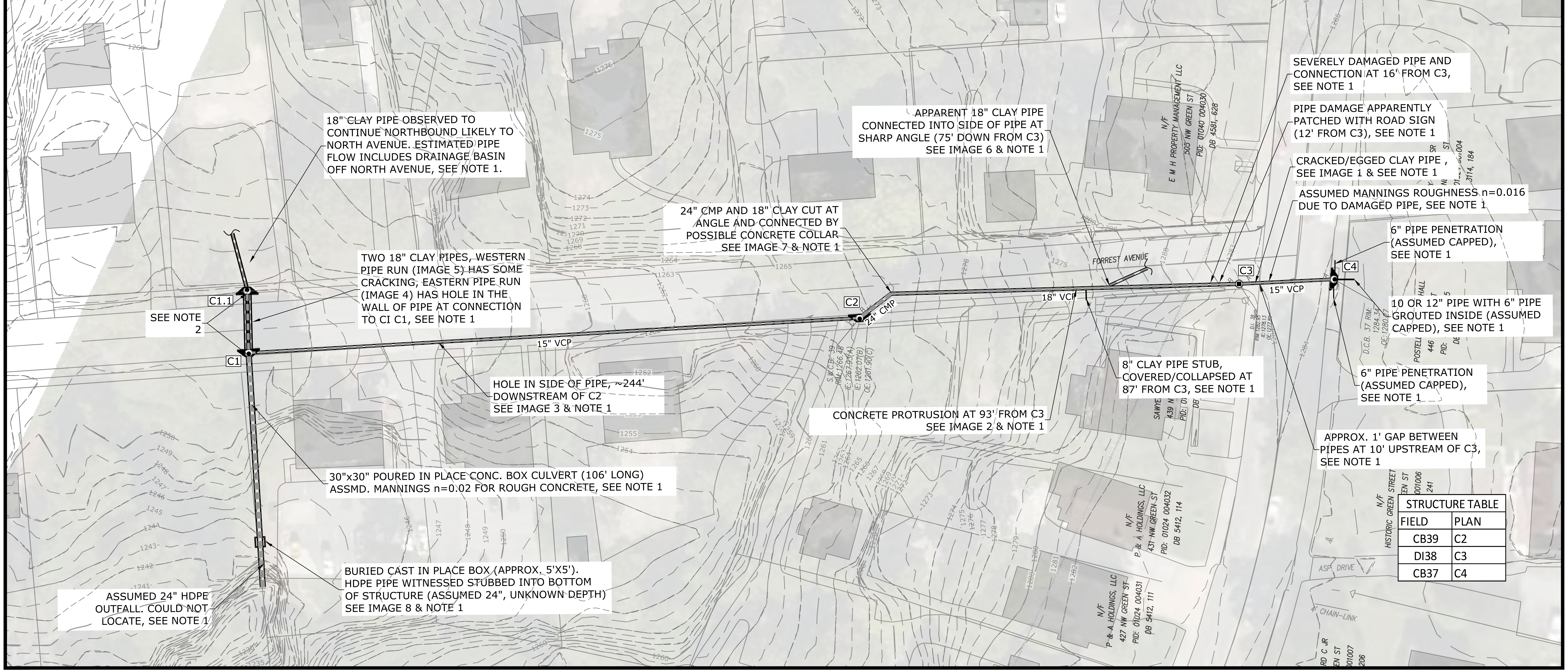
IMAGE 6

IMAGE 7

IMAGE 8

NOTES:

1. INFORMATION GATHERED FROM VIDEO INSPECTION.
2. STRUCTURE LOCATED WITH HANDHELD GPS.



18" CLAY PIPE OBSERVED TO CONTINUE NORTHBOUND LIKELY TO NORTH AVENUE. ESTIMATED PIPE FLOW INCLUDES DRAINAGE BASIN OFF NORTH AVENUE, SEE NOTE 1.

TWO 18" CLAY PIPES, WESTERN PIPE RUN (IMAGE 5) HAS SOME CRACKING, EASTERN PIPE RUN (IMAGE 4) HAS HOLE IN THE WALL OF PIPE AT CONNECTION TO CI C1, SEE NOTE 1

SEE NOTE 2

24" CMP AND 18" CLAY CUT AT ANGLE AND CONNECTED BY POSSIBLE CONCRETE COLLAR SEE IMAGE 7 & NOTE 1

APPARENT 18" CLAY PIPE CONNECTED INTO SIDE OF PIPE AT SHARP ANGLE (75' DOWN FROM C3) SEE IMAGE 6 & NOTE 1

SEVERELY DAMAGED PIPE AND CONNECTION AT 16' FROM C3, SEE NOTE 1

PIPE DAMAGE APPARENTLY PATCHED WITH ROAD SIGN (12' FROM C3), SEE NOTE 1

CRACKED/EGGED CLAY PIPE , SEE IMAGE 1 & SEE NOTE 1

ASSUMED MANNINGS ROUGHNESS n=0.016 DUE TO DAMAGED PIPE, SEE NOTE 1

6" PIPE PENETRATION (ASSUMED CAPPED), SEE NOTE 1

10 OR 12" PIPE WITH 6" PIPE GROUTED INSIDE (ASSUMED CAPPED), SEE NOTE 1

6" PIPE PENETRATION (ASSUMED CAPPED), SEE NOTE 1

APPROX. 1' GAP BETWEEN PIPES AT 10' UPSTREAM OF C3, SEE NOTE 1

8" CLAY PIPE STUB, COVERED/COLLAPSED AT 87' FROM C3, SEE NOTE 1

CONCRETE PROTRUSION AT 93' FROM C3 SEE IMAGE 2 & NOTE 1

HOLE IN SIDE OF PIPE, ~244' DOWNSTREAM OF C2 SEE IMAGE 3 & NOTE 1

30"x30" POURED IN PLACE CONC. BOX CULVERT (106' LONG) ASSMD. MANNINGS n=0.02 FOR ROUGH CONCRETE, SEE NOTE 1

BURIED CAST IN PLACE BOX (APPROX. 5'X5'). HDPE PIPE WITNESSED STUBBED INTO BOTTOM OF STRUCTURE (ASSUMED 24", UNKNOWN DEPTH) SEE IMAGE 8 & NOTE 1

ASSUMED 24" HDPE OUTFALL. COULD NOT LOCATE, SEE NOTE 1

STRUCTURE TABLE

FIELD	PLAN
CB39	C2
DI38	C3
CB37	C4

FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\939-15-192.04_C-STRM.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO

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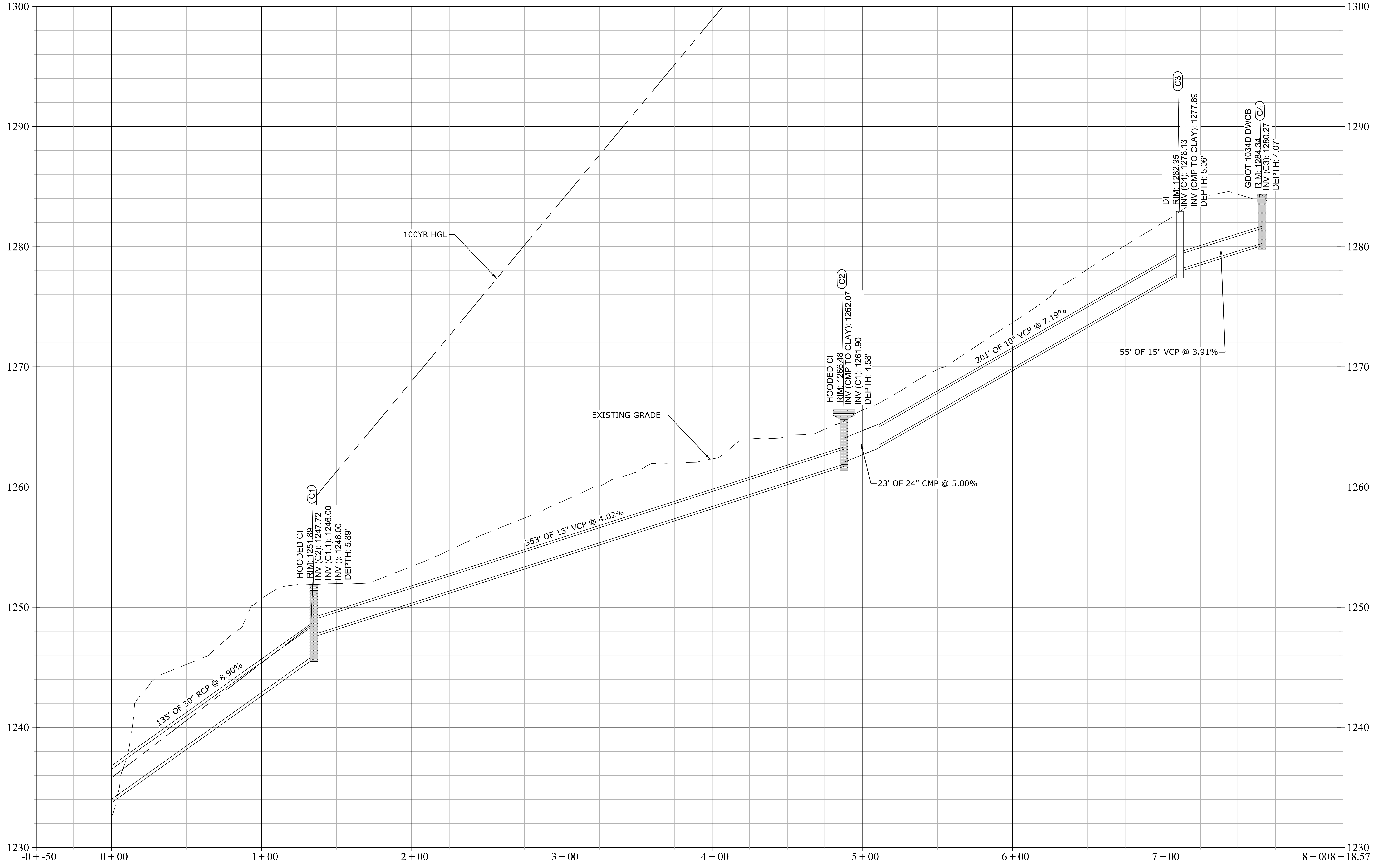
PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

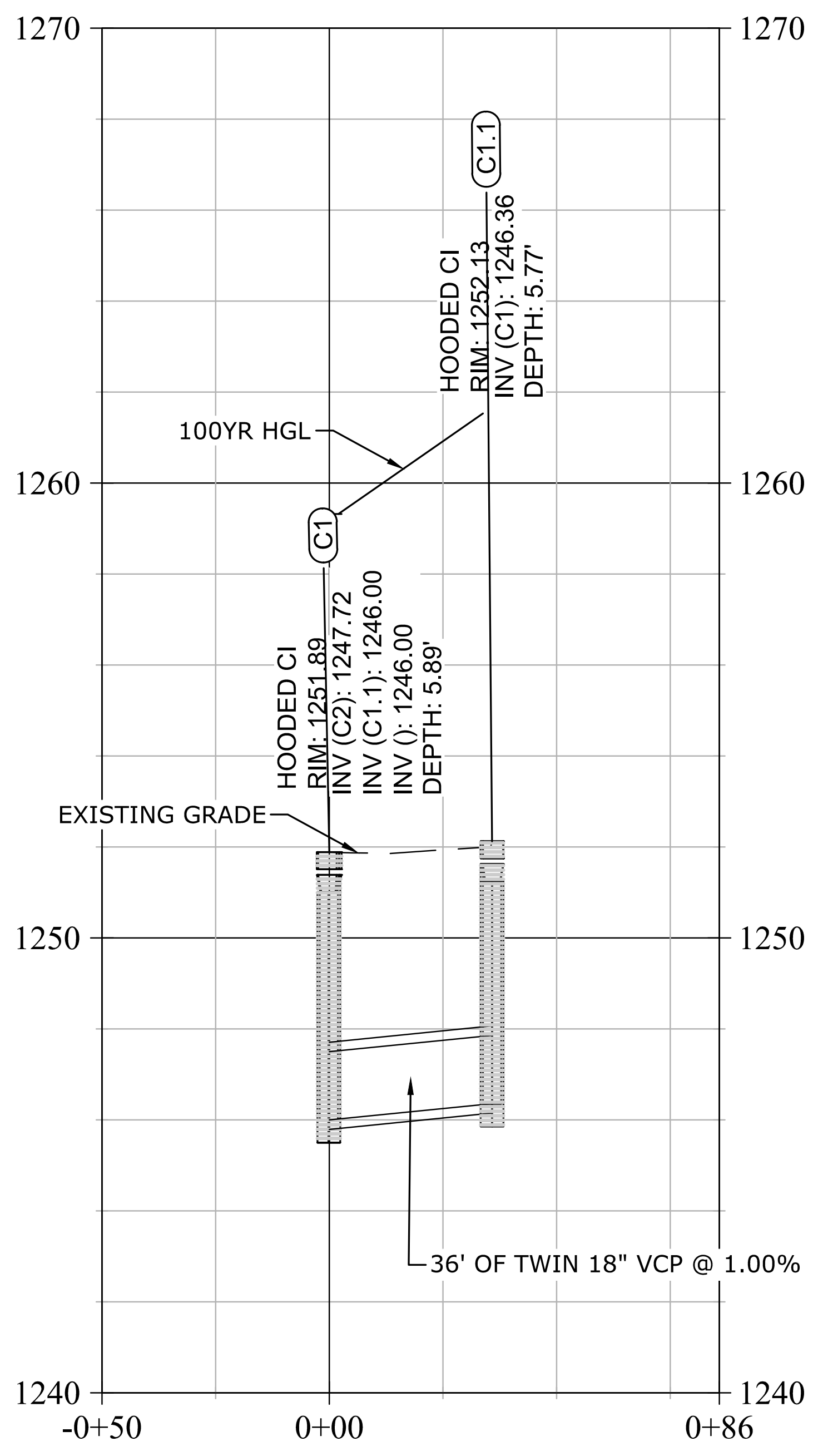
PLAN VIEW DRAINAGE
SYSTEM C
GREEN STREET DRAINAGE ASSESSMENT
PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

C8



⑫ STORM SEWER OUTFALL-C4 - PROFILE



⑬ STORM SEWER
C1-C1.1 - PROFILE

FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\Linework\939-15-192_V-BASE_UTIL.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO

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939-15-192

No	ISSUED DESCRIPTION	DATE
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9	-	-

PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

DRAINAGE SYSTEM C PROFILE

GREEN STREET DRAINAGE ASSESSMENT

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

C9

811 Know what's below.

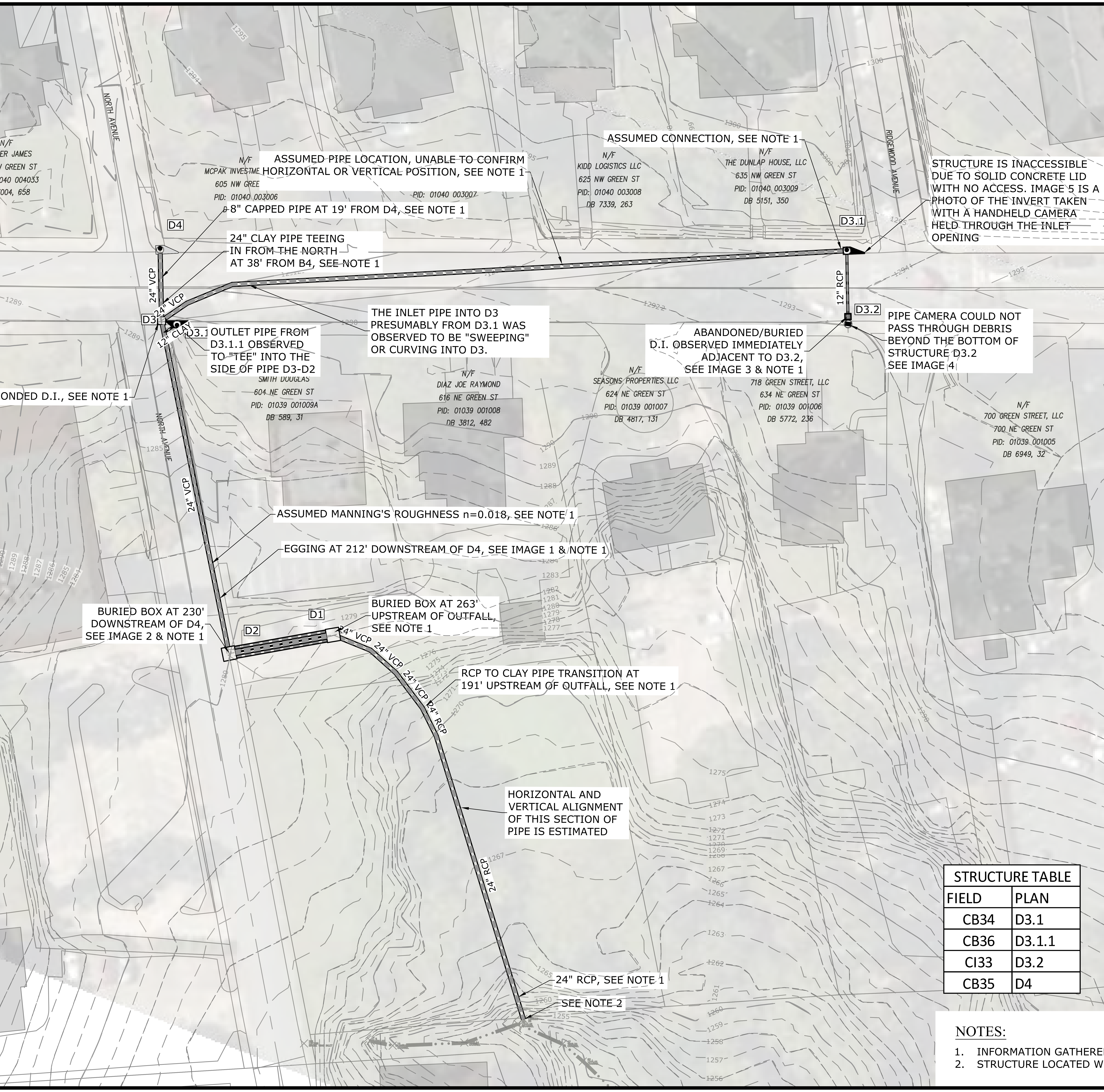

IMAGE 1

IMAGE 2

IMAGE 3

IMAGE 4

IMAGE 5

STRUCTURE TABLE	
FIELD	PLAN
CB34	D3.1
CB36	D3.1.1
CI33	D3.2
CB35	D4

NOTES:

1. INFORMATION GATHERED FROM VIDEO INSPECTION.
2. STRUCTURE LOCATED WITH HANDHELD GPS.

FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\939-15-192.04_C-STRM.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO

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PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

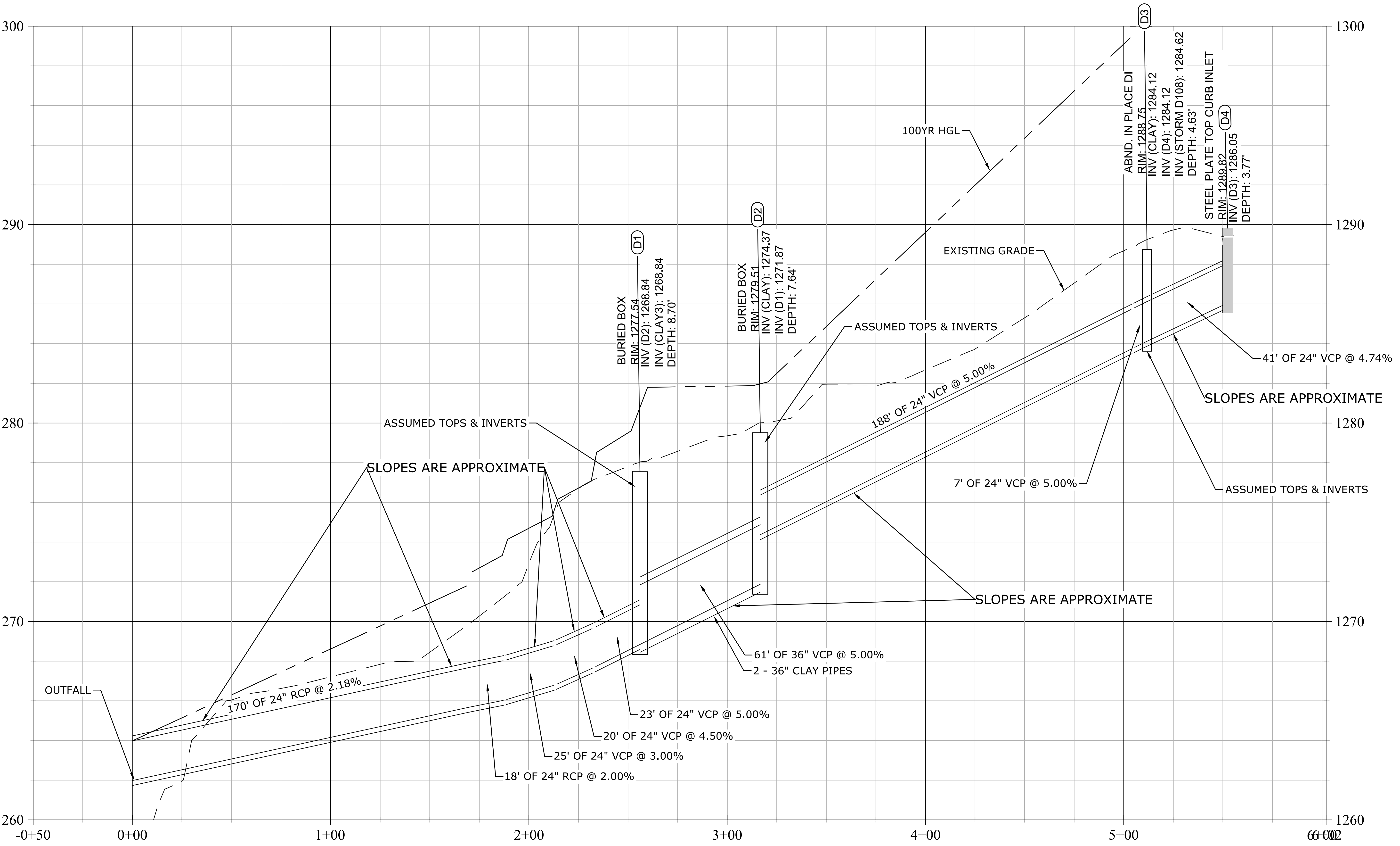
PLAN VIEW DRAINAGE SYSTEM D

GREEN STREET DRAINAGE ASSESSMENT

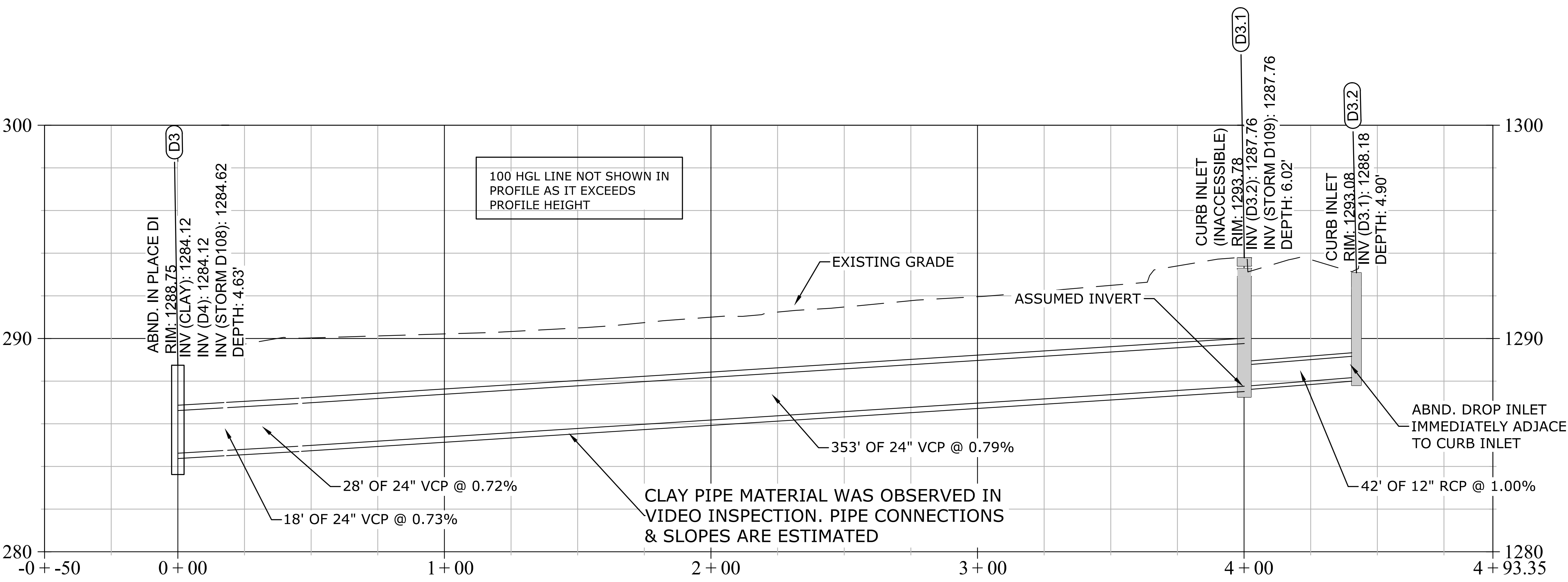
PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

C10



14 STORM SEWER OUTFALL-D4 - PROFILE



15 STORM SEWER D3-D3.2 - PROFILE

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9	-	-

PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

DRAINAGE SYSTEM D PROFILE

GREEN STREET DRAINAGE ASSESSMENT

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

C11

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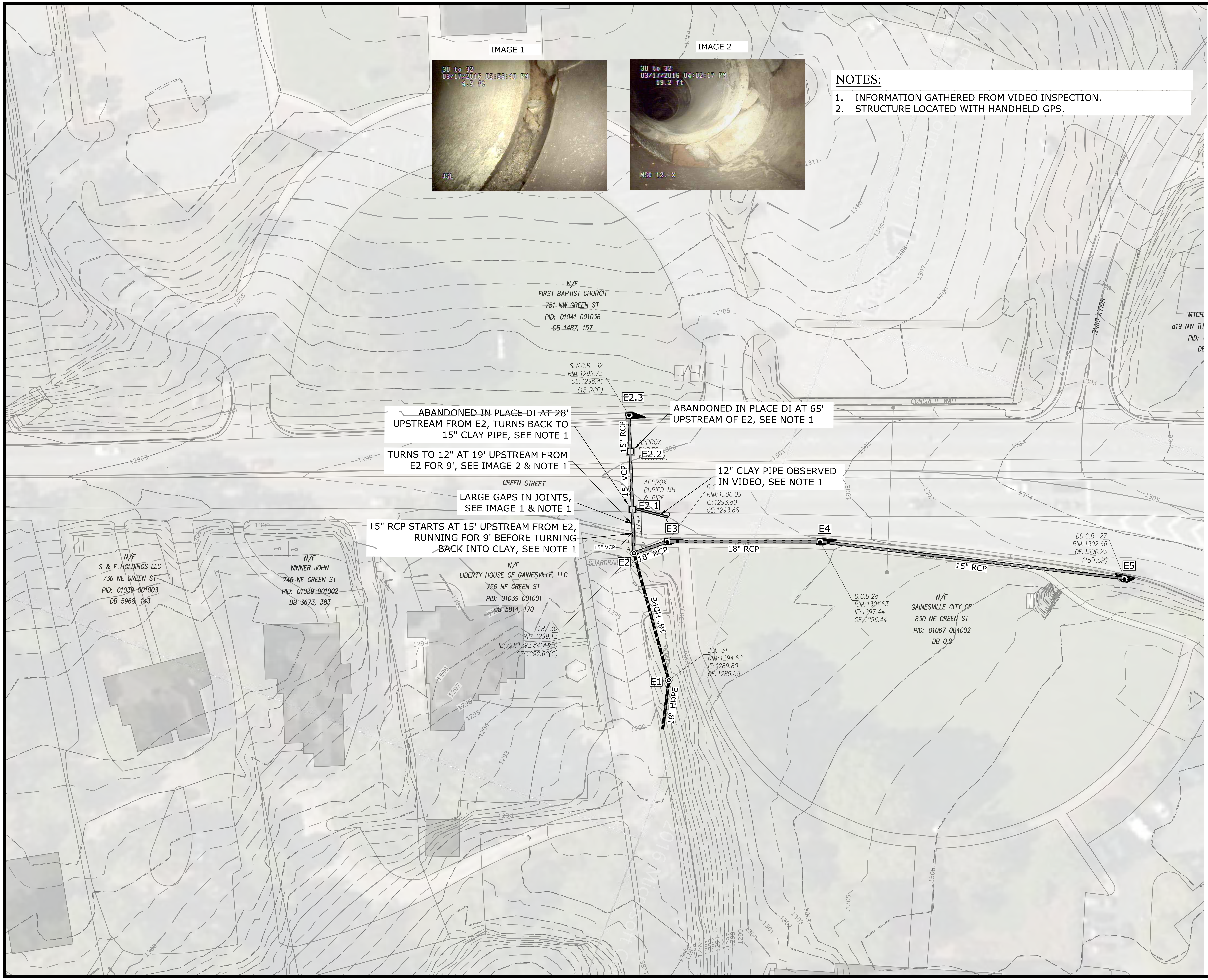

NOTES:

1. INFORMATION GATHERED FROM VIDEO INSPECTION.
2. STRUCTURE LOCATED WITH HANDHELD GPS.

STRUCTURE TABLE

FIELD	PLAN
DMH31	E1
DMH30	E2
CBR32	E2.3
CBL29	E3

FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\939-15-192.04_C-STRM.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO

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PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

PLAN VIEW DRAINAGE SYSTEM E

GREEN STREET DRAINAGE ASSESSMENT

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

C12

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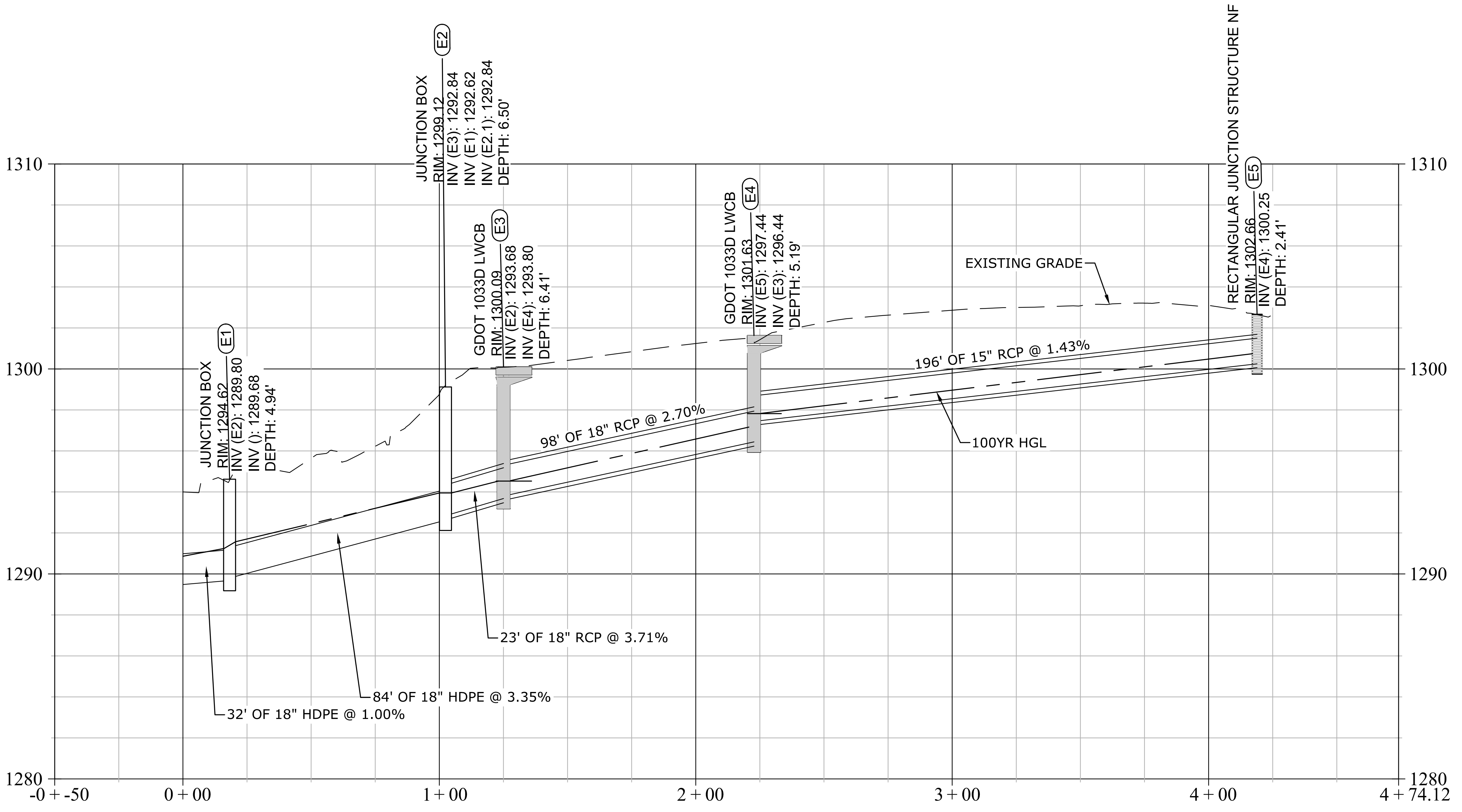
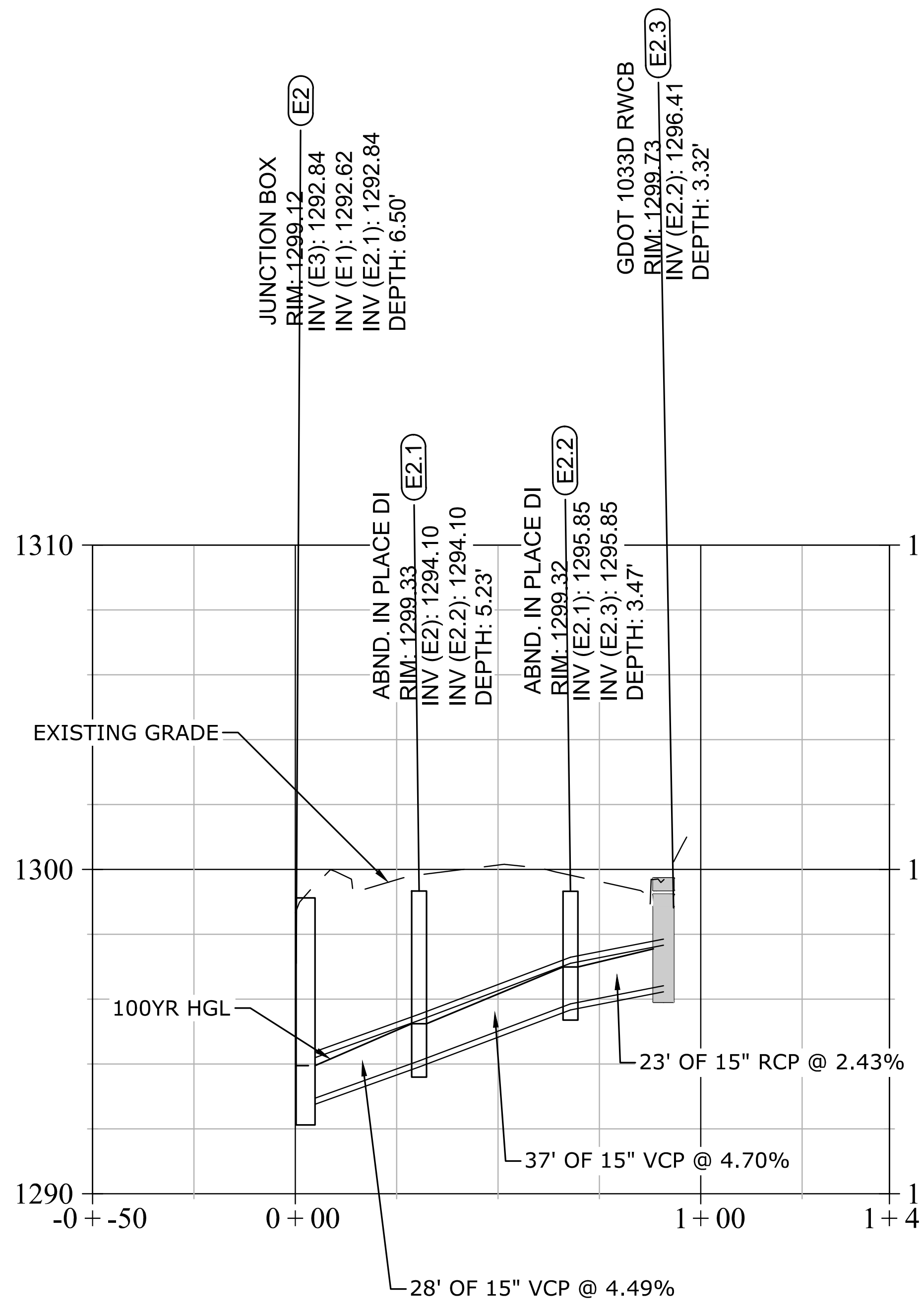
Know what's below.
Call before you dig.



⑯ STORM SEWER OUTFALL-E5 - PROFILE



⑰ STORM SEWER E2-E2.3 - PROFILE

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No	ISSUED DESCRIPTION	DATE
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PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

DRAINAGE SYSTEM E PROFILE

GREEN STREET DRAINAGE ASSESSMENT

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

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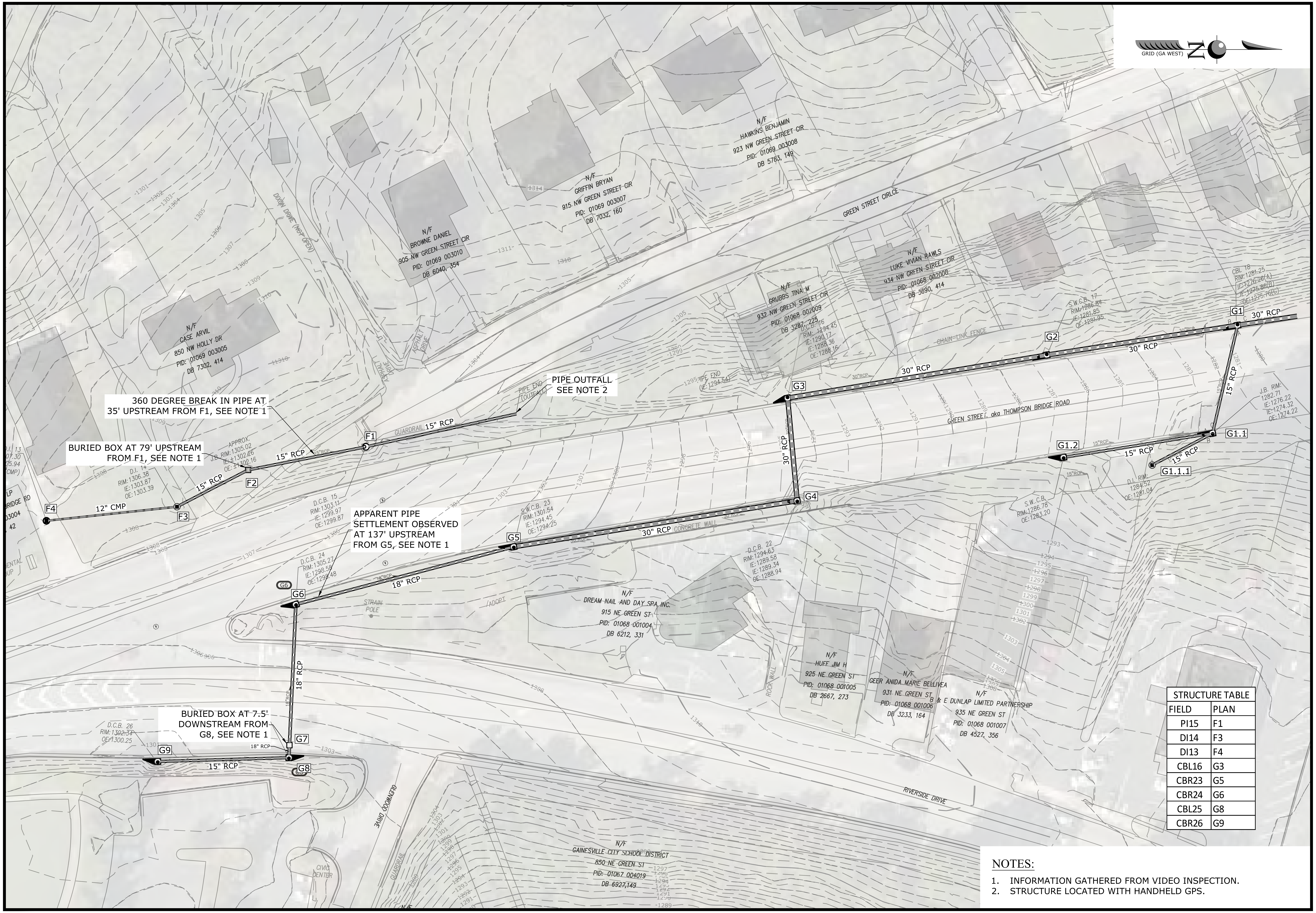
FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\Linework\939-15-192_V-BASE_UTIL.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO



STRUCTURE TABLE	
FIELD	PLAN
PI15	F1
DI14	F3
DI13	F4
CBL16	G3
CBR23	G5
CBR24	G6
CBL25	G8
CBR26	G9

NOTES:

1. INFORMATION GATHERED FROM VIDEO INSPECTION.
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9	-	-

PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE
GAINESVILLE, GA

PLAN VIEW DRAINAGE SYSTEM F & G

GREEN STREET DRAINAGE ASSESSMENT

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
Designed By: ----
Issue Date: 02.23.2016

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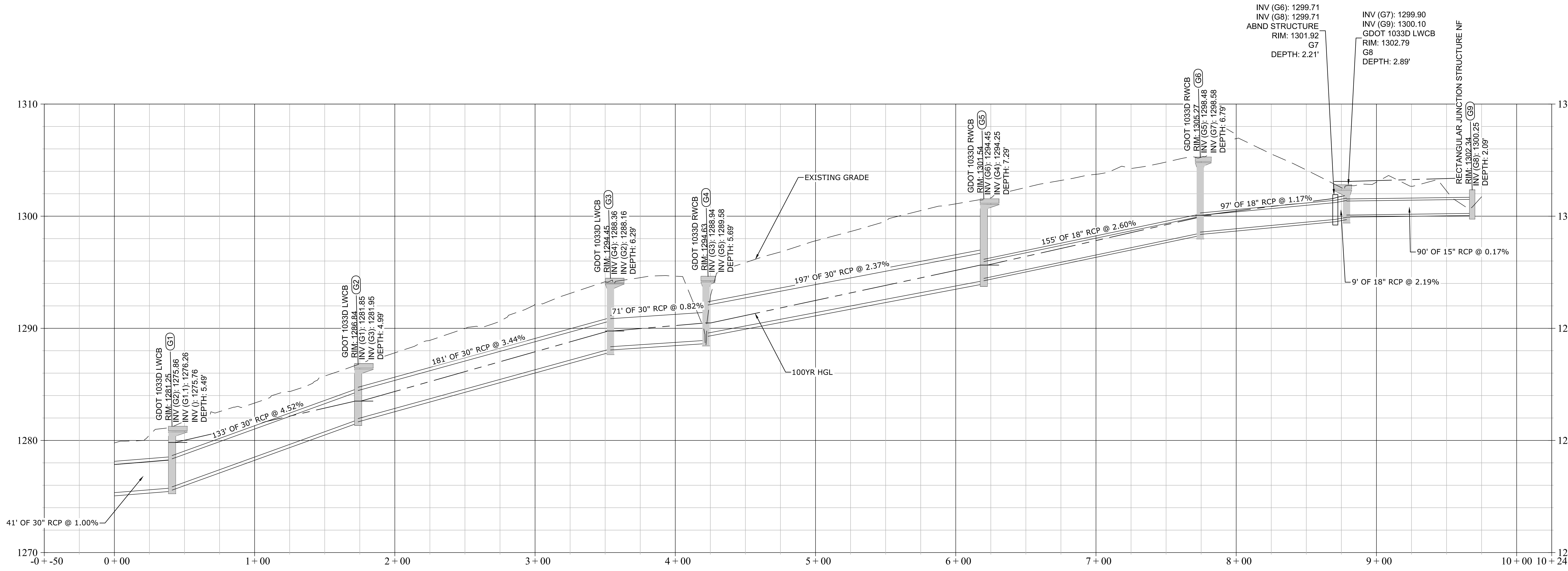
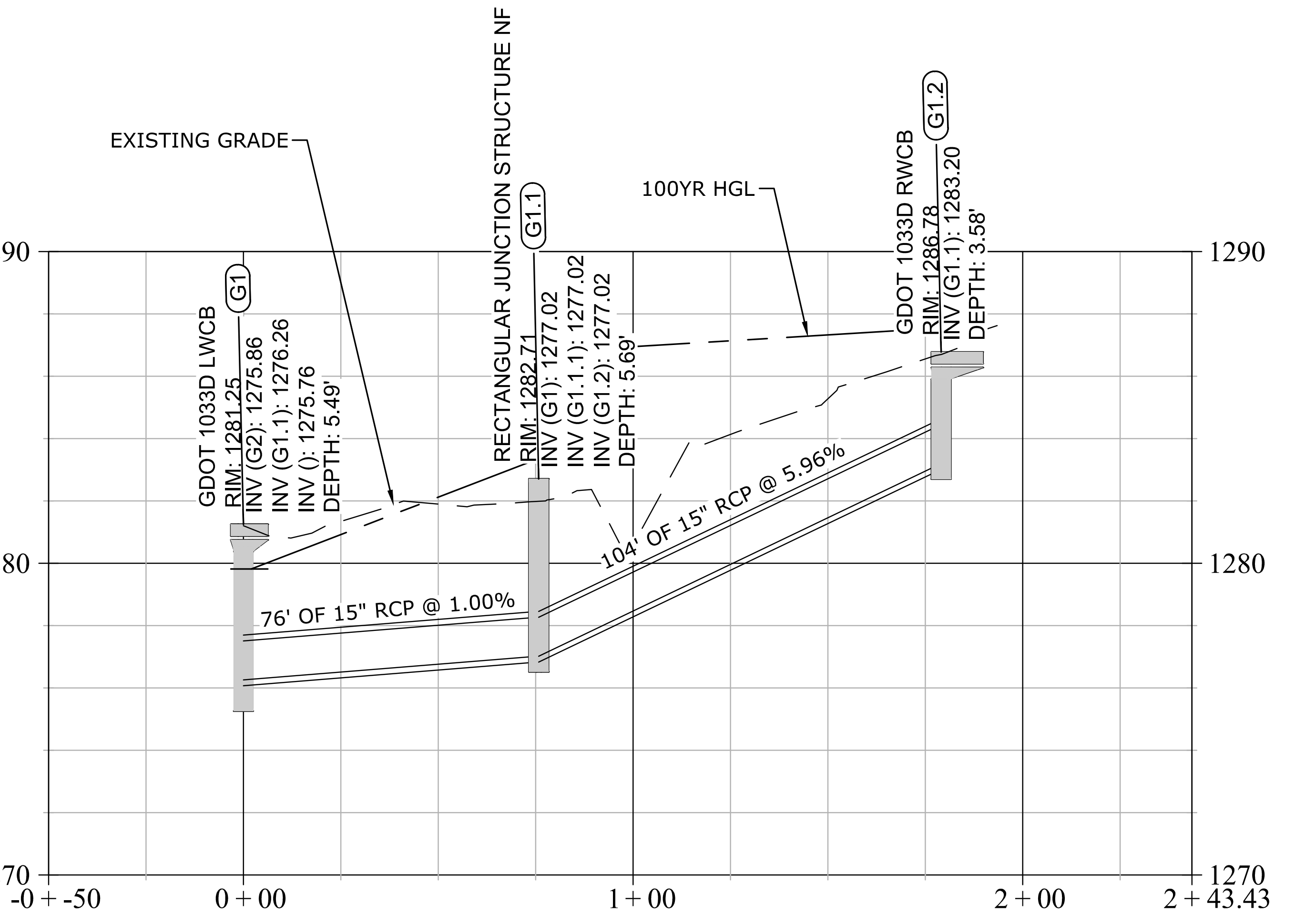
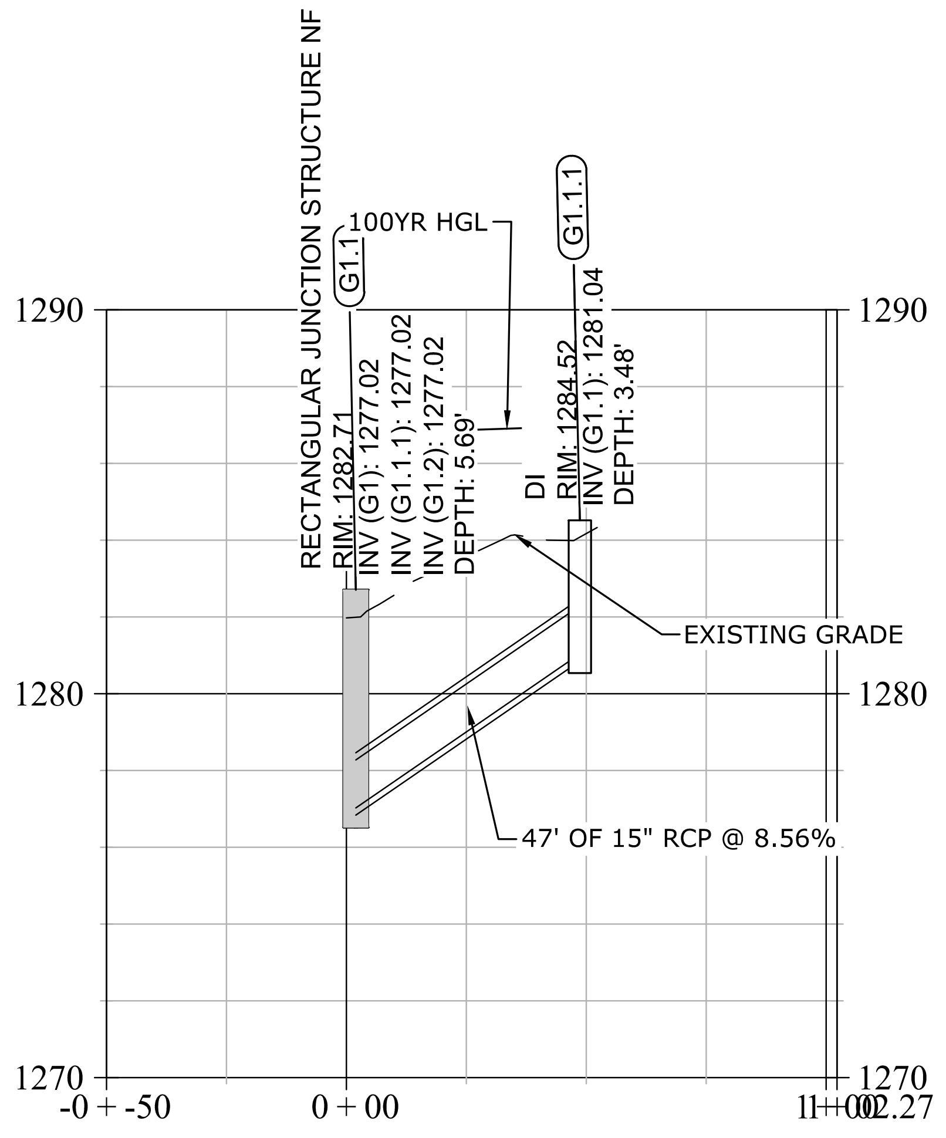
FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\939-15-192.04_C-STRM.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO



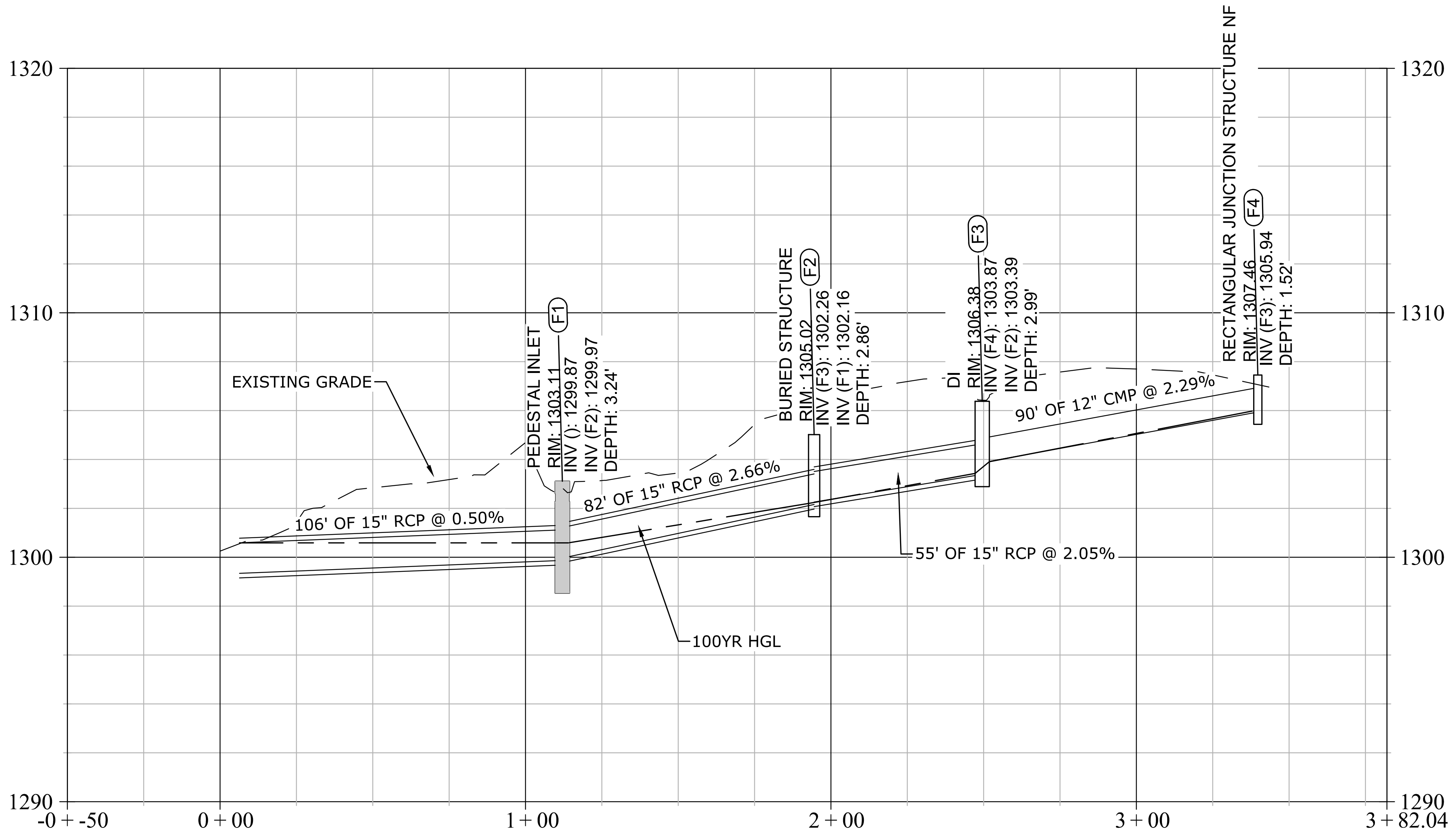
18 STORM SEWER G1-G9 - PROFILE



19 STORM SEWER G1-G1.2 - PROFILE



20 STORM SEWER G1.1-G1.1.1 - PROFILE



21 STORM SEWER OUTFALL-F4 - PROFILE

FILE NAME: I:\CUSTOMERS_PROJECTS\939 City of Gainesville\939-15-192 Green Street\939-15-192.04 Drainage Assess\Eng\Construction\Linework\939-15-192_V-BASE_UTIL.dwg PLOT DATE:7/12/2016 USER:JOE SAINATO

939-15-192

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PROJECT OWNED/DEVELOPED BY:
CITY OF GAINESVILLE

GAINESVILLE, GA

DRAINAGE SYSTEM F & G PROFILE

GREEN STREET DRAINAGE ASSESSMENT

PROJECT LOCATED AT:
GREEN STREET GAINESVILLE, GA 30501
HALL COUNTY

Project No.: 939-15-192
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STRUCTURE DATA CHART

GREEN STREET DRAINAGE ASSESSMENT

.	FIELD MARKING	AREA (ac)	PERVIOUS	IMP.	C
A1	DMH79	-	-	-	-
A2	MH80	-	-	-	-
A2.1	CBR81	0.11	0.02	0.09	0.81
A3.1	CB82.CI83	0.95	0.00	0.95	0.95
A4	CI85	0.06	0.02	0.04	0.70
A4.1	CBL84	0.07	0.01	0.06	0.84
A5	CBR86	0.51	0.00	0.51	0.95
A5.1	CBL91	0.17	0.00	0.17	0.95
A5.1.1	MH87	-	-	-	-
A6.1	DI89	0.48	0.11	0.37	0.78
A6.2	CI88	0.21	0.00	0.21	0.95
A7	CBR93	0.12	0.00	0.12	0.95
A8	DI92	0.13	0.00	0.13	0.95
B1	-	1.05	0.38	0.67	0.68
B1.1	-	1.31	0.11	1.2	0.89
B1.10	DI53	0.10	0.00	0.10	0.95
B1.2	-	0.11	0.00	0.11	0.95
B1.3	-	0.06	0.02	0.04	0.70
B1.4	-	0.03	0.03	0.00	0.20
B1.5	-	0.03	0.02	0.01	0.45
B1.6	-	0.21	0.03	0.18	0.84
B1.7	DI50	0.01	0.00	0.01	0.95
B1.8	DI51	0.71	0.22	0.49	0.72
B1.9	CBD52	1.47	0.47	1.00	0.71
B2	-	0.16	0.05	0.11	0.72
B3	DI56	1.08	0.22	0.86	0.80
B3.1	-	1.03	0.15	0.88	0.84
B4	DI55	0.94	0.26	0.68	0.74
B5	DI54	0.55	0.16	0.39	0.73
B6	DMH49	-	-	-	-
C2	CB39	1.30	0.27	1.03	0.79
C3	DI38	0.01	0.00	0.01	0.95
C4	CB37	2.17	0.72	1.45	0.70
D3.1	CB34	4.39	2.27	2.12	0.56
D3.1.1	CB36	0.32	0.04	0.28	0.86
D3.2	CI33	1.77	0.95	0.82	0.55
D4	CB35	2.35	1.01	1.34	0.63
E1	DMH31	-	-	-	-
E2	DMH30	-	-	-	-
E2.3	CBR32	1.20	0.36	0.84	0.73
E3	CBL29	0.41	0.30	0.11	0.40
E4	CBL28	0.56	0.39	0.17	0.43
E5	CBD27	0.19	0.03	0.16	0.83
F1	PI15	2.43	1.75	0.68	0.41
F3	DI14	0.07	0.07	0.00	0.20
F4	DI13	0.01	0.01	0.00	0.20
G1	CBL18	1.27	0.72	0.55	0.52
G1.1	CBL19	0.55	0.09	0.46	0.83
G1.1.1	DI20	0.45	0.03	0.42	0.90
G1.2	CBR21	0.71	0.15	0.56	0.79
G2	CBL17	0.56	0.37	0.19	0.45
G3	CBL16	0.03	0.00	0.03	0.95
G4	CBR22	0.57	0.11	0.46	0.81
G5	CBR23	0.41	0.10	0.31	0.77
G6	CBR24	0.14	0.00	0.14	0.95
G8	CBL25	1.10	0.12	0.98	0.87
G9	CBR26	0.47	0.07	0.40	0.84

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	148.705	0.00	97.69	0.00	0.00	2.44	0.0	254.0	1.4	4.28	17.27	3.47	18	2.70	1254.59	1258.61	1256.09	1259.40	1259.07	1264.02	A1-A2
2	1	37.884	0.00	97.58	0.00	0.00	2.35	0.0	253.9	1.4	4.16	11.94	4.90	18	1.29	1258.72	1259.21	1259.40	1259.99	1264.02	1264.00	A2-A3
3	2	44.627	0.06	96.63	0.70	0.04	1.44	5.0	253.9	1.4	2.92	15.16	3.56	18	2.08	1259.21	1260.14	1259.99	1260.79	1264.00	1266.85	A3-A4
4	3	27.397	0.51	96.50	0.95	0.48	1.34	5.0	253.8	1.4	2.78	24.98	3.90	18	5.66	1260.15	1261.70	1260.79	1262.33	1266.85	1268.70	A4-A5
5	4	49.984	0.00	95.82	0.00	0.00	0.70	0.0	13.5	7.5	6.13	23.90	6.92	18	5.18	1261.70	1264.29	1262.33	1265.25	1268.70	1269.20	A5-A6
6	5	151.807	95.00	95.13	0.00	0.00	0.12	5.0	6.0	9.5	2.07	23.67	2.79	18	5.08	1264.39	1272.10	1265.25	1272.64	1269.20	1277.74	A6-A7
7	6	41.669	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.78	0.87	4.63	6	1.42	1273.22	1273.81	1273.59	1274.25	1277.74	1274.52	PVC-A7
8	6	58.171	0.13	0.13	0.95	0.12	0.12	5.0	5.0	9.9	1.22	9.12	3.45	15	1.99	1272.25	1273.41	1272.64	1273.85	1277.74	1277.65	A7-A8
9	4	70.378	0.17	0.17	0.95	0.16	0.16	5.0	252.5	1.4	0.24	12.89	1.17	18	1.51	1261.70	1262.76	1262.33	1262.94	1268.70	1268.23	A5-A5.1
10	9	104.850	0.00	0.00	0.00	0.00	0.00	0.0	145.3	0.0	0.02	6.46	1.13	15	1.00	1263.08	1264.13	1263.13	1264.18	1268.23	1271.78	A5.1-A5.2
11	10	15.537	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.01	19.66	1.49	15	9.27	1264.25	1265.69	1264.27	1265.73	1271.78	1268.12	A5.2-A5.2.1
12	10	71.035	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.01	6.46	0.93	15	1.00	1264.50	1265.21	1264.54	1265.25	1271.78	1273.72	A5.2-A5.3
13	5	39.861	0.48	0.69	0.78	0.37	0.57	5.0	13.2	7.5	4.33	0.00	3.49	18	-6.47	1265.14	1262.56	1265.94	1266.31	1269.20	1272.46	A6-A6.1
14	13	77.539	0.21	0.21	0.95	0.20	0.20	5.0	5.0	9.9	1.97	0.00	0.16	48	-0.43	1262.66	1262.33	1266.45	1266.45	1272.46	1270.06	A6.1-A6.2
15	4	46.849	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.01	22.66	0.43	24	1.00	1261.70	1262.17	1262.33	1262.20	1268.70	1270.19	A5-A5.1.1
16	3	27.487	0.07	0.07	0.84	0.06	0.06	5.0	5.0	9.9	0.58	23.43	1.89	15	13.17	1260.26	1263.88	1260.79	1264.18	1266.85	1267.82	A4-A4.1
17	1	11.641	0.11	0.11	0.81	0.09	0.09	5.0	5.0	9.9	0.88	12.84	4.45	15	3.95	1259.31	1259.77	1259.53	1260.14	1264.02	1264.31	A2-A2.1
18	2	26.872	0.95	0.95	0.95	0.90	0.90	5.0	5.0	9.9	8.91	21.97	8.00	15	11.57	1258.99	1262.10	1259.99	1263.25	1264.00	1267.05	A3-A3.1

Project File: STORM A.stm

Number of lines: 18

Run Date: 5/16/2016

NOTES:Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period =Yrs. 100 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	A2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	A3	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	A4	0.41	3.34	2.34	1.42	Comb	4.0	2.40	0.00	1.80	2.40	0.027	1.50	0.050	0.043	0.013	0.25	5.60	0.25	5.53	0.0	17
4	A5	4.78	0.39	1.94	3.23	Curb	8.0	8.00	0.00	0.00	0.00	0.042	1.50	0.050	0.042	0.013	0.26	5.91	0.22	4.93	0.0	3
5	A6	0.00	1.50	0.00	1.50	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
6	A7	0.12*	0.00	0.12	0.00	Curb	8.0	8.00	0.00	0.00	0.00	0.032	1.50	0.050	0.048	0.013	0.07	1.38	0.00	0.00	0.0	4
7	6 IN. PVC	0.78*	0.00	0.00	0.78	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
8	A8	1.22	0.00	0.83	0.39	Grate	0.0	0.00	0.00	1.75	2.40	0.029	1.50	0.050	0.020	0.013	0.15	5.41	0.11	3.06	0.0	4
9	A5.1	1.59	0.00	0.94	0.66	Curb	8.0	8.00	0.00	0.00	0.00	0.037	1.50	0.050	0.035	0.013	0.17	4.22	0.13	2.93	0.0	Off
10	A5.2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
11	A5.2.1	0.01*	0.00	0.00	0.01	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
12	A5.3	0.01*	0.00	0.00	0.01	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
13	A6.1	3.70	1.13	3.32	1.50	Grate	0.0	0.00	0.00	2.30	3.00	0.077	1.50	0.050	0.099	0.013	0.25	3.28	0.16	2.31	0.0	5
14	A6.2	1.97	0.00	0.84	1.13	Grate	0.0	0.00	0.00	2.30	3.00	0.010	1.50	0.050	0.010	0.013	0.19	12.71	0.16	10.01	0.0	13
15	A5.1.1	0.01*	0.00	0.00	0.01	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
16	A4.1	0.58	0.00	0.47	0.11	Curb	8.0	8.00	0.00	0.00	0.00	0.037	1.50	0.050	0.023	0.013	0.12	3.33	0.07	1.32	0.0	3
17	A2.1	0.88	7.25	1.34	6.79	Curb	8.0	6.00	0.00	0.00	0.00	0.040	1.50	0.050	0.012	0.013	0.24	15.18	0.23	14.18	0.0	Off
18	A3.1	8.91	0.00	3.07	5.84	Comb	4.0	2.40	0.00	1.75	2.40	0.028	1.50	0.050	0.018	0.013	0.28	13.12	0.28	13.01	0.0	17

Project File: STORM A.stm

Number of lines: 18

Run Date: 5/16/2016

NOTES: Inlet N-Values = 0.016; Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	24.829	1.05	8.85	0.68	0.71	6.82	5.0	56.9	3.7	25.28	39.55	3.62	36	1.01	1232.00	1232.25	1235.00	1235.09	0.00	1245.47	OUT-B1
2	1	120.094	0.16	3.76	0.72	0.12	2.94	5.0	56.6	3.7	10.93	65.49	4.56	24	8.39	1233.25	1243.32	1235.40	1244.51	1245.47	1261.49	B1-B2
3	2	74.296	1.08	3.60	0.80	0.86	2.83	5.0	56.5	3.7	10.52	78.63	5.50	24	12.09	1243.32	1252.30	1244.51	1253.46	1261.49	1264.72	B2-B3
4	3	314.485	0.94	1.49	0.74	0.70	1.10	5.0	55.0	3.8	4.16	45.67	3.16	24	6.18	1252.30	1271.72	1253.46	1272.44	1264.72	1281.29	B3-B4
5	4	43.599	0.55	0.55	0.73	0.40	0.40	5.0	54.9	3.8	1.53	5.41	3.89	10	5.21	1271.86	1274.13	1272.44	1274.68	1281.29	1278.99	B4-B5
6	1	92.574	1.31	4.04	0.89	1.17	3.16	5.0	35.2	4.9	15.39	38.34	8.81	18	13.33	1233.25	1245.59	1235.40	1247.00	1245.47	1256.26	B1-B1.1
7	6	60.410	0.11	2.73	0.95	0.10	2.00	5.0	35.0	4.9	9.75	55.67	4.76	24	6.06	1245.59	1249.25	1247.00	1250.37	1256.26	1258.58	B1.1-B1.2
8	7	54.206	0.06	2.62	0.70	0.04	1.89	5.0	34.9	4.9	9.25	17.44	6.40	18	7.90	1249.25	1253.53	1250.37	1254.71	1258.58	1259.62	B1.2-B1.3
9	8	68.278	0.03	2.56	0.20	0.01	1.85	5.0	34.8	4.9	9.06	17.76	6.13	18	8.19	1253.53	1259.12	1254.71	1260.28	1259.62	1265.89	B1.3-B1.4
10	9	37.893	0.03	2.53	0.45	0.01	1.85	5.0	34.8	4.9	9.04	17.46	6.15	18	7.92	1259.12	1262.12	1260.28	1263.28	1265.89	1268.00	B1.4-B1.5
11	10	57.498	0.21	2.50	0.82	0.17	1.83	5.0	34.7	4.9	8.99	18.19	6.13	18	8.59	1262.12	1267.06	1263.28	1268.22	1268.00	1275.48	B1.5-B1.6
12	11	162.986	0.01	2.29	0.95	0.01	1.66	5.0	34.5	4.9	8.16	4.13	10.39	12	3.85	1267.06	1273.33	1268.22	1292.74	1275.48	1279.23	B1.6-B1.7
13	12	73.051	0.71	2.28	0.72	0.51	1.65	5.0	34.5	4.9	8.12	3.10	10.34	12	2.18	1273.33	1274.92	1293.58	1304.46	1279.23	1279.62	B1.7-B1.8
14	13	44.239	1.47	1.57	0.71	1.04	1.14	5.0	34.4	4.9	5.61	3.71	10.29	10	2.44	1275.02	1276.10	1305.30	1307.77	1279.62	1280.30	B1.8-B1.9
15	14	51.912	0.10	0.10	0.95	0.10	0.10	5.0	34.1	4.9	0.48	1.66	1.37	8	1.62	1276.50	1277.34	1309.30	1309.37	1280.30	1278.99	B1.9-B1.10
16	15	104.204	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.01	0.61	0.05	6	1.00	1277.44	1278.48	1309.42	1309.42	1278.99	1280.00	B1.10-UNK
17	5	17.799	0.00	0.00	0.00	0.00	0.00	0.0	49.0	0.0	0.01	0.89	0.71	6	2.13	1274.59	1274.97	1274.68	1275.02	1278.99	1278.31	B5-B6
18	17	149.829	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.01	0.24	0.61	6	0.16	1274.97	1275.21	1275.04	1275.28	1278.31	1280.00	B6-WB
19	3	25.668	1.03	1.03	0.84	0.87	0.87	5.0	5.0	9.9	8.54	10.57	5.90	18	1.01	1252.30	1252.56	1253.46	1253.69	1264.72	1265.76	B3-B3.1

Project File: STORM B.stm

Number of lines: 19

Run Date: 5/16/2016

NOTES:Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period =Yrs. 100 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	B1	7.05	6.48	3.86	9.67	Curb	8.0	8.00	0.00	0.00	0.00	0.010	1.50	0.050	0.020	0.013	0.40	17.60	0.35	15.45	0.0	Off
2	B2	1.14	0.00	0.77	0.37	Grate	0.0	0.00	0.00	2.00	2.00	0.020	1.50	0.050	0.020	0.013	0.16	5.71	0.11	3.31	0.0	6
3	B3	8.53	0.00	4.14	4.38	Grate	0.0	0.00	0.00	2.80	1.80	0.008	1.50	0.050	0.043	0.013	0.42	9.62	0.33	7.48	0.0	Off
4	B4	6.87	2.09	4.95	4.01	Grate	0.0	0.00	0.00	3.00	2.20	0.004	1.50	0.050	0.051	0.013	0.51	10.05	0.38	7.44	0.0	Off
5	B5	3.96	0.00	1.87	2.09	Curb	4.0	3.00	0.00	0.00	0.00	0.001	1.50	0.050	0.046	0.013	0.48	10.24	0.38	8.05	0.0	4
6	B1.1	11.51	0.85	5.88	6.48	Comb	4.0	2.00	0.00	2.00	2.00	0.004	1.50	0.050	0.075	0.013	0.64	8.98	0.49	7.07	0.0	1
7	B1.2	1.03	0.05	0.61	0.48	Comb	4.0	2.00	0.00	2.00	2.00	0.034	1.50	0.050	0.006	0.013	0.13	10.35	0.11	6.52	0.0	6
8	B1.3	0.41	0.00	0.36	0.05	Comb	4.0	2.00	0.00	2.00	2.00	0.007	1.50	0.050	0.035	0.013	0.14	3.42	0.07	1.36	0.0	7
9	B1.4	0.06	0.10	0.16	0.00	Comb	4.0	2.00	0.00	2.00	2.00	0.089	1.50	0.050	0.135	0.013	0.06	1.26	0.00	0.00	0.0	8
10	B1.5	0.13	1.44	1.47	0.10	Comb	4.0	2.00	0.00	2.00	2.00	0.024	1.50	0.050	0.216	0.013	0.21	2.13	0.07	1.36	0.0	9
11	B1.6	1.70	1.93	2.20	1.44	Comb	4.0	2.00	0.00	2.00	2.00	0.056	1.50	0.050	0.031	0.013	0.21	5.79	0.15	3.95	0.0	10
12	B1.7	0.09	2.24	0.40	1.93	Grate	0.0	0.00	0.00	2.00	2.00	0.012	1.50	0.050	0.001	0.013	0.13	56.60	0.13	52.60	0.0	11
13	B1.8	5.05	0.00	2.80	2.24	Grate	0.0	0.00	0.00	2.00	2.00	0.011	1.50	0.050	0.054	0.013	0.35	6.50	0.25	4.82	0.0	12
14	B1.9	10.30	0.20	10.51	0.00	Curb	4.0	43.45	0.00	0.00	0.00	0.008	1.50	0.050	0.016	0.013	0.36	19.13	0.00	0.00	0.0	13
15	B1.10	0.94	0.00	0.73	0.20	Grate	0.0	0.00	0.00	4.07	2.00	0.015	1.50	0.050	0.020	0.013	0.16	5.61	0.10	2.56	0.0	14
16	Null Structure	0.01*	0.00	0.00	0.01	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
17	B6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
18	Null Structure	0.01*	0.00	0.00	0.01	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
19	B3.1	8.54	0.00	3.00	5.54	Curb	8.0	8.00	0.00	0.00	0.00	0.024	1.50	0.050	0.040	0.013	0.34	8.18	0.29	6.93	0.0	Off

Project File: STORM B.stm

Number of lines: 19

Run Date: 5/16/2016

NOTES: Inlet N-Values = 0.016; Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	134.816	7.80	11.53	0.50	3.90	6.66	10.0	10.0	8.3	105.2	122.4	24.70	30	8.90	1234.00	1246.00	1235.79	1248.49	0.00	1251.89	OUT-C1
2	1	352.878	1.30	3.48	0.79	1.03	2.56	5.0	5.6	9.7	24.69	12.94	20.12	15	4.02	1247.72	1261.90	1248.97	1300.58	1251.89	1266.48	C1-C2
3	2	22.912	0.00	2.18	0.00	0.00	1.53	0.0	5.5	9.7	14.82	29.94	4.72	24	5.02	1262.07	1263.22	1306.37	1306.65	1266.48	1265.32	C2-CLAY
4	3	200.728	0.01	2.18	0.95	0.01	1.53	5.0	5.1	9.8	15.04	28.16	8.51	18	7.19	1263.46	1277.89	1306.87	1310.99	1265.32	1282.95	C3-CLAY
5	4	54.729	2.17	2.17	0.70	1.52	1.52	5.0	5.0	9.9	14.99	10.37	12.22	15	3.91	1278.13	1280.27	1311.55	1316.03	1282.95	1284.34	C3-C4
6	1	36.000	0.25	0.25	0.80	0.20	0.20	5.0	5.0	9.9	51.95	21.00	14.70	18(2b)	1.00	1246.00	1246.36	1248.49	1250.69	1251.89	1252.13	C1-C1.1

Project File: STORM C.stm

Number of lines: 6

Run Date: 5/16/2016

NOTES:Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period =Yrs. 100 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	C1	32.35	132.48	9.52	155.32	Curb	8.0	3.00	0.00	0.00	0.00	0.004	1.50	0.050	0.030	0.013	1.28	41.67	1.25	40.74	0.0	6
2	C2	10.14	0.00	2.06	8.08	Curb	8.0	8.00	0.00	0.00	0.00	0.066	1.50	0.050	0.020	0.013	0.26	10.96	0.25	10.01	0.0	1
3	CMP TO CLAY	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
4	C3	0.09	0.00	0.09	0.00	Grate	0.0	0.00	0.00	2.00	2.00	0.075	1.50	0.043	0.013	0.013	0.05	1.19	0.00	0.00	0.0	2
5	C4	14.99	0.00	6.02	8.98	Curb	8.0	8.00	0.00	0.00	0.00	0.006	1.50	0.050	0.039	0.013	0.54	13.32	0.45	10.99	0.0	Off
6	C1.1	51.95*	80.81	8.35	124.41	Curb	8.0	3.00	0.00	0.00	0.00	0.001	1.50	0.050	0.014	0.013	1.18	80.22	1.15	78.29	0.0	1

Project File: STORM C.stm	Number of lines: 6	Run Date: 5/16/2016

NOTES: Inlet N-Values = 0.016; Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	170.000	0.00	8.83	0.00	0.00	5.19	0.0	6.7	9.3	48.11	33.37	15.32	24	2.18	1261.98	1265.68	1263.98	1271.68	0.00	1268.06	CLAY3(0)
2	1	17.909	0.00	8.83	0.00	0.00	5.19	0.0	6.6	9.3	48.15	32.07	15.33	24	2.01	1265.68	1266.04	1272.37	1273.18	1268.06	1268.41	CLAY1(0)
3	2	25.292	0.00	8.83	0.00	0.00	5.19	0.0	6.6	9.3	48.20	39.21	15.34	24	3.00	1266.04	1266.80	1273.98	1275.13	1268.41	1269.17	CLAY0(0)
4	3	19.593	0.00	8.83	0.00	0.00	5.19	0.0	6.6	9.3	48.24	47.93	15.36	24	4.49	1266.80	1267.68	1275.98	1276.87	1269.17	1270.05	CLAY(0)
5	4	23.241	0.00	8.83	0.00	0.00	5.19	0.0	6.6	9.3	48.29	50.53	15.37	24	4.99	1267.68	1268.84	1278.30	1279.36	1270.05	1277.54	D1-CLAY(0)
6	5	60.640	0.00	8.83	0.00	0.00	5.19	0.0	6.2	9.4	48.85	298.2	3.46	36(2b)	5.00	1268.84	1271.87	1281.53	1281.61	1277.54	1279.51	D1-D2
7	6	187.952	0.00	8.83	0.00	0.00	5.19	0.0	6.0	9.5	49.24	36.53	15.67	24	5.00	1274.37	1283.77	1281.79	1298.87	1279.51	1286.14	D2-CLAY
8	7	7.118	0.00	8.51	0.00	0.00	4.91	0.0	6.0	9.5	46.64	50.15	14.85	24	4.92	1283.77	1284.12	1302.46	1302.77	1286.14	1288.75	CLAY-D3
9	8	395.551	4.39	6.16	0.56	2.46	3.43	5.4	5.4	9.7	33.36	20.15	10.62	24	0.79	1284.62	1287.76	1306.19	1314.80	1288.75	1293.78	D3-D3.1
10	9	42.064	1.77	1.77	0.55	0.97	0.97	5.0	5.0	9.9	9.61	3.56	12.24	12	1.00	1287.76	1288.18	1317.43	1320.49	1293.78	1293.08	D3.1-D3.2
11	8	40.699	2.35	2.35	0.63	1.48	1.48	5.0	5.0	9.9	14.61	49.25	4.65	24	4.74	1284.12	1286.05	1306.19	1306.36	1288.75	1289.82	D3-D4
12	7	8.882	0.32	0.32	0.86	0.28	0.28	5.0	5.0	9.9	2.72	16.83	3.46	12	19.03	1284.13	1285.82	1302.46	1302.51	1286.14	1289.52	CLAY-D3.1.1

Project File: STORM D.stm

Number of lines: 12

Run Date: 5/16/2016

NOTES:Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period =Yrs. 100 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	CLAY2	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	CLAY5	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CLAY4	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
4	CLAY3	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	D1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
6	D2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CLAY	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
8	D3	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
9	D3.1	23.89	0.00	5.47	18.42	Curb	8.0	8.00	0.00	0.00	0.00	0.020	1.50	0.050	0.034	0.013	0.49	13.77	0.45	12.50	0.0	11
10	D3.2	9.61	0.00	3.79	5.82	Comb	4.0	2.00	0.00	2.00	1.50	0.012	1.50	0.050	0.036	0.013	0.40	10.39	0.33	8.59	0.0	11
11	D4	14.61	24.24	9.07	29.79	Curb	8.0	8.00	0.00	0.00	0.00	0.005	1.50	0.050	0.024	0.013	0.68	26.67	0.62	24.13	0.0	Off
12	D3.1.1	2.72	0.00	2.42	0.30	Curb	8.0	8.00	0.00	0.00	0.00	0.002	1.50	0.050	0.037	0.013	0.35	8.88	0.16	3.75	0.0	Off

Project File: STORM D.stm

Number of lines: 12

Run Date: 5/16/2016

NOTES: Inlet N-Values = 0.016; Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	31.601	0.00	2.36	0.00	0.00	1.44	0.0	8.7	8.7	12.46	11.45	7.05	18	1.01	1289.36	1289.68	1290.86	1291.24	0.00	1294.62	OUT-E1
2	1	84.207	0.00	2.36	0.00	0.00	1.44	0.0	8.5	8.7	12.53	20.82	7.32	18	3.35	1289.80	1292.62	1291.58	1293.95	1294.62	1299.12	E1-E2
3	2	22.648	0.41	1.16	0.40	0.16	0.56	5.0	8.3	8.7	4.92	20.22	4.12	18	3.71	1292.84	1293.68	1293.95	1294.53	1299.12	1300.09	E2-E3
4	3	97.683	0.56	0.75	0.43	0.24	0.40	5.0	7.6	9.0	3.58	17.26	4.21	18	2.70	1293.80	1296.44	1294.53	1297.16	1300.09	1301.63	E3-E4
5	4	196.235	0.19	0.19	0.83	0.16	0.16	5.0	5.0	9.9	1.56	7.73	4.19	15	1.43	1297.44	1300.25	1297.82	1300.74	1301.63	1302.66	E4-E5
6	2	28.000	0.00	1.20	0.00	0.00	0.88	0.0	5.1	9.8	8.60	13.70	7.38	15	4.50	1292.84	1294.10	1293.95	1295.24	1299.12	1299.33	E2-E2.1
7	6	41.765	0.00	1.20	0.00	0.00	0.88	0.0	5.0	9.9	8.63	13.22	7.35	15	4.19	1294.10	1295.85	1295.24	1296.99	1299.33	1299.20	E2.1-E2.2
8	7	18.500	1.20	1.20	0.73	0.88	0.88	5.0	5.0	9.9	8.65	11.24	7.36	15	3.03	1295.85	1296.41	1296.99	1297.55	1299.20	1299.73	E2.2-E2.3

Project File: STORM E.stm

Number of lines: 8

Run Date: 5/16/2016

NOTES:Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period =Yrs. 100 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	E1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	E2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	E3	1.62	1.41	1.64	1.39	Curb	8.0	8.00	0.00	0.00	0.00	0.011	1.50	0.050	0.021	0.013	0.24	9.41	0.19	6.89	0.0	Off
4	E4	2.38	0.22	1.18	1.41	Curb	8.0	8.00	0.00	0.00	0.00	0.018	1.50	0.050	0.012	0.013	0.19	11.26	0.16	8.76	0.0	3
5	E5	1.56	0.00	1.34	0.22	Curb	8.0	8.00	0.00	0.00	0.00	0.009	1.50	0.050	0.065	0.013	0.24	3.96	0.11	2.04	0.0	4
6	E2.1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	E2.2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
8	E2.3	8.65	0.00	2.87	5.78	Curb	8.0	8.00	0.00	0.00	0.00	0.020	1.50	0.050	0.029	0.013	0.33	10.33	0.29	8.85	0.0	Off

Project File: STORM E.stm

Number of lines: 8

Run Date: 5/16/2016

NOTES: Inlet N-Values = 0.016; Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	105.673	2.43	2.51	0.41	1.00	1.01	5.0	83.1	2.9	2.97	4.57	2.75	15	0.50	1299.34	1299.87	1300.59	1300.79	0.00	1303.11	OUT-F1
2	1	82.405	0.00	0.08	0.00	0.00	0.02	0.0	72.1	3.2	0.05	10.53	0.72	15	2.66	1299.97	1302.16	1300.86	1302.25	1303.11	1305.02	F1-F2
3	2	54.991	0.07	0.08	0.20	0.01	0.02	5.0	64.8	3.4	0.05	9.26	1.73	15	2.05	1302.26	1303.39	1302.33	1303.48	1305.02	1306.38	F2-F3
4	3	90.237	0.01	0.01	0.20	0.00	0.00	5.0	5.0	9.9	0.02	3.19	1.12	12	2.29	1303.87	1305.94	1303.93	1306.00	1306.38	1307.46	F3-F4

Project File: STORM F.stm

Number of lines: 4

Run Date: 5/16/2016

NOTES:Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period =Yrs. 100 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	F1	9.83	0.00	9.83	0.00	DrCrb	6.0	4.00	0.00	0.00	0.00	Sag	0.00	0.020	0.020	0.000	1.09	54.37	1.09	54.37	0.0	Off
2	F2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	F3	0.14	0.00	0.14	0.00	Grate	0.0	0.00	4.00	2.00	2.00	Sag	1.50	0.050	0.020	0.000	0.08	1.64	0.08	1.64	0.0	Off
4	F4	0.02	0.00	0.02	0.00	Grate	0.0	0.00	0.00	1.00	2.00	0.050	1.50	0.050	0.020	0.013	0.03	0.64	0.00	0.00	0.0	Off

Project File: STORM F.stm

Number of lines: 4

Run Date: 5/16/2016

NOTES: Inlet N-Values = 0.016; Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	41.138	1.27	6.26	0.52	0.66	4.63	5.0	8.3	8.8	44.87	40.94	9.14	30	1.00	1275.35	1275.76	1277.85	1278.34	0.00	1281.25	OUT-G1
2	1	132.661	0.56	3.28	0.45	0.25	2.54	5.0	7.9	8.9	26.95	87.15	6.38	30	4.52	1275.86	1281.85	1280.18	1283.62	1281.25	1286.84	G1-G2
3	2	180.547	0.03	2.72	0.95	0.03	2.29	5.0	7.3	9.1	25.15	76.06	7.13	30	3.44	1281.95	1288.16	1283.62	1289.87	1286.84	1294.45	G2-G3
4	3	70.834	0.57	2.69	0.81	0.46	2.26	5.0	7.0	9.2	20.72	37.11	6.60	30	0.82	1288.36	1288.94	1289.87	1290.49	1294.45	1294.63	G3-G4
5	4	197.328	0.41	2.12	0.77	0.32	1.80	5.0	6.0	9.5	17.09	63.09	8.36	30	2.37	1289.58	1294.25	1290.49	1295.65	1294.63	1301.54	G4-G5
6	5	154.820	0.14	1.71	0.95	0.13	1.48	5.0	5.7	9.6	14.26	16.94	8.89	18	2.60	1294.45	1298.48	1295.65	1299.87	1301.54	1305.27	G5-G6
7	6	96.797	0.00	1.57	0.00	0.00	1.35	0.0	5.5	9.7	13.09	10.13	7.41	18	0.93	1298.58	1299.48	1300.08	1301.59	1305.27	1302.32	G6-G7
8	7	8.582	1.10	1.57	0.87	0.96	1.35	5.0	5.5	9.7	13.10	23.23	7.41	18	4.89	1299.48	1299.90	1301.71	1301.85	1302.32	1302.79	G7-G8
9	8	90.154	0.47	0.47	0.84	0.39	0.39	5.0	5.0	9.9	3.90	2.63	3.18	15	0.17	1300.10	1300.25	1303.13	1303.46	1302.79	1302.34	G8-G9
10	1	76.176	0.55	1.71	0.83	0.46	1.42	5.0	5.4	9.7	13.83	6.45	11.27	15	1.00	1276.26	1277.02	1280.18	1283.67	1281.25	1282.71	G1-G1.1
11	10	103.719	0.71	0.71	0.79	0.56	0.56	5.0	5.0	9.9	5.54	15.76	4.51	15	5.96	1277.02	1283.20	1286.46	1287.22	1282.71	1286.78	G1.1-G1.2
12	10	46.909	0.45	0.45	0.90	0.41	0.41	5.0	5.0	9.9	4.00	18.88	3.26	15	8.55	1277.03	1281.04	1286.46	1286.64	1282.71	1284.52	G1.1-G1.1.1

Project File: STORM G.stm	Number of lines: 12	Run Date: 5/16/2016

NOTES:Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period =Yrs. 100 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	G1	6.52	3.77	1.56	8.73	Curb	8.0	8.00	0.00	0.00	0.00	0.052	1.50	0.050	0.007	0.013	0.22	22.23	0.21	20.80	0.0	Off
2	G2	2.49	3.07	1.78	3.77	Curb	8.0	8.00	0.00	0.00	0.00	0.043	1.50	0.050	0.026	0.013	0.24	8.00	0.22	6.89	0.0	1
3	G3	4.66*	0.00	1.59	3.07	Curb	8.0	8.00	0.00	0.00	0.00	0.046	1.50	0.050	0.026	0.013	0.23	7.39	0.20	6.23	0.0	2
4	G4	4.56	1.69	1.59	4.66	Curb	8.0	8.00	0.00	0.00	0.00	0.028	1.50	0.050	0.010	0.013	0.23	16.51	0.21	14.61	0.0	11
5	G5	3.12	0.39	1.82	1.69	Curb	8.0	8.00	0.00	0.00	0.00	0.028	1.50	0.050	0.062	0.013	0.26	4.44	0.19	3.40	0.0	4
6	G6	1.31	0.00	0.92	0.39	Curb	8.0	8.00	0.00	0.00	0.00	0.024	1.50	0.050	0.039	0.013	0.17	4.04	0.11	2.48	0.0	5
7	G7	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
8	G8	9.45	7.56	8.09	8.91	Curb	8.0	8.00	0.00	0.00	0.00	0.005	1.50	0.050	0.062	0.013	0.66	10.87	0.51	8.55	0.0	9
9	G9	3.90	7.61	3.95	7.56	Curb	8.0	8.00	0.00	0.00	0.00	0.022	1.50	0.050	0.050	0.013	0.41	8.12	0.35	6.94	0.0	8
10	G1.1	4.51	7.68	2.07	10.11	Curb	8.0	8.00	0.00	0.00	0.00	0.020	1.50	0.050	0.007	0.013	0.26	28.51	0.25	26.51	0.0	Off
11	G1.2	5.54	4.66	2.52	7.68	Curb	8.0	8.00	0.00	0.00	0.00	0.040	1.50	0.050	0.025	0.013	0.30	10.54	0.27	9.46	0.0	10
12	G1.1.1	4.00	0.00	2.75	1.25	Grate	0.0	0.00	0.00	2.00	1.50	0.056	1.50	0.050	0.056	0.013	0.23	4.32	0.15	2.84	0.0	Off

Project File: STORM G.stm

Number of lines: 12

Run Date: 5/16/2016

NOTES: Inlet N-Values = 0.016; Intensity = 88.39 / (Inlet time + 14.00) ^ 0.74; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Appendix D

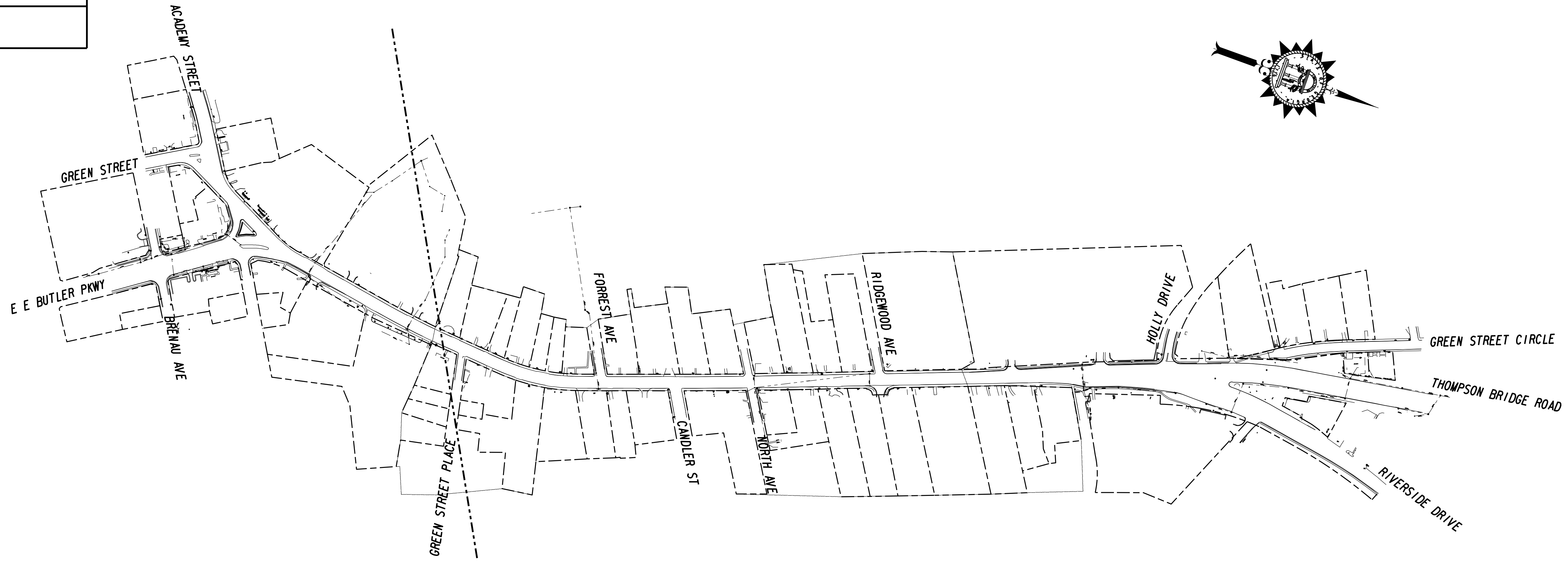
5/10/2016 CPfau	GPLOT-V8 gplotborder-V8I-PO.tbl	GREEN STREET_01-001.dgn GRWCOV	STATE GA	PROJECT NUMBER 939-15-192	SHEET NO. 1	TOTAL SHEETS 13

LOCATION SKETCH

CITY OF GAINESVILLE
HALL COUNTY

PLAN OF EXISTING

GREEN STREET



THIS PROJECT HAS BEEN PREPARED USING THE HORIZONTAL GEORGIA COORDINATE SYSTEM OF 1984 (NAD 1983)/94 WEST ZONE, AND THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.

SCALE IN FEET
0 200 400 800

PREPARED BY: ____________________

DESIGN

SOUTHEASTERN ENGINEERING, INC.
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PLANS COMPLETED - -	
REVISIONS	

DRAWING No.
01-001

5/10/2016	4:25:47 PM	GPLOT-V8	GREEN STREET_24-001.dgn	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
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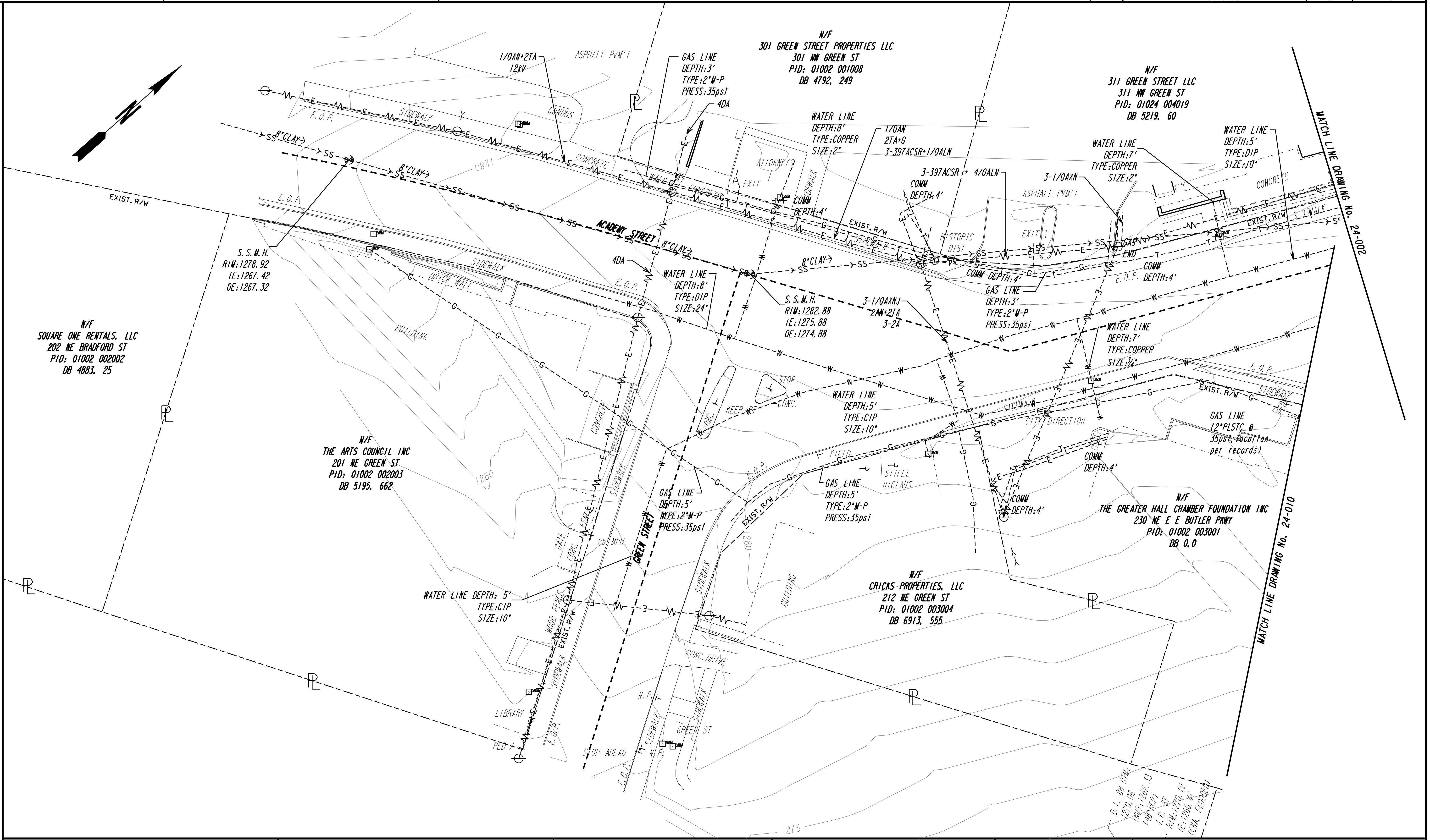

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SCALE IN FEET
0 20 40 80

REVISION DATES

CITY OF GAINESVILLE

OFFICE:

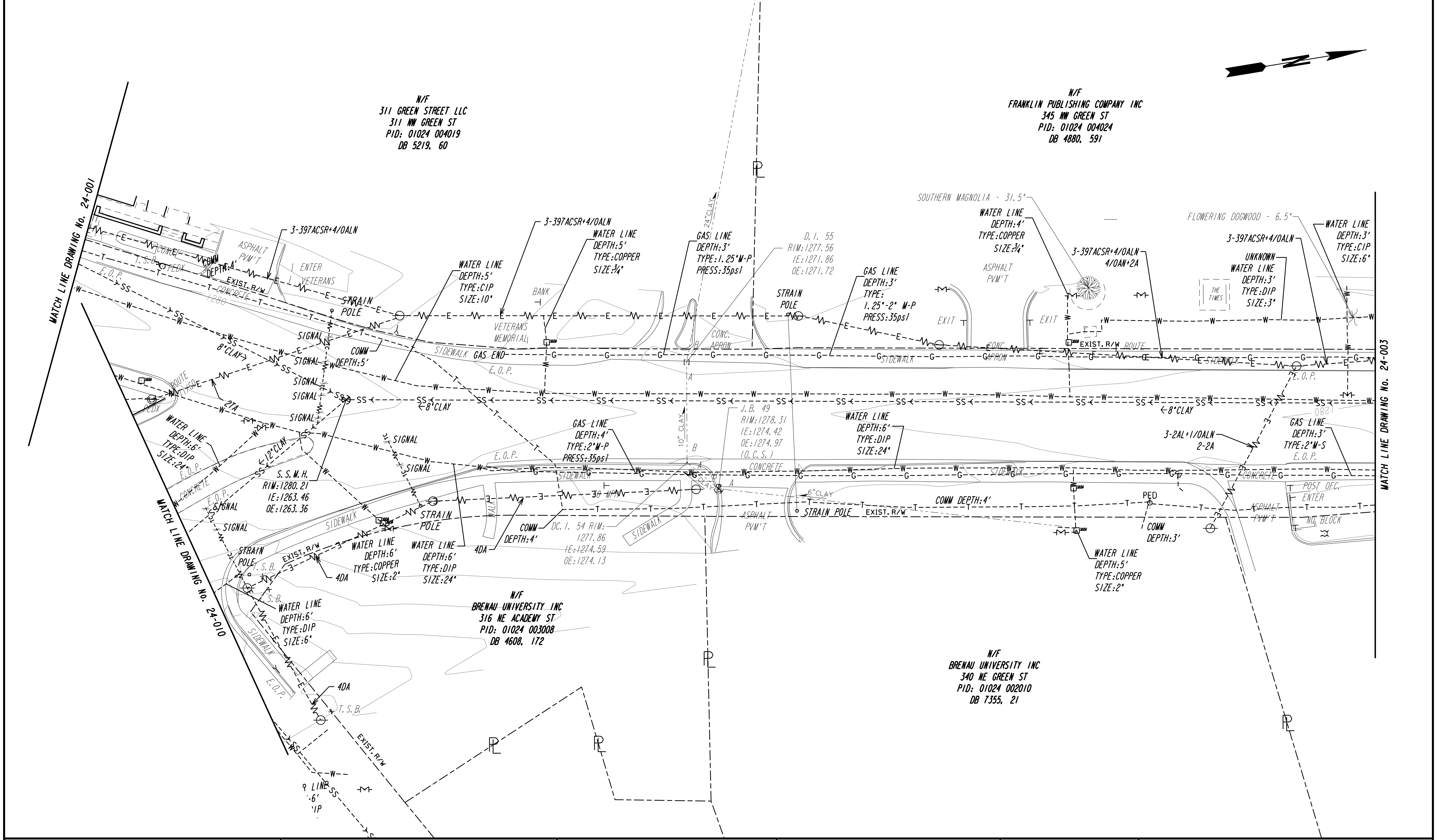
EXISTING SURVEY PLANS

GREEN STREET
HALL COUNTY

DRAWING No.
24-001

12/14/2012 GPLN

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	939-15-192	3	13



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SCALE IN FEET
0 20 40 80

REVISION DATES

CITY OF GAINESVILLE

OFFICE:

EXISTING SURVEY PLANS

GREEN STREET
HALL COUNTY

DRAWING No.
24-002

12/14/2012 GPLN

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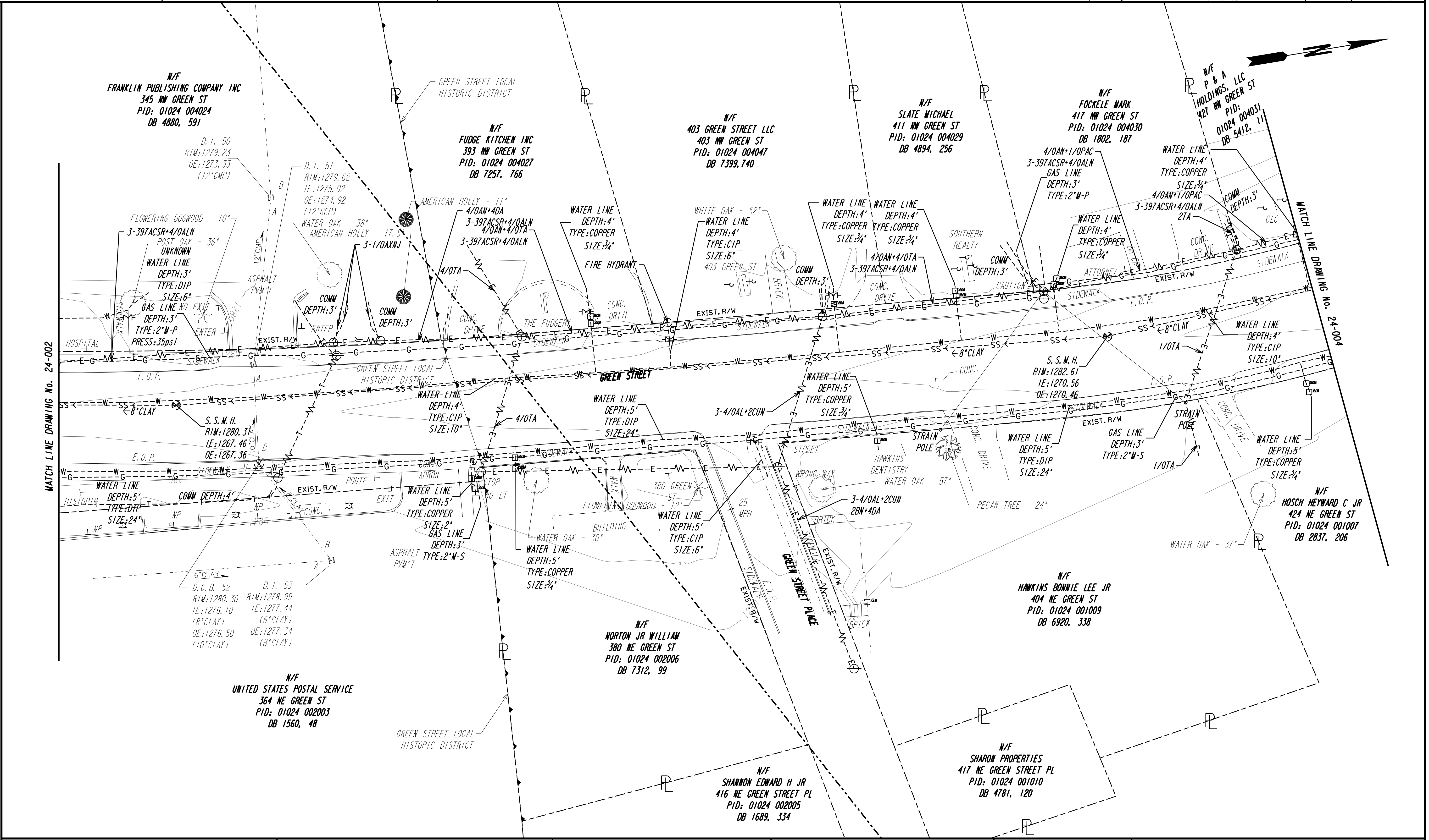

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SCALE IN FEET
0 20 40 80

REVISION DATES

CITY OF GAINESVILLE

OFFICE:

EXISTING SURVEY PLANS

GREEN STREET
HALL COUNTY

DRAWING No.
24-003

12/14/2012 GPLN

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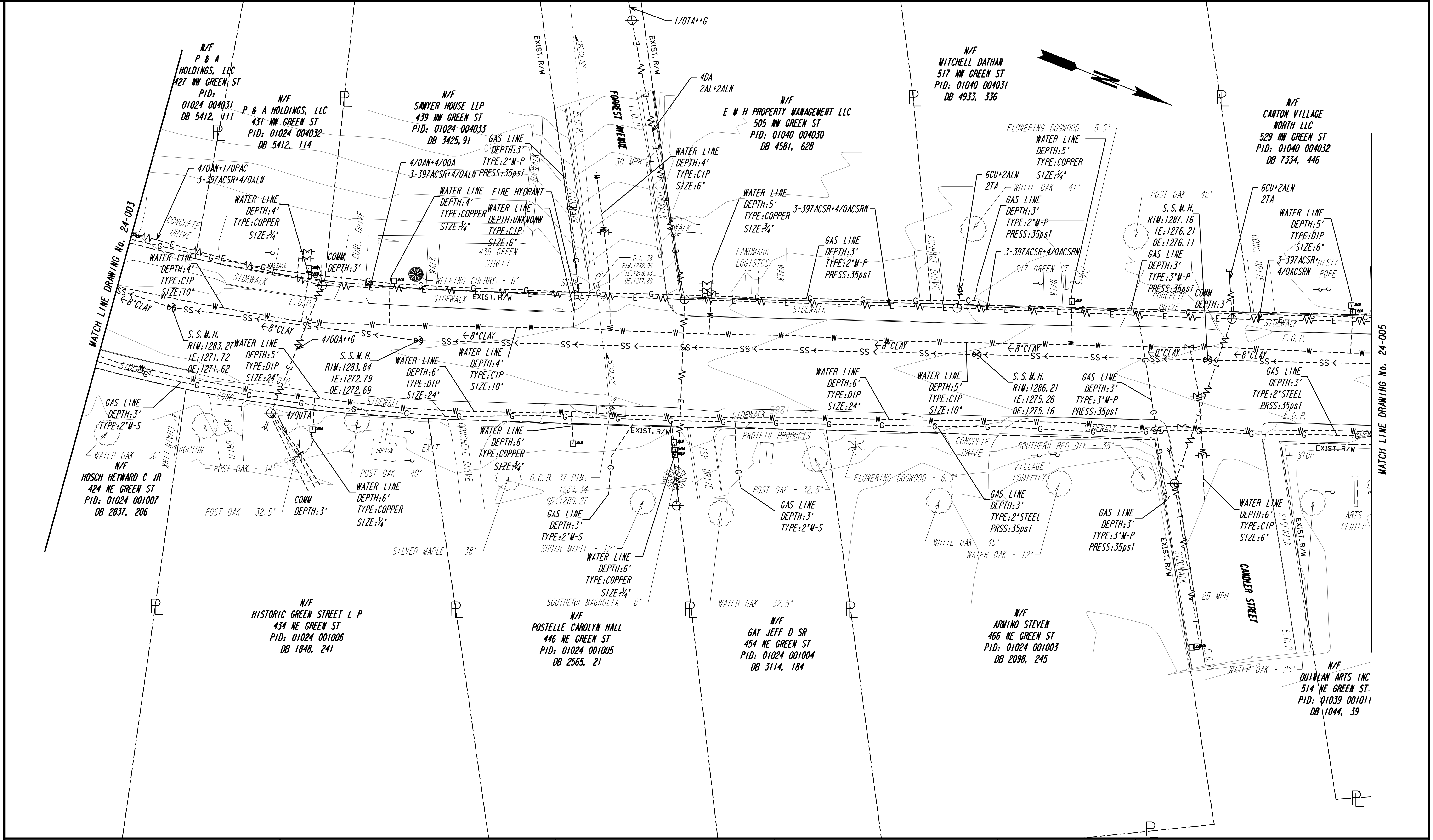

12/14/2012 GPLN

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SCALE IN FEET
0 20 40 80

REVISION DATES

CITY OF GAINESVILLE

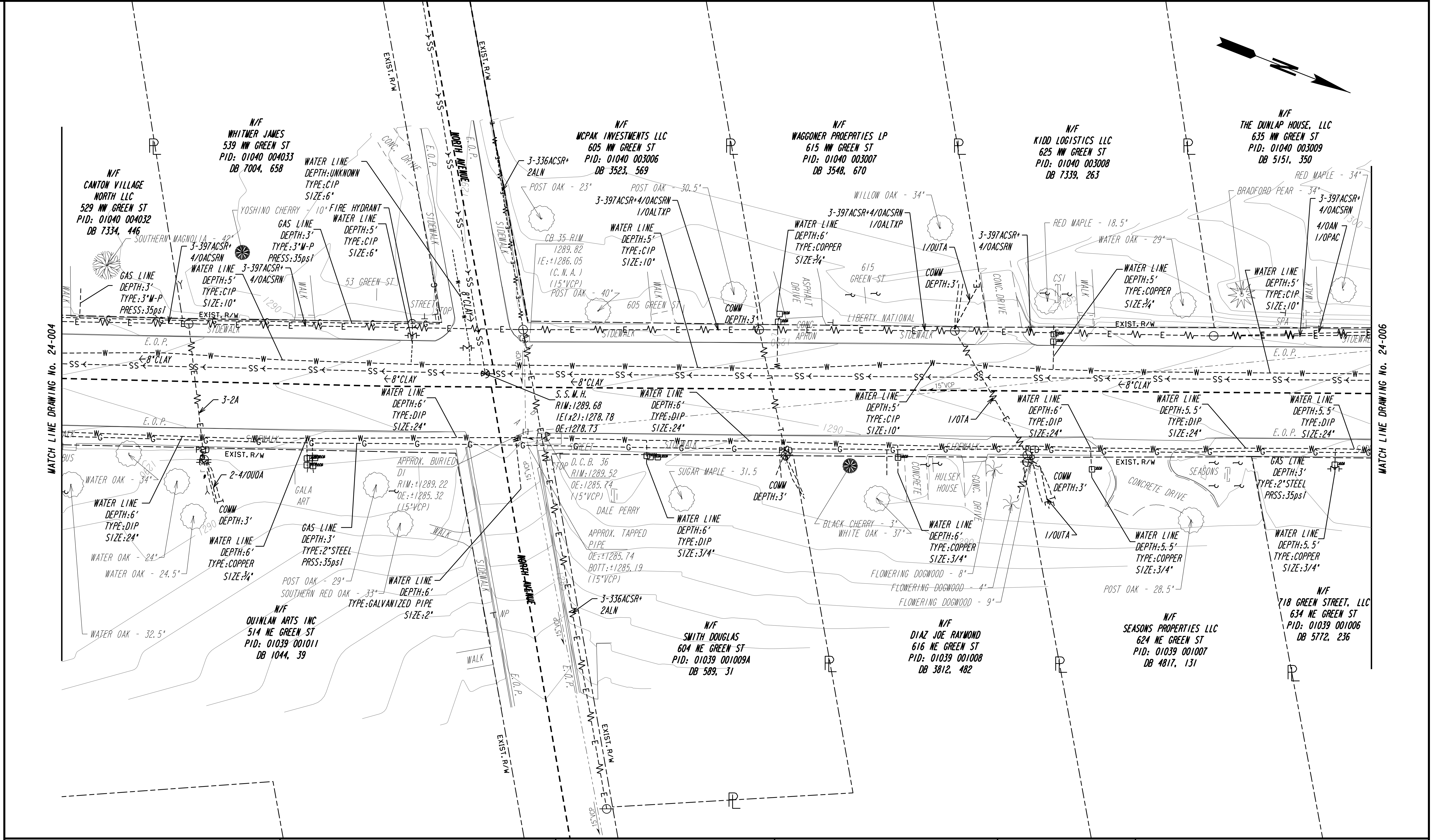
OFFICE:

EXISTING UTILITY PLANS

GREEN STREET
HALL COUNTY

DRAWING No.
24-004

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	939-15-192	6	13



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SCALE IN FEET
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CITY OF GAINESVILLE

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EXISTING SURVEY PLANS

GREEN STREET
HALL COUNTY

DRAWING No.
24-005

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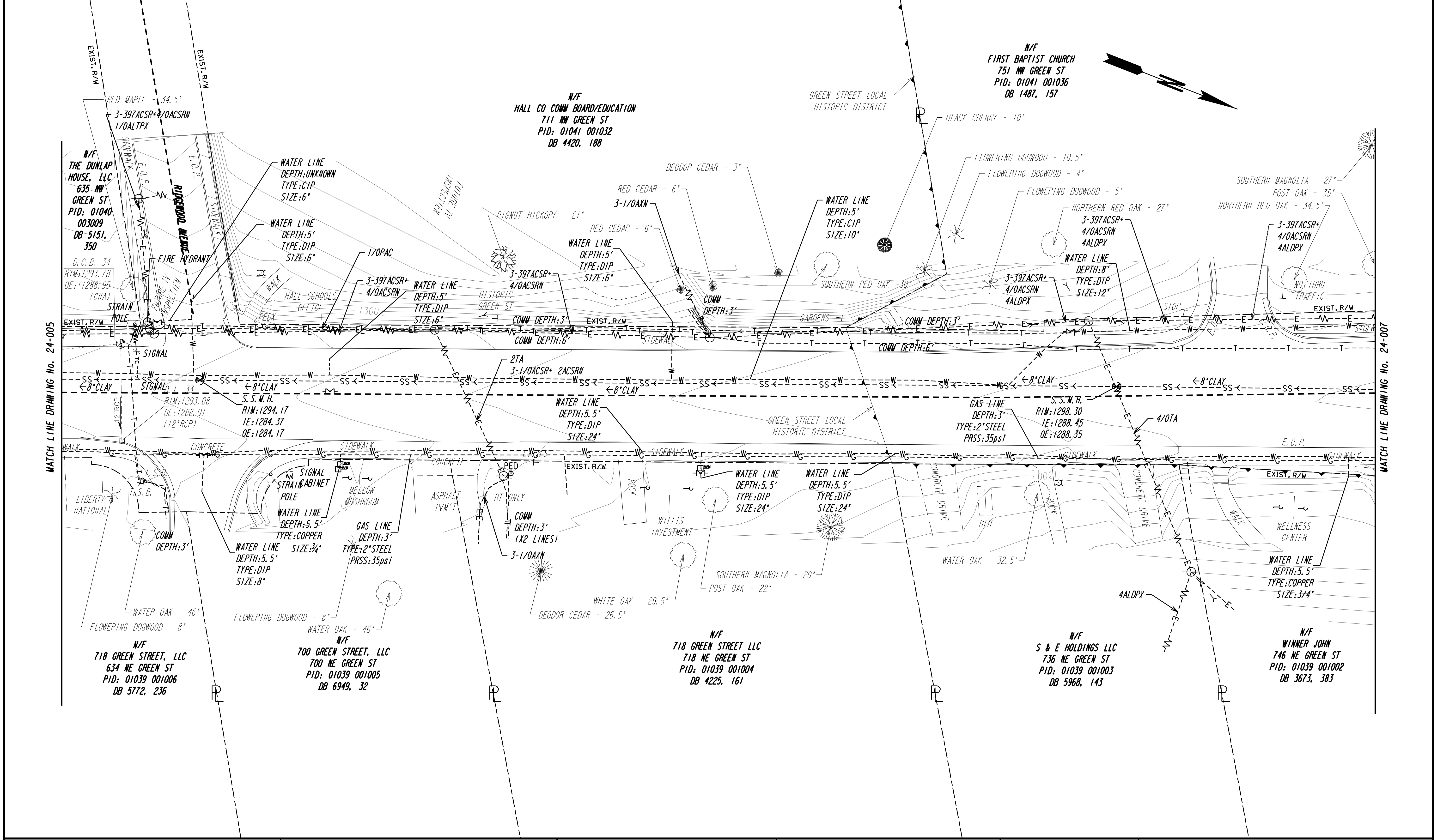

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SCALE IN FEET
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REVISION DATES

CITY OF GAINESVILLE

OFFICE:

EXISTING UTILITY PLANS

GREEN STREET
HALL COUNTY

DRAWING No.
24-006

12/14/2012 GPLN

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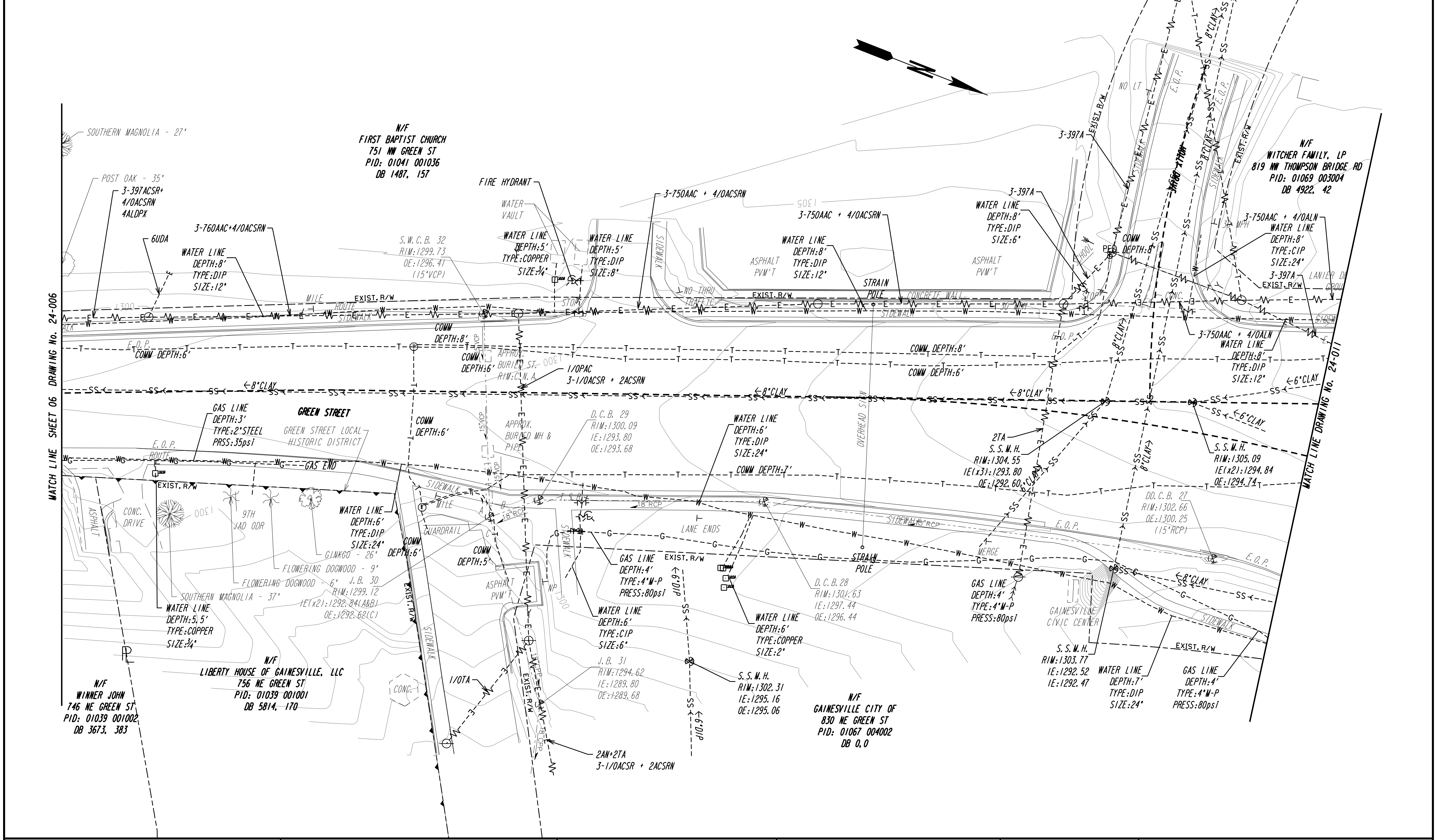

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SCALE IN FEET
0 20 40 80

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CITY OF GAINESVILLE

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GREEN STREET
HALL COUNTY

DRAWING No.
24-007

12/14/2012 GPLN

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GREEN STREET_24-008.dgn

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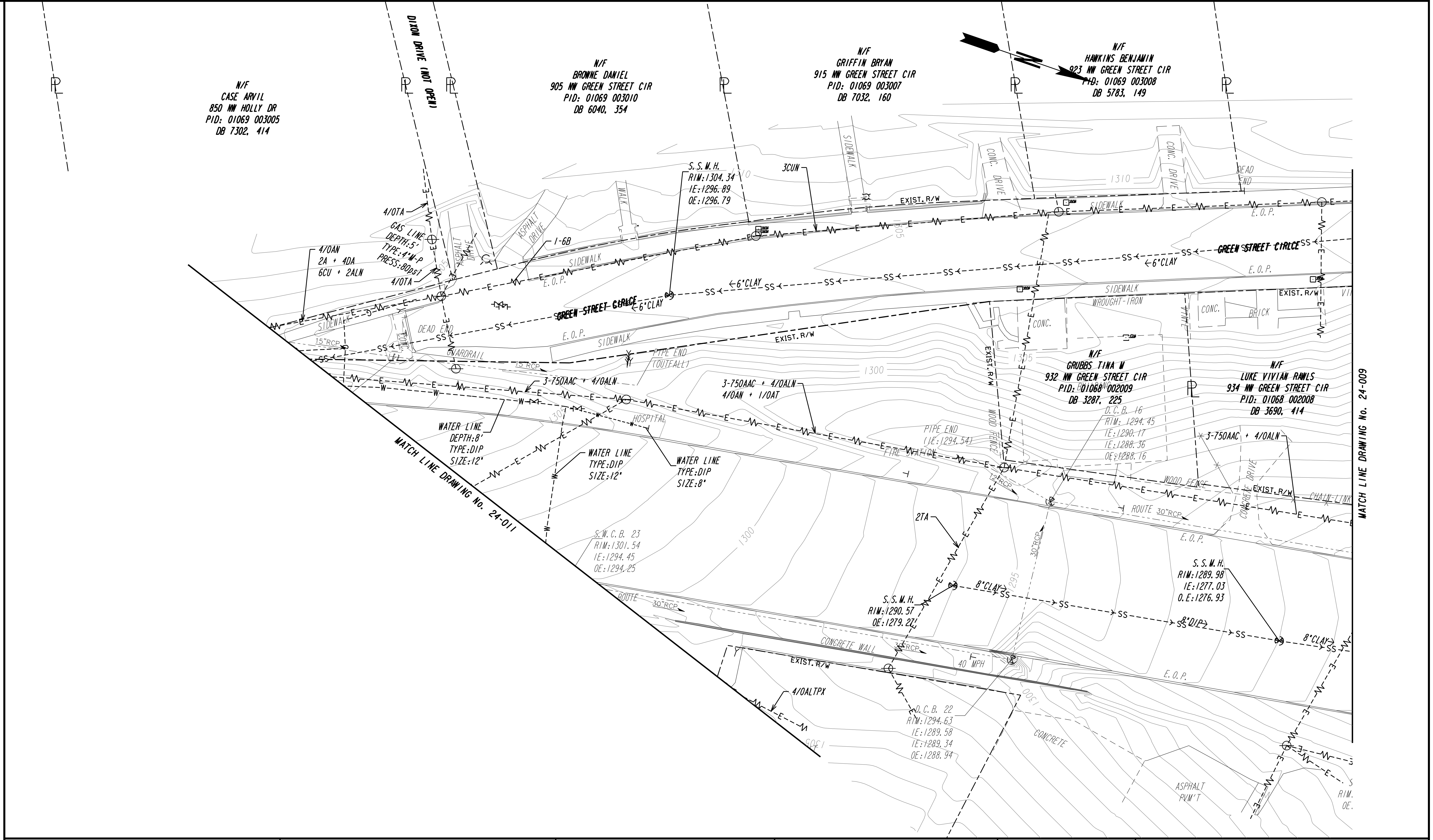

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GREEN STREET
HALL COUNTY

DRAWING No.
24-008

12/14/2012 GPLN

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
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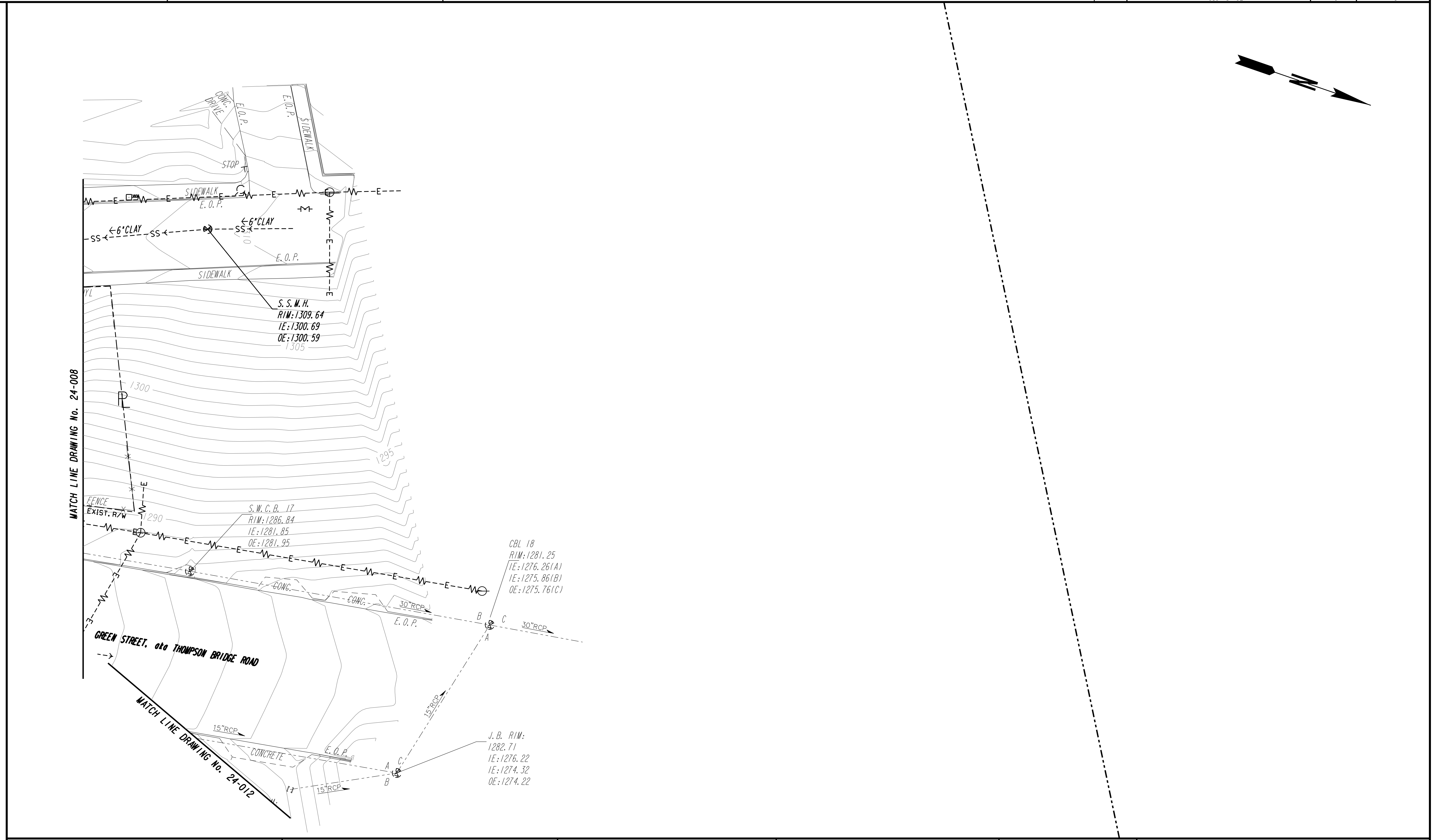

12/14/2012 GPLN

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GREEN STREET
HALL COUNTY

DRAWING No.
24-009

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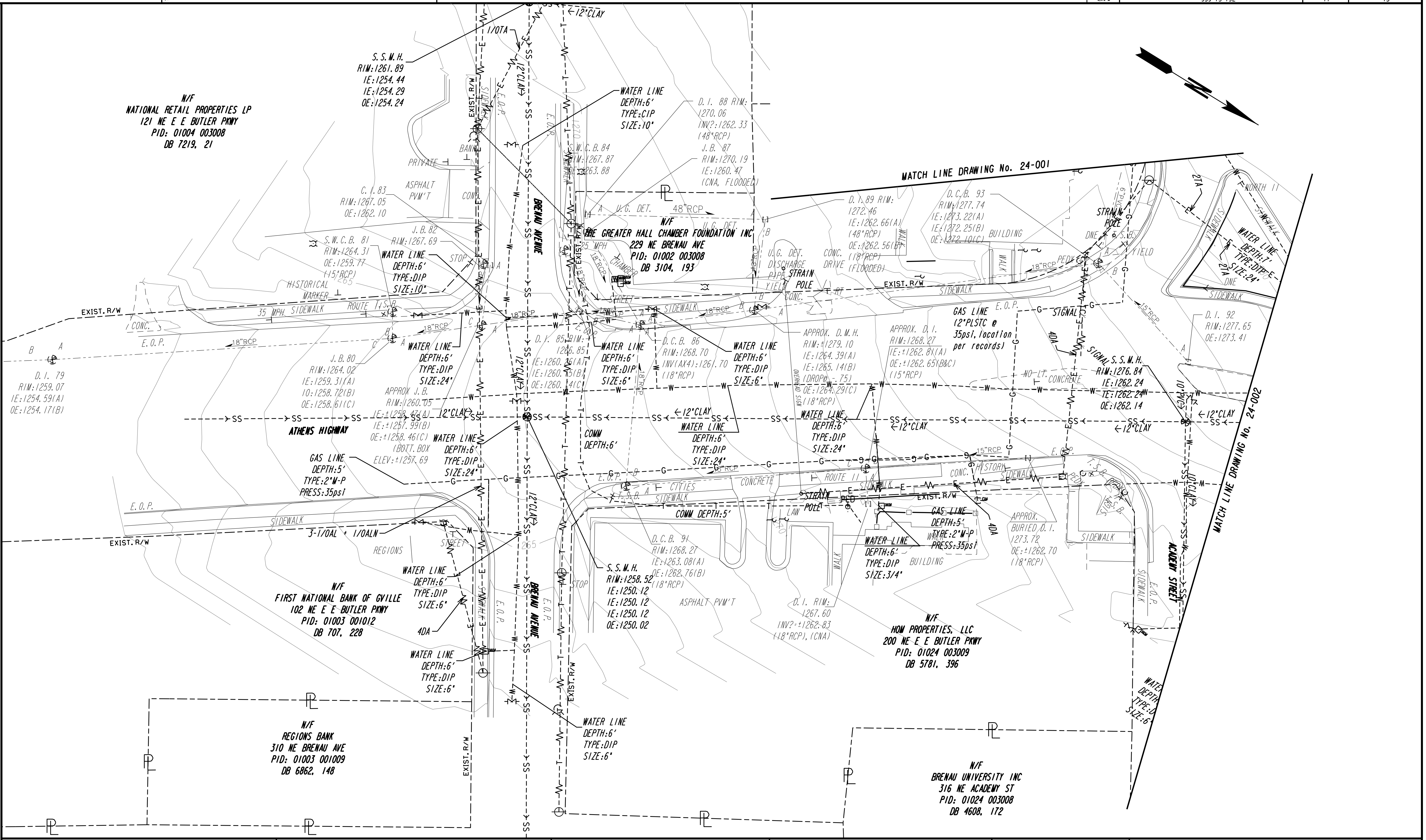

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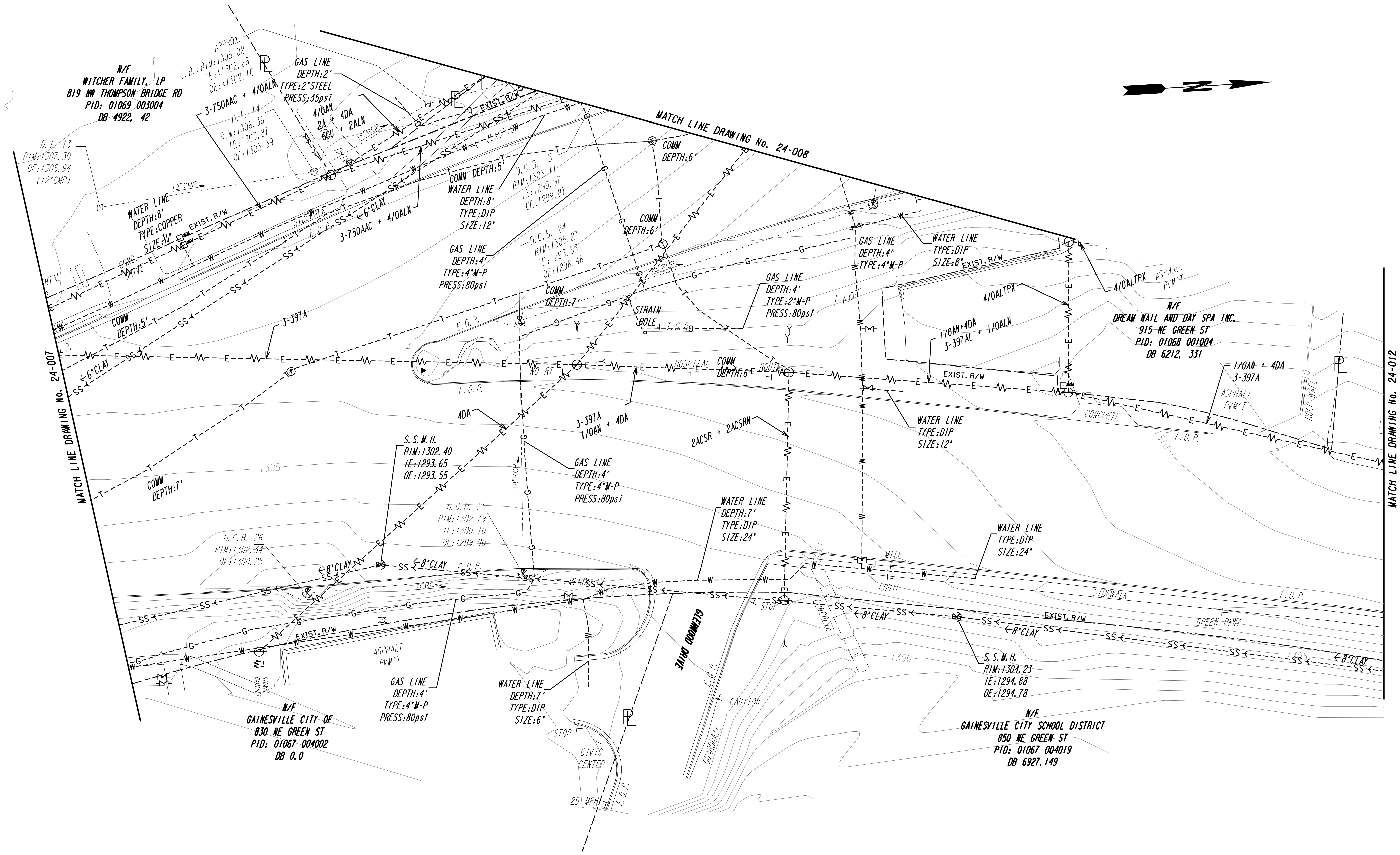
HALL COUNTY

DRAWING No.
24-010

12/14/2012 GPLN



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HALL COUNTY

DRAWING No.
24-011

12/14/2012 GPLN

5/10/2016 4:27:36 PM
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GPLOT-V8
gplotborder-V8i-PO - Green Street.tbl

GREEN STREET_24-012.dgn

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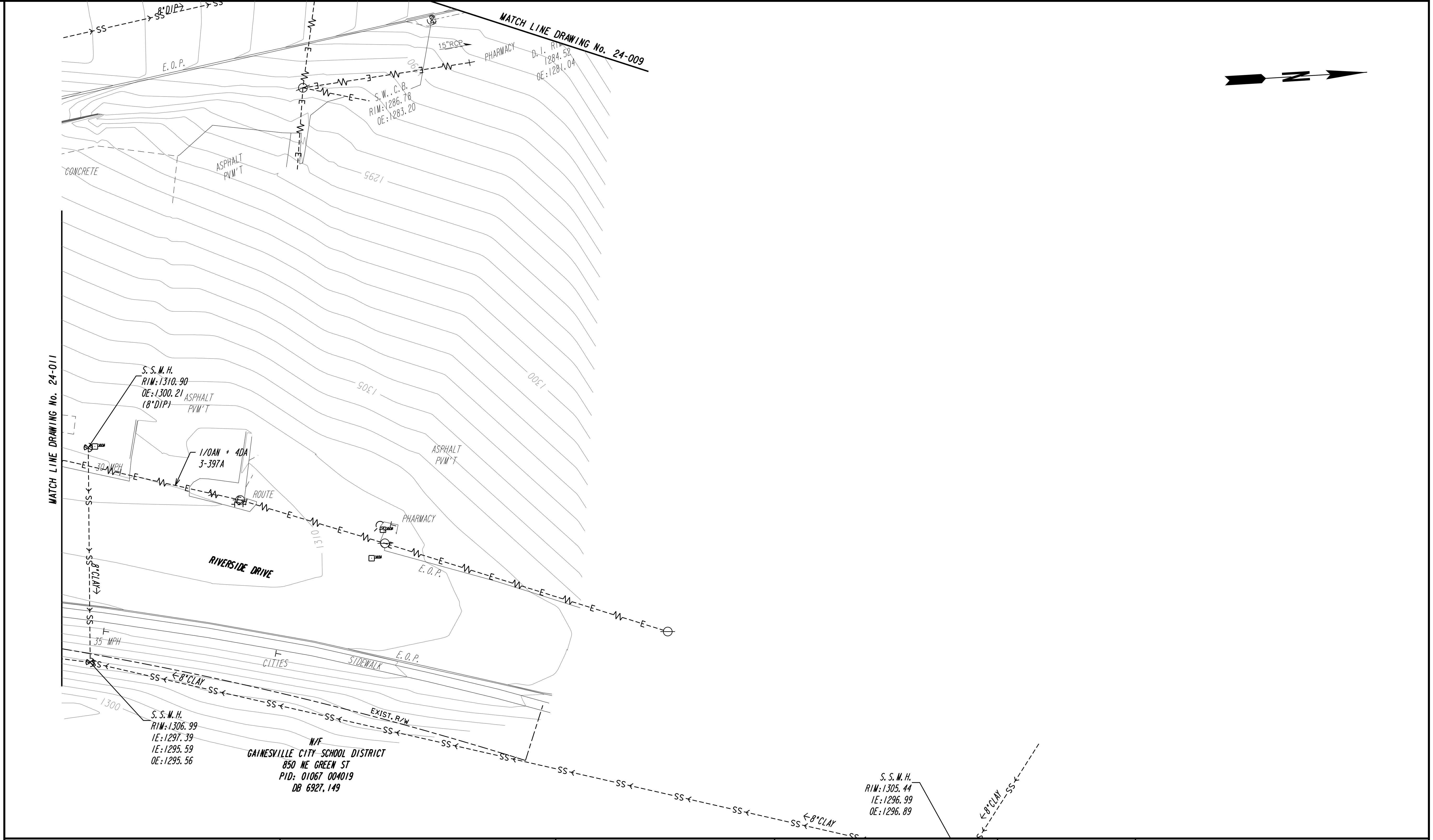

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HALL COUNTY

DRAWING No.
24-012

12/14/2012 GPLN