HEINRICH & ASSOCIATES
RESIDENTIAL & COMMERCIAL DESIGN

July 5, 2022

Mississippi State Department of Environmental Quality
Stormwater Division
515 East Amite Street
Jackson, Mississippi 39201

RE: Request for LCNOI Approval
Magnolia Walk Subdivision – Phase 2 – 42 Residential Lots
City of Pass Christian, Harrison County, MS

To Whom It May Concern:

For your review, please find in PDF format, the LCNOI application, construction plans, specifications, SWPPP, and drainage calculations for the above referenced project.

If you have any questions or need any additional information, please contact me at (228) 896-6768.

Sincerely,

Robert Heinrich
Heinrich & Associates

20-013

enclosures

MISSISSIPPI DEPARTMENT OF
ENVIRONMENTAL QUALITY

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY (MDEQ)
Large Construction Storm Water General Permit
NPDES Permit MSR10

LARGE CONSTRUCTION FORMS PACKAGE

These standard forms are used to apply for permit coverage under the Large Construction Storm Water General Permit and for submittals and record keeping required by permit conditions after coverage has been granted. The forms are on our website at www.deq.state.ms.us/MDEQ.nsf/page/epd_epdgeneral. Required information can be completed on screen, printed and signed.

Revised: 12/06/16

MISSISSIPPI DEPARTMENT OF
ENVIRONMENTAL QUALITY

LARGE CONSTRUCTION NOTICE OF INTENT (LCNOI) FOR COVERAGE UNDER THE LARGE CONSTRUCTION STORM WATER GENERAL NPDES PERMIT

INSTRUCTIONS

The Large Construction Notice of Intent (LCNOI) is for coverage under the Large Construction General Permit for land disturbing activities of five (5) acres or greater; or for land disturbing activities, which are part of a larger common plan of development or sale that are initially less than five (5) acres but will ultimately disturb five (5) or more acres. Applicant must be the owner or operator. For construction activities, the operator is typically the prime contractor. The owner(s) of the property and the prime contractor associated with regulated construction activity on the property have joint and severable responsibility for compliance with the Large Construction Storm Water General Permit MSR10.

If the company seeking coverage is a corporation, a limited liability company, a partnership, or a business trust, attach proof of its registration with the Mississippi Secretary of State and/or its Certificate of Good Standing. This registration or Certificate of Good Standing must be dated within twelve (12) months of the date of the submittal of this coverage form. Coverage will be issued in the company name as it is registered with the Mississippi Secretary of State.

Completed LCNOIs should be filed at least thirty (30) days prior to the commencement of construction. Discharge of storm water from large construction activities without written notification of coverage is a violation of state law.

Submittals with this LCNOI must include:
- **A site-specific Storm Water Pollution Prevention Plan (SWPPP) developed in accordance with ACT5 of the General Permit**
- **A detailed site-specific scaled drawing showing the property layout and the features outlined in ACT5 of the General Permit**
- **A United States Geological Survey (USGS) quadrangle map or photocopy, extending at least one-half mile beyond the facility property boundaries with the site location and outfalls outlined or highlighted. The name of the quadrangle map must be shown on all copies. Quadrangle maps can be obtained from the MDEQ, Office of Geology at 601-961-5523.**

Additional submittals may include the following, if applicable:
- **Appropriate Section 404 documentation from U.S. Army Corps of Engineers**
- **Appropriate documentation concerning future disposal of sanitary sewage and sewage collection system construction**
- **Appropriate documentation from the MDEQ Office of Land & Water concerning dam construction and low flow requirements**
- **Approval from County Utility Authority in Hancock, Harrison, Jackson, Pearl River and Stone Counties**

ALL QUESTIONS MUST BE ANSWERED (Answer "NA" if the question is not applicable)

MSR10 _ _ _ _

(NUMBER TO BE ASSIGNED BY STATE)

APPLICANT IS THE: ☑ **OWNER** ☐ **PRIME CONTRACTOR**

OWNER CONTACT INFORMATION

OWNER CONTACT PERSON: Raymond Necaise

OWNER COMPANY LEGAL NAME: Heritage Development, Inc.

OWNER STREET OR P.O. BOX: 7394 Magnolia

OWNER CITY: Pass Christian **STATE:** MS **ZIP:** 39571

OWNER PHONE #: (228) 363-1464 **OWNER EMAIL:** rnecaise@bellsouth.net

PRIME CONTRACTOR CONTACT INFORMATION

PRIME CONTRACTOR CONTACT PERSON: N/A

PRIME CONTRACTOR COMPANY LEGAL NAME: N/A

PRIME CONTRACTOR STREET OR P.O. BOX: N/A

PRIME CONTRACTOR CITY: _____ **STATE:** _____ **ZIP:** _____

PRIME CONTRACTOR PHONE #: (___)_____ **PRIME CONTRACTOR EMAIL:** _____

FACILITY SITE INFORMATION

FACILITY SITE NAME: Magnolia Walk - Phase 2 - 42 Residential Lots

FACILITY SITE ADDRESS (If the physical address is not available, please indicate the nearest named road. For linear projects indicate the beginning of the project and identify all counties the project traverses.)

STREET: Magnolia Blvd (Magnolia Loop) and Lobouy Rd.

CITY: Pass Christian STATE: MS COUNTY: Harrison ZIP: 39571

FACILITY SITE TRIBAL LAND ID (N/A If not applicable): N/A

LATITUDE: 30 **degrees** 23 **minutes** 43 N **seconds** **LONGITUDE:** 89 **degrees** 16 **minutes** 22 W **seconds**

LAT & LONG DATA SOURCE (GPS *(Please GPS Project Entrance/Start Point)* or Map Interpolation): Google Maps

TOTAL ACREAGE THAT WILL BE DISTURBED [1]: 24.62+/-

IS THIS PART OF A LARGER COMMON PLAN OF DEVELOPMENT? **YES** ☑ **NO** ☐

IF YES, NAME OF LARGER COMMON PLAN OF DEVELOPMENT: Magnolia Walk - Future Phases 3-6
AND PERMIT COVERAGE NUMBER: MSR10_ _ _ _

ESTIMATED CONSTRUCTION PROJECT START DATE: 8-15-22 (YYYY-MM-DD)

ESTIMATED CONSTRUCTION PROJECT END DATE: 3-1-23 (YYYY-MM-DD)

DESCRIPTION OF CONSTRUCTION ACTIVITY: Clearing,Grubbing,Water/Sewer Install; Sub-Surf. Drainage

PROPOSED DESCRIPTION OF PROPERTY USE AFTER CONSTRUCTION HAS BEEN COMPLETED:
42 Lot Residential Subdivision

SIC Code ___ ___ ___ ___ **NAICS Code** _ _ _ _ _ _

NEAREST NAMED RECEIVING STREAM: De Lisle Bayou

IS RECEIVING STREAM ON MISSISSIPPI'S 303(d) LIST OF IMPAIRED WATER BODIES? (The 303(d) list of impaired waters and TMDL stream segments may be found on MDEQ's web site: http://www.deq.state.ms.us/MDEQ.nsf/page/TWB_Total_Maximum_Daily_Load_Section) YES☐ NO☑

HAS A TMDL BEEN ESTABLISHED FOR THE RECEIVING STREAM SEGMENT? YES☐ NO☑

ARE THERE RECREATIONAL STREAMS, PRIVATE/PUBLIC PONDS OR LAKES WITHIN ½ MILE DOWNSTREAM OF PROJECT BOUNDRY THAT MAY BE IMPACTED BY THE CONSTRUCTION ACTIVITY? YES☑ NO☐

EXISTING DATA DESCRIBING THE SOIL (for linear projects please describe in SWPPP):
Sandy Soil

WILL FLOCCULANTS BE USED TO TREAT TURBIDITY IN STORM WATER? YES☐ NO☑

IF YES, INDICATE THE TYPE OF FLOCCULANT.
☐ **ANIONIC POLYACRYLIMIDE (PAM)**
☐ **OTHER** _____

IF YES, DOES THE SWPPP DESCRIBE THE METHOD OF INTRODUCTION, THE LOCATION OF INTRODUCTION AND THE LOCATION OF WHERE FLOCCULATED MATERIAL WILL SETTLE? YES☐ NO☐

[1]Acreage for subdivision development includes areas disturbed by construction of roads, utilities and drainage. Additionally, a housesite of at least 10,000 ft^2 per lot (entire lot, if smaller) shall be included in calculating acreage disturbed.

DOCUMENTATION OF COMPLIANCE WITH OTHER REGULATIONS/REQUIREMENTS

COVERAGE UNDER THIS PERMIT WILL NOT BE GRANTED UNTIL ALL OTHER REQUIRED MDEQ PERMITS AND APPROVALS ARE SATISFACTORILY ADDRESSED

IS LCNOI FOR A FACILITY THAT WILL REQUIRE OTHER PERMITS? YES ☐ NO ☑

IF YES, CHECK ALL THAT APPLY: ☐ AIR ☐ HAZARDOUS WASTE ☐ PRETREATMENT

☐ WATER STATE OPERATING ☐ INDIVIDUAL NPDES ☐ OTHER: _____

IS THE PROJECT REROUTING, FILLING OR CROSSING A WATER CONVEYANCE OF ANY KIND? (If yes, contact the U.S. Army Corps of Engineers' Regulatory Branch for permitting requirements.) YES ☐ NO ☑

IF THE PROJECT REQUIRES A CORPS OF ENGINEER SECTION 404 PERMIT, PROVIDE APPROPRIATE DOCUMENTATION THAT:

- **The project has been approved by individual permit, or**
- **The work will be covered by a nationwide permit and NO NOTIFICATION to the Corps is required, or**
- **The work will be covered by a nationwide or general permit and NOTIFICATION to the Corps is required**

IS A LAKE REQUIRING THE CONSTRUCTION OF A DAM BEING PROPOSED? (If yes, provide appropriate approval documentation from MDEQ Office of Land and Water, Dam Safety.) YES ☐ NO ☑

IF THE PROJECT IS A SUBDIVISION OR A COMMERCIAL DEVELOPMENT, HOW WILL SANITARY SEWAGE BE DISPOSED? Check one of the following and attach the pertinent documents.

☑ **Existing Municipal or Commercial System. Please attach plans and specifications for the collection system and the associated "Information Regarding Proposed Wastewater Projects" form or approval from County Utility Authority in Hancock, Harrison, Jackson, Pearl River and Stone Counties. If the plans and specifications can not be provided at the time of LCNOI submittal, MDEQ will accept written acknowledgement from official(s) responsible for wastewater collection and treatment that the flows generated from the proposed project can and will be transported and treated properly. The letter must include the estimated flow.**

☐ **Collection and Treatment System will be Constructed. Please attach a copy of the cover of the NPDES discharge permit from MDEQ or indicate the date the application was submitted to MDEQ (Date: _____.)**

☐ **Individual Onsite Wastewater Disposal Systems for Subdivisions Less than 35 Lots. Please attach a copy of the Letter of General Acceptance from the Mississippi State Department of Health or certification from a registered professional engineer that the platted lots should support individual onsite wastewater disposal systems.**

☐ **Individual Onsite Wastewater Disposal Systems for Subdivisions Greater than 35 Lots. A determination of the feasibility of installing a central sewage collection and treatment system must be made by MDEQ. A copy of the response from MDEQ concerning the feasibility study must be attached. If a central collection and wastewater system is not feasible, then please attach a copy of the Letter of General Acceptance from the State Department of Health or certification from a registered professional engineer that the platted lots should support individual onsite wastewater disposal systems.**

INDICATE ANY LOCAL STORM WATER ORDINANCE WITH WHICH THE PROJECT MUST COMPLY:

Harrison County Stormwater Ordinance

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Russell R. Necaise Jr.

Signature of Applicant[1] (owner or prime contractor)

1-17-22

Date Signed

Raymond Necaise

Printed Name[1]

Owner

Title

[1]This application shall be signed as follows:

- **For a corporation, by a responsible corporate officer.**
- **For a partnership, by a general partner.**
- **For a sole proprietorship, by the proprietor.**

For a municipal, state or other public facility, by principal executive officer, mayor, or ranking elected official

Please submit the LCNOI form to:

Chief, Environmental Permits Division
MS Department of Environmental Quality, Office of Pollution Control
P.O. Box 2261
Jackson, Mississippi 39225

PRIME CONTRACTOR CERTIFICATION

LARGE CONSTRUCTION GENERAL PERMIT

Coverage No. MSR10 __ __ __ __ County _____

(Fill in your Certificate of Coverage Number and County)

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

By completing and submitting this form to MDEQ, the prime contractor is certifying that (1) they have operational control over the erosion and sediment control specifications (including the ability to make modifications to such specifications) or (2) they have day-to-day operational control of those activities at the site necessary to ensure compliance with the SWPPP and applicable permit conditions.

The owner(s) of the property and the prime contractor associated with regulated construction activity on the property have joint and severable responsibility for compliance with the permit. Notwithstanding any permit condition to the contrary, the coverage recipient and any person who causes pollution of waters of the state or places waste in a location where they are likely to cause pollution of any waters of the state shall remain responsible under applicable federal and state laws and regulations and applicable permits.

PRIME CONTRACTOR INFORMATION

PRIME CONTRACTOR CONTACT PERSON: N/A **PHONE NUMBER: (__)_____**

PRIME CONTRACTOR COMPANY: N/A

PRIME CONTRACTOR STREET (P.O. BOX): N/A

PRIME CONTRACTOR CITY: _____ **STATE:** _____ **ZIP:** _____

E-MAIL ADDRESS: _____

OWNER INFORMATION

OWNER CONTACT PERSON: Raymond Necaise **PHONE NUMBER:** (228) 363-1464

OWNER COMPANY NAME: Heritage Development, Inc.

PROJECT INFORMATION

PROJECT NAME: Magnolia Walk - Phase 2 - 42 Lot Residential Subdivision

DESCRIPTION OF CONSTRUCTION ACTIVITY: Clearing, Grubbing, Water/Sewer Installation, Sub-Surface Drainage, and Detention Pond.

PHYSICAL SITE ADDRESS (If the physical address is not available indicate the nearest named road. For linear projects, indicate the beginning of the project and identify all counties the project traverses.)

STREET: Magnolia Blvd (Magnolia Loop) and Lobouy Rd.

CITY: Pass Christian **COUNTY:** Harrison

I certify that I am the prime contractor for this project and will comply with all the requirements in the above referenced general NPDES permit. I further certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____ _____

Prime Contractor Signature[1] **Date Signed**

Raymond Necaise Owner

Printed Name[1] **Title**

[1]**This application shall be signed as follows:**

- **For a corporation, by a responsible corporate officer.**
- **For a partnership, by a general partner.**
- **For a sole proprietorship, by the proprietor.**
- **For a municipal, state or other public facility, by principal executive officer, mayor, or ranking elected official.**

This Prime Contractors Certification form shall be submitted to:

Chief, Environmental Permits Division
MS Department of Environmental Quality, Office of Pollution Control
P.O. Box 2261
Jackson, Mississippi 39225

Revised: 10/25/16

Keep a Copy at the Construction Site and Also Submit this Page to:
Chief, Environmental Permits Division
MS Department of Environmental Quality, Office of Pollution Control
P.O. Box 2261
Jackson, Mississippi 39225-2261

Registration Form for Residential Lot Coverage
under Mississippi's Large Construction Storm Water General Permit
INSTRUCTIONS

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

Coverage recipients for residential subdivision construction that do not retain responsibility for permit compliance for individual lots are to furnish this Registration to buyers of individual lots at the time of purchase. In addition, the attached Requirements for Individual Lots in Residential Subdivisions, the Site Inspection and Certification Form and the Large Construction Storm Water General Permit shall also be given to buyers of individual lots at the time of purchase. This form is providing notification to buyers of lots in residential developments, that being part of a "larger common plan of development or sale," coverage is required under Mississippi's Large Construction Storm Water General Permit. To comply with the permit, **the Registration Form must be submitted to MDEQ** at the address listed above and a Storm Water Pollution Prevention Plan (SWPPP) must be developed and implemented to reduce pollutants in storm water discharges during construction activity. **The SWPPP is <u>not</u> required to be submitted to MDEQ**. A copy of the SWPPP and Registration Form must be kept at the construction site or locally available (i.e., able to be produced within an hour of being requested by a state or local inspector). See the following attachments for information on SWPPP development. In addition, **a copy of the completed Registration Form(s) must be retained by the developer and submitted to the MDEQ when requesting termination of permit coverage**. If the buyer or homebuilder sells the lot before a house is built, they must provide this form to the new owner. All questions must be answered. Answer "NA" if the question is not applicable. For further information, contact MDEQ at 601/961-5171 or access our website address: www.deq.state.ms.us/MDEQ.nsf/page/epd_epdgeneral.

ORGINAL COVERAGE RECIPIENT NAME:

COMPANY NAME:

STREET OR P.O. BOX:

CITY: **STATE:** **ZIP:**

PHONE # (INCLUDE AREA CODE):

BUYER / HOMEBUILDER:

COMPANY NAME (IF APPROPRIATE):

STREET OR P.O. BOX:

CITY: **STATE:** **ZIP:**

BUYER PHONE # (INCLUDE AREA CODE):

RESIDENTIAL SUBDIVISON NAME: _____

LARGE CONSTRUCTION STORM WATER PERMIT COVERAGE NUMBER: MSR10: ___ ___ ___ ___ 363-1464

LOT NUMBER(s) (attach an additional sheet if necessary): _____ **LOT SIZE(s):** _____

PHYSICAL SITE ADDRESS (IF NOT AVAILABLE INDICATE THE NEAREST NAMED ROAD):

STREET: _____

CITY: _____ **COUNTY:** _____ **ZIP:** _____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the persons or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. As a buyer / homebuilder, I further certify that I have read and understand the terms and conditions of Mississippi's Large Construction Storm Water General Permit and that I am responsible for installing and maintaining the appropriate pollution control measures for the purchased lot(s) identified.

Original Coverage Recipient Signature[1]	24.62+/- **Date Signed**
Printed Name	**Title**
Buyer / Homebuilder Signature[1]	**Date Signed**
Printed Name	**Title**

[1]**This application shall be signed according to ACT11, T-7 of the Large Construction General Permit.**

Revised: 12/12/16

REQUIREMENTS FOR LOTS IN RESIDENTIAL SUBDIVISION WHICH ARE COVERED BY THE LARGE CONSTRUCTION STORM WATER GENERAL PERMIT

As a homebuilder on a lot that is part of a regulated subdivision, you are also regulated under the State's storm water regulations and are required to take steps to keep soil and sediment from leaving the lot. When rain falls on exposed soil it can wash away valuable topsoil. It also carries sediment, nutrients and other pollutants into streets, gutters and ditches, where it then travels to lakes, rivers, streams or wetlands. Polluted runoff can cause excessive growth of aquatic weeds and algae and reduce recreational opportunities such as swimming and fishing. Sediment laden runoff can also destroy fish habitat reducing productive fishing opportunities. In addition, sediment-laden runoff can also clog pipes, ditches, streams and basins resulting in increased flooding and maintenance cost. Therefore, the homebuilder is required to minimize off-site damage from soil erosion, sediment leaving the construction site, and poor "housekeeping" practices. This requirement must be accomplished by developing and implementing a Storm Water Pollution Prevention Plan (SWPPP). Some examples of individual lot SWPPPs are attached for your convenience. Sketch the controls on a copy of your site plan. Narrative notes on the site plan may also be used in addition to the erosion control symbols.

In developing and implementing the SWPPP, controls must be used from each control group (vegetative, structural, housekeeping) to prevent erosion and sediment and other pollutants from leaving the site. Commonly used controls include:

Vegetative Controls

Temporary vegetation includes annual grasses that sprout quickly such as annual rye, browntop millet, oats, and winter wheat. These grow quickly with little care and can protect the soil from rainfall and act as a filter. They will not provide permanent cover. Permanent cover must be established as indicated below. When a disturbed area will be left undisturbed for fourteen (14) days or more, the appropriate temporary or permanent vegetative practices shall be implemented immediately.

Mulching is the placement of hay grass, woodchips, straw, or synthetic material on the soil to provide temporary cover to protect the soil from rain. Mulching may be the only option during the winter when seeding or sodding is not possible. Mulch must stay in place to be effective. Netting, stakes or chemical binders are used to anchor some types of mulch. Be sure to reinstall washed-out mulch and anchor if necessary until permanent cover is established.

Permanent stabilization is the establishment of a permanent vegetative cover on disturbed areas using either sod, perennial seed, trees or shrubs. When a disturbed area will be left undisturbed for fourteen (14) days or more, the appropriate temporary or permanent vegetative practices shall be implemented immediately. Silt fences, and other temporary measures must be removed following permanent stabilization.

Vegetative buffer zones are undisturbed or planted vegetated areas that are between construction activities and water bodies.

Structural Controls

Silt fences are temporary sediment barriers made of filter fabric buried at the bottom, stretched, and supported by stakes. The silt fence slows runoff and allows it to puddle or pond, so soil and sediment can settle out before leaving the site. The bottom eight to twelve inches of fence must either be sliced in or buried in a trench about four to six inches deep by four to six inches wide. **Silt fences that are not buried are improperly installed. They have no useful function, are a waste of money, and may result in enforcement action**. Stakes must be on the downstream side of the fence and spaced about 3 feet apart. Silt fence must not be installed across streams, ditches, waterways, or other concentrated flow areas. Place fences on the contour or perpendicular to the slope of the hill so that water and sediment will pond behind the fence. **Turn ends uphill** to prevent water going around the end. Install on the downslope, downhill, downstream, or low side of your lot. Keep the fence/barrier in place until grass is established.

Slope drains are piping or lined channels that carry storm water downslope without erosion. A good example would be a downspout extender. Extenders may be used to protect temporarily stabilized areas from roof runoff. Extenders can direct water from roof gutters to paved or grassed areas. Remove extenders following permanent stabilization.

Construction entrance/exits are stone stabilized site entrances which reduce sediment tracked onto public roads. Apply gravel or crushed rock to the driveway area and restrict traffic to this one route. Use 3 to 6 inch gravel over a geotextile fabric. At the end of each day sweep or scrape up any soil tracked onto the street. Limit "standard" vehicle access (including workers' vehicles) to only streets and roads, keep vehicles off of future yard areas; limit tracking of mud onto streets by requiring any required vehicles to use designated access drives. Streets are conduits for storm water, it is important to keep mud and sediment off the streets.

Stockpiles of sand or soil should be covered with plastic or tarps at the end of each workday, or surrounded with silt fence or haybales. Do not locate a stockpile near a street, storm drain inlet, or ditch.

Erosion control blankets or mats are machine-produced mats of straw or other fibers held together with netting that provide temporary or permanent stabilization in critical areas, such as slopes or channels, so that vegetation may be established.

Storm Drain Inlets on the lot must be protected by surrounding or covering with a filter material until final stabilization has been achieved.

Additional Controls: The above controls are the more common practices used at small construction sites. There are a number of other controls, techniques and manufactured product available. A few examples include hydro seeding, diversion berms, silt dikes and fiber logs. Even something as simple as a tarp or plastic may provide temporary cover for small exposed areas. You may wish to contact an erosion and sediment control specialist, local building official, or MDEQ for further information. In addition, MDEQ has several guidance manuals that may be of assistance and the internet has abundant guidance on construction BMPs.

Housekeeping Controls: Pollutants that may enter storm water from construction sites because of poor housekeeping include oils, grease, paints, gasoline, solvents, litter, debris, and sanitary waste. Good housekeeping practices include:

- Frequent cleaning of trash and debris, providing waste receptacles at convenient locations and providing regular collection of waste;
- Directing concrete trucks to the subdivision's designated wash-off area(s) or back to the Ready-Mix facility;
- Providing protected storage areas for chemicals, paints, solvents, fertilizers, and other potentially toxic materials; and
- Providing adequately maintained sanitary facilities.

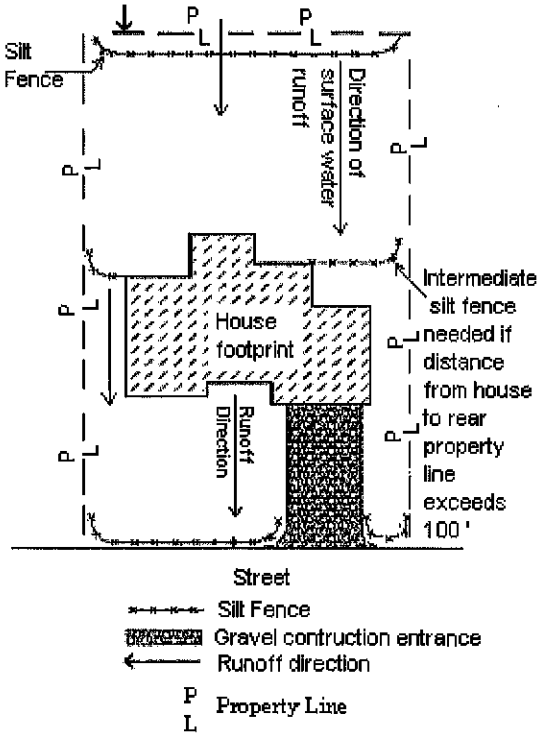
In addition, you should be aware that State air regulations prohibit the open burning of residential solid waste.

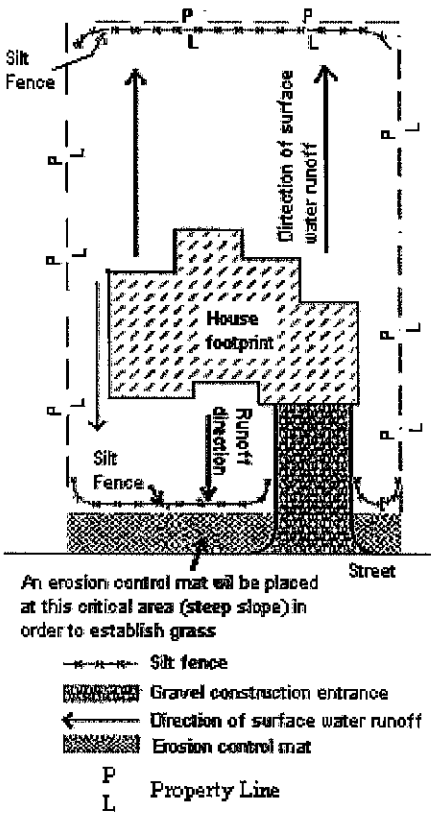
Inspection Requirements. Homebuilders shall inspect all erosion controls as often as is necessary, but no less than weekly, to ensure that appropriate erosion and sediment controls have been properly constructed and maintained to prevent erosion and sediment from leaving the site and determine if additional or alternative control measures are required. The inspection results shall be recorded on the Site Inspection and Certification Form contained in the Large Construction Forms Package. MDEQ strongly recommends that homebuilders perform "walk through" inspections daily. It is a responsibility of the homebuilder to install additional and/or alternative erosion and sediment controls when existing controls prove to be ineffective in preventing sediment from leaving the site.

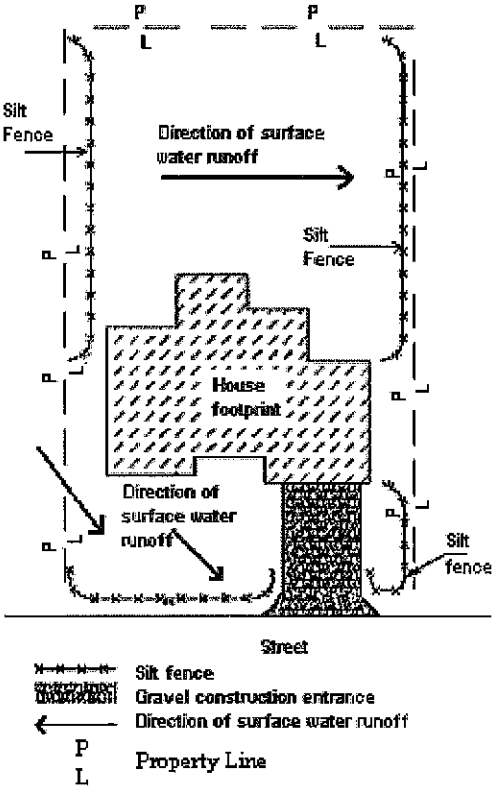
Retention of Records. All records, reports, forms and information resulting from activities required by this permit shall be retained for a period of at least three years from the date of the document origin.

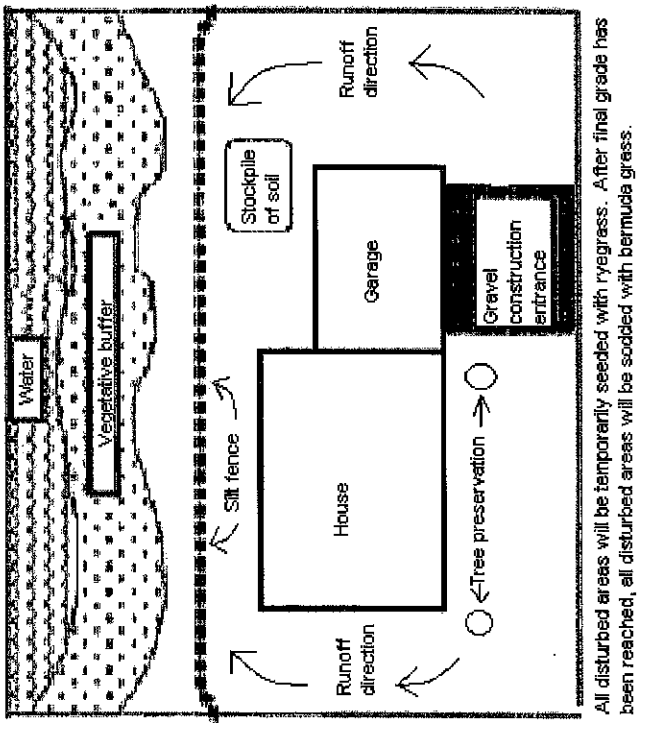
Duty to Comply. Lot owners must comply with the applicable permit conditions. See Activities 3, 5, 6, 7, 10 and 11 in the Large Construction Storm Water General Permit for applicable conditions. Any noncompliance with the applicable permit conditions and aforementioned conditions including sediment leaving the lot constitutes a violation of the Mississippi Water Pollution Control Law and is grounds for enforcement action. It shall not be an acceptable defense that controls were not installed because subsequent activities would require their replacement or cause their destruction.

EXAMPLE INDIVIDUAL LOT EROSION AND SEDIMENT CONTROL PLANS









Keep a Copy Available at the Permitted Facility or Locally Available
Submit the Inspection Reports Only if Requested by the Mississippi Department of Environmental Quality (MDEQ)

LARGE CONSTRUCTION GENERAL PERMIT
SITE INSPECTION AND CERTIFICATION FORM
COVERAGE NUMBER (MSR10 _ _ _ _)

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

INSTRUCTIONS

Results of construction storm water inspections required by ACT6 of this permit shall be recorded on this report form and kept with the Storm Water Pollution Prevention Plan (SWPPP) in accordance with the inspection documentation provisions of ACT9 of the this permit. Inspections shall be performed at least weekly for a minimum of four inspections per month. The coverage number must be listed at the top of all Inspection and Certification Forms.

COVERAGE RECIPIENT INFORMATION

OWNER/PRIME CONTRATOR NAME: Raymond Necaise

PROJECT NAME: Magnolia Walk Subdivision Phase 2

PROJECT STREET ADDRESS: Magnolia Blvd (Magnolia Loop) and Lobouy Rd.

PROJECT CITY: Pass Christian **PROJECT COUNTY:** Harrison

OWNER/PRIME CONTRACTOR MAILING ADDRESS: 7394 Magnolia

MAILING CITY: Pass Christian **STATE:** MS **ZIP:** 39571

CONTACT PERSON: Raymond Necaise **CONTACT PHONE NUMBER:** (228) 363-1464

EMAIL ADDRESS: rneicase@bellsouth.net

INSPECTION DOCUMENTATION

DATE (mo/day/yr)	TIME (hr:min AM/PM)	ANY DEFICIENCIES? (CHECK IF YES)	INSPECTOR(S)
		☐	
		☐	
		☐	
		☐	
		☐	
		☐	

Deficiencies Noted During any Inspection (give date(s); attach additional sheets if necessary): _____

Corrective Action Taken or Planned (give date(s); attach additional sheets if necessary): _____

Based upon this inspection, which I or personnel under my direct supervision conducted, I certify that all erosion and sediment controls have been implemented and maintained, except for those deficiencies noted above, in accordance with the Storm Water Pollution Prevention Plan (SWPPP) and sound engineering practices as required by the above referenced permit. I further certify that the LCNOI and SWPPP information is up to date.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Authorized Signature _____ Date _____

Raymond Necaise Printed Name

Owner Title

MAJOR MODIFICATION FORM
FOR LARGE CONSTRUCTION GENERAL PERMIT
Coverage No. MSR10 _ _ _ _ County _____

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

INSTRUCTIONS

Coverage recipients shall notify the Mississippi Department of Environmental Quality at least 30 days in advance of the following activities (check all that apply). This form should be submitted with a modified Storm Water Pollution Prevention Plan (SWPPP), updated USGS topographic map, Corps of Engineers Section 404 documentation and wastewater collection and treatment information, as appropriate.

☐ **SWPPP details have been developed and are ready for MDEQ review for subsequent phases of an existing, covered project.**

☐ **"Footprint" identified in the original LCNOI is proposed to be enlarged.**

This form must be signed by the current coverage recipient under Mississippi's Large Construction General Permit. A different developer of new phases of existing subdivisions must apply for separate permit coverage through the submittal of a new complete LCNOI package. Coverage recipients are authorized to discharge storm water associated with proposed expansions of existing subdivisions or subsequent phases, under the conditions of the General Permit, only upon receipt of written notification of approval by MDEQ. All other modifications, such as changes of erosion and sediment controls used, must be in accordance with ACT6, S-1 (6) and S-2 (7) of the General Permit.

ALL INFORMATION MUST BE COMPLETED (indicate "N/A" where not applicable)

COVERAGE RECIPIENT INFORMATION

COVERAGE RECIPIENT CONTACT NAME: _____ TEL # (_____) _____

COMPANY NAME: _____

STREET OR P.O. BOX: _____

CITY: _____ STATE: _____ ZIP: _____ E-MAIL: _____

PROJECT INFORMATION

PROJECT NAME: _____

CITY: _____

ADDITIONAL ACREAGE TO BE DISTURBED: _____ TOTAL PROJECT ACREAGE: _____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____ _____
Signature (must be signed by coverage recipient) Date

_____ _____
Printed Name Title

Please submit this form to:

Chief, Environmental Permits Division
MS Department of Environmental Quality, Office of Pollution Control
P.O. Box 2261
Jackson, Mississippi 39225

Revised: 12/12/16

Environmental Permits for Industrial Facilities
Request for Transfer of Permit, General Permit Coverage and/or Name Change

Instructions: For Ownership Change-Complete all Items on Page 1 (except Item VIII) and Page 2 (reverse side).
For Name Change Only-Complete Items I, II, V, VI, VII, VIII, and Page 2 (reverse side).
Note-This form should be submitted to MDEQ when a transferal date is finalized but prior to the actual transfer.

Item I.

Facility Name: _____

Location: (Do Not Use P.O. Box)

Street: _____

City: _____ State: MS Zip: _____

County: _____

Telephone: (_____)_____

Item II.

Responsible official after transfer or name change:

Name: _____

Title: _____

Mailing Address:
Street/P.O. Box: _____

City: _____ State: _____ Zip: _____

Telephone (_____)_____

Item III.

Previous Permittee[1]: _____

Mailing Address:

Street/P.O. Box:_____

City: _____ State: _____ Zip: _____

Telephone: (_____)_____

Item IV.

New Permittee[1]: _____

Mailing Address:

Street/P.O. Box:_____

City: _____ State: _____ Zip: _____

Telephone: (_____)_____

Item V.

Industrial Activity SIC Code: _____

Brief Description:

Item VI.

Will Facility Operations Change? Yes _____ No _____

If yes, the appropriate applications and permits may require modification prior to change.

Item VII.

Will Facility Name Change? Yes_____ No_____

If Yes, Provide New Name for Permit Coverage.

New Name:_____

Item VIII.

Signature for Name Change

Print Name: _____

Authorized Signature[2]: _____

Title: _____ Date: _____

Item IX.

We the undersigned request transfer of permit(s) and/or permit coverage(s) listed on the backside of this form.

From:_____

To:_____ Acquisition Date:_____

By signature below, the recipient certifies that: 1) they are aware of the requirements of the permit(s), 2) the applicant can demonstrate to the Permit Board it has the financial resources and operational expertise and 3) agrees to accept responsibility and liability for the permit(s) listed on the back of this document. By signature below, the previous permittee is requesting that the permit(s) and/or permit coverage(s) be transferred to the recipient. The transfer of the permit(s) or permit coverage(s) will be by written notification from the Office of Pollution Control (OPC). The OPC may require submittal of information regarding financial capability and past compliance history of the recipient.

_____ _____

Print New Permittee[1] Name Print Previous Permittee[1] Name

_____ _____

New Authorized Signature[2] Previous Authorized Signature[2]

_____ _____ _____ _____

Title Date Title Date

[1]A Permittee is a company or individual that has been issued an individual permit or coverage under a general permit.
[2]Authorized Signature must be owner or in the case of a corporation, a corporate officer as defined in Regulations 11 Miss. Admin. Code Pt. 2, Ch. 2. and 11 Miss. Admin. Code Pt. 6, Ch. 1.

Mississippi Department of Environmental Quality/Office of Pollution Control
P.O. Box 2261
Jackson, Mississippi 39225
(601) 961-5171

Item X. Storm Water	Item XI. Hazardous Waste ID Number
(Check One) ☐ A Storm Water Pollution Prevention Plan (SWPPP) is not required for the site. ☐ The recipient certifies that they have received a copy of the Office of Pollution Control approved SWPPP from the original owner. ☐ The recipient is submitting a new SWPPP, which is attached to this form. ☐ A copy of the SWPPP cannot be obtained from the original owner.	EPA ID No. ____________________ (Check One) ☐ An EPA Hazardous Waste ID Number is not required for the site. ☐ The site's EPA ID Number is listed above and a Notification of Regulated Waste Activity Form is attached.

Item XII. Permit(s) and/or Coverage(s) to be Transferred

Permit Type: ____________________ Permit/Coverage No.: ____________________ Permit Issuance Date: ____________________ Date of General Permit Coverage: ____________ Permit Expiration Date: ____________________	Permit Type: ____________________ Permit/Coverage No.: ____________________ Permit Issuance Date: ____________________ Date of General Permit Coverage: ____________ Permit Expiration Date: ____________________
Permit Type: ____________________ Permit/Coverage No.: ____________________ Permit Issuance Date: ____________________ Date of General Permit Coverage: ____________ Permit Expiration Date: ____________________	Permit Type: ____________________ Permit/Coverage No.: ____________________ Permit Issuance Date: ____________________ Date of General Permit Coverage: ____________ Permit Expiration Date: ____________________
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Permit Type: ____________________ Permit/Coverage No.: ____________________ Permit Issuance Date: ____________________ Date of General Permit Coverage: ____________ Permit Expiration Date: ____________________	OTHER INFORMATION:

INSPECTION SUSPENSION FORM

UNDER LARGE CONSTRUCTION STORM WATER GENERAL NPDES PERMIT MSR10

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

INSTRUCTIONS

Coverage recipients under Mississippi's Large Construction Storm Water General Permit may temporarily suspend required weekly inspections of erosion and sediment controls and monthly record keeping by submission of this form. Inspections may be suspended only when land disturbing activities have ceased, no further land disturbing activities are planned for a period of at least six (6) months, the site is stable with no active erosion, and vegetative cover has been established (see ACT9, S-1). The coverage recipient is responsible for all permit conditions during the suspension period and nothing in this condition shall limit the rights of MDEQ to take enforcement or other actions against the coverage recipient. Once land disturbing activities resume MDEQ must be notified and all inspections and record keeping required by the permit must also resume. Color photographs, representative of the construction site, must be submitted with this inspection form.

COVERAGE RECIPIENT INFORMATION

COVERAGE RECIPIENT CONTACT PERSON: _____

COMPANY NAME: _____

STREET OR P.O. BOX: _____

CITY: _____ STATE: _____ ZIP: _____

PHONE # (INCLUDE AREA CODE): _____ E-MAIL: _____

PROJECT INFORMATION

CONSTRUCTION STORM WATER GENERAL PERMIT COVERAGE NUMBER: MSR10 _ _ _ _

PROJECT NAME: _____

CITY: _____ COUNTY: _____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. **I further certify that: land disturbing activities have ceased, no further land disturbing activities are planned for a period of at least six (6) months, the site is stable with no active erosion, and vegetative cover has been established.**

_____ _____

Signature (must be signed by coverage recipient) Date Signed

_____ _____

Printed Name Title

Please submit this form to:

Chief, Environmental Permits Division
MS Department of Environmental Quality, Office of Pollution Control
P.O. Box 2261
Jackson, Mississippi 39225

Revised: 12/10/2016

Request for Termination (RFT) of Coverage

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

LARGE CONSTRUCTION GENERAL PERMIT

Coverage No. MSR10 __ __ __ __ County _____

(Fill in your Certificate of Coverage Number and County)

This form must be submitted within thirty (30) days of achieving final stabilization (see ACT10, S-1 of general permit). Failure to submit this form is a violation of permit conditions.

The signatory of this form must be the owner or operator (prime contractor) who is the current coverage recipient (rather than the project manager or environmental consultant).

(Please Print or Type)

Project Name: _____

Physical Site Street Address (if not available, indicate nearest named road): _____

City: _____ **County:** _____ **Zip:** _____

Coverage Recipient Company Name: _____

Street Address / P.O. Box: _____

City: _____ **State:** _____ **Zip:** _____

Coverage Recipient Contact Name and Position: _____ **Tel. #:** (____) _____

Has another owner(s) or operator(s) assumed control over all areas of the site that have not reached final stabilization?

RESIDENTIAL SUBDIVISIONS:

☐ **YES. A copy of the Registration Form for Residential Lot Coverage for each lot or out parcel that has been sold and a site map, indicating which lots have been sold, are attached.**

☐ **NO. Coverage may not be terminated until all areas have reached final stabilization.**

COMMERCIAL DEVELOPMENT:

☐ **YES. A copy of the site map, indicating which out-parcels have been sold, is attached.**

☐ **NO. Coverage may not be terminated until all areas have reached final stabilization.**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. I understand that by submitting this Request for Termination and receiving written confirmation, I will no longer be authorized to discharge storm water associated with construction activity under this general permit. Discharging pollutants associated with construction activity to waters of the State without proper permit coverage is a violation of state law. I also understand that the submittal of this Request for Termination does not release an owner or operator from liability for any violations of this permit or the Clean Water Act.

_____	_____	_____	_____
Authorized Name (Print)	Telephone	Signature	Date Signed

[1]This application shall be signed according to the General Permit, ACT11, T-7 as follows:

- For a corporation, by a responsible corporate officer.
- For a partnership, by a general partner.
- For a sole proprietorship, by the proprietor.
- For a municipal, state or other public facility, by principal executive officer, mayor, or ranking elected official.

After signing please mail to: Chief, Environmental Permits Division
MS Department of Environmental Quality, Office of Pollution Control
P.O. Box 2261
Jackson, Mississippi 39225

Revised: 12/01/16

MAGNOLIA WALK SUBDIVISION
PHASE 2

HARRISON COUNTY, MS

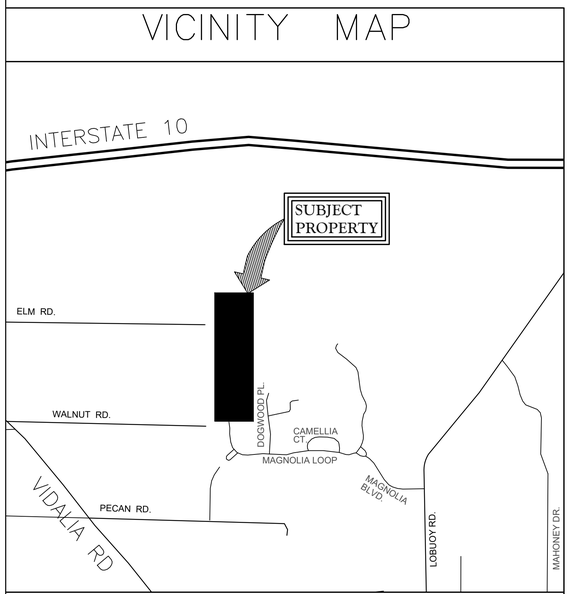
PARCEL NO. - 0310L-01-001.002

CLIENT:

HERITAGE DEVELOPMENT, INC.
7394 Magnolia
Pass Christian, MS 39571

May 13, 2022

VICINITY MAP



SECTION 13, T7S, R35W

NORTH

N.T.S.

T. J. MORAN, JR. REGISTERED PROFESSIONAL ENGINEER 6005 STATE OF MISSISSIPPI

TME

TERRY MORAN
ENGINEERING & SURVEYING
TERRY MORAN, P.E., P.L.S.
P.O. BOX 4075 -
Biloxi, MS 39535
Ph (228) 896-4733 Fax (228) 896-6769

IN ASSOCIATION WITH

HEINRICH & ASSOCIATES
RESIDENTIAL & COMMERCIAL DESIGN
1806 23rd AVE., Suite B - Gulfport, MS 39501
Ph (228) 896-6768

ATTENTION: NO CONSTRUCTION IS TO COMMENCE ON THIS PROJECT BEFORE THE APPROPRIATE PERMITS HAVE BEEN OBTAINED.

SHEET INDEX

Sheet
T1
Project No
20-013

DEMOLITION NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ANY AND ALL EXISTING STRUCTURES DESIGNATED TO BE REMOVED WITHIN THE PROPERTY LIMITS, INCLUDING BUT NOT LIMITED TO STRUCTURES, FOUNDATIONS, ALL EXISTING PAVEMENTS AND DRIVEWAYS, EXISTING FENCES, UTILITIES, AND DEBRIS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGES THAT MIGHT OCCUR TO IMPROVEMENTS SHOWN HEREON TO REMAIN.
3. CONTRACTOR SHALL REMOVE ALL DEBRIS FROM THE SITE THAT IS FOUND TO EXIST PRIOR TO HIS WORK OR THAT IS GENERATED AS A RESULT OF HIS WORK. DEBRIS SHALL CONSIST OF ANY MATERIAL OTHER THAN SOIL. SOIL DESIGNATED TO BE REMOVED FROM THE SITE SHALL BE AT THE CONTRACTORS EXPENSE.
4. CONTRACTOR WILL NOT BE RESPONSIBLE FOR DEMOLISHING, REMOVING, OR RELOCATING ANY EXISTING ABOVE OR BELOW GROUND TELEPHONE OR POWER (UNLESS OTHERWISE SPECIFIED)BUT SHALL BE RESPONSIBLE FOR COORDINATING HIS WORK WITH ALL LOCAL UTILITY COMPANIES.
5. CONTRACTOR SHALL CALL THE MISSISSIPPI DAMAGE PREVENTION NUMBER (1-800-227-6477) BY LAW TO LOCATE ALL EXISTING UTILITIES ON SITE PRIOR TO HIS WORK. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING UTILITIES NOT DESIGNATED TO BE REMOVED UNDER THIS CONTRACT AND BE RESPONSIBLE FOR ANY AND ALL DAMAGES TO EXISTING UTILITIES NOT DESIGNATED TO BE DEMOLISHED, REMOVED, OR RELOCATED THAT RESULT FROM CONTRACTOR'S WORK. REMOVAL OF ALL POWER LINES, POLES, AND APPURTENANCES SHALL BE BY LOCAL UTILITY COMPANY.
6. LIMITS OF CLEARING AND GRUBBING SHALL BE PROPERTY LINES, UNLESS SPECIFICALLY DESIGNATED OTHERWISE.
7. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL CONSTRUCTION PERMITS THAT ARE REQUIRED TO ACCOMPLISH THE WORK SPECIFIED HEREON.

STORM WATER POLLUTION PREVENTION NOTES:

1. CONTRACTOR SHALL STOCKPILE TOPSOIL FOR USE IN LANDSCAPING.
2. CONTRACTOR SHALL LINE ALL PROPOSED SWALES AND DETENTION POND SLOPES WITH EROSION AND SEDIMENT CONTROL BLANKETS AS SHOWN.
3. CONTRACTOR SHALL ROUGHEN ALL 4:1 CUT SLOPES BY DISKING PRIOR TO SEEDING.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR SEEDING WITH TEMPORARY SEED ANY DISTURBED AREAS THAT WILL BE LEFT UNDISTURBED FOR FOURTEEN OR MORE DAYS (SEE MDEQ LIST OF TEMPORARY SEED TYPES).
5. CONTRACTOR SHALL BE RESPONSIBLE FOR SEEDING WITH PERMANENT SEED ANY DISTURBED AREAS WITHIN SEVEN DAYS (SEE OWNER FOR TYPE OF LANDSCAPE TO BE USED).
6. ALL EQUIPMENT MAINTENANCE AND REPAIR SHALL BE DONE OFFSITE.
7. TRASH RECEPTACLES SHALL BE PLACED AT CONVENIENT LOCATIONS THROUGHOUT THE SITE.
8. THE MAIN TRASH COLLECTION BIN SHALL BE PLACED NEAR THE CORNER OF THE CONSTRUCTION ENTRANCE. CONTRACTOR SHALL COORDINATE PICKUP WITH THE CITY OR REFUSE DISPOSAL PROVIDERS AND SHALL ENSURE THAT COLLECTION IS DONE A MINIMUM OF ONCE A WEEK.
9. CONTRACTOR SHALL CHECK ALL DISTURBED AREAS, EROSION AND SEDIMENT CONTROLS AFTER EACH SIGNIFICANT RAINFALL BUT NOT LESS THAN ONCE PER WEEK AND MAKE ANY NEEDED REPAIRS WITHIN 24 HOURS.
10. CONTRACTOR SHALL REMOVE ANY SEDIMENT FROM SILT FENCE, CHECK POINTS, AND INLET PROTECTION DEVICES WHENEVER SEDIMENT HAS ACCUMULATED TO 50 PERCENT CAPACITY. CONTRACTOR SHALL MAINTAIN ALL VEGETATED AREAS TO PROVIDE PROPER GROUND COVER BY RESEEDING, FERTILIZATION, OR MULCHING AS NEEDED.
11. A TEMPORARY OFFICE AND PORTABLE TOILET BUILDINGS SHALL BE LOCATED AT THE OR NEAR THE JOB TRAILER OR LAY-DOWN YARD AND AT LOCATIONS SO THAT NO PART OF THE PROJECT IS MORE THAN 1,000 FEET FROM A TOILET FACILITY IF POSSIBLE. THESE STRUCTURES SHALL BE MAINTAINED ON A REGULAR SCHEDULE BY A LICENSED DISPOSAL COMPANY.

GENERAL NOTES & LEGENDS

SITE NOTES:

1. ROADWAY DIMENSIONS ARE GIVEN IN THE CROSS SECTION DETAIL FOUND ON SHEET CD 1.
2. ALL ROADWAY RADIUS DIMENSIONS ARE 20' UNLESS NOTED.
3. SEE SHEET CD1 FOR PAVEMENT DETAILS.
4. SHOULD CONTRACTOR FIND ANY DISCREPANCIES IN DIMENSIONS, PROJECT ENGINEER SHALL BE CONSULTED IMMEDIATELY.
5. ALL DIMENSIONS ARE FROM BOC TO BOC.
6. CONTRACTOR SHALL FORM CURB AT HANDICAP RAMP LOCATIONS TO MEET ADA REQUIREMENTS.
ALL FINISH SPOT ELEVATIONS REPRESENT CURB FLANGE (FL) ELEVATIONS, TOP OF CURB (TOC), OR TOP OF SURFACE (TOP).
7. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE AT ALL TIMES.
8. OWNER SHALL BE RESPONSIBLE FOR GRADING OF PARCELS TO ENSURE POSITIVE DRAINAGE AS INDICATED.
9. ALL FINISH SPOT ELEVATIONS REPRESENT CURB FLANGE (FL) ELEVATIONS, TOP OF CURB (TOC), OR TOP OF SURFACE (TOP).

UTILITY NOTES:

1. ALL NEW WATER MAIN SHALL BE PVC, C900 AWWA APPROVED.
2. ALL SEWER MAIN SHALL BE PVC, ASTM 2-3034 SDR 26.
3. WATER AND SEWER SERVICES SHALL CONFORM TO THE DETAIL SHEET.
4. ANY ROAD CROSSING REQUIRED SHALL BE DONE IN STRICT CONFORMANCE WITH THE PLAN DETAIL AND SPECIFICATIONS.
5. ALL TAPS ONTO EXISTING WATER AND SEWER MAINS SHALL BE COORDINATED WITH MUNICIPALITY OR PRIVATE UTILITY COMPANY.
6. EXISTING UTILITY INFORMATION BASED ON SURVEY.
7. ALL PRESSURE AND LEAKAGE TESTS MUST BE IN ACCORDANCE WITH AWWA C-600.
8. DISINFECTION AND SAMPLING PROCEDURES SHOULD MEET THE CURRENT AWWA STANDARD (C652).

LOCAL UTILITY COMPANIES

1. WATER AND SEWER – WEST HARRISON WATER & SEWER DISTRICT 216-1342
2. GAS SERVICE – CENTERPOINT ENERGY 896-7500
3. TV CABLE SERVICE – CABLE ONE 864-1506
4. ELECTRICAL SERVICE – MISSISSIPPI POWER COMPANY 868-9800
5. TELEPHONE SERVICE – AT&T 557-6000
6. MISS I CALL BEFORE YOU DIG 1-800-227-6477

LEGEND

PROPOSED		EXISTING
W	WATER MAIN	W
S	SEWER LINE	S
G	GAS LINE	G
	ROW/EASEMENT	
	PROPERTY LINE	
	LOT LINES	
CO	CLEAN-OUT	
S	MANHOLE	S
	WATER VALVE	WV
	FIRE HYDRANT	
W	WATER METER	WM
21.5	PROP. SPOT EL.	
	EXIST. SPOT EL.	
	TYP. SIGN	
	TYP. STOP BAR	
	HEADER CURB	
	CURB & GUTTER	

PROJECT SCOPE:

CONSTRUCT MAGNOLIA WALK SUBDIVISION PHASE 2 AS PER DRAWINGS FOUND HEREIN AND ALL CITY/STATE REQ'S & PERMITS.

NON-EXCLUSIVELY, GRADING, ASPHALT PAVING, STORM & UTILITY LINES, CONCRETE FORMING AND FINISHING, THERMOPLASTIC STRIPING, AND GRADING/GRASSING/FINISHING IMPROVEMENTS SHALL BE REQ'D TO COMPLETE THIS PROJECT.

TERRY MORAN, P.E., P.L.S.
1806 23rd Ave Suite B, Gulfport, MS 39501
P.O. Box 4075 Biloxi, MS 39535
Ph (228) 896-4733

TME
TERRY MORAN
ENGINEERING & SURVEYING

T. J. MORAN, JR.
ENGINEER
STATE OF MISSISSIPPI

In Association With

HEINRICH & ASSOCIATES
RESIDENTIAL & COMMERCIAL DESIGN
1806 23rd Ave., Suite B - Gulfport, MS 39501
Ph (228) 896-6768

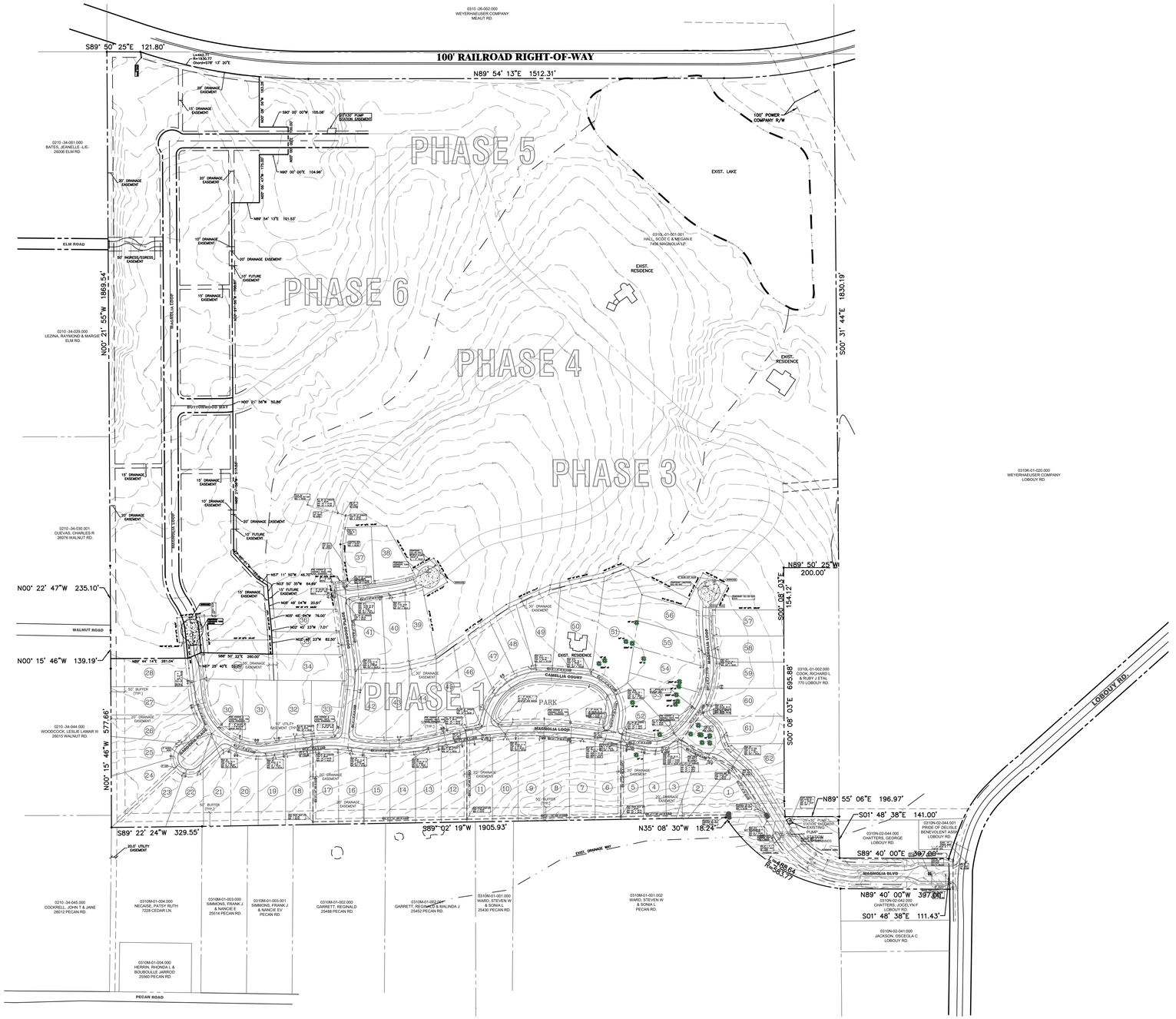
Sheet GENERAL NOTES & LEGENDS

Project MAGNOLIA WALK SUBDIVISION PHASE 2 LOBOUY ROAD HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C.
Check By K.E.D.
REV

Sheet C1

Project No 20-013



EXISTING CONDITIONS & DEMOLITION PLAN

SCALE: 1" = 200'-0"

N

W E

S

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

ELEV = 60.71	60d NAIL IN GROUND APPROX. 377 SOUTHWEST OF EXIST. HOUSE

BOUNDARY AND TOPOGRAPHIC INFORMATION BASED ON SURVEY BY LARRY SMITH LAND SURVEYING.

SUBJECT PROPERTY LIES WITHIN "X" & "A" FLOOD ZONE SHOWN HEREON PER FEMA PANEL 28047C0220G DATED JUNE 16, 2009

LEGEND

- REMOVE UTILITY
- DENOTES REMOVAL OF ALL EXISTING IMPROVEMENTS AND FILL
- DENOTES LIMITS OF REMOVAL FOR A STRUCTURE AND ITS APPURTENANCES

DEMOLITION NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ANY AND ALL EXISTING STRUCTURES DESIGNATED TO BE REMOVED WITHIN THE PROPERTY LIMITS, INCLUDING BUT NOT LIMITED TO STRUCTURES, FOUNDATIONS, ALL EXISTING PAVEMENTS AND DRIVEWAYS, EXISTING FENCES, UTILITIES, AND DEBRIS.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGES THAT MIGHT OCCUR TO IMPROVEMENTS SHOWN HEREON TO REMAIN.

3. CONTRACTOR SHALL REMOVE ALL DEBRIS FROM THE SITE THAT IS FOUND TO EXIST PRIOR TO HIS WORK OR THAT IS GENERATED AS A RESULT OF HIS WORK. DEBRIS SHALL CONSIST OF ANY MATERIAL OTHER THAN SOIL.

4. CONTRACTOR WILL NOT BE RESPONSIBLE FOR DEMOLISHING OR REMOVING ANY EXISTING ABOVE OR BELOW GROUND TELEPHONE OR POWER BUT SHALL BE RESPONSIBLE FOR COORDINATING HIS WORK WILL ALL LOCAL UTILITY COMPANIES.

5. CONTRACTOR SHALL CALL THE MISSISSIPPI DAMAGE PREVENTION NUMBER (1-800-227-6477) BY LAW TO LOCATE ALL EXISTING UTILITIES ON SITE PRIOR TO HIS WORK. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING UTILITIES NOT DESIGNATED TO BE REMOVED UNDER THIS CONTRACT AND BE RESPONSIBLE FOR ANY AND ALL DAMAGES TO EXISTING UTILITIES NOT DESIGNATED TO BE REMOVED THAT RESULT FROM CONTRACTOR'S WORK.

6. REMOVAL OF ALL POWER LINES, POLES, AND APPURTENANCES SHALL BE BY LOCAL UTILITY COMPANY.

7. LIMITS OF CLEARING AND GRUBBING SHALL BE PROPERTY LINES, UNLESS SPECIFICALLY DESIGNATED OTHERWISE.

8. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL CONSTRUCTION PERMITS THAT ARE REQUIRED TO ACCOMPLISH THE WORK SPECIFIED HEREON.

NOTE:
NO ON SITE SUPERVISION OR INSPECTIONS ARE PROVIDED WITH THE USE OF THESE PLANS BY THE DESIGNER. BUILDER/CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS, CONDITIONS, AND SIZES OF COMPONENTS ALONG WITH SITE CONDITIONS BEFORE STARTING CONSTRUCTION. BUILDER/CONTRACTOR SHALL SEE THAT CONSTRUCTION IS IN CONFORMANCE WITH THE LATEST EDITION OF THE INTERNATIONAL BUILDING CODE (I.B.C.) AND WITH THE COUNTY/CITY BUILDING INSPECTOR. THE USE OF THESE PLANS FOR CONSTRUCTION SHALL BE EVIDENCE THAT THE REQUIREMENTS STATED ARE ACCEPTED BY THE BUILDER/CONTRACTOR.

BEFORE UNDERTAKING EACH PART OF THE WORK, THE CONTRACTOR SHALL CAREFULLY STUDY AND COMPARE THE PLANS & SPECIFICATIONS AND CHECK AND VERIFY PERTINENT FIGURES SHOWN THEREON AND ALL APPLICABLE FIELD MEASUREMENTS. IF ANY CONFLICTS, ERRORS, DISCREPANCIES, OR OTHER UNSATISFACTORY CONDITIONS ARE DISCOVERED EITHER ON THE CONSTRUCTION DOCUMENTS OR IN THE FIELD, THE CONTRACTOR SHALL PROMPTLY REPORT IN WRITING TO THE ENGINEER OR HIS REPRESENTATIVE BEFORE PROCEEDING WITH ANY WORK AFFECTED THEREBY.

TERRY MORAN, P.E., P.L.S.
1806 23rd Ave Suite B, Gulfport, MS 39501
P.O. Box 407 Biloxi, MS 39535
Ph (228) 806-4733

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19005
STATE OF MISSISSIPPI

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1806 23rd Avenue, Suite B - Gulfport, MS 39501
Ph (228) 896-6768

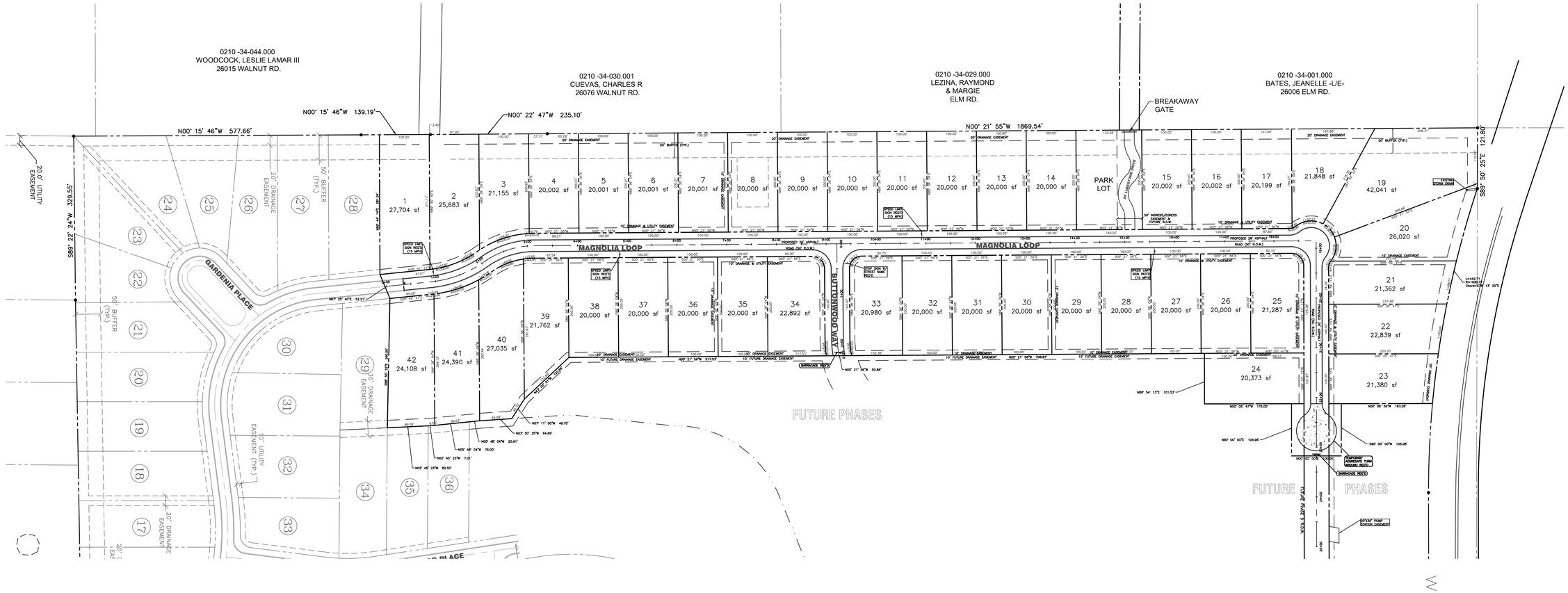
Sheet EXISTING CONDITIONS & DEMOLITION PLAN

Project MAGNOLIA WALK SUBDIVISION PHASE 2 LOBOUY ROAD HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C
Check By K.E.D.
REV

Sheet C2

Project No 20-013



SITE LEGEND

- TYPICAL SIGN
- TYPICAL STOP BAR
- HEADER CURB
- CURB & GUTTER
- STREET LIGHT

SITE DATA TABLE

ZONING	R-1
ACREAGE	8.0 AC
MIN. LOT SIZE	75' X 120'
SETBACKS (SEE LOT 8)	
FYSB – 50 FT	
SYSB – 20 FT	
RYSB – 35 FT	

SITE NOTES:

1. CONTRACTOR TO ENSURE ALL CURB RAMPS AND SIDEWALKS MEET ADA REQUIREMENTS.

2. STREET LIGHT LOCATIONS AND TYPES TO BE DESIGNED AND SUBMITTED BY MS POWER.

SITE NOTES:

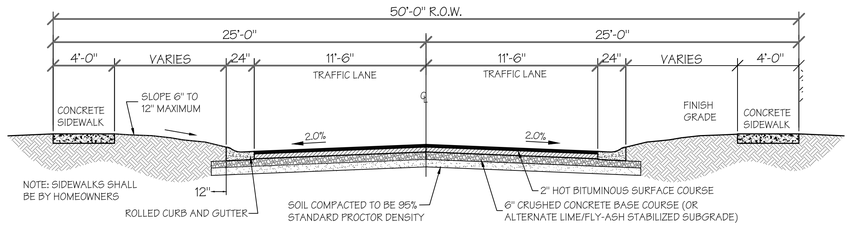
1. ALL DIMENSIONS ARE FROM BACK OF CURB TO BACK OF CURB.

2. ALL ROADWAY RADIUS DIMENSIONS ARE 25' UNLESS NOTED.

3. SEE SHEET CD1 FOR PAVEMENT DETAILS.

4. SHOULD CONTRACTOR FIND ANY DISCREPANCIES IN DIMENSIONS, PROJECT ENGINEER SHALL BE NOTIFIED IMMEDIATELY.

5. ALL INTERIOR LOTLINES SHALL HAVE A 10' WIDE DRAINAGE EASEMENT.



TYPICAL STREET SECTION

N.T.S.

ROAD CONSTRUCTION NOTES:

1. THE ROUGH GRADED ROAD SURFACE SHALL BE PROOF-ROLLED WITH A HALF FILLED LOADED DUMP TRUCK IN THE PRESENCE OF THE PROJECT ENGINEER/REPRESENTATIVE AND THE CITY ENGINEER. ANY AREAS SHOWN TO BE SOFT AND YIELDING SHALL BE UNDERCUT AND THE UNSUITABLE MATERIAL SHALL BE REPLACED WITH STABLE MATERIAL. THE PURPOSE OF THIS IS TO DETECT AND CORRECT ANY AREAS OF NATIVE MATERIAL WHICH WILL BE UNSUITABLE TO INCORPORATE INTO THE SUB-BASE.

2. PRIOR TO PAVING, THE SUB-BASE SHALL BE PROOF-ROLLED WITH A HALF FILLED LOADED DUMP TRUCK IN THE PRESENCE OF THE PROJECT ENGINEER/REPRESENTATIVE AND THE CITY ENGINEER. ALL SOFT AREAS SHALL THE ADDRESSED AS MENTIONED ABOVE.

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

ELEV = 60.71	60d NAIL IN GROUND APPROX. 377' SOUTHWEST OF EXIST. HOUSE

BOUNDARY AND TOPOGRAPHIC INFORMATION BASED ON SURVEY BY LARRY SMITH LAND SURVEYING.

SUBJECT PROPERTY LIES WITHIN "X" & "A" FLOOD ZONE SHOWN HEREON PER FEMA PANEL 28047C0220G DATED JUNE 16, 2009

NOTE:
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LOT & STREET LAYOUT

SCALE: 1" = 100'-0"

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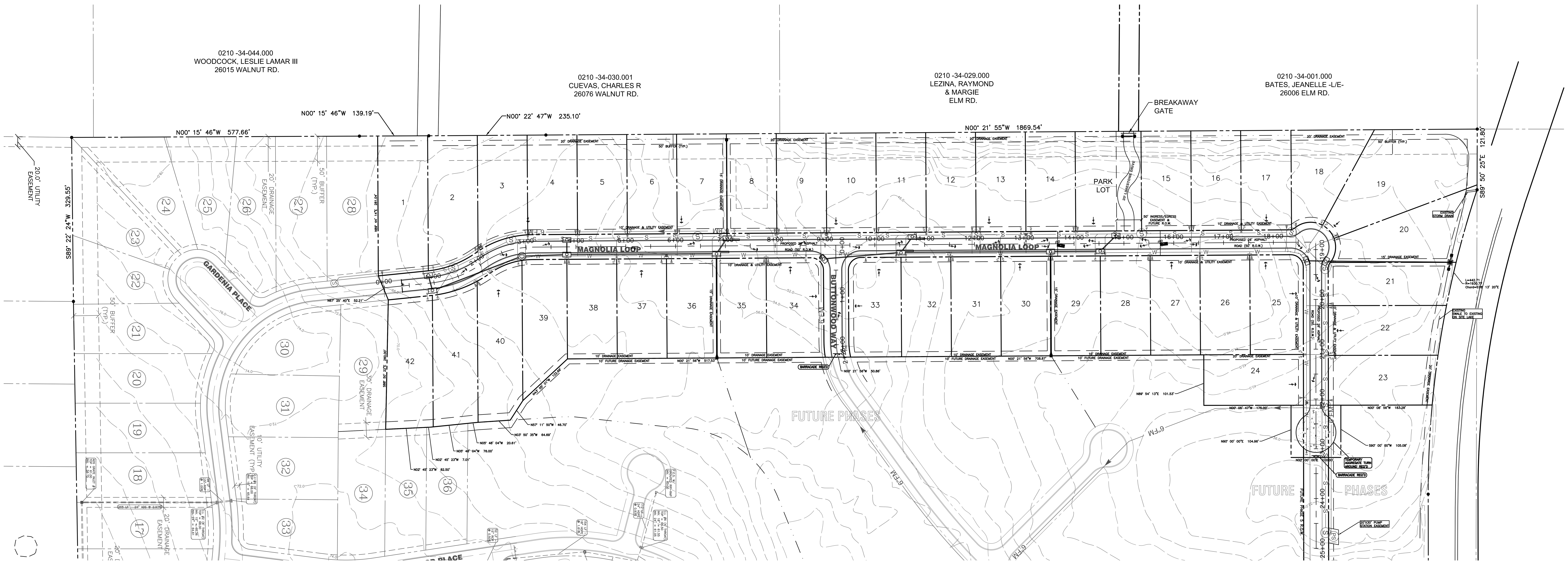
Sheet: LOT & STREET LAYOUT
Project: MAGNOLIA WALK SUBDIVISION PHASE 2 LOBOUY ROAD HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C.
Check By K.E.D.
REV

Sheet C3
Project No 20-013



LEGEND

Symbol	Description
— 7 — (dashed)	EXISTING CONTOUR
— 7 — (solid)	PROPOSED CONTOUR
+4.3	EXISTING SPOT ELEVATION
[7.0]	PROPOSED SPOT ELEVATION
⊞	PROPOSED DRAIN INLET AND PIPE
□	EXISTING CURB INLET AND PIPE
* * *	MATCH EXISTING GRADE
←	FLOW DIRECTION ARROW
— R —	RIDGE LINE

NOTES:

1. ALL FINISH SPOT ELEVATIONS REPRESENT BASE OF CURB ELEVATIONS.

2. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE AT ALL TIMES.

3. OWNER SHALL BE RESPONSIBLE FOR GRADING OF PARCELS TO ENSURE POSITIVE DRAINAGE AS INDICATED.

GRAPHIC SCALE

100 0 50 100 200 400

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BOUNDARY AND TOPOGRAPHIC INFORMATION BASED ON SURVEY BY LARRY SMITH LAND SURVEYING.

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OVERALL GRADING & DRAINAGE PLAN

SCALE: 1" = 100'-0"

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Sheet: OVERALL GRADING & DRAINAGE PLAN

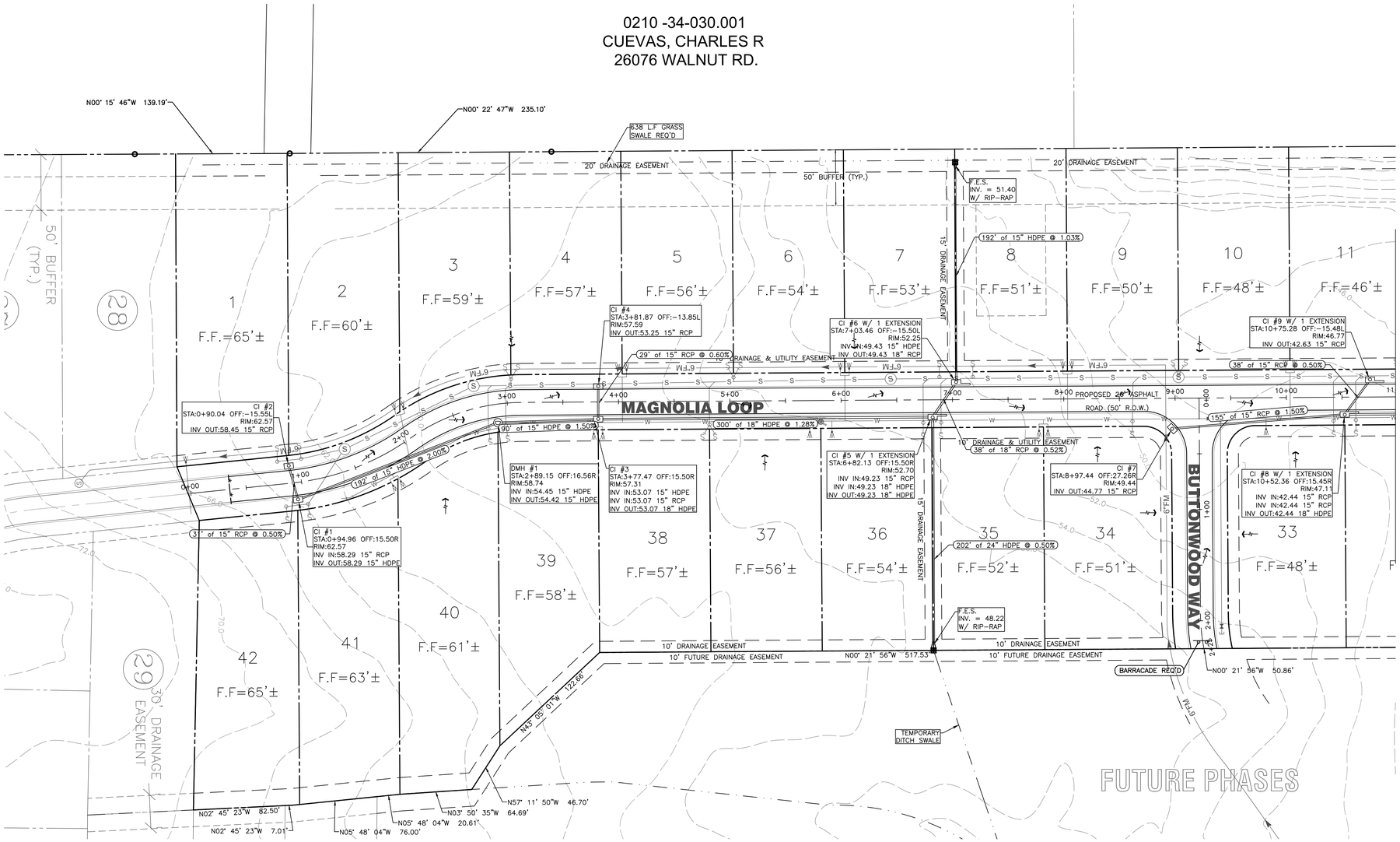
Project: MAGNOLIA WALK SUBDIVISION PHASE 2 LOBOUY ROAD HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C.
Check By K.E.D.
REV

Sheet C4

Project No 20-013

0210 -34-030.001
CUEVAS, CHARLES R
26076 WALNUT RD.



GRAPHIC SCALE

50 0 15 50 100 200

(IN FEET)
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LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING SPOT ELEVATION
- PROPOSED SPOT ELEVATION
- PROPOSED DRAIN INLET AND PIPE
- EXISTING CURB INLET AND PIPE
- MATCH EXISTING GRADE
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- RIDGE LINE

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GRADING & DRAINAGE PLAN

SCALE: 1" = 50'-0"

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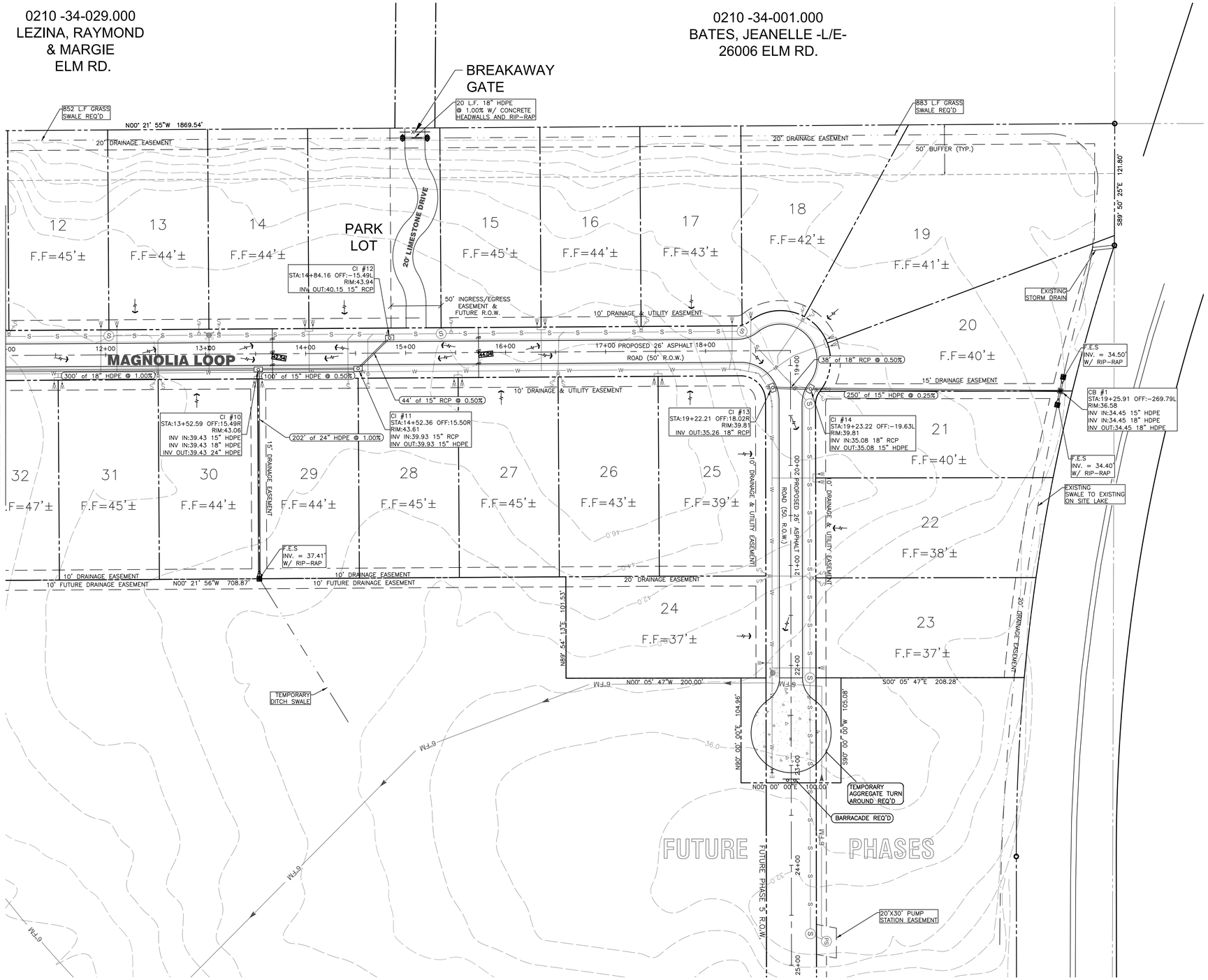
Sheet GRADING & DRAINAGE PLAN
Project MAGNOLIA WALK SUBDIVISION PHASE 2 LOBOUY ROAD HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C
Check By K.E.D.
REV

Sheet C4a
Project No 20-013



GRAPHIC SCALE

50 0 15 50 100 200

(IN FEET)
1 inch = 50 ft.

ELEV = 60.71	60d NAIL IN GROUND APPROX. 377' SOUTHWEST OF EXIST. HOUSE

BOUNDARY AND TOPOGRAPHIC INFORMATION BASED ON SURVEY BY LARRY SMITH LAND SURVEYING.

SUBJECT PROPERTY LIES WITHIN "X" & "A" FLOOD ZONE SHOWN HEREON PER FEMA PANEL 28047C0220G DATED JUNE 16, 2009

LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING SPOT ELEVATION
- PROPOSED SPOT ELEVATION
- PROPOSED DRAIN INLET AND PIPE
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GRADING & DRAINAGE PLAN

SCALE: 1" = 50'-0"

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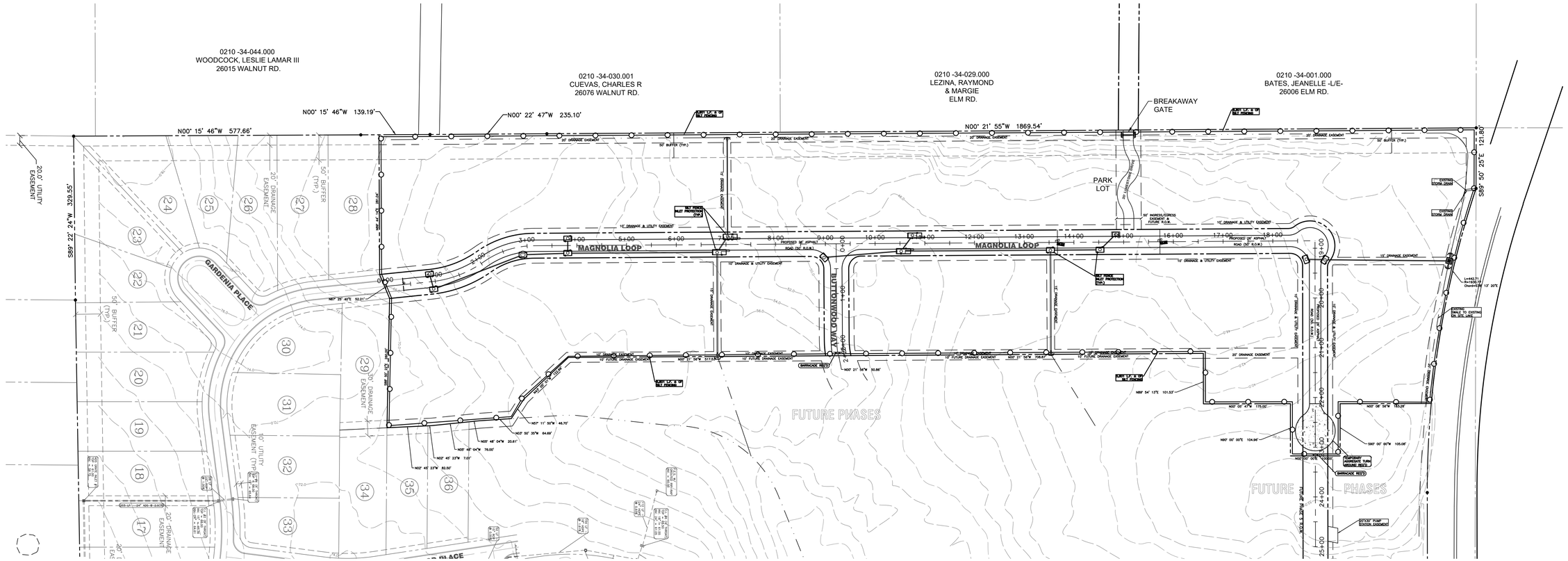
Sheet GRADING & DRAINAGE PLAN

Project MAGNOLIA WALK SUBDIVISION
PHASE 2
LOBOUY ROAD
HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C
Check By K.E.D.
REV

Sheet C4b

Project No 20-013



STORM WATER POLLUTION PREVENTION NOTES:

1. CONTRACTOR SHALL STOCKPILE TOPSOIL FOR USE IN LANDSCAPING.
2. CONTRACTOR SHALL LINE ALL PROPOSED SWALES AND DETENTION POND SLOPES WITH EROSION AND SEDIMENT CONTROL BLANKETS AS SHOWN.
3. CONTRACTOR SHALL ROUGHEN ALL 4:1 CUT SLOPES BY DISKING PRIOR TO SEEDING.
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9. CONTRACTOR SHALL CHECK ALL DISTURBED AREAS, EROSION AND SEDIMENT CONTROLS AFTER EACH SIGNIFICANT RAINFALL BUT NOT LESS THAN ONCE PER WEEK AND MAKE ANY NEEDED REPAIRS WITHIN 24 HOURS.
10. CONTRACTOR SHALL REMOVE ANY SEDIMENT FROM SILT FENCE, CHECK POINTS, AND INLET PROTECTION DEVICES WHENEVER SEDIMENT HAS ACCUMULATED TO 50 PERCENT CAPACITY.
11. CONTRACTOR SHALL MAINTAIN ALL VEGETATED AREAS TO PROVIDE PROPER GROUND COVER BY RESEEDING, FERTILIZATION, OR MULCHING AS NEEDED.
12. A TEMPORARY OFFICE AND PORTABLE TOILET BUILDINGS SHALL BE LOCATED AT THE SOUTH ENTRANCE TO THE SITE AND AT LOCATIONS SO THAT NO PART OF THE PROJECT IS MORE THAN 1,000 FEET FROM A TOILET FACILITY. THESE STRUCTURES WILL BE MAINTAINED ON A REGULAR SCHEDULE BY A LICENSED DISPOSAL COMPANY.

LEGEND

○—○	SILT FENCE
▨	CONSTRUCTION ENTRANCE
☐	DRAIN INLET PROTECTION

⊕	60d NAIL IN GROUND APPROX. 377 SOUTHWEST OF EXIST. HOUSE
ELEV = 60.71	

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OVERALL EROSION CONTROL PLAN

SCALE: 1" = 100'-0"

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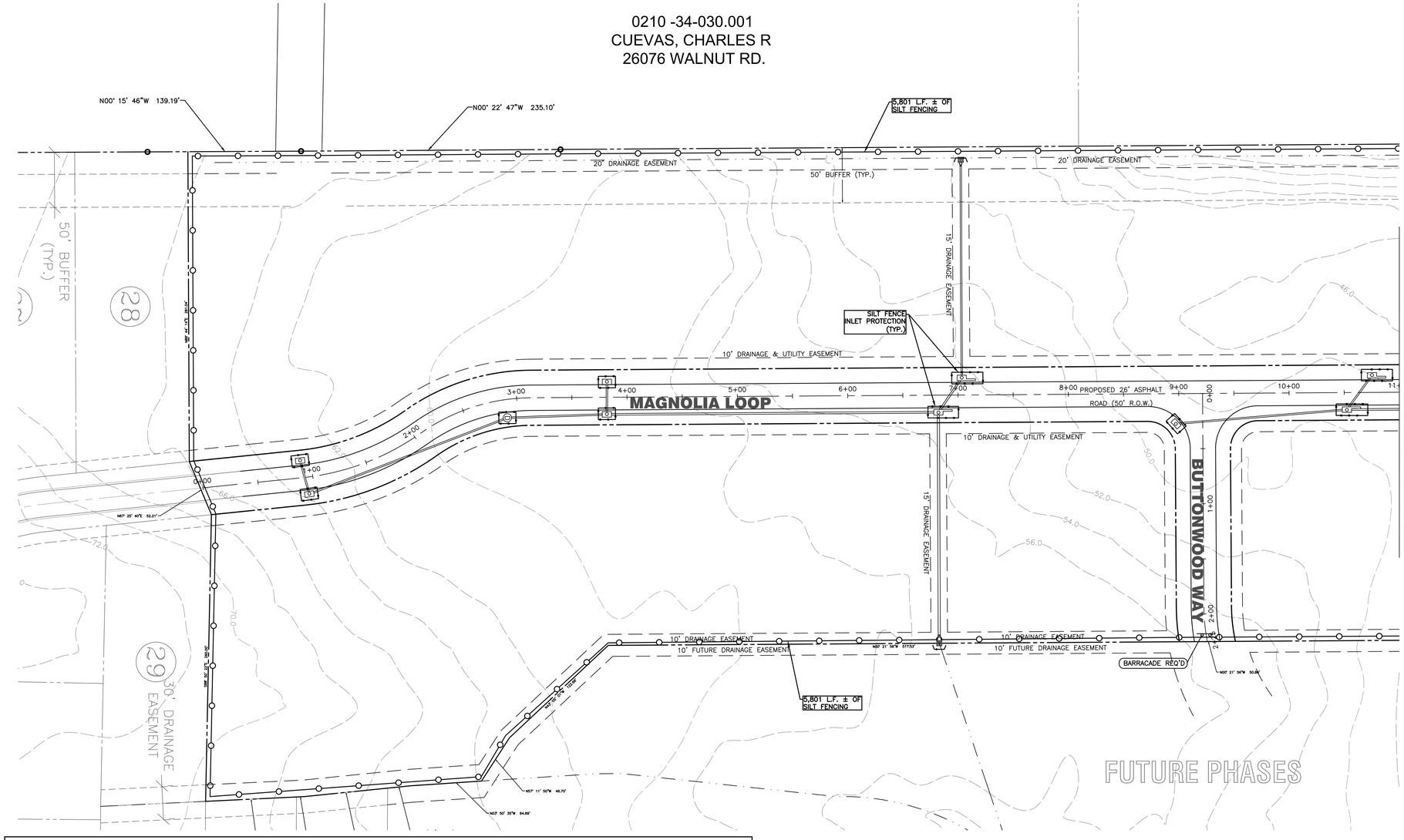
Sheet	OVERALL EROSION CONTROL PLAN
Project	MAGNOLIA WALK SUBDIVISION PHASE 2 LOBOUY ROAD HARRISON COUNTY, MS

Date 11-4-21
Drawn By S.G.C
Check By K.E.D.
REV

Sheet
C5
Project No
20-013



GRAPHIC SCALE

50 0 15 50 100 200

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LEGEND

- SILT FENCE
- CONSTRUCTION ENTRANCE
- DRAIN INLET PROTECTION

STORM WATER POLLUTION PREVENTION NOTES:

1. CONTRACTOR SHALL STOCKPILE TOPSOIL FOR USE IN LANDSCAPING.
2. CONTRACTOR SHALL LINE ALL PROPOSED SWALES AND DETENTION POND SLOPES WITH EROSION AND SEDIMENT CONTROL BLANKETS AS SHOWN.
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8. THE MAIN TRASH COLLECTION BIN SHALL BE PLACED NEAR THE NORTHWEST CORNER OF THE CONSTRUCTION ENTRANCE. CONTRACTOR SHALL COORDINATE PICKUP WITH THE CITY AND SHALL ENSURE THAT COLLECTION IS DONE A MINIMUM OF ONCE A WEEK.
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EROSION CONTROL PLAN

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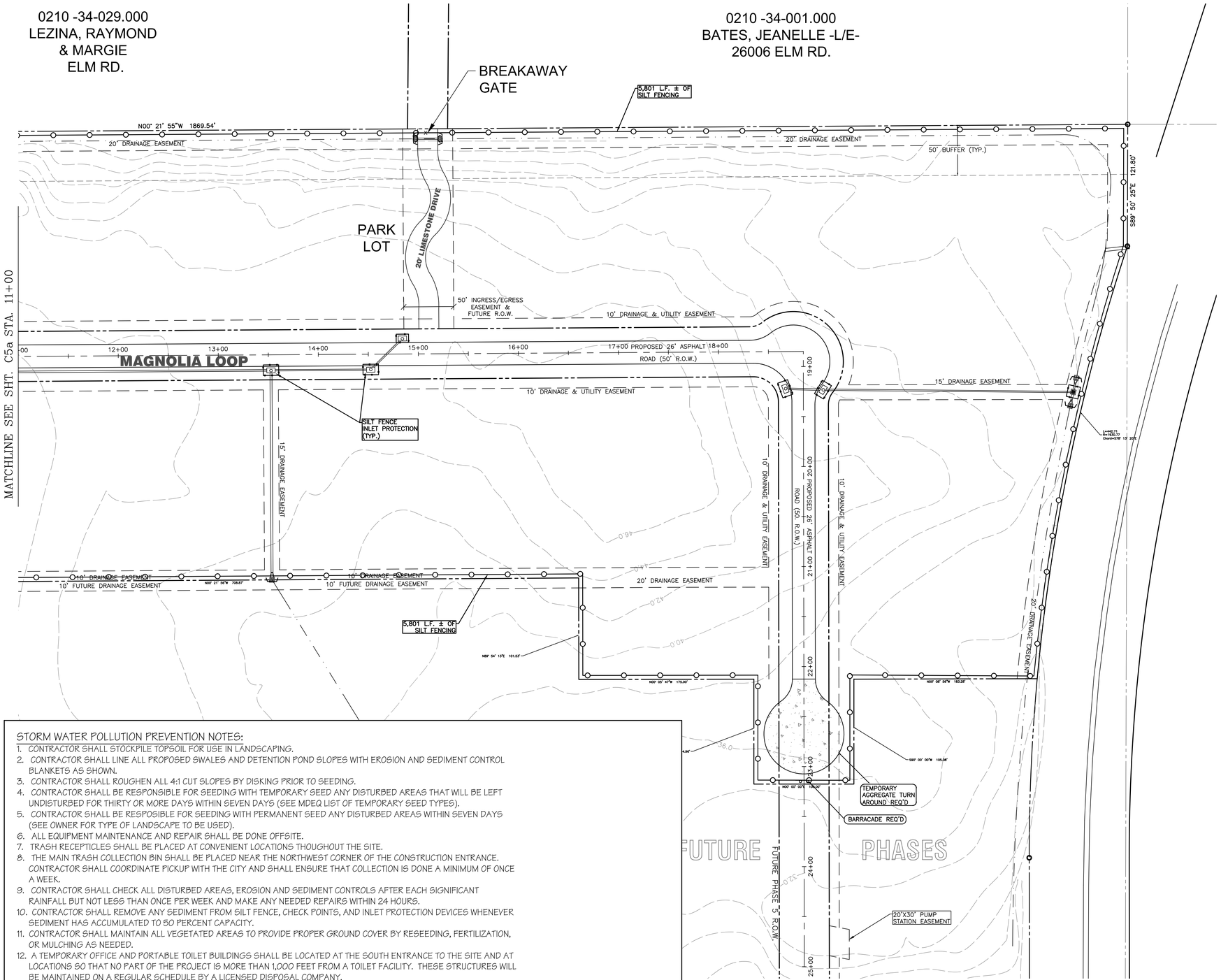
Sheet: EROSION CONTROL PLAN

Project: MAGNOLIA WALK SUBDIVISION
PHASE 2
LOBOUY ROAD
HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C
Check By K.E.D.
REV

Sheet C5a

Project No 20-013



GRAPHIC SCALE

50 0 15 50 100 200

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LEGEND

- SILT FENCE
- CONSTRUCTION ENTRANCE
- DRAIN INLET PROTECTION

STORM WATER POLLUTION PREVENTION NOTES:

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8. THE MAIN TRASH COLLECTION BIN SHALL BE PLACED NEAR THE NORTHWEST CORNER OF THE CONSTRUCTION ENTRANCE. CONTRACTOR SHALL COORDINATE PICKUP WITH THE CITY AND SHALL ENSURE THAT COLLECTION IS DONE A MINIMUM OF ONCE A WEEK.
9. CONTRACTOR SHALL CHECK ALL DISTURBED AREAS, EROSION AND SEDIMENT CONTROLS AFTER EACH SIGNIFICANT RAINFALL BUT NOT LESS THAN ONCE PER WEEK AND MAKE ANY NEEDED REPAIRS WITHIN 24 HOURS.
10. CONTRACTOR SHALL REMOVE ANY SEDIMENT FROM SILT FENCE, CHECK POINTS, AND INLET PROTECTION DEVICES WHENEVER SEDIMENT HAS ACCUMULATED TO 50 PERCENT CAPACITY.
11. CONTRACTOR SHALL MAINTAIN ALL VEGETATED AREAS TO PROVIDE PROPER GROUND COVER BY RESEEDING, FERTILIZATION, OR MULCHING AS NEEDED.
12. A TEMPORARY OFFICE AND PORTABLE TOILET BUILDINGS SHALL BE LOCATED AT THE SOUTH ENTRANCE TO THE SITE AND AT LOCATIONS SO THAT NO PART OF THE PROJECT IS MORE THAN 1,000 FEET FROM A TOILET FACILITY. THESE STRUCTURES WILL BE MAINTAINED ON A REGULAR SCHEDULE BY A LICENSED DISPOSAL COMPANY.

NOTE:
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EROSION CONTROL PLAN

SCALE: 1" = 50'-0"

TERRY MORAN, P.E., P.L.S.
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TERRY MORAN
ENGINEERING & SURVEYING

STATE OF MISSISSIPPI
T. J. MORAN JR.
REGISTERED PROFESSIONAL
ENGINEER
19005
5/13/22

In Association With

HEINRICH & ASSOCIATES
RESIDENTIAL & COMMERCIAL DESIGN
1806 23rd Avenue, Suite B - Gulfport, MS 39501
Ph (228) 896-6768

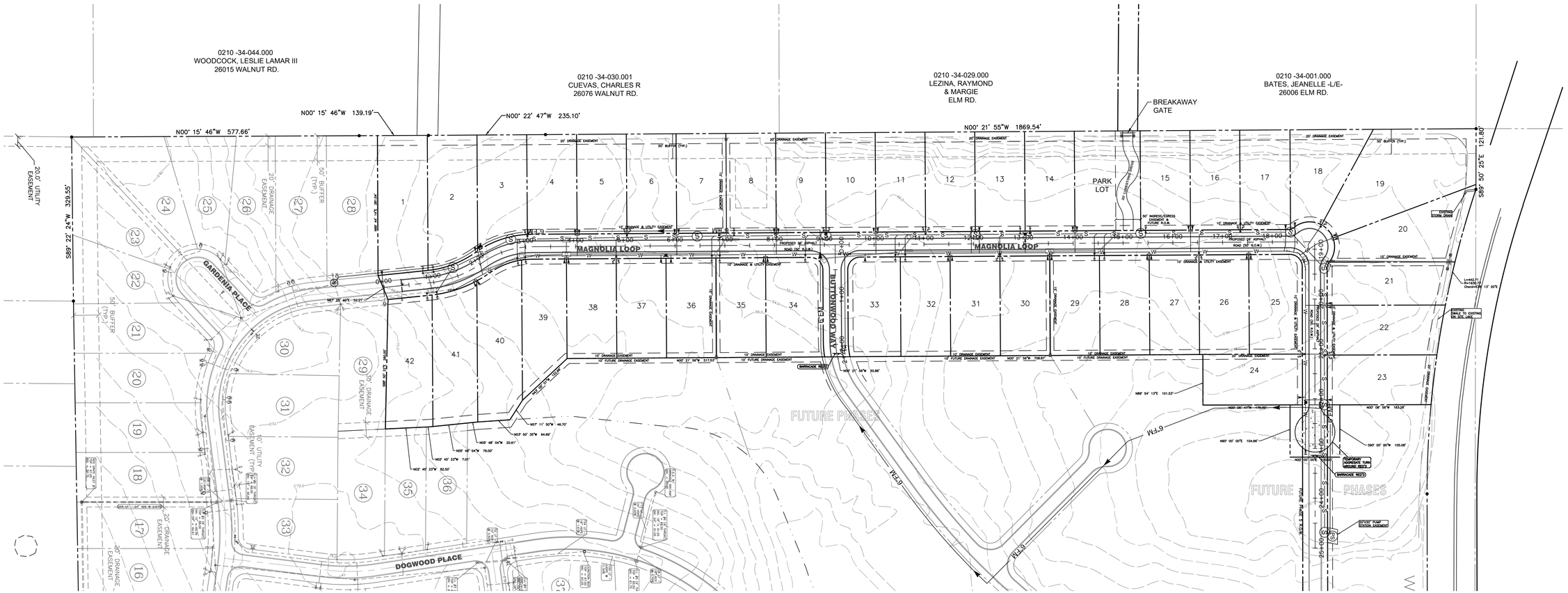
Sheet EROSION CONTROL PLAN

Project MAGNOLIA WALK SUBDIVISION
PHASE 2
LOBOUY ROAD
HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C
Check By K.E.D.
REV

Sheet C5b

Project No 20-013



UTILITY NOTES:

1. ALL NEW WATER MAIN SHALL BE PVC, C900 AWWA APPROVED.
2. ALL SEWER MAIN SHALL BE PVC, ASTM D-3034, SDR 26.
3. WATER AND SEWER SERVICES SHALL CONFORM TO THE DETAIL SHEET.
4. ANY ROAD CROSSING REQUIRED SHALL BE DONE IN STRICT CONFORMANCE WITH THE PLAN DETAIL AND SPECIFICATIONS.
5. ALL TAPS ONTO EXISTING WATER AND SEWER MAINS SHALL BE COORDINATED WITH MUNICIPALITY OR PRIVATE UTILITY COMPANY.
6. EXISTING UTILITY INFORMATION BASED ON SURVEY.
7. ALL PRESURE AND LEAKAGE TEST MUST BE IN ACCORDANCE WITH AWWA C-600.
8. DISINFECTION AND SAMPLING PROCEDURES SHOULD MEET THE CURRENT AWWA STANDARD (C652).

LOCAL UTILITY COMPANIES

1. WATER AND SEWER - WEST HARRISON WATER & SEWER DISTRICT 216-1342
2. GAS SERVICE - CENTERPOINT ENERGY 896-7500
3. TV CABLE SERVICE - SPARKLIGHT 864-1506
4. ELECTRICAL SERVICE - MS POWER CO. 868-9800
5. TELEPHONE SERVICE - AT&T 557-6000
6. MISS I CALL BEFORE YOU DIG 1-800-227-6477

LEGEND

PROPOSED		EXISTING
W	WATER MAIN	W
S	SEWER LINE	S
G	GAS LINE	G
FM	FORCE MAIN	FM
FOC	FIBER OPTIC CABLE	FOC

- POWER POLE
- CLEAN-OUT
- MANHOLE
- WATER VALVE
- FIRE HYDRANT
- WATER METER
- GV — GAS VALVE

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

ELEV = 60.71	60d NAIL IN GROUND APPROX. 377' SOUTHWEST OF EXIST. HOUSE

BOUNDARY AND TOPOGRAPHIC INFORMATION BASED ON SURVEY BY LARRY SMITH LAND SURVEYING.

SUBJECT PROPERTY LIES WITHIN "X" & "A" FLOOD ZONE SHOWN HEREON PER FEMA PANEL 28047C0220G DATED JUNE 16, 2009

NOTE:
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OVERALL UTILITY PLAN

SCALE: 1" = 100'-0"

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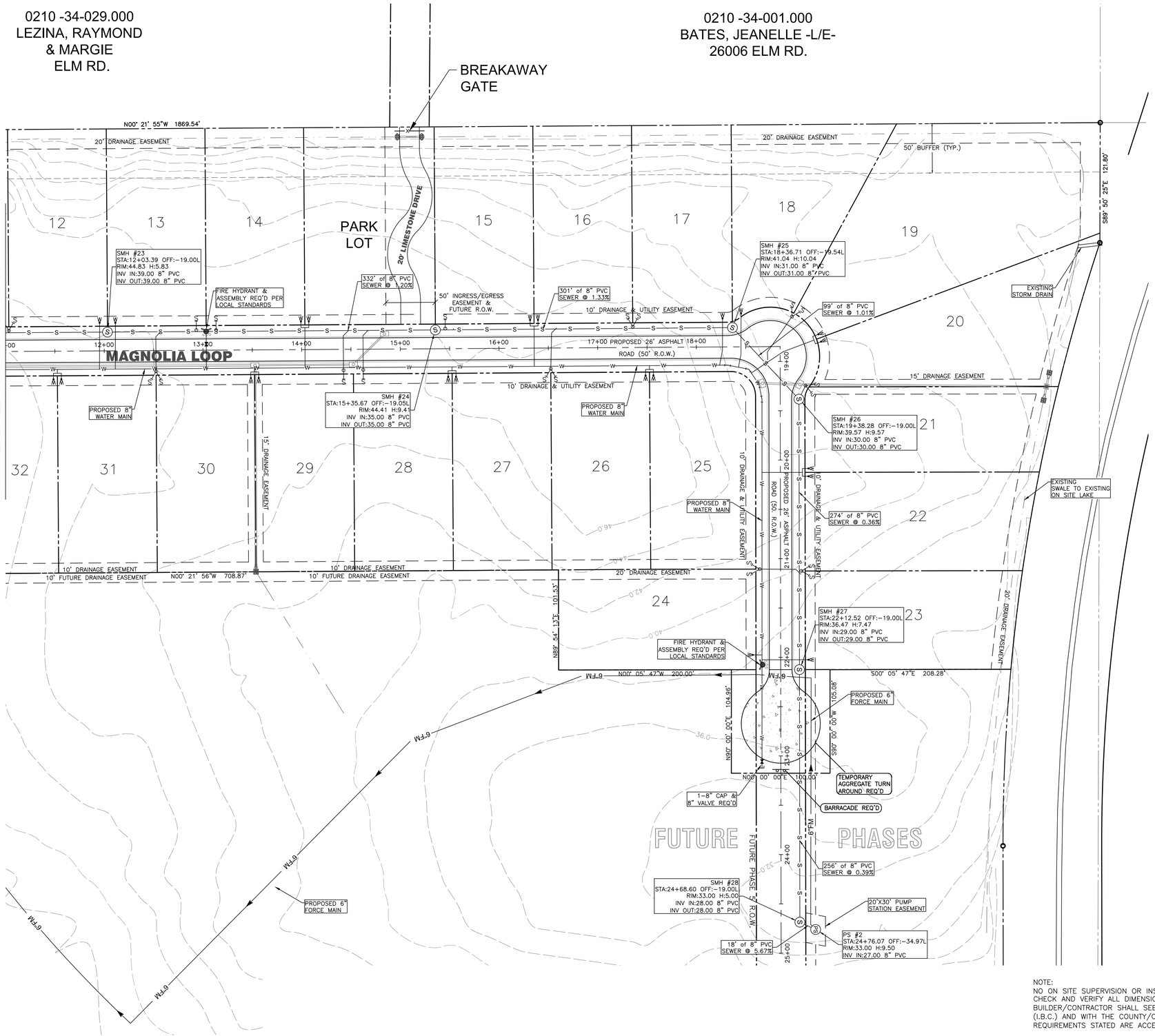
TERRY J. MORAN
REGISTERED PROFESSIONAL ENGINEER
ENGINEER
19005
STATE OF MISSISSIPPI
In Association With

HEINRICH & ASSOCIATES
RESIDENTIAL & COMMERCIAL DESIGN
1806 23rd Avenue, Suite B - Gulfport, MS 39501
Ph (228) 896-6768

Sheet: OVERALL UTILITY PLAN
Project: MAGNOLIA WALK SUBDIVISION PHASE 2 LOBOUY ROAD HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C
Check By K.E.D.
REV

Sheet C6
Project No 20-013



UTILITY PLAN

SCALE: 1" = 50'-0"

GRAPHIC SCALE

50 0 15 50 100 200

(IN FEET)
1 inch = 50 ft.

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SUBJECT PROPERTY LIES WITHIN "X" & "A" FLOOD ZONE SHOWN HEREON PER FEMA PANEL 28047C0220G DATED JUNE 16, 2009

LEGEND

PROPOSED		EXISTING
W	WATER MAIN	W
S	SEWER LINE	S
G	GAS LINE	G
FM	FORCE MAIN	FM
FOC	FIBER OPTIC CABLE	FOC

POWER POLE
CLEAN-OUT
MANHOLE
WATER VALVE
FIRE HYDRANT
WATER METER
GAS VALVE

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T. J. MORAN — STATE OF MISSISSIPPI — REGISTERED PROFESSIONAL ENGINEER — 19005 — 5/13/22

In Association With

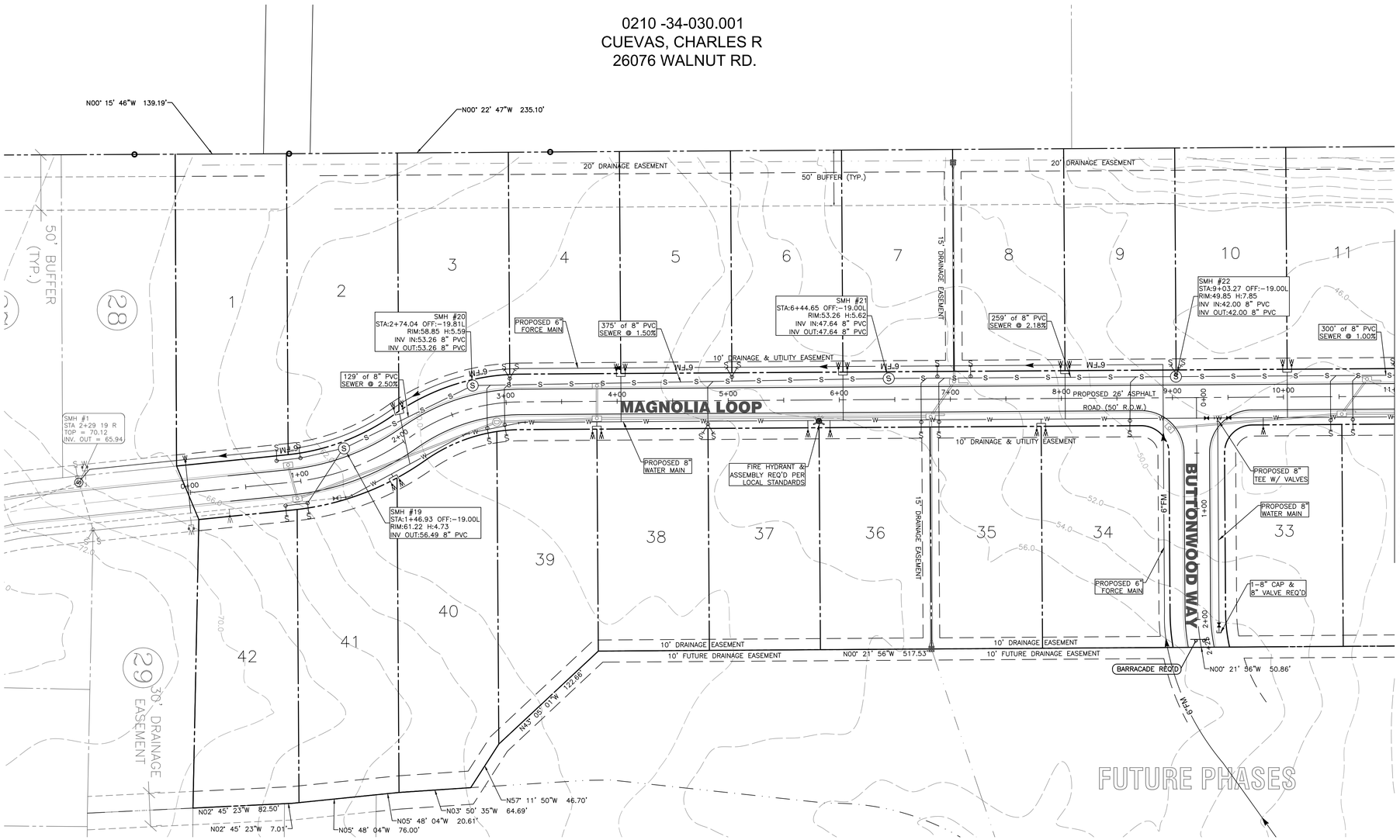
HEINRICH & ASSOCIATES
RESIDENTIAL & COMMERCIAL DESIGN
1806 23rd Avenue, Suite B - Gulfport, MS 39501
Ph (228) 896-6768

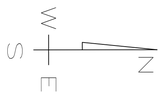
Sheet: UTILITY PLAN
Project: MAGNOLIA WALK SUBDIVISION
PHASE 2
LOBOUY ROAD
HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C.
Check By K.E.D.
REV

Sheet C6b
Project No 20-013

0210 -34-030.001
CUEVAS, CHARLES R
26076 WALNUT RD.





GRAPHIC SCALE

50 0 15 50 100 200

(IN FEET)
1 inch = 50 ft.

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LEGEND

PROPOSED		EXISTING
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S	SEWER LINE	S
G	GAS LINE	G
FM	FORCE MAIN	FM
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UTILITY PLAN

SCALE: 1" = 50'-0"

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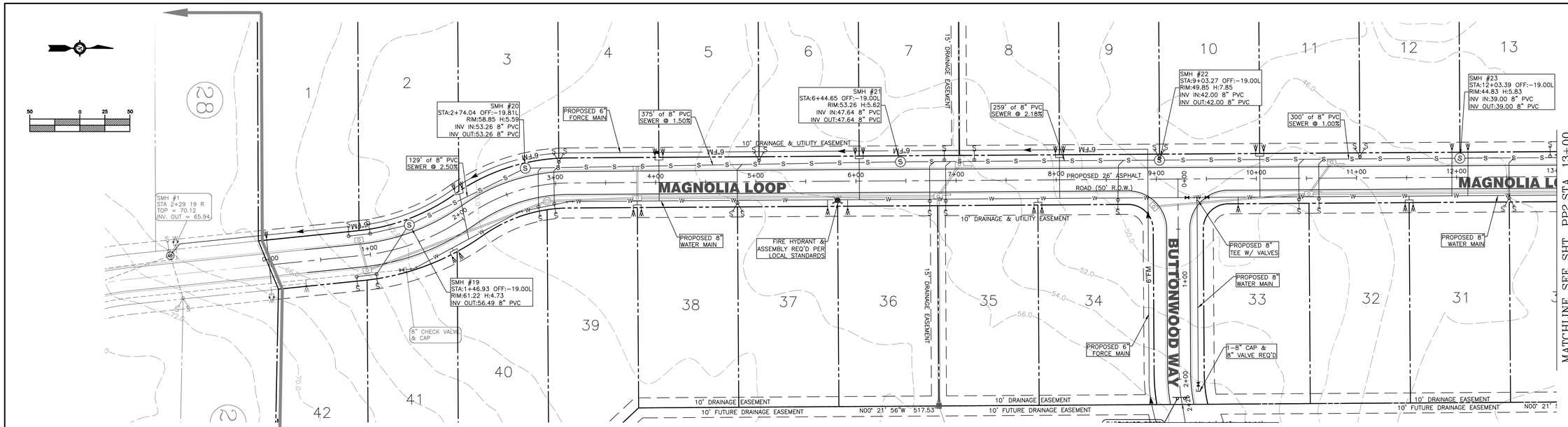
Sheet: UTILITY PLAN
Project: MAGNOLIA WALK SUBDIVISION PHASE 2 LOBOUY ROAD HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C
Check By K.E.D.
REV

Sheet C6a
Project No 20-013

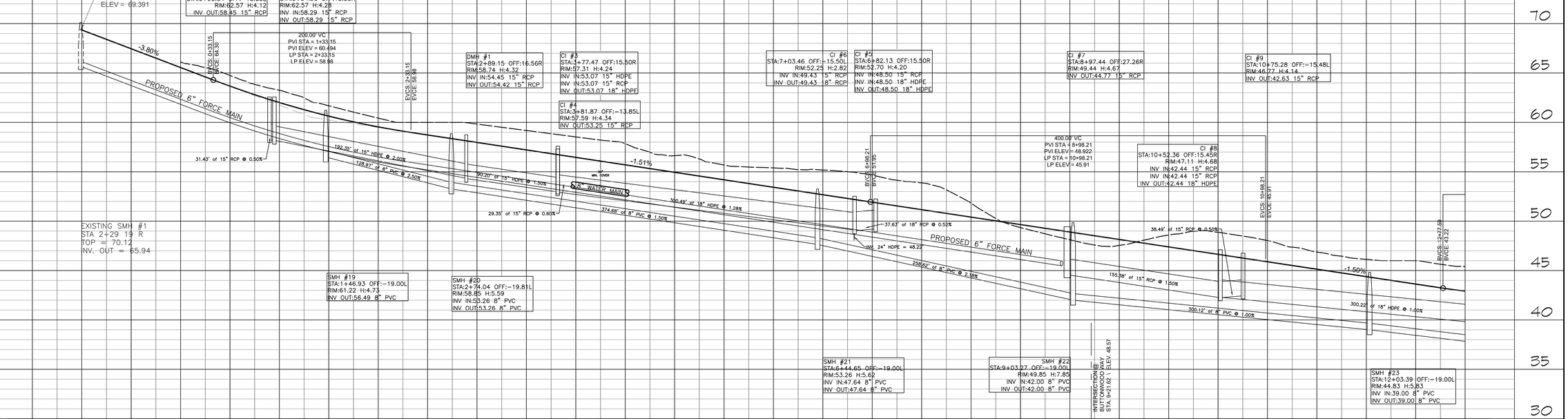


PHASE 1
MAGNOLIA WALK SUBDIVISION

MAGNOLIA LOOP STA. 0+00 - 13+00

HORIZONTAL = 1"=50'
VERTICAL = 1"=10'

PLAN
SURVEYED
PLOTTED
GRADES CHECKED
ALIGNMENT CHECKED
R/W & MONUMENTS
STRUCTURE NOTATIONS CHKD
NOTE BOOK
NO.
BY
DATE

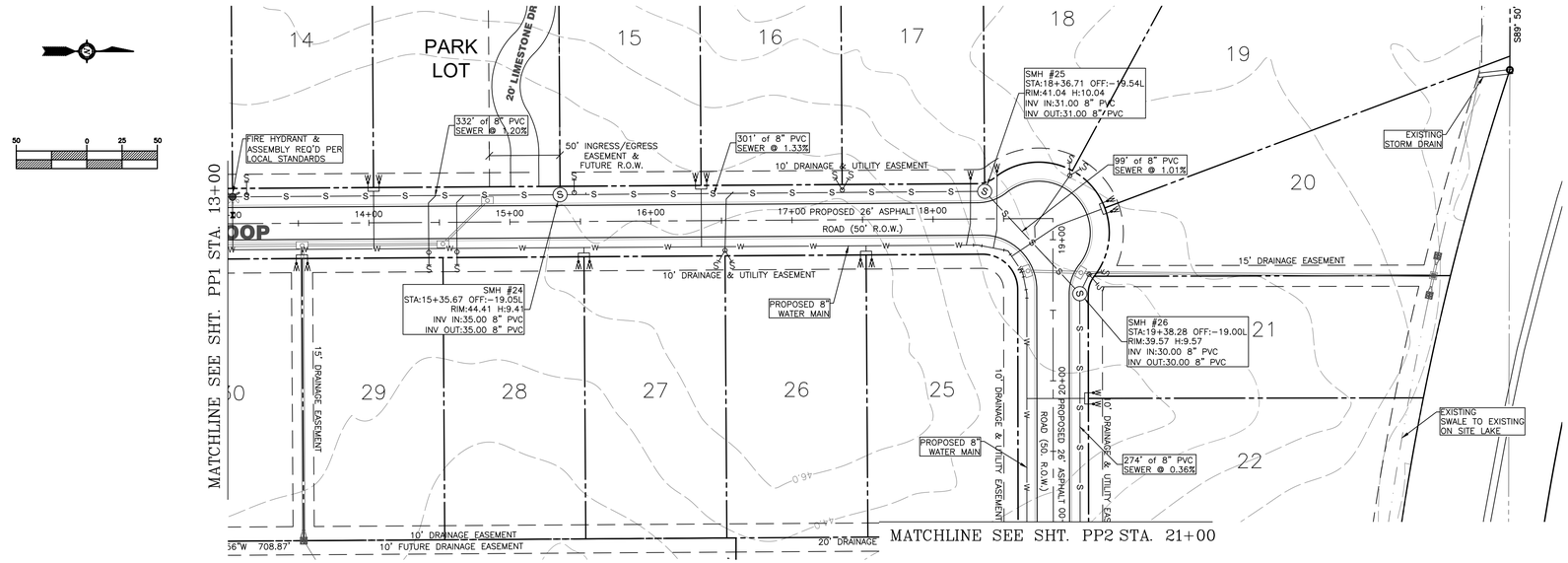


PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
ALIGNMENT CHECKED
R/W & MONUMENTS
STRUCTURE NOTATIONS CHKD
NOTE BOOK
NO.
BY
DATE

T. J. MORAN JR.
REGISTERED PROFESSIONAL ENGINEER
6005
STATE OF MISSISSIPPI

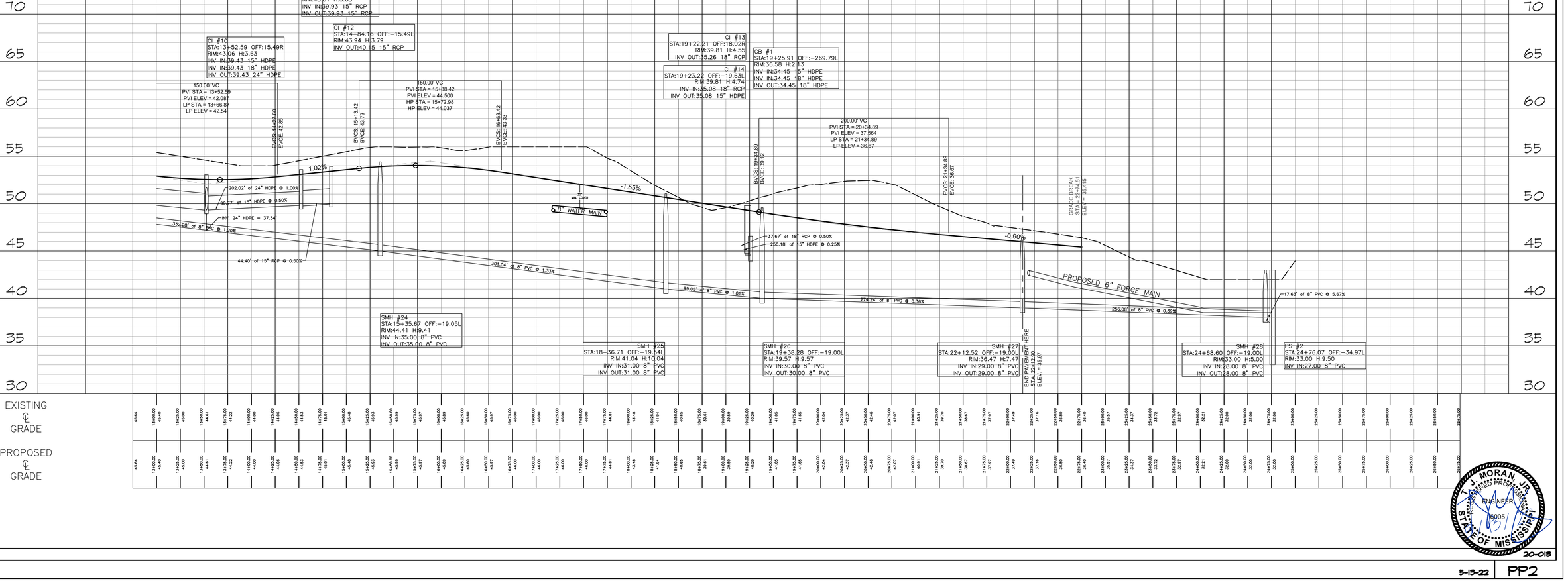
20-015

5-13-22 | PP1



MAGNOLIA LOOP STA. 13+00 - 22+79.71

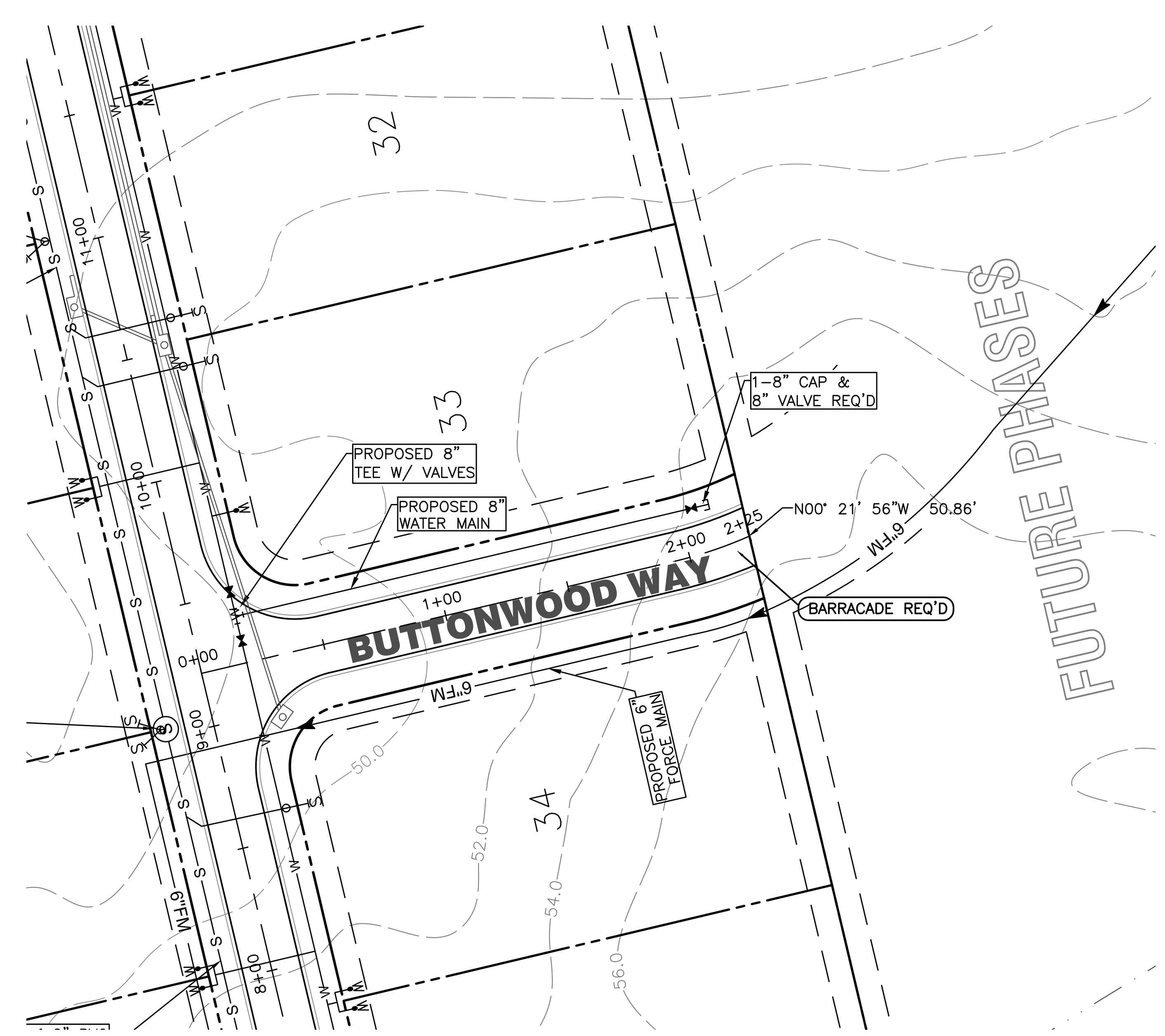
HORIZONTAL = 1"=50'
VERTICAL = 1"=10'



L. J. MORAN, JR.
REGISTERED PROFESSIONAL ENGINEER
STATE OF MISSISSIPPI
16005

20-015

5-13-22 | PP2



BUTTONWOOD WAY STA. 0+00 - 2+25

HORIZONTAL = 1"-50'
VERTICAL = 1"-10'

Station	EXISTING ℄ GRADE	PROPOSED ℄ GRADE
−1+25.00		
−1+00.00		
−0+75.00		
−0+50.00		
−0+25.00		
0+00.00	48.57	47.65
0+25.00	48.83	48.35
0+50.00	49.18	49.12
0+75.00	49.62	49.88
1+00.00	50.16	50.48
1+25.00	50.80	51.46
1+50.00	51.53	52.56
1+75.00	52.36	53.57
2+00.00	53.27	54.50
2+25.00	54.19	55.28
2+50.00		
2+75.00		
3+00.00		
3+25.00		
3+50.00		
3+75.00		
4+00.00		
4+25.00		

PLAN
NOTE BOOK
NO. ____
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
BY
DATE

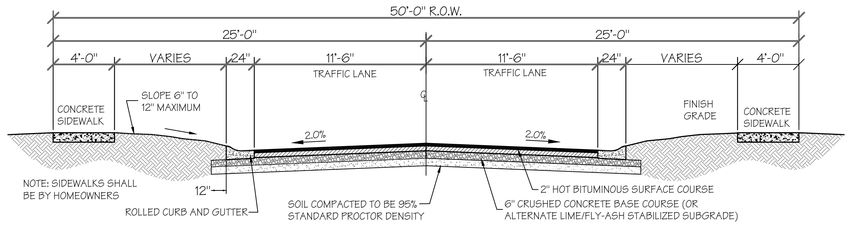
PROFILE
NOTE BOOK
NO. ____
SURVEYED
PLOTTED
GRADES CHECKED
B.M.s NOTED
STRUCTURE NOTATNS CH'KD
BY
DATE

J. MORAN, JR.
REGISTERED PROFESSIONAL ENGINEER
5005
STATE OF MISSISSIPPI

20-015

5-15-22 | PP3

CONSTRUCTION DETAILS



TYPICAL STREET SECTION

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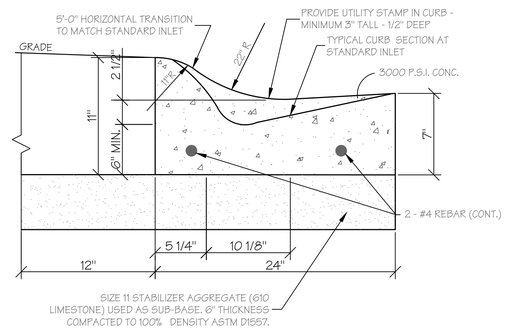

TYPICAL ROLLED TYPE CURB AND GUTTER

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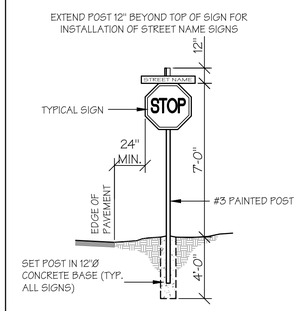

SIGN INSTALLATION DETAIL

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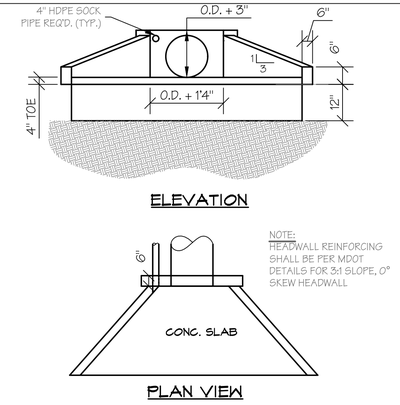

HEADWALL DETAIL

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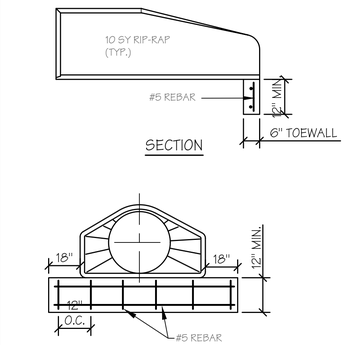
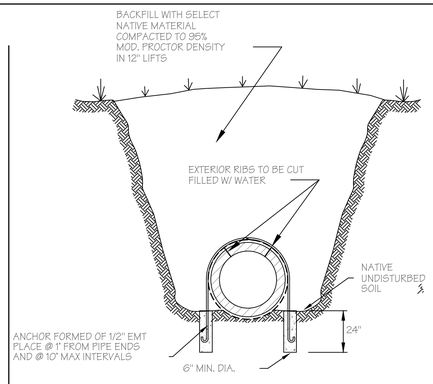


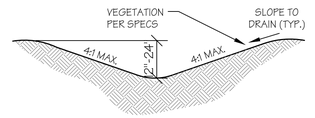
FES - TOE-WALL DETAIL

N.T.S.



TYPICAL PIPE BEDDING POLYETHYLENE DRAINAGE PIPE

N.T.S.



SWALE SECTION

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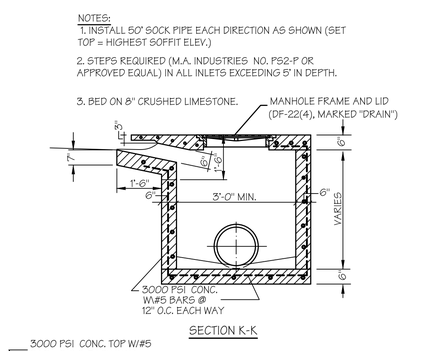
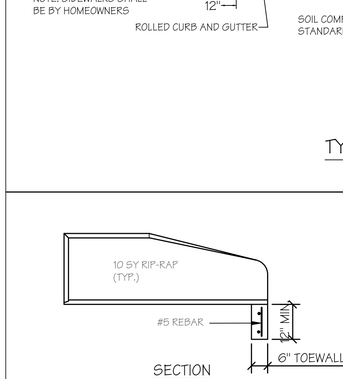




RIPRAP DETAIL

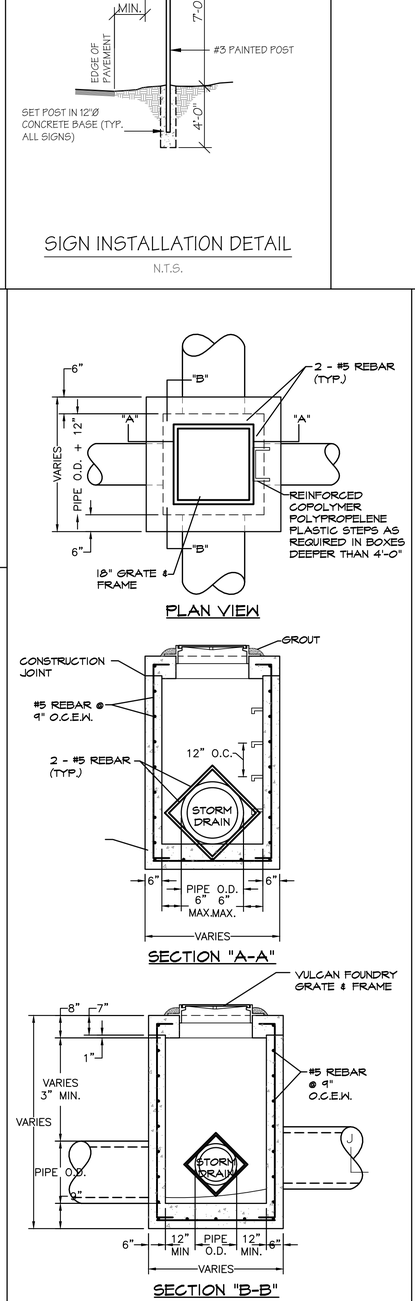
N.T.S.

STORM DRAIN BEDDING DETAIL

N.T.S.

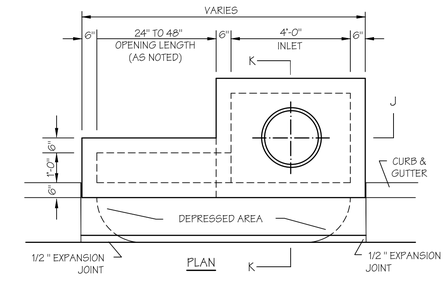
JUNCTION BOX DETAIL

N.T.S.



TYPICAL CATCH BASIN

N.T.S.



CURB INLET DETAIL

N.T.S.

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In Accordance With

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Sheet: CONSTRUCTION DETAILS

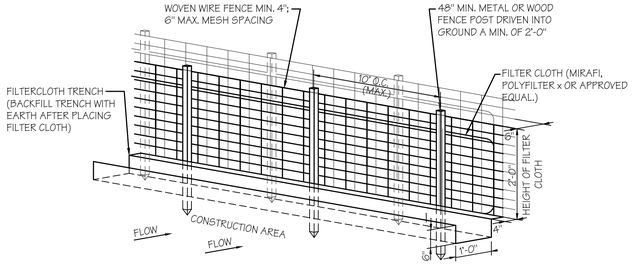
Project: MAGNOLIA WALK SUBDIVISION PHASE 2 LOBOUY ROAD HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C.
Check By K.E.D.
REV

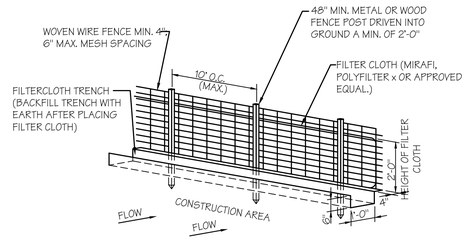
Sheet CD1

Project No 20-013

EROSION CONTROL DETAILS



DOUBLE LAYER SILT FENCE



SINGLE LAYER SILT FENCE

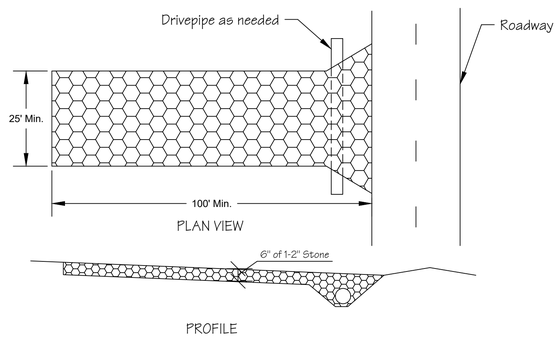
CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS BY USE OF WIRE TIES.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE BY USE OF WIRE TIES SPACED EVERY 24" X 24".
3. SILT FENCES TO BE INSTALLED IN LOCATIONS AS SHOWN ON THIS EROSION AND SEDIMENT CONTROL PLAN PRIOR TO BEGINNING OF CONSTRUCTION TO CONTROL SEDIMENT.
4. SILT FENCES TO BE MAINTAINED AND CLEANED AS NECESSARY TO MAINTAIN IN FUNCTIONAL CONDITION.
5. SILT FENCES TO BE REMOVED AND THE AREA TO BE RESTORED TO ITS NATURAL CONDITION WHEN PERMANENT EROSION AND SEDIMENT CONTROL PROCEDURES ARE EFFECTIVE.

SILT FENCE DETAIL

N.T.S.

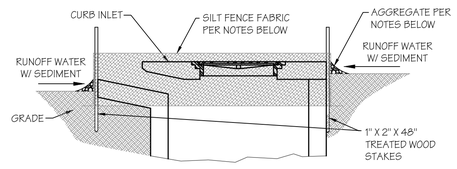
1. Stone Size - Two-inch stone shall be used, or recycled concrete equivalent.
2. Length - The construction entrance shall be as required to stabilize high traffic areas but not less than 50 ft.
3. Thickness - The stone layer shall be at least 6 in. thick.
4. Width - The entrance shall be at least 10 ft. wide, but not less than the full width at points where ingress or egress occurs.
5. Bedding - A geotextile shall be placed over the entire area prior to placing stone. It shall have a Grab Tensile Strength of at least 200 lb. and a mullen Burst Strength of at least 190 lb.
6. Culvert - A pipe or culvert shall be constructed under the entrance if needed to prevent surface water flowing across the entrance from being directed out onto paved surfaces.
7. Maintenance - Top dressing of additional stone shall be applied as conditions demand. Mud spilled, dropped, washed or tracked onto public roads, or any surface where runoff is not checked by sediment controls shall be removed immediately. Removal shall be accomplished by scraping or sweeping.
8. Construction Entrances shall not be relied upon to remove mud from vehicles and prevent off-site tracking. Vehicles that enter and leave the construction site shall be restricted from muddy areas.



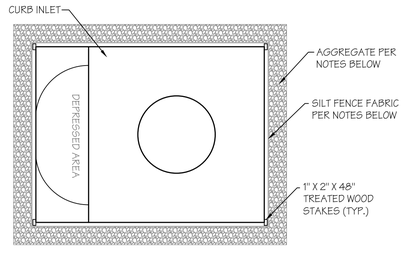
CONSTRUCTION ENTRANCE DETAIL

N.T.S.

NOTES:
1. FENCE SHALL BE 10 OUNCE PER SQUARE YARD AND SHALL BE CUT FROM A CONTINUOUS ROLL TO AVOID JOINTS
2. STAKES SHALL BE 1" X 2" TREATED WOOD OR EQUIVALENT METAL WITH A MINIMUM LENGTH OF 3 FEET.
3. STAPLES SHALL BE OF HEAVY DUTY WIRE AT LEAST 1/2" LONG.
4. STAKES SHALL BE SPACED AROUND PERIMETER OF THE INLET A MAXIMUM OF 3 FEET APART AND SECURELY DRIVEN INTO THE GROUND (MINIMUM OF 8").
5. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4" WIDE AND 4" DEEP AROUND THE OUTSIDE PERIMETER OF THE STAKES.
6. THE FABRIC SHALL BE STAPLED TO THE WOODEN STAKES, AND 8" OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE HEIGHT OF THE FILTER BARRIER SHALL BE A MINIMUM OF 15" AND SHALL NOT EXCEED 18".
7. THE TRENCH SHALL BE BACKFILLED AND THE SOIL COMPACTED OVER THE FABRIC.
8. A 6" WIDE X 4" DEEP TRENCH OF DOT NO. 1 COARSE AGGREGATE SHALL BE FILLED AGAINST THE FENCE TO BE LEVEL WITH THE THROAT AND TOP OF INLET TO PREVENT EROSION WHERE GRADE MEETS FENCE.



ELEVATION VIEW



PLAN VIEW

SILT FENCE SEDIMENT FILTER FOR CURB INLET DETAIL

N.T.S.

NOTES:
1. FENCE SHALL BE 10 OUNCE PER SQUARE YARD AND SHALL BE CUT FROM A CONTINUOUS ROLL TO AVOID JOINTS
2. STAKES SHALL BE 1" X 2" TREATED WOOD OR EQUIVALENT METAL WITHH A MINIMUM LENGTH OF 3 FEET.
3. STAPLES SHALL BE OF HEAVY DUTY WIRE AT LEAST 1/2" LONG.
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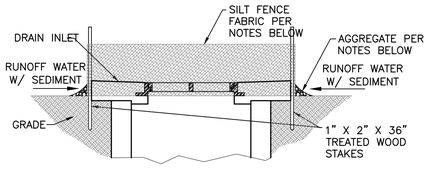
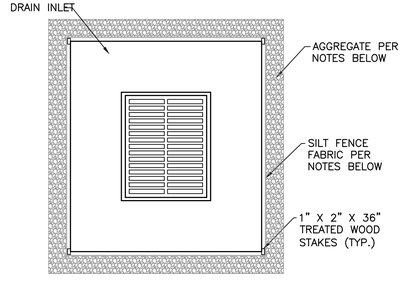
5. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4" WIDE AND 4" DEEP AROUND THE OUTSIDE PERIMETER OF THE STAKES.
6. THE FABRIC SHALL BE STAPLED TO THE WOODEN STAKES, AND 8" OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE HEIGHT OF THE FILTER BARRIER SHALL BE A MINIMUM OF 15" AND SHALL NOT EXCEED 18".
7. TRENCH SHALL BE 8" WIDE X 4" DEEP AND FILLED WITH DOT NO. 1 COARSE AGGREGATE TO PREVENT EROSION WHERE GRADE MEETS FENCE.



ELEVATION VIEW



PLAN VIEW

SILT FENCE SEDIMENT FILTER FOR DRAIN INLET DETAIL

N.T.S.

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Sheet CONSTRUCTION DETAILS

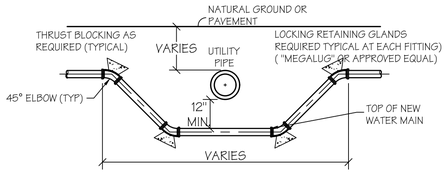
Project MAGNOLIA WALK SUBDIVISION PHASE 2 LOBOUY ROAD HARRISON COUNTY, MS

Date 5-13-22
Drawn By S.G.C.
Check By K.E.D.
REV

Sheet CD2

Project No 20-013

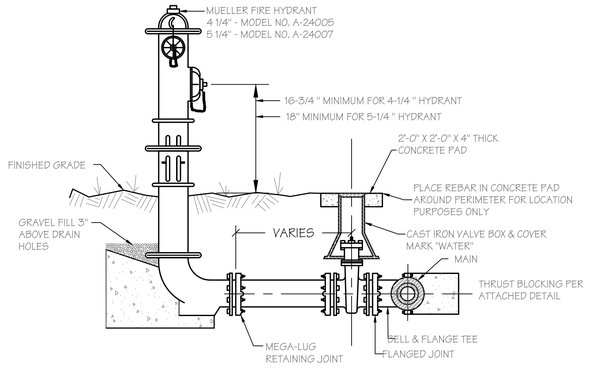
WATER DETAILS



NOTE: THIS ADJUSTMENT TO BE USED ONLY WHEN REQUIRED BY ENGINEER.

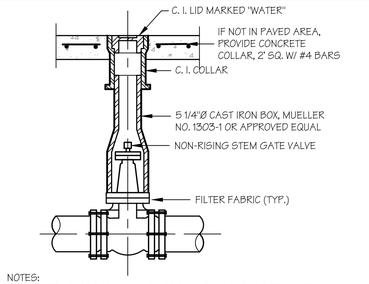
WATER MAIN ADJUSTMENT

N.T.S.



TYPICAL HYDRANT DETAIL

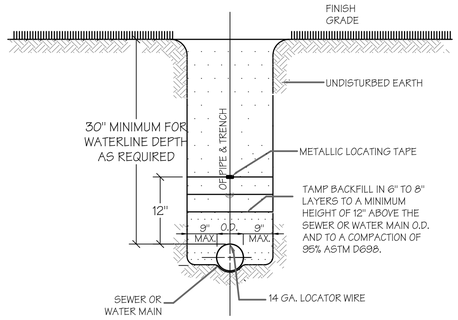
N.T.S.



NOTES:
1. VALVE BOX SECTIONS SHALL BE OF THE ADJUSTABLE SCREW TYPE.
2. FURNISH PLASTIC VALVE BOX EXTENSIONS AS REQUIRED.

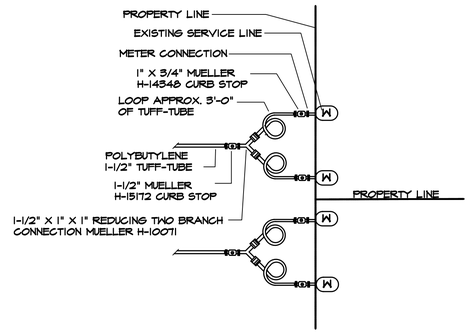
GATE VALVE BOX & COVER DETAIL

N.T.S.

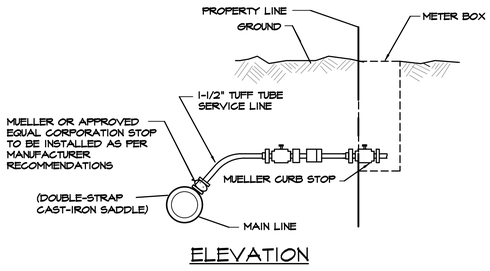


TYPICAL UTILITY LINE EMBEDMENT DETAIL

N.T.S.



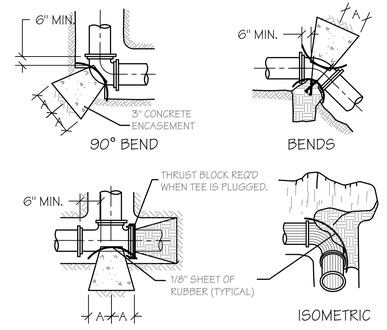
PLAN



ELEVATION

TYPICAL LOT WATER SERVICE CONNECTION

N.T.S.



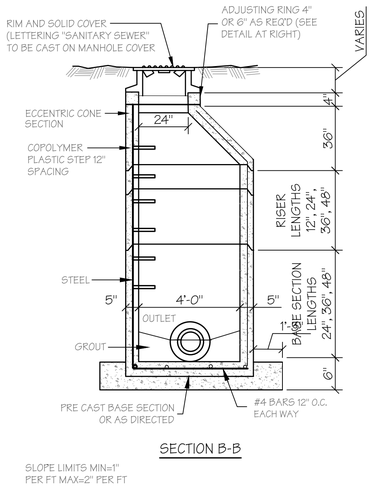
NOTES:
1. ALL DIMENSIONS ARE IN INCHES.
2. USE ON WATER LINES AND SEWER FORCE MAINS.
3. ALL CONCRETE AND PIPE SHALL BE SEPARATE BY A NON-CONDUCTIVE MATERIAL (TYPICALLY 1/8" SHEET RUBBER).

SOIL	SIZE	45° BEND		22-1/2° BEND		11-1/4° BEND		90° DEND		TEE		PLUG	
		A	B	A	B	A	B	A	B	A	B	A	B
2000 PSF	6"	16	10	9	10	6	8	18	10	10	12	10	21
	8"	22	13	12	13	8	10	25	13	16	12	20	29
	10"	26	17	14	17	10	13	30	17	16	20	14	36
	12"	29	21	16	21	11	16	34	21	18	24	16	41
	14"	35	24	19	24	12	20	36	24	22	27	18	48
	16"	38	27	21	27	12	24	42	27	24	30	20	54

THRUST BLOCKING

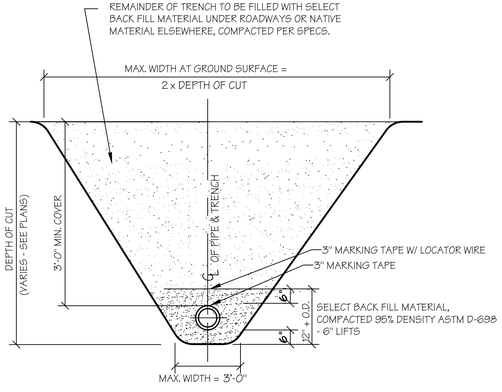
N.T.S.

SEWER DETAILS



TYPICAL PRE CAST CONCRETE SEWER MANHOLE DETAIL

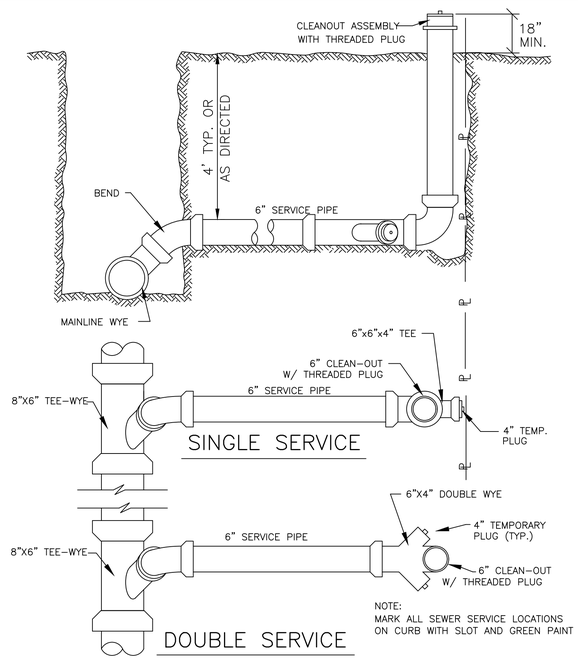
N.T.S.



NOTE:
CONTRACTOR SHALL INSTALL TEMPORARY BRACING, TRENCH BOX AND/OR SHEET PILING IF NECESSARY TO ENSURE STABILITY OF TRENCH UNTIL UTILITY IS FULLY BACK FILLED, INCIDENTAL TO PIPE INSTALLATION.

SEWER TRENCH & BEDDING DETAIL

N.T.S.



NOTE:
MARK ALL SEWER SERVICE LOCATIONS ON CURB WITH SLOT AND GREEN PAINT

TYPICAL GRAVITY SEWER SERVICE DETAIL

N.T.S.

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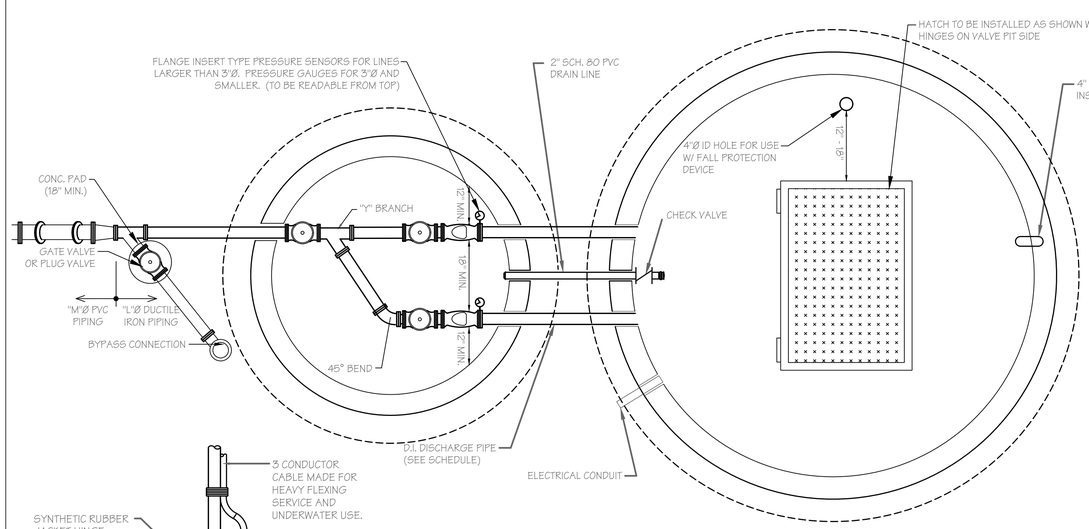
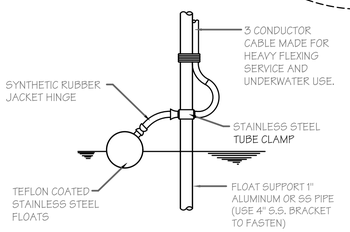
Sheet CD3
Project No 20-013



WETWELL / VALVE PIT - TOP VIEW
N.T.S.

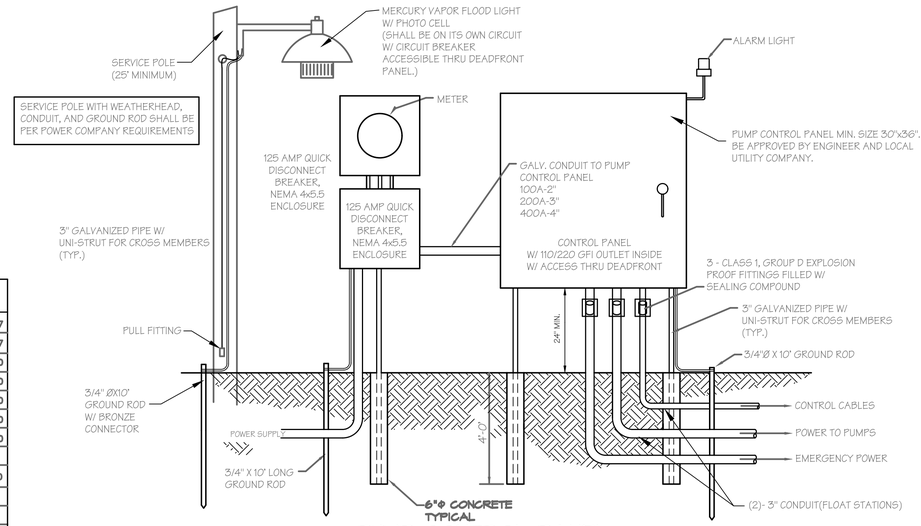
NOTE:
USE ALL STAINLESS STEEL BOLTS, NUTS, FITTINGS.



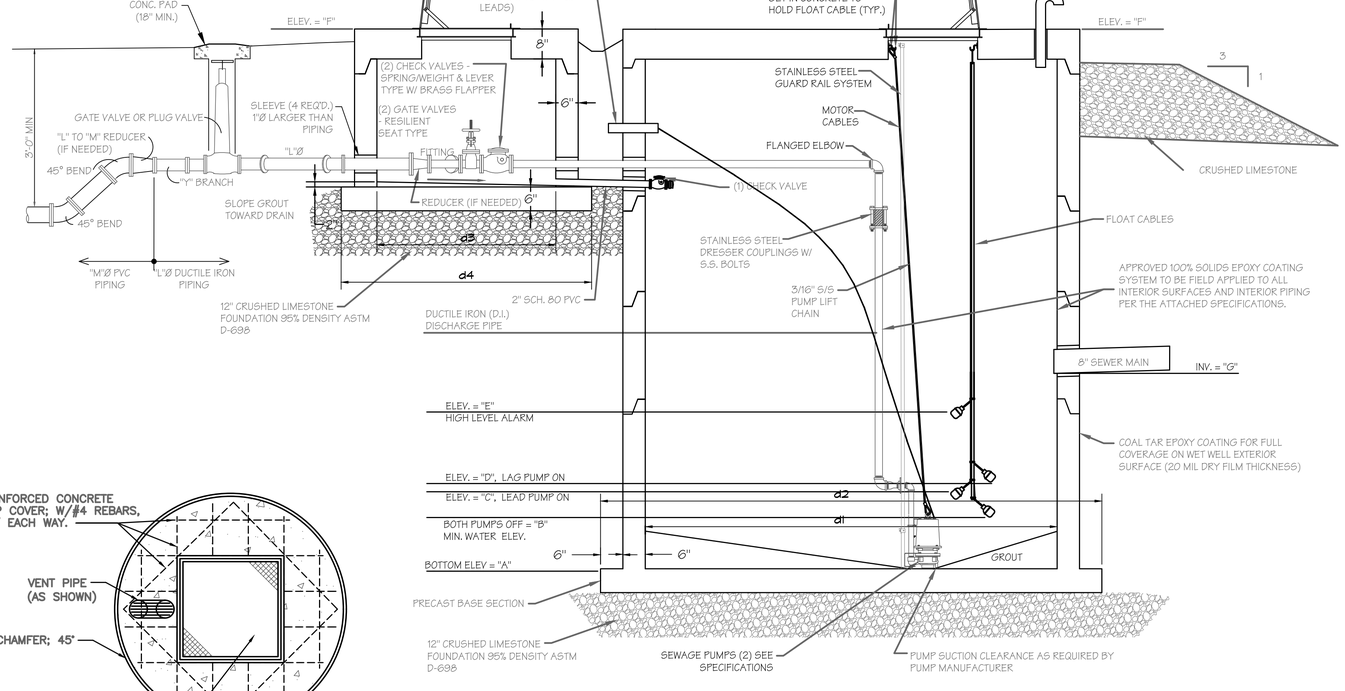
TYPICAL OPTIONAL FLOAT INSTALLATION
N.T.S.

NOTE:
LIFT STATION SPECIFICATIONS WILL BE APPROVED BY ENGINEER AND LOCAL UTILITY COMPANY BEFORE INSTALLATION.

LIFT STATION DATA					
	PUMP STATION NO.	2	MINIMUM DIMENSIONS ELEVATIONS	A	21.67
	CAPACITY G.P.M.	83.61		B	22.67
HEAD COND. (FT)	STATIC	11.3		C	24.00
	FRICTION	1.45		D	25.00
	T.D.H.	49.78		E	26.00
	NO. REQ'D.	2		F	33.00
	MODEL	WEMCO		G	27.00
	TYPE	CL4S3	MINIMUM DIMENSIONS	d1	8.00
	MIN. H.P.	15		d2	10.00
	MAX. R.P.M.	1750		d3	4.00
	SIZE DISCH.	4"		d4	6.00
	SIZE SUCT.	4"		L	4"
	FLOAT CON'T CABLE LENGTH	40'		M	6"
			FLOOD ZONE		
FORCE MAIN	LENGTH FT.	2200'	"X"		
	SIZE IN.	6"			
	MAT'L.	PVC			

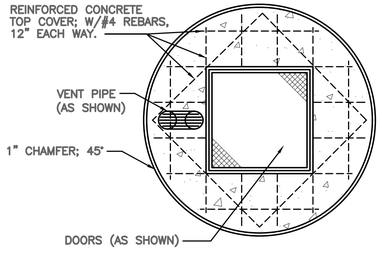


PUMP CONTROL PANEL MOUNTING DETAIL
N.T.S.

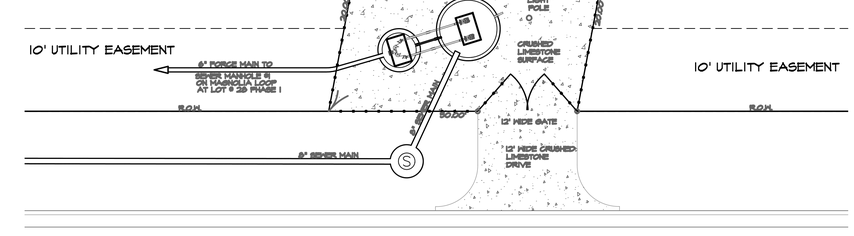


WET WELL / VALVE PIT ELEVATION
N.T.S.

WET WELL NOTES:
1. WRAP ALL JOINTS WITH FILTER FABRIC
2. R.C.C.P. CLASS III ASTM C-76
3. ALL SEALS WATER TIGHT
4. ANY VALVE BOX SHALL BE PRECAST
5. ANY VALVE LOCATED OUTSIDE VALVE PIT SHALL HAVE 18" Ø MIN CONC. OR FIBERGLASS PAD



TOP REINFORCEMENT DETAIL
N.T.S.



PUMP STATION SITE PLAN
N.T.S.

MAGNOLIA LOOP

NOTES:
1. PUMPS SHALL BE CAPABLE OF BEING REMOVED WITHOUT CONFINED SPACE ENTRY WITH THE USE OF GUIDE RAILS.
2. 2" WATER SERVICE SHALL BE INSTALLED W/ BACKFLOW PREVENTION DEVICE APPROVED BY THE MS DEPT OF HEALTH & SHALL BE PROPERLY TESTED.
3. WET WELL & VALVE PIT CONSTRUCTION MATERIAL SHALL BE IN ACCORDANCE W/ LOCAL UTILITY COMPANY.
4. STAINLESS STEEL NUTS, BOLTS, & HARDWARE SHALL BE USED IN WET WELL & VALVE PIT.
5. PUMP LIFTING DEVICE SHALL BE STAINLESS STEEL CHAIN (NO CABLE).
6. CHECK VALVES TO BE OF SPRING/WEIGHT & LEVER TYPE W/ BRASS FLAPPER.
7. GATE & PLUG VALVES SHALL BE RESILIENT SEAT.
8. CHECK VALVE SHALL BE INSTALLED ON VALVE PIT DRAIN & TO BE LOCATED INSIDE WET WELL.
9. ANY GATE/PLUG VALVE OUTSIDE VALVE PIT SHALL HAVE MIN. 18"ø CONCRETE OR FIBERGLASS PAD.
10. ISOLATION VALVE TO BE INSTALLED ON FORCE MAIN.
11. BYPASS PLUMBING TO BE INSTALLED AS PER LOCAL UTILITY COMPANY REQUIREMENTS.
12. MISSION COMMUNICATIONS, IF REQUIRED, PER LOCAL UTILITY COMPANY.
13. CONTROL PANEL SHALL BE 3 LATCH OPERATED W/ SINGLE HANDLE AS PER LOCAL UTILITY COMPANY REQUIREMENTS.
14. NO JUNCTION BOXES SHALL BE USED. ALL MOTOR LEADS, FLOAT SWITCH CABLES SHALL TERMINATE IN CONTROL PANEL.
15. THERE SHALL BE NO PENETRATIONS THRU TOP OF CONTROL PANEL.
16. FLOATS SHALL BE PER LOCAL UTILITY COMPANY REQUIREMENTS.
17. FLOAT SUPPORT SHALL BE SUSPENDED W/ EITHER 1" ALUMINUM OR S/S PIPE AND HUNG FROM HOOK IN WET WELL LID.
18. 3" GALV. PIPE SHALL BE USED FOR CONTROL PANEL POSTS W/ UNI-STRUT FOR CROSS MEMBERS.
19. VALVE PIT COVER TO BE 1"x3" GALV. GRATING OR 3'x3' ALUMINUM HATCH W/ S/S HARDWARE.
20. SEE SITE PLAN FOR LIMITS OF AGGREGATE SURFACE & CONTROL PANEL LOCATION.
21. CONCRETE PERIMETER SHALL BE COATED W/ 20 MILS OF ASPHALTIC BASE COATED PRIOR TO ALUM. HATCH INSTALLATION.
22. UNDERGROUND PIPING SHALL HAVE THRUST BLOCKS AT BENDS OR RETAINER GLANDS AT ALL M.J. CONNECTIONS.
23. SANITARY SEWER SHALL NOT CONFLICT WITH STORM DRAINAGE.
24. IF REQ'D., CONTRACTOR SHALL PROVIDE AN APPROVED ENGINE GENERATOR SYSTEM TO PROVIDED SOURCE OF EMERGENCY AND STANDBY POWER.

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Date 5-13-22
Drawn By S.G.C
Check By K.E.D.
REV 10-26-21

Sheet CD4
Project No 20-013

TECHNICAL SPECIFICATIONS

FOR:

Magnolia Walk Subdivision,
Phase Two,
Pass Christian, Harrison County, MS

PREPARED FOR:

Heritage Development, Inc.
7394 Magnolia Street
Pass Christian, MS 39571

PREPARED BY:

Terry Moran Engineering
1806 23rd Ave. Suite B
Gulfport, MS 39501
Ph. (228) 896-6768

PROJECT NO. 20-013

TECHNICAL SPECIFICATIONS INDEX

DIVISION 2 - SITEWORK

SECTION 02050 - DEMOLITION AND REMOVAL

1.0 SCOPE OF WORK

1.1 This work shall consist of all labor, materials, services, and equipment necessary to remove the existing obstructions, including but not limited to fences, slabs, foundations and utilities which are designated to be removed and/or re-located in the plans and in these specifications.

1.2 Contractor shall pay for any permits, licenses, bonds, etc., required for demolition or removal items herein.

1.3 Work related to these removal items such as Site Preparation, Earthwork, Grading and Drainage and Site Utilities is specified elsewhere under those applicable sections.

1.4 Any work performed within public right-of-way or on adjacent properties shall be done in strict accordance with the requirements of the governmental agencies or the owning entities having jurisdiction and shall not begin until authorized by those parties.

1.5 The Existing Conditions Plan has been prepared in order to show all existing structures and improvements. Others may exist and may be discovered upon visiting the site. It is the Contractor's responsibility to visit the site prior to initiating any work. If any deviations from those conditions shown are found, the Contractor shall notify the Engineer and Owner in writing immediately. If said deviations are found by Engineer to adversely affect the progress or scope of the project, construction will cease until said deviations are resolved between the Contractor and Engineer.

1.6 All surrounding site features which are shown to remain on the drawings, shall not be injured in any manner during the Contractor's work. Any adjacent public street or road that is used to accomplish the work herein shall be fully restored if damaged or changed in any respect during the work, to the complete satisfaction of the governmental agencies having jurisdiction over said street or road.

1.7 Any damage done to existing drainage facilities or utilities during the course of this work shall be repaired at the Contractor's expense in a

manner acceptable to Engineer and the owning entity. Any unnecessary damage shall be reported to Engineer, should it occur.

2.0 MATERIALS

None

3.0 CONSTRUCTION REQUIREMENTS

3.1 Quantities for Removal Items have been shown in the plans. The Contractor shall be responsible for visiting the site so as to obtain a better understanding of exactly what difficulties are associated with these removal items, and determining more exact quantities, if necessary.

3.2 It shall be the Contractor's responsibility to contact all pertinent utility companies or owning entities to verify that the utilities shown to be removed are in fact inoperative, and if not, shall provide a temporary means of operation until permanent utilities are in place.

3.3 Extreme caution shall be taken when removing any structures or utilities below grade to prevent damage or disturbance to existing utilities which are to remain in service.

3.4 Concrete curb and drainage structures shall not be removed until the traffic is satisfactorily accommodated otherwise.

3.5 All removal items, if deemed to not be salvageable by the Engineer, shall be satisfactorily disposed of by the Contractor off-site.

3.6 Contractor shall not remove any existing storm drain pipe shown on the plans to be removed, until positive drainage has been secured for all areas.

3.7 No existing storm drain pipe shall be plugged until providing a positive drainage route for the area adjacent to the pipe.

3.8 All demolition and removal of existing buildings or building slabs shall include any and all building remains, building floor slab, all subsurface structural footings and piers, and all utility appurtenances associated with the buildings including, but not limited to plumbing, gas, electric, telephone meters, etc., up to the point at which said services enter the project limits, unless specified otherwise .

4.0 METHOD OF MEASUREMENT

4.1 Removal of existing items (and re-location were required) will be measured as indicated on the plans and shall include complete and satisfactory removal and transportation of the material and any associated materials that might be incurred, out of the project limits and shall include proper disposal of those items.

4.2 Materials designated to be removed shall be legally deposited at a location approved by Engineer, and shall by no means be burned or deposited on-site.

END OF SECTION

DIVISION 2 - SITEWORK

SECTION 02100 - SITE PREPARATION

PART 1 GENERAL

1.01 Scope of Work

A. Cleaning site of debris, grass, trees and other plant life in preparation for site or building excavation work.

B. Protection of existing structures, trees or vegetation indicated on the contract documents to remain.

C. Stripping topsoil from areas that are to be incorporated into the limits of the project and where so indicated on the construction drawings.

1.02 Related Sections

A. Section 02050 - Demolition

B. Section 02200 - Earthwork

C. Section 02270 - Slope Protection and Erosion Control

D. Construction Drawings

1.03 Environmental Requirements

A. Construct Temporary Erosion Control Systems as Shown on the Plans or as directed by the Engineer to protect adjacent properties and water resources from erosion and sedimentation.

1.04 Job Conditions

A. Conditions existing at time of inspection for bidding purposes will be maintained by owner in so far as practical.

B. Variations to conditions or discrepancy in actual conditions as they apply to site preparation operations are to be brought to the attention of the owner prior to the commencement of any site work.

1.0 SCOPE OF WORK

1.1 This work shall consist of clearing, grubbing, stripping, excavation, removal and disposal of all overburden materials and debris of whatever character necessary to satisfactory expose suitable subgrade material.

1.2 Stripping is generally inclusive of the top six inches (6”) of material referred hereafter to as topsoil, but will include whatever depth necessary to satisfactorily expose acceptable subgrade.

2.0 MATERIALS

None.

3.0 CONSTRUCTION REQUIREMENTS

3.1 Clearing and Grubbing

3.1.1 Clearing and grubbing shall include removal of all trees, brush, stumps, and tall grass that are designated to be removed in the plans. It may be necessary for the Contractor to bush-hog portions of the site prior to beginning the stripping operations. There shall be no separate payment for said work. Undisturbed stumps and roots, and nonperishable solid objects which will be a minimum of three feet below subgrade or slope of embankments may be left when authorized by Engineer.

3.1.2 Burning of perishable material shall be done only in accordance with applicable laws, ordinances, and regulations. All burning is subject to the permission of the local Fire Department and/or Fire Marshall and in accordance with their requirements. <u>No burning within limits of paving or buildings is allowed whatsoever.</u>

3.1.3 All materials and debris not burned shall be removed and disposed of outside of the project limits in a manner satisfactory to Engineer. Burial of material or debris on the project is not permitted without the expressed consent of the Engineer.

3.1.4 Following the clearing and grubbing operations, the Contractor shall slope the existing ground surface and fill depressions and stumpholes to encourage drainage utilizing existing material within the limits of clearing and grubbing and to the specified grades.

3.1.5 After sloping the ground surface to ensure positive drainage over the entire site, the Contractor shall rake the entire area to remove surface roots and objects and to provide a final dressing for the project area.

3.1.6 Low hanging and unsound or unsightly branches on trees or shrubs on adjacent property, but extending over the clearing and grubbing limits shall be trimmed. All trimming shall be done by skilled workmen and in accordance with good tree surgery practices. An approved asphalt paint prepared specifically for tree surgery shall be furnished and applied by Contractor to cut or scarred surfaces on trees or shrubs not designated to be removed.

3.1.7 Contractor shall saw-up, pile, and burn trees in accordance with paragraph 3.1.2, where allowed by local municipality, in an area approved by the Owner and Engineer. Said area shall be set aside prior to commencement of this project.

3.2 Stripping

3.2.1 Contractor shall remove topsoil prior to the placement of new fill material.
The depth of topsoil to be removed will be that depth required to expose
suitable subgrade material, as determined by the Engineer or Soils Engineer.

3.2.2 Contractor shall undercut any existing swales through the site deeper than the six inches (6”) as required to remove all loose and soft material present.

3..2.3 The Contractor shall not remove any topsoil in those areas designated on the plans to be grassed or landscaped, except as necessary for the construction of new improvements.

3.2.4 Contractor’s stockpiling of topsoil and plating materials operation shall be
completed prior to beginning any further work or excavation of the underlying material.

3.3 Excavation

3.3.1 Excavation shall include all topsoil that is deemed by the Engineer or Soils Engineer as unsuitable for subgrade material. Topsoil shall not be used as fill material.

3.3.2 Excavation operations shall be so conducted as to minimize the loosening of materials outside the area designated for removal of such material or below the indicated grade. No payment will be made for the removal, disposal, or replacement of material determined to be loosened or undercut through carelessness or negligence on the part of the Contractor.

3.4 Disposal

3.4.1 Contractor shall provide at his expense a suitable area for disposal of topsoil which is determined by the Soils Engineer or Engineer to be unsuitable as upgrade material, or that is not necessary for plating material. A quantity of topsoil sufficient to bring, those areas designated to be grassed or landscaped to finished grade, (4" required) will be set aside by the Contractor for use, subsequent to all other compensation to the Contractor for hauling topsoil off of the site and depositing excess topsoil.

4.0 METHOD OF MEASUREMENT

4.1 Clearing, Grubbing, and Stripping will be measured by their respective units and shall include complete removal and deposition of any materials encountered deemed by Engineer or Engineer's Representative as unsuitable for subgrade material, from the project in a proper and acceptable manner and stockpiling all, or the portion of topsoil material sufficient in quantity to cover proposed lawn areas, the required 4 inches.

END OF SECTION

DIVISION 2 - SITEWORK

SECTION 02200 - EARTHWORK

1.0 SCOPE OF WORK

1.1 The Contractor shall furnish all labor, equipment, transportation, and supplies necessary for the completion of all earthwork as shown on the drawings and specified herein, and includes the preparation of subgrades, foundations, and other utilization or disposal of materials excavated, and the compaction and dressing of excavated areas and embankments. Excavation for drainage, water, and sewer systems is not included under this section, but is considered incidental to the drainage and sewer systems installations.

1.2 Contractor shall perform all on and offsite preparation work and earth moving required to best achieve land balance and to meet indicated subgrade.

1.3 All Clearing, Grubbing, and Stripping shall take place and those materials either stockpiled offsite or disposed of prior to any further preparation of subgrade or earthwork operations, as specified under SITE PREPARATION.

1.4 All excavating, filling, compacting, and grading required shall be done so as to obtain the finished subgrade elevations. Subgrade shall be prepared to properly receive pavements, slabs, structures, or fill as shown in the drawings and these specifications.

1.5 Contractor shall be responsible for coordinating and contacting the Soils Testing Laboratory in accordance with these specifications to observe the overall earthwork operation, including but not limited to, the Stripping, Clearing, and Grubbing, proof-rolling of subgrade, cut and fill work, and site grading. Owner will retain Soils Testing Laboratory prior to the letting of this contract. Owner will submit to Contractor an outline of the required testing.

1.6 Contractor shall be responsible for establishing and maintaining a borrow source should the earthwork not balance. Said borrow source samples shall be submitted to the Owner’s testing lab to ensure compatibility of soil material for use as fill material. Contractor shall ensure that borrow material is clean and uncontaminated by organic soils or other deleterious materials. If native material from Contractor’s operations, and shall always be left in a well positioned.

1.7 Contractor shall assume sole responsibility for the completion of the work described herein regardless of the subsurface materials or conditions encountered.

1.8 Contractor shall at all times minimize noise-producing activities, and shall comply to all noise abatement ordinances.

1.9 Contractor shall keep all areas of construction sufficiently dampened to prevent dust from adversely affecting adjacent properties or public streets. Contractor shall ensure that trucks leaving the site are free of mud and earth, and do not leave deposits on adjacent streets or properties. Any deposits that are left shall be immediately removed by the Contractor at his expense to the satisfaction of the entity having jurisdiction.

1.10 Contractor shall be responsible for ensuring the protection of adjacent properties from runoff of soils. Contractor shall temporarily construct, at his expense, whatever means necessary to ensure no erosion or sediment transport occurs onto adjacent properties. This shall be incidental to the other units of work described herein.

1.11 During the earthwork operations, Contractor shall pay close attention to those existing utilities and improvements designated to remain, so as to not cause any damage to said features. Should any damages occur as a result of Contractor's operations, said damages will be repaired at Contractor's expense.

1.12 During the entire course of this work, Contractor shall maintain existing drainage ways. During placement and grading operations, the exposed subgrade shall be maintained in a positively drained condition.

1.13 All earthwork performed under this Contract shall be done in strict accordance with this specification.

2.0 MATERIALS

2.1 Native subsurface granular materials, which are free from organic contamination and are approved by Engineer shall be suitable for use as fill. Organic contamination is defined as containing 4.0 percent or more of organic material.

2.2 Select Granular Fill shall be approved by the Engineer and shall consist of sand, clayey sand or sandy clay, provided the % passing the #200 sieve is not greater than 15% for any of the material.

3.0 CONSTRUCTION REQUIREMENTS

3.1 General

3.1.1 Contractor shall ensure during the course of this work that all excavations are free from water before structures and pipes are installed.

3.1.2 Contractor may be required to provide all necessary pumps, drains, well point systems, and other means of removing water from excavations, trenches, subgrades, etc., if necessary to accelerate the dewatering process. Water from said portions of the work shall be disposed of in a manner satisfactory to Owner, Engineer, and Municipality.

3.1.3 Should the subgrades experience “pumping” and loss of bearing strength due to accumulated water beneath the subgrades, the compaction of these material shall be terminated. The Contractor shall either remove the affected soil to a sufficient depth and replace with a dry fill material, or allow the excess moisture to dissipate sufficiently to achieve the specified compaction.

3.1.4 Site Contractor shall be responsible for making whatever subsurface exploration, as he deems necessary to determine if any further excavation than that shown on the plans is necessary to remove unsuitable material(s). Any unsuitable material(s) discovered below the ground surface shall be removed and disposed of, as described in these specifications. There will be no separate or additional payment for excavation, handling, processing, removal, replacing, or re-compacting that is related to this work, other than the pay items set forth in the Bid Proposal.

3.2.1 All surface materials shall be stripped from limits of the area to be improved and satisfactorily stockpiled on-site in an area outside of any proposed construction and reserved for later use. All other unsuitable materials shall be satisfactorily disposed of off of the site. Suitable in-situ subgrade materials shall then be proof-rolled and compacted in place to the density specified in the Geotechnical Report.

3.2.2 Excavations shall be finished to reasonably smooth and uniform surfaces with a tolerance of $\pm$ 1/2”. Operations shall be conducted so that material outside the limits of slopes will not be unnecessarily disturbed and so as to minimize the loosening of materials outside the required slopes or below the indicated grade.

3.2.3 When the Contractor's excavating operations encountered remains of prehistoric dwelling sites or other artifacts of historical or archeological significance, the operations shall be temporarily discontinued. The Engineer will contact appropriate authorities to determine the disposition thereof. When directed by the Engineer, the Contractor shall excavate the site in a manner to preserve the artifacts encountered, and if required shall remove them for delivery to the custody of the proper State authorities. Such excavation will be considered and paid for as extra work.

3.2.4 Where excavation to grade results in a foundation, subgrade, or slope of unsuitable soil, the Contractor shall remove unsuitable materials and backfill to the required grade with approved material. Slides or other soil failures shall be removed by the Contractor unless their removal is waived by the Engineer.

3.2.5 All earth cut slopes shall be dressed to smooth and uniform surfaces to conform to the specified sections. Slopes shall not exceed 2:1 horizontal to vertical, unless a lesser slope is specified herein, in which case the otherwise specified slope shall govern.

3.2.6 All material encountered in excavation within the project which is unsuitable for use in the work shall be removed and disposed of as specified in the contract or as directed. Unless otherwise specified, the Contractor shall provide at his own expense the location for the disposal of excess excavation. Contractor shall plan his operation to utilize all suitable excavation in the project including transportation as required.

3.3 When practical, the most suitable materials will be placed in the top courses of fill sections.

3.4 Where plating or landscaping is contemplated, either in cut or fill sections, appropriate adjustment shall be made in the graded section during construction so that the finished section after plating will conform within allowable tolerances to the typical sections and finished grades shown on the plans.

3.5 Embankments around structures shall not start until the structure has been properly cured for the minimum number of days required and permission has been granted by the Engineer to proceed with the work. The Contractor shall repair, restore with new work, or make good without extra compensation, all damage done to any structure as a result of the backfilling operations.

3.6 All backfill material shall be at the moisture content determined to be proper for the particular material being placed so that the resulting work will be both dense and stable. It shall be the Contractor's responsibility to remain the proper moisture content during compaction operations.

3.7 The materials shall be compacted to 95% standard proctor density per ASTM D698, unless stated otherwise. Tests shall be made in accordance with applicable AASHTO or ASTM test methods.

3.8 The finished contours and spot elevations shown on the Grading and Drainage Plan indicate the finished surface after all construction. In areas where paving, floor slabs, or plating with topsoil are specified, Contractor shall make due allowances for these thickness.

3.9 Contractor shall make note of pavement thickness as shown and the areas in which they occur. Landscaped or lawn areas are to be finished four inches (4") below finished grade. New street paving inside public right-of-way shall be finished as required by those governing entities. The tolerance on all earthwork and finished grading shall be +/- one-half inch (1/2).

3.10 Cut and Fill Work shall be done in strict accordance with these specifications. By no means shall fill material be placed in excess of eight inch(8") thick loose lifts or compact to less than 95% standard density.

4.0 METHOD OF MEASUREMENT

4.1 Earthwork shall be measured per the respective unit prices and shall include all excavation, compaction, filling, grading, subgrade preparation, utilization, transportation, and disposal of material required to obtain the finished subgrade elevations specified in the plans and the required compaction specified herein.

END OF SECTION

DIVISION 2- SITEWORK

SECTION 02232 - GRANULAR BASE MATERIAL

1.0 SCOPE OF WORK

1.1 This work shall consist of furnishing and placing one or more plant-mixed courses of crushed limestone base course on a prepared subgrade in accordance with these Specifications and in reasonably close conformity with the lines, grades, thickness and typical cross-sections shown on the Plans.

2.0 MATERIALS

2.1 Material shall be composed of three (3) well controlled aggregate sizes and water mixed in a central plant. Aggregates shall be one hundred (100) percent crushed limestone or granite produced in three (3) separate sizes in conformance with this specification.

2.2 The composition blend of the components of aggregates from approved source(s) shall fall within the master gradation ranges, based on aggregates of uniform specific gravity.

2.3 The overall limits set out in these master ranges encompasses the extreme limits for the combination of aggregates from various sources. Closer controls on the composition blend of the components, appropriate to the job materials, shall be established for the mixture required under any contract by establishment of an approved job mix formula in accordance with these provisions.

2.4 The job-mix formula shall bind the Contractor to furnish mixtures meeting the requirements of such approved exact formula within the allowable tolerance specified.

2.5 Samples of the actual mixtures in use will be taken as often as the Engineer may deem necessary, to insure maintenance of uniformity of the quality of the mixture within allowable tolerances, throughout the work.

2.6 No change in source of materials will be allowed on the project without expressed written consent from the Engineer. In such cases, Contractor will be responsible for supplying and paying for the testing required in the section.

2.7 No mixture will be accepted for use, nor shall any mixture be placed until the Engineer has established or approved a job-mix formula for the partial mixture.

2.8 The material shall consist of limestone or granite.

2.9 No source of material used in the blend shall have a percent of wear, Los Angeles Abrasion Test, of more than 50. All material shall contain less than twenty (20) percent thin or elongated pieces.

2.10 The gradation for the Granular Base Material shall be as follows.

Square Mesh Size	% passing (by dry weight)
1-12”	100
1’	90-100
3/4”	70-95
3/8”	50-80
#4	35-65
#10	25-50
#40	10-26
#200	4-12

3.0 CONSTRUCTION REQUIREMENTS

3.1 Prior to placement of Granular Base Course, the site shall be prepared and proof-rolled in Accordance with the EARTHWORK section.

3.2 All stockpiling and proportioning, Equipment, Spreading, Shaping and Compacting shall be done in accordance with the applicable requirements of section 308 of the Local State Highway Department or Department of Transportation Standard Specifications for Highway Construction, latest edition.

4.0 METHOD OF MEASUREMENT

Granular Base Course will be measured by the number of square yards, compacted to the specified density, to the thickness specified in the Plan, per measure.

END OF SECTION

DIVISION 2 - SITEWORK

SECTION 02270 - SLOPE PROTECTION & EROSION CONTROL

1.0 SCOPE OF WORK

1.1 This work shall consist of all labor, materials, and equipment necessary to temporarily control erosion as shown on the drawings and specified herein, including, but limited to, sodding, silt traps, sediment barriers, earthen berms, diversion ditches, and the placement of hay bales.

2.0 MATERIALS

2.1 Filter cloth for silt fences shall be a pervious sheet of synthetic polymer filaments nonwoven from continuous fibers and shall be the type specified on the drawings or an approved equal.

3.0 CONSTRUCTION REQUIREMENTS

3.1 Temporary erosion control shall be used until such time as permanent paving, planting, and restoration of natural areas are effective in the control of site erosion.

3.2 Sodding shall be at openings of on-site flared end sections and at curb cuts as specified on the drawings.

3.3 Silt traps shall be installed as necessary and shall be maintained until other erosion control methods can be substituted for them. Silt traps shall be cleaned out when half filled with silt.

3.4 Sediment barriers shall be located at all points where surface water can leave the construction site after bypassing a silt trap, if that point is subject to erosion. Barriers shall be constructed to remove sediments from flowing water through filtration by filter cloth fences or staked hay bales. Sediment barriers shall be arranged to create ponding behind them. Sediment shall be removed to maintain ponding capacity drainage structures until establishment of permanent erosion control.

3.5 Diversion ditches and earthen berms shall be constructed wherever steep slopes or changes in grade are required.

3.6 All temporary erosion control measures shall be removed and areas restored when permanent erosion control is effective.

3.7 No drainage across building pad.

4.0 METHOD OF MEASUREMENT

4.1 There shall be no separate pay item for temporary erosion control, in that it is incidental to the applicable types of work.

END OF SECTION

DIVISION 2 - SITEWORK

SECTION 02430 - DRAINAGE STRUCTURES

1.0 SCOPE OF WORK

1.1 The Contractor shall furnish all labor, materials, tools, equipment and incidentals necessary to construct all drainage structures and related work including but not limited to junction boxes, detention structures, concrete flumes, and incidental ditch shaping, in accordance with these specifications and in reasonably close conformity with the lines, grades and dimensions shown on the drawings or established by the Engineer.

2.0 MATERIALS

2.1 Concrete - Class B, Local State Highway Department or Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

2.2 Bar Reinforcement - Grade 40 or 60 billet steel , ASTM A-615.

2.3 Castings-Heavy Duty-non-rocking shall be of uniform quality , free from blowholes, shrinkage, distortion or other defects. They shall be smooth and well cleaned by shot blasting. Metal used in manufacture shall to ASTM A48-76 Class 35 for Gray Iron and ASTM A536-80 Grade 65-45-12 for Ductile Iron. All castings shall be true to pattern, component parts shall fit together in a satisfactory manner. Round frames and covers shall have continuously machined bearing surfaces to prevent rocking and ratting. Tolerance shall be plus or minus 1/16 per foot.

2.4 Expansion Joint - Performed expansion joint filler for concrete, AASTHO M-33.

2.5 Corrugated Polyethylene Drainage Tubing - AASHTO M-252; fittings shall conform to ASTM F-405.

2.6 Junction Box Steps - Cast iron, ASTM A-48, Class 30 or 12” wide 3/8” steel reinforcing rod in capsuled in a copolymer polypropylene plastic similar to M.A. Plastic Step as manufactured by M.A. Industries, Peachtree City, Georgia, integrally cast with junction box, or cast in place with junction box.

2.7 Select Backfill Borrow Material specified specified elsewhere.

3.0 CONSTRUCTION REQUIREMENTS

3.1 Conform to applicable construction requirements of the Local State Highway Department or Department of Transportation Specifications for Road and Bridge Construction, latest edition, and all additional supplements.

3.2 Ditches and swales shall be dressed to a smooth and uniform surface and shall conform reasonably close to the typical section shown on the drawings. Machine dressed slopes will be classed satisfactory and hand dressing will not ordinarily be required.

3.3 Excavation and backfill required for construction of culverts, junction boxes, flared end sections, and other drainage structures, where applicable, shall be included in the price for the structure.

3.4 The ground surface that has been affected by the Contractor's operation shall be dressed to a smooth and uniform surface reasonably close to the original ground surface and shaped to encourage drainage.

3.5 Pre-cast inlets, junction boxes, and detention structures may be permitted by Engineer subject to review and approval of shop drawings.

3.6 Perforated polyethylene drainage tubing to be constructed with all standard junction boxes, and other drainage structures shall be included in the cost of each standard junction box. (THERE WILL BE NO SEPARATE PAYMENT FOR THIS TUBING.)

3.7 All drainage structures shall be installed with steps as shown in the construction drawings and designated herein where the structure height from flow line to top structure height exceeds five feet(5").

3.8 All drainage structures shall be constructed on a 6" thick (minimum) Select Backfill Borrow Material foundation per the plans.

4.0 METHOD OF MEASUREMENT

4.1 All drainage structures and related work will be measured as indicated in the drawings. Drainage structures including all related casting, frames, perforated pipe, etc., will be measured by the number of completed and functioning units in place. Drainage ditch will be measured by the number of linear feet of ditch constructed and satisfactorily completed.

END OF SECTION

DIVISION 2 - SITEWORK

SECTION 02434 - STORM DRAIN CULVERTS

1.0 SCOPE OF WORK

1.1 The Contractor shall furnish all labor, equipment, tools, and equipment for the construction of pipe culverts, hereinafter referred to as “conduit”, in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or established. It shall also consist of furnishing all materials, and joining the work to the other conduit, catch basins, manholes, inlets, etc. as may be required to complete the work in accordance with these specifications and/ or as detailed in the drawings.

2.0 MATERIAL

2.1 Conduit shall conform to the design and dimensions shown on the plans, and materials shall meet the requirements specified.

2.1.1 Reinforced Type Round Concrete Pipe - ASTM C-76 & AASHTO M-170, Spigot Groove, “O” type rubber gasket joint in conformance with C-443, lubricant as recommended by gasket manufacturer.

2.1.2 High Density Polyethylene Pipe (HDPE) - ASTM F-408, ASTM F-667, AASHTO M-252, and ASTM D-2321.

2.2 Lifting holes will <u>not</u> be allowed in any concrete pipe on this project.

2.3 Select Backfill Borrow Material - specified elsewhere.

2.4 Storm Drain Culverts other than reinforced concrete may be allowed, but are subject to Engineer’s approval.

3.0 CONSTRUCTION REQUIREMENTS

3.1 Conform to applicable local State Highway Department or Department of Transportation Specifications for Road and Bridge Construction, latest edition, and all additional supplements.

3.2 Lengths of storm drain pipe shown on the drawings are appropriate distances from center to center of structures. The Contractor shall install drain pipe based on actual field measurements.

3.3 Where reinforced concrete pipe is used, Contractor shall wrap each joint of culvert pipe with four ounce filter cloth, 36” wide, centered on joint, and secured to the pipe with duct tape or mastic. Conform to the drawings.

3.4 Where the excavation is in wet material, and suitable construction conditions cannot be obtained by other methods, the Contractor shall install and operate, at his own expense, a pumping system connected with well points, so as to drain the same effectively. All wet point holes shall be back-filled with sand after removal. No masonry or pipe shall be laid in water, and water shall not be allowed to rise over masonry until concrete or masonry has set al least 48 hours. All water pumped or drained from the work shall be disposed of in a manner that will not damage adjacent property or other work under construction. Necessary precautions shall be taken to protect all construction against flooding. No culvert shall be laid in wet trenches.

3.5 Where the storm crosses a sanitary sewer line or water main and the vertical clearance is less than eighteen inches (18”), the pipe intersection shall be embedded in concrete for a distance of five feet (5’) each way from centerline of intersection.

3.6 Contractor shall provide Select Backfill Borrow Material in accordance with these plans and specifications. Cost of said backfill to be included in the linear foot cost of culverts.

3.7 Connections of new storm drains to existing and proposed drainage structures shall be provided as shown on the plans. The cost for this work shall be included in the linear foot cost of the pipe being connected.

3.8 Where culverts cross existing asphalt or concrete pavement, Contractor shall carefully saw-cut pavement over a sufficient width and as necessary to place new pipe, backfill around pipe per these specifications, and replace pavement to existing thickness with same type and replace base course, if necessary. The cost of this work shall be included in the linear foot cost of the pipe being placed. There shall be no separate payment for said work.

4.0 METHOD OF MEASUREMENT

4.1 Storm drain culverts will be measured as indicated on the drawings and shall be determined in linear feet by multiplying the number of commercial lengths necessary and used to provide the specified lengths by the nominal laying length per pipe section.

END OF SECTION

DIVISION 2 - SITEWORK

SECTION 02452 - SIGNAGE

1.0 SCOPE OF WORK

1.1 This work shall consist of all labor, materials, equipment, tools, and services for furnishing and placing traffic signs, in reasonably close conformity with these specifications and the details shown on the plans or established.

2.0 MATERIALS

2.1 Traffic Control Signs.

2.1.1 “Handicapped Parking” signs and code required traffic control shall be standard traffic control type signs and shall be manufactured by Traffic Parking and Control Company, Inc., 136 North 120th Street, Wauwatose, WI 53226, or a similar firm specializing in this type of commercial sign.

2.1.2 Handicapped parking sign shall read “Reserved Parking,” and contain an identifying handicapped symbol. Sign shall be 12” x 18” x 0.80 aluminum with baked enamel finish. Sign shall have white lettering and symbol on blue background.

2.1.3 Traffic control signs, (stop signs, directional turn signs, etc.) shall conform to local code and state highway department standards and regulations.

3.0 EXECUTION

3.1 All signs shall be installed per the plans and the details within the plans.

3.2 Sign poles shall be erected plumb in their foundations and shall be installed to the proper height above grade.

3.3 Contractor shall always coordinate final sign placement with Engineer and the local governing entity. Where there is any discrepancy between Engineer and a governmental entity regarding final sign placement, that governmental entity shall have jurisdiction.

3.4 Payment for a sign shall always include the installed sign, including foundation, pole, fasteners, sign face, any painting (if required), bollards (if required) and disruption to existing vegetation or pavement, if already in place.

END OF SECTION

DIVISION 2 - SITEWORK

SECTION 02485 - GRASS ESTABLISHMENT

1.0 SCOPE OF WORK

1.1 This work shall consist of ground preparation, fertilizing, seeding and mulching to establish a permanent ground cover of grass in locations shown on the drawings and as designated in the drawings.

2.0 MATERIALS

2.1 Seed shall conform to an in-season mixture meeting the requirements of Section 214, Local State Highway Department or Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

2.2 Fertilizer-Conform to requirements of Section 212, Local State Highway Department or Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

2.3 Mulch-Conform to Section 215, Local State Highway Department or Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

3.0 CONSTRUCTION REQUIREMENTS

3.1 Ground preparation and application of fertilizer shall conform to the construction requirements of Section 212, Local State Highway Department or Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

3.2 Seeding shall conform to the construction requirements of Section 214, Local State Highway Department or Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

3.3 Mulching shall conform to the construction requirements of Section 215, Local State Highway Department or Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

4.0 METHOD OF MEASUREMENT

4.1 Plant establishment, including ground preparation, fertilizing, seeding and mulching, complete with satisfactory growth and coverage, will be measured by the acre.

END OF SECTION

DIVISION 2 – SITEWORK

SECTION 02525 - CURB AND SIDEWALKS

1.0 GENERAL

1.1 Section Includes

1.1.1 Combination concrete curb and gutter

1.1.2 Concrete Curb

1.1.3 Concrete Flume

1.1.4 Concrete Sidewalk

1.2 Related Sections

1.2.1 Section 02100—Site Preparation

1.2.2 Section 02584—Parking Lot and Roadway Marking

1.2.3 Section 03300—Cast-in-place Concrete (See Architectural/Building Specifications)

1.2.4 State Highway Department Standard Specifications

1.2.5 Construction Documents

1.3 References

1.3.1 ACI 304—Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete

1.3.2 ANSI/ASTM D1751—Preformed Expansion Joint Fillers for Concrete Paving and Structural construction

1.3.3 ANSI/ASTM D1752—Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

1.3.4 ASTM C33—Concrete Aggregates

1.3.5 ASTM C94—Ready Mix Concrete

1.3.6 ASTM C150—Portland Cement

1.3.7 ASTM C260—Air-Entraining Admixtures for Concrete

1.3.8 ASTM C309—Liquid Membrane-Forming Compounds for Curing Concrete

1.3.9 ASTM C494—Chemical Admixtures for Concrete

1.3.10 FS TT-C-800—Curing Compound, Concrete, for New and Existing Surfaces

1.4 Performance Requirements

1.4.1 Contractor shall maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

2.0 PRODUCTS

2.1 Materials

2.1.1 Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required. The forms shall be of a depth equal to the depth of curbing or sidewalk, and so designed as to permit secure fastening together at the tops. Coat forms with nonstaining type coating that will not discolor or deface surface of concrete.

2.1.2 Concrete Materials: Comply with requirements of applicable Division 3 sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.

2.1.3 Joint Fillers: Resilient premolded bituminous impregnated fiberboard units complying with ASTM D 1751 FS HH-F-341, Type II, Class A; or AASHTO M 153, Type I.

2.1.4 Joint Sealers: Non-priming, pourable, self-leveling polyurethane. Acceptable sealants are Sonneborn "Sonolastic Paving Joint Sealant" Sonneborn "Sonomeric CT 1 Sealant", Sonneborn "Sonomeric CT 2 Sealant", Mameco "Vulken 45", or Woodmont Products "Chem-Caulk".

2.2 Mix Design and Testing

2.3 Concrete mix design and testing shall comply with requirements of applicable Section 03300.

2.4 Design mix to produce normal weight concrete consisting of Portland cement, aggregate, water-reducing admixture, air-entraining admixture, and water to produce the following properties:

2.4.1 Compressive Strength: 3,000 psi, minimum at 28 days, unless otherwise indicated on the Drawings

2.4.2 Slump Range: 3"-5" for normal concrete

2.4.3 Air Entrainment: 5% to 8%.

3.0 EXECUTION

3.1 Preparation

3.1.1 Proof-roll prepared base material surface to check for unstable areas. The paving work shall begin after any unsuitable areas have been corrected and are ready to receive paving. Compaction testing for the base material shall be completed prior to the placement of the paving.

3.1.2 Surface Preparation: Remove loose material from compacted base material surface to produce a firm, smooth surface immediately before placing concrete.

3.2 Installation

3.2.1 Form Construction

A) Set forms to required grades and lines, rigidly braced and secured.

B) Install sufficient quantity of forms to allow continuance of work and so that forms remain in place a minimum of 24 hours after concrete placement.

C) Check completed formwork for grade and alignment to following tolerances:
Top of forms not more than 1/8-inch in 10 feet-0 inches.
Vertical face on longitudinal axis, not more than ¼ feet in 10 feet-0 inches.

a) Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

3.3 Concrete Placement

3.3.1 Comply with requirements of Section 03300.

3.3.2 Do not place concrete until base material and forms have been checked for line and grade. Moisten base material if required to provide uniform dampened condition at time concrete is placed. Concrete shall not be placed around manholes or other structures until they are at the required finish elevation and alignment.

3.3.3 Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Consolidate with care to prevent dislocation of dowels, and joint devices.

3.3.4 Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hours, place construction joint. Automatic machine may be used for curb and gutter placement at Contractor's option. Machine placement must produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

3.3.5 Concrete curb and curb and gutter may be constructed by the use of a curb forming machine. Such a machine shall conform to (a), (b), and (e) of 609.03.03.2, and in addition, its continued use shall be contingent upon it producing curb with the specified section, line, and grade. If these conditions cannot be met, construction shall be by conventional methods.

3.4 Joint Construction

3.4.1 Contraction Joints: If joints are specified, the curb or gutter shall be constructed in uniform sections of the length specified on the plans. The joints between sections shall be formed either by steel templates 1/8 inch in thickness, of a length equal to the width of the gutter or curb, and with a depth which will penetrate at least 2 inches below the surface of the curb and gutter; or with 3/4-inch thick preformed expansion joint filler cut to the exact cross section of the curb or gutter; or by sawing to a depth of at least 2 inches while the concrete is between 4 to 24 hours old. If steel templates are used, they shall be left in place until the concrete has set sufficiently to hold its shape, but shall be removed while the forms are still in place.

3.4.2 Longitudinal Construction Joints. Concrete curb, concrete gutter, combination concrete curb and gutter, where specified on the plans, shall be tied to concrete pavement with 1/2 inch round, reinforcement bars of the length and spacing shown on the plans.

3.4.3 Transverse Expansion Joints. Transverse expansion joint in curb, curb and gutter, gutter or sidewalk shall have the filler cut to the exact cross section of the curb, curb and gutter, gutter or sidewalk. The joints shall be similar to the type of expansion joint used in the adjacent pavement.

3.5 Joint Fillers.

3.5.1 Extend joint fillers full-width and depth of joint, and not less than ½” or more than 1” below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together.

3.6 Concrete Finishing

3.6.1 After striking off and consolidating concrete, smooth surface by screening and floating. Adjust floating to compact surface and produce uniform texture. After floating, test surface for trueness with 10□-0□ straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide continuous smooth finish.

3.6.2 Work edges of sidewalks, gutters, back top edge of integral curb, and formed joints with an edging tool, and round to 1/2" radius. Eliminate tool marks on concrete surface. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:

A) Inclined Slab Surfaces: Provide coarse, nonslip finish by scoring surface with stiff-bristled broom perpendicular to line of traffic.

B) Curbs, gutters, and walks: Broom finish by drawing fine-hair broom across surface perpendicular to line of traffic. Repeat operation as necessary to produce a fine line texture.

3.7 Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up any minor honeycombed areas. Remove and place areas or sections with major defects, as directed.

3.8 Protect and cure finished concrete paving using acceptable **moist-curing** methods, more particularly described in the "water-curing" section of ACI 308-81.

4.0 BACKFILL

4.1 After the concrete has set sufficiently, the spaces in front and back of the curb and gutter or sidewalk shall be refilled to the required elevation with suitable material which shall be compacted until firm and solid and neatly graded.

5.0 CLEANING AND ADJUSTING

5.1 Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.

5.2 Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials.

END OF SECTION

DIVISION 2 - SITEWORK

SECTION 02577 - PAVEMENT MARKING

1.0 SCOPE OF WORK

1.1 This work shall consist of all labor, materials, equipment, tools, and services for furnishing and placing traffic paint on pavement surfaces in the form of traffic markings and legend, in reasonably close conformity with these specifications and the details shown on the plans or established.

2.0 MATERIALS

2.1 Paint

2.1.1 All paint for parking stalls and traffic control shall be Sherwin Williams “Pro-Mar” Traffic Marking Series B-29Y2 or approved equivalent.

3.0 CONSTRUCTION REQUIREMENTS

3.1 Equipment

3.1.2 All Markings shall be applied by approved mechanical equipment (with provisions for constant agitation of paint), traveling at controlled speeds, with one or more paint “guns” synchronized to begin and cut off paint flow automatically in case of specified skip lines, and subject to manual control in case of continuous lines of varying length. All painting equipment and operations shall be under the control of an experienced technician thoroughly familiar with equipment, materials and marking layouts.

3.2 Preparation of Surface

3.2.1 All pavement areas to be painted shall be thoroughly cleaned. Cleaning may be done by hand brooms, rotary brooms air blast, scrapers or whatever combination of equipment is necessary to clean the pavement thoroughly without damage to the surface. Particular care shall be taken to remove all vegetation, loose soil, and the like from the area to be painted, should it exist. Should other methods fail the surface shall be wetted with a water jet and scrubbed as necessary to dislodge all foreign material.

After washing, the surface shall be allowed to dry thoroughly and any film of dried mud apparent after surface drying shall be removed before application of paint. Striping shall follow as closely as practicable after the surface has been cleaned and dried, but no striping shall be done until the surface has been inspected and permission given to proceed. Compensation for preparing the surface shall be included in the contract unit prices bid for the several striping pay items.

3.2.2 The contractor shall be responsible for laying out his own work. It shall also be the Contractor's responsibility to preserve and apply markings in conformity with the construction plans.

3.3 Application

3.3.1 Uniformly painted markings of required length and width with true, sharp edges and ends shall be applied on properly curved, prepared and dried surfaces in conformity with the specifications and drawings. The length and width of lines shall conform within a tolerance of plus or minus three(3) inches and plus or minus one-eight (1/8) inch,respectively.

3.3.2 The rate of application shall not be less than one (1) gallon of paint per each three hundred and thirty (330) linear feet of four (4) inch line applied.

3.4 Contractor shall apply traffic marking paint as follows:

3.4.1 Parking stalls (single-line layout) shall be marked in accordance with the typical pattern indicated on drawings. All stripes are to be 4" minimum.

3.4.2 Directional arrows at entrances and at ends of parking stalls shall be marked on pavement as shown on drawings.

3.4.3 Paint all blue and white handicap symbols as shown on the drawings.

3.4.4 Provide painted stop bar "STOP" legend as shown on the drawings.

3.4.5 Contractor shall apply striping only under the proper weather conditions. No striping shall be applied when the ambient temperature is less than 50°F.

4.0 METHOD OF MEASUREMENT

4.1 Traffic stripe completed in accordance with plans and specification requirements will be measured by the linear foot, from end-to-end of individual stripes as shown on the plans and in the proposal. In the case of skip lines the measurement shall include skip intervals as well as actual sections.

4.2 The length used to measure stripes for the parking area will be the actual horizontal length computed along each line.

4.3 Legend completed in accordance with the plans and specifications will be measured by the square foot. Areas of indicated letters and symbols are shown on the plans.

4.4 Blue and white international handicap symbols will be measured per each. Locations for symbols are designated in the paving plan.

4.5 The contract unit price bid on each type and color of striping shall be based on striping of a width of four (4) inches. When striping of a width other than four (4) inches is specified in the contract, or ordered, the measured length of striping shall be adjusted in the ratio of the specified or ordered width to four (4) inches.

END OF SECTION

DIVISION TWO - SITEWORK

SECTION 02601 - MANHOLES

1.0 SCOPE

1.0.1 Summary

A) Scope

a) CONTRACTOR shall furnish all labor, materials, equipment and incidentals necessary to provide all pre-cast sanitary sewer manholes and pump station wet-wells shown, specified and otherwise required to complete the Work.

1.0.2 General

A) Structures shall conform in shape, size, dimensions, material, and other respects to the details shown on the Drawings or as ordered by the ENGINEER.

B) Metal frames, grates, covers, steps and similar required items shall be furnished as required.

C) Inverts shall conform accurately to the size and elevation of the adjoining pipes. Side inverts shall be curved and main inverts, where direction changes, shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipelines.

1.0.3 Related Work Specified Elsewhere:

A) Section 02200, Excavation and Backfill.

B) Section 02221, Crushed Stone and Gravel.

C) Section 05540, Castings.

D) Section 15052, Buried Piping Installation.

E) Section 15064, Concrete Pipe.

F) Section 15068, Ductile Iron Pipe

1.0.4 Quality Assurance

A) Reference Standards:

a) ASTM C 139, Concrete Masonry Units for Construction of Catch Basins and Manholes.

b) ASTM C 140, Sampling and Testing Concrete Masonry Units.

c) ASTM C 207, Hydrated Lime for Masonry Purposes.

d) ASTM C 478, Pre-cast Reinforced Concrete Manhole Sections.

1.0.5 Submittals

A) Samples: Submit for approval samples of gaskets and all accessories required for the manholes, if requested by ENGINEER.

B) Shop Drawings:

a) Submit for approval Shop Drawings of design and construction details of all pre-cast concrete manholes.

b) Submit manufacturer's data on ceramic epoxy lining material, manhole steps, joint gasket, and flexible pipe gasket material if required.

C) The CONTRACTOR shall submit an affidavit from the coating supplier that each manhole sections and special has been coated in accordance with this specification.

2.0 PRODUCTS

2.2 Pre-cast Concrete Manholes

2.2.1 Pre-cast manholes shall conform to the details shown. Manhole bases may be pre-cast unless cast-in-place is required by the Drawings.

2.2.2 Except where otherwise specified, manhole sections shall conform to ASTM C 478.

2.2.3 Pre-cast manhole bases shall be of approved design and of sufficient strength to withstand the loads to be imposed upon them. An approved joint shall be provided to receive the pipe sections forming the barrel.

2.2.4 Mark date of manufacture and name or trademark of manufacturer on inside of barrel.

2.2.5 Unless a larger size is required by the Drawings or the Manhole Schedule below, the barrel of pre-cast manholes shall be constructed of 48-inch diameter standard reinforced concrete manhole sections. The barrel shall be constructed of various lengths of pipe in combination to provide the correct height with the fewest joints. Wall sections shall not be less than five inches thick. For 72-inch and larger manholes, a transition slab, as shown on the Contract Drawings, is required for manholes greater than 12 feet deep.

2.2.6 Joints shall be preformed mastic joint compound or rubber and concrete using O-ring gaskets conforming with ASTM C-443. For rubber ring joints, the base of the bell shall be buttered with 1 to 2 cement mortar to provide a uniform bearing for the spigot of the entering pipe.

A) A pre-cast or cast-in-place slab or pre-cast eccentric cone, as shown or approved, shall be provided at the top of the manhole barrel to receive the cast iron frame and cover. The slab or cone shall be of acceptable design and of sufficient strength to safely support an H-20 loading. Concrete slabs shall be not less than 8 inches thick.

B) Manhole sections shall contain manhole steps, uniformly spaced, 12 inches minimum, 16 inches maximum on centers, accurately positioned and embedded in the concrete. Manhole steps shall be cast iron, ASTM A-48, Class 30, or 12” wide 3/8” steel reinforcing rod encapsulated in a Copolymer Polypropylene Plastic similar to M. A. Plastic Step as manufactured by M. A. Industries, Inc., Peachtree City, Georgia, integrally cast with pre-cast riser and cone sections.

C) Epoxy Lining:

a) All manhole sections shall be lined with an approved ceramic epoxy coating.

b) Surface preparation:

1) Solvent cleaned using guidelines of SSPC-1 solvent cleaning.

2) Abrasive blasted using compressed air nozzles with sand or grit media

3) All concrete surfaces receiving a ceramic epoxy coating shall contain no greater than 10 percent moisture as determined by measurement with a suitable moisture meter.

c) Ceramic epoxy coating shall be applied in strict accordance with manufacturer's requirements.

d) Epoxy coating shall be applied at the concrete casting facility unless approved by the ENGINEER. No pipe, fittings or specials sections shall be coated until coating system is approved by the ENGINEER.

e) Field touch-up and repair shall be preformed in strict accordance with manufacturers requirements.

f) Thickness:

1) 40 dry mils on pipe barrel.

2) 10 dry mils on pipe's joint areas.

3) Shall be applied with a centrifugal lance applicator.

g) Number of Coats:

1) As recommended by ceramic epoxy supplier.

h) Product and Manufacturer:

1) Protecto 401 by Vulcan Painters.

2) Permite 9043, Type II glass filled epoxy by Permite Corporation.

3) Or equal.

i) Bituminous Waterproofing

1) The exterior of all pre-cast manhole sections, slabs and adjusting rings shall be coated with a bitumastic waterproofing.

2) Surface Preparation:

a. Solvent-cleaned using guidelines of SSPC-1 solvent cleaning.

b. Abrasive-blasted using compressed air nozzles with sand or grit media.

c. All concrete surfaces receiving a bitumastic waterproofing shall contain no greater than 10 percent moisture as determined by measurement with a suitable moisture meter.

j) Bitumastic waterproofing shall be applied in strict accordance with manufacturer's requirements.

k) Bitumastic waterproofing shall be applied at the concrete casting facility unless approved by the ENGINEER. No pipe, fittings or specials sections shall be shipped until coating is approved by the ENGINEER.

l) Field touch-up and repair shall be preformed in strict accordance with manufacturers requirements

m) Thickness: As recommended by manufacturer.

n) Number of Coats: As recommended by manufacturer.

o) Product and Manufacturer:

1) CB-42 by International Oil Company.

2) 47-BX-4 Coal Tar Solution by BLP Mobile Paints.

3) Or equal.

2.3 Miscellaneous Metals

2.3.1 Manhole frame and cover sets - conform to ASTM A-48, Class 30. The bearing surfaces of the frames and covers shall be machined and the cover shall seat firmly into the frame without rocking. Frames and covers shall be painted or dipped in a commercial quality asphaltum paint. Manhole frame and cover shall be 400 pound minimum weight. Cover shall read “SEWER”. Frame shall provide a (minimum) inside dimension of 24 inches.

2.4 Drop Inlet Connections

2.4.1 Drop inlet connections for manholes shall be constructed where a drop of two feet or greater is encountered between the inlet invert and invert of the manhole. The drop inlet shall conform to the design and details provided by the ENGINEER. Pipe and fittings shall be cast or ductile iron, or reinforced concrete as shown or otherwise approved. Concrete shall be bonded to manhole in a manner shown or otherwise approved by ENGINEER.

2.5 Flexible Connectors

2.5.1 Flexible connections complying with ASTM C923 shall be employed in the connection of each sewer pipe with outside diameter less than 59 inches to pre-cast manholes.

2.5.2 Connector will consist of rubber EPDM and elastomers designed to resist ozone, acids, alkalis, oils and petroleum products.

2.5.3 Banding mechanism shall be totally non-magnetic 304 stainless steel and torqued for 60-70 inch/lbs.

2.5.4 Manufacturer:

A) Kor-N-Seal.

B) Press Seal Gasket Corporation

C) Or equal.

2.6 Manhole Waterstops

2.6.1 Elastomeric PVC manhole waterstops shall be employed in the connection of each sewer pipe with outside diameter greater than 59 inches to pre-cast manholes.

2.6.2 Waterstop will consist of elastomeric PVC designed to resist ozone, acids, alkalis, oils and petroleum products.

2.6.3 Banding mechanism shall be totally non-magnetic stainless steel, torqued for 60 inch/lbs, and furnished with a waterstop.

2.6.4 Installation:

A) Slide waterstop over clean end of entrance pipe.

B) Position waterstop on centerline of manhole wall.

C) Tighten the stainless steel band to required torque.

D) Use waterplug around the waterstop to close the opening in the manhole

2.6.5 Manufacturer

A) Fernco, Inc.

B) DFW Plastics, Inc.

C) Or equal.

3.0 EXECUTION

3.1 Laying Masonry

3.1.1 Each grading ring shall be laid in a full bed of mortar and shall be thoroughly bonded

3.2 Plastering

3.2.1 The outside of grading rings shall be neatly plastered with 1/2 inch of cement mortar as the Work progresses.

3.3 Manhole Bases

3.3.1 Pre-cast bases shall be set on a concrete foundation or compacted granular material as shown. Pre-cast bases shall be set at the proper grade and carefully leveled and aligned.

3.4 Pre-cast Manhole Sections

3.4.1 Set sections vertical with steps and sections in true alignment.

3.4.2 Install sections, joints and gaskets in accordance with manufacturers recommendations.

3.4.3 Lifting holes shall be sealed tight with a solid rubber plug driven into hole and the remaining void filled with 1 to 2 cement-sand mortar.

3.5 Manhole Channels

3.5.1 For straight through flow, channels shall be formed from pipe laid through the manholes. A bench of concrete shall be built up to the 2/3 point of the vertical sewer diameter before the top of the sewer pipe is broken out.

3.5.2 Where side channels and curved sections occur, the channels within the manholes shall be formed of concrete and shall be given a hard trowel finish.

3.6 Grading Rings

3.6.1 Grading rings shall be used for all pre-cast manholes where required. Stacks shall be a maximum of 12 inches in height, constructed on the roof slab or cone section on which the manhole frame and cover shall be placed. The height of the stack shall be such as is necessary to bring the manhole frame to the proper grade.

3.7 Grading at Manholes

3.7.1 All manholes in unpaved areas shall be built as shown or directed to an elevation higher than the surrounding ground.

3.7.2 The ground surface shall be graded to drain away from the manhole. Fill shall be placed around them to the level shown on the plans, and the surface evenly graded on a 1 to 5 slope to the existing surrounding ground unless otherwise shown. The slope shall be covered with 4-inches of top soil, seeded and maintained until a satisfactory growth of grass is obtained.

3.8 Manhole Watertightness

3.8.1 All manholes shall be free of visible leakage. Each manhole shall be tested for leaks and inspected, and all leaks shall be repaired in a manner subject to ENGINEER'S approval.

3.9 Flexible Pipe Connector and Waterstop at Manhole Base

3.9.1 An approved flexible connector or waterstop shall be provided between each pipe entering and exiting manhole. The joint into the manhole base shall be completely watertight.

END OF SECTION

DIVISION 2 – SITEWORK

SECTION 02713 - WATER DISTRIBUTION SYSTEMS

1.0 GENERAL

1.1 Summary

1.1.1 Furnish labor, materials, services, equipment, and other necessary items required for accompanying the construction of the water distribution systems. This shall include, but not be limited to the following: pipe and fittings for site water line including domestic water line and fire water line, valves and fire hydrants, set lines, elevations, and grades for water distribution systems work and control system for duration of work including careful maintenance of benchmarks, property corners, monuments, or other reference points.

1.2 Related Sections

1.2.1 Section 02222—Excavating, Backfill and Compacting for Utilities

1.2.2 Local Governing Authority and Code Requirements

1.2.3 All Necessary Construction Permits

1.3 References

1.3.1 AASHTO T180—Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop

1.3.2 ANSI/ASME B16.18—Cast Copper Alloy Solder Joint Pressure Fittings

1.3.3 ANSI/ASME B16.22—Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

1.3.4 ANSI/ASTM D1557—Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop

1.3.5 ANSI/ASTM D2466—Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40

1.3.6 ANSI/AWS A5.8—Brazing Filler Metal

1.3.7 ANSI/AWWA C104—Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water

1.3.8 ANSI/AWWA C105—Polyethylene Encasement for Ductile Iron Piping for Water and Other liquids

1.3.9 ANSI/AWWA C11—Rubber-Gasket Joints for Ductile Iron and Grey-Iron Pressure Pipe and Fittings

1.3.10 ANSI/AWWA C151—Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids

1.3.11 ANSI/AWWA C500—Gate Valves, 3 through 48 in NPS, for Water and Sewage Systems

1.3.12 ANSI/AWWA C502—Dry Barrel Fire Hydrants

1.3.13 ANSI/AWWA C504—Rubber Seated Butterfly Valves

1.3.14 ANSI/AWWA C508—Swing-Check Valves for Waterworks Service, 2 in through 24 in NPS

1.3.15 ANSI/AWWA C509—Resilient Seated Gate Valves 3 in through 12 in NPS, for Water and Sewage Systems

1.3.16 ANSI/AWWA C600—Installation of Ductile-Iron Water Mains and Appurtenances

1.3.17 ANSI/AWWA C606—Grooved and Shouldered Type Joints.

1.3.18 ANSI/AWWA C900—Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for Water

1.3.19 ASTM B88—Seamless Copper water Tube

1.3.20 ASTM D1785—Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

1.3.21 ASTM D2241—Poly (Vinyl Chloride) (PVC) Plastic Pipe(SDR-PR)

1.3.22 ASTM D2855—Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings

1.3.23 ASTM D2922—Test Methods for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth)

1.3.24 ASTM D3017—Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures

1.3.25 ASTM D3139—Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals

1.3.26 ASTM D3035—Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter

1.3.27 AWWA C901—Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, 1/2 inch through 3 inch, for water

1.3.28 UL 246—Hydrants for Fire - Protection Service

1.4 Submittals

1.4.1 Product Data: Provide data on pipe materials, pipe fittings, hydrants, valves and accessories.

1.4.2 Manufacturer's Certificate: Certify that products meet or exceed state or local requirements.

1.5 Project Record Documents

1.5.1 Accurately record actual locations of piping mains, valves, connections, and invert elevations.

1.5.2 Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 Quality Assurance

1. Perform work in accordance with utility company and/or municipality requirements.

2. Valves: Manufacturer's name and pressure rating marked on valve body.

2.0 PRODUCTS

2.1 Pipe

2.1.1 Pipe sizes less than 3” that are installed below grade and outside buildings shall comply with one or combination of following:

A) Seamless Copper Tubing: Type "K" roll -form to comply with ASTM B 88-62 and installed with wrought copper (95-5 Tin Antimony solder joint) fittings in accordance with ASTM B16.22.

B) Polyvinyl Chloride (PVC) Water Pipe: AWWA Standard C900, Class 150, DR 18, NSF approved, with outside diameters same as cast iron. Use metallic tape or 12 gauge copper wire buried in the backfill approximately 12 inches (12”) above the pipe, fittings per ANSI A-21.10.

2.1.2 Pipe sizes 3” and larger that are installed below grade and outside building shall comply with one of the following:

2.1.3 Ductile Iron Water Pipe: In accordance with ANSI A21.51, Fittings shall be either mechanical joint or push-on joint complying with ANSI A21.10 or ANSI 21.11 (AWWA C-151) (CLASS 52), and cement mortar lined in accordance with ANSI -24.4 and/or coal tar coated with EPA approval.

2.1.4 Polyvinyl Chloride (PVC) Water Pipe: Pipe shall meet the requirements of AWWA C-900, rated DR 18 (Class 150). Pipe shall be continually marked as for smaller pipes with NSF seal. Pipe joints shall be integrally molded bell ends in accordance with AWWA C-900 with factory supplied elastomeric gaskets and lubricant. Use metallic tape or 12 gauge copper wire buried in backfill approximately (12") above pipe.

2.2 Gate Valves — 2 Inches and over

2.2.1 Manufacturers:

A) Mueller Resilient Seat Gate Valves or approved equal

2.2.2 Valves shall be resilient seat “O” ring type, complying with AWWA C500. Valves shall be Mueller or approved equal. Valves shall have a non-rising stem. Valve ends shall be MJ or Flanged, as appropriate for each connection, for use with AWA C-900 PVC pipes. ANSI/AWWA C509, Iron body, bronze mounted double disc, parallel seat type, non-rising stem with square nut, single wedge, resilient seat, flanged or mechanical joint ends, control rod, post indicator where indicated on plans, extension box and valve key.

2.3 Ball Valves — up to 2 Inches

2.3.1 Manufacturers:

A) Mueller Oriseal or approved equal

2.3.2 Brass body, teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, AWWA compression inlet end, compression outlet with electrical ground connector, with control rod, extension box and valve key

2.4 Butterfly Valves - from 2 Inches to 24 Inches

2.4.1 ANSI/AWWA C504, iron body, bronze disc, resilient replaceable seat, water or lug ends, infinite position lever handle.

2.5 Hydrant

2.5.1 Hydrant: Type as required by utility company and as shown on plans.

2.5.2 Hydrant Extensions: Fabricate in multiples of 6 inches with rod and coupling to increase barrel length.

2.5.3 Hose and Steamer Connection: Match sizes with utility company, two hose nozzles, one pumper nozzle.

2.5.4 Finish: Primer and two coats of enamel or special coating to color as required by utility company.

2.6 Accessories

2.6.1 Concrete for Thrust Blocks: Place thrust blocking consisting of 2,500 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 lbs/sq ft when water main pressure is 100 psi. Where thrust blocks are impractical, tie-rods, 3/4" diameter, may be used in lieu thereof as follows: 14" dia. - 4 rods: 12" dia. or less 2-rods. Approved retainer glands to be used on each side of all gate valves feeding fire hydrants and one at tee and fire hydrant.

2.6.2

MINIMUM THRUST BLOCKING BEARING AREAS

Pipe Diameter	Tees Sq.Ft.	90□ Bend Sq.Ft.	45□Bend Sq.Ft.	22□Bend Sq.Ft.
4□	1.0	1.0	1.0	1.0
6□	1.5	2.0	1.0	1.0
8□	2.5	3.5	1.8	1.0
10□	4.0	5.5	2.8	1.5
12□	6.0	8.0	4.0	2.0
14□	8.0	11.0	5.5	3.0
16□	10.0	14.2	7.0	4.0

2.6.3 Water service piping shall be as per the details. Fittings shall be wrought copper. Provide dielectric fittings between copper and iron, joints shall be soldered.

2.6.4 Joint restraints, Ebaa Series 1100 HV, as manufactured by Ebaa Iron, Inc., P.O. Box 857 Eastland, Texas 76448, (817) 629-1737, or approved equal.

2.6.5 Plugs: mechanical joint.

2.6.6 Fittings: Cast Iron - mechanical joint.

3.0 EXECUTION

3.1 Excavation

3.1.1 Trenches shall be excavated to the minimum width sufficient to allow for the proper bedding of the pipe; however, the maximum allowable trench width at the ground surface shall not exceed the outside diameter of the pipe two feet or 3’ - 0” total, whichever is greater. Include cost of excavation with this item.

3.2 Bedding

3.2.1 When the native material encountered in the trench bottom consists of a soil unsuitable for receiving the bedding for the pipe, the Engineer may authorize the Contractor to over-dig to a depth as specified in the drawings and replace with a suitable backfill material. Suitable backfill material authorized by the Engineer will be paid for separately: however, should over-digging occur without Engineer’s authorization, the Contractor shall fill the area of over-excavation with acceptable sub-bedding, thoroughly compacted, at Contractor’s expense.

3.2.2 Trenches shall be dry when the trench bottom is prepared. A continuous trough shall be prepared or excavated to receive the bottom quadrant of the pipe barrel. In addition, bell holes shall be excavated so that after placement, only the barrel of the pipe receives bearing pressure for the trench bottom.

3.2.3 Preparation of the trench bottom and placement of the pipe shall be carefully made so that when in final position, the pipe is true to line and grade.

3.2.4 Select backfill shall be used to support the pipe, and shall be placed in the trench bottom to the depths prescribed and a trough as described in the drawings shall be formed to uniformly support the bottom quadrant of the pipe barrel.

3.3 Laying Pipe

3.3.1 Pipe shall be protected during handling against impact shocks and free fall. Pipe shall be kept clean at all times, and no pipe shall be used in the work that does not conform to the appropriate specifications.

3.3.2 Pipe shall be laid accurately, to the line and grade as designated on the job plans. Preparatory to making pipe joints all surfaces of the portions of the pipe to be jointed shall be clean and dry. Lubricants, primers, adhesives, etc. shall be used as recommended by the pipe or joint manufacturer. The jointing materials shall then be placed, fitted, joined and adjusted in such a workmanlike manner as to obtain the degree of water-tightness required. Trenches shall be kept water-free and as dry as possible during bedding, laying, and jointing and for as long a period as required. As soon as possible after the joint is made, sufficient backfill material shall be placed along each side of the pipe to offset conditions that might tend to move the pipe off line and grade.

3.3.3 Water pipe shall be buried so that the top of the pipe is approximately 30 inches below the finished surface unless additional depth is necessary to avoid conflict with other utilities or structures.

3.3.4 Contractor shall not exceed maximum permissible deflections in laying pipe as recommended by manufacturer.

3.3.5 Joint restraints shall be installed at all fittings. Joint restraints will require the use of mechanical joint pipe or mechanical joint fittings where restraint is required.

3.3.6 Backfill for water pipe may proceed immediately after pipe is bedded and select backfill has been tamped 1’-0” above top of pipe. See detail drawings.

3.3.7 The ground surface that has been affected by the Contractors operations shall be dressed to a smooth and uniform surface reasonably close to the original surface and sloped to encourage drainage.

3.3.8 All PVC pipe installations require that detector tape or 12 gauge copper wire be buried in the backfill approximately 12 inches above the pipe.

3.4 Installation — Pipe

3.4.1 Maintain separation of water main from sanitary and storm sewer piping in accordance with state or local code.

3.4.2 Install pipe to indicated elevation to within tolerance of 1 inch.

3.4.3 Install ductile iron piping and fittings to ANSI/AWWA C600.

3.4.4 Route pipe in straight line.

3.4.5 Install pipe to allow for expansion and contraction without stressing pipe or joints.

3.4.6 Install access fittings to permit disinfection of water system performed under this Section.

3.4.7 Slope water pipe and position drain at low points.

3.4.8 Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions which least interfere with operation of existing pipeline.

3.4.9 Form and place concrete for thrust blocks at each elbow or change of direction of pipe main.

3.4.10 Establish elevations of buried piping to ensure not less than 36 in. of cover over the top of pipe: In northern climates, establish elevations of buried piping to ensure 6 inches between top of pipe and frost line.

3.4.11 Backfill trench in accordance with Section 02222.

3.4.12 Sewers must maintain a minimum horizontal distance of 10 feet from all water mains and the sewer must be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. If a situation arises such that either of these distances must be less than that specified, the Engineer must be notified so that each variant can be dealt with on a case by case basis.

3.4.13 When pipe laying ceases for any reason the open ends of the pipe will be capped or plugged to prevent the entrance of any unwanted materials.

3.5 Installation — Valves and Hydrants

3.5.1 Install gate valves as indicated on Drawings and supported on concrete pads with valve stem vertical and plumb. Install valve boxes in a manner that will not transmit loads, stress, or shock to valve body. Center valve box over operating nut of valve vertical and plumb. Securely fit valve box together leaving cover flush with finished surface.

3.5.2 Set hydrants plumb and locate pumper nozzle perpendicular to roadway.

3.5.3 Install fire hydrant assemblies as indicated on Drawings in vertical and plum position with steamer nozzle pointed toward building unless otherwise directed by local authorities. Support hydrant assembly on concrete pad and firmly braced on side opposite inlet pipe against undisturbed soil and concrete blocking. Place minimum of 6 cu. ft. of crushed stone or gravel around hydrant base and barrel after thrust blocking has cured at least 24 hours. Exercise care when backfilling and compacting so proper vertical position will not be altered.

3.6 Disinfection of Domestic Water Piping System

3.6.1 Sterilize distribution system with chlorine before acceptance for domestic operation. Amount of chlorine shall be such as to provide dosage of not less than 50 parts/million. Thoroughly flush lines before introduction of chlorinating materials and after contact period of not less than 24 hours, system shall be flushed with clean water until residual chlorine content is not greater than 1.0 part/million. Open and close valves in lines being sterilized several times during contact period.

3.6.2 After disinfecting all water distribution lines, the Contractor shall arrange for samples to be taken on *two consecutive days* by a representative of the Mississippi State Dept. of Health, or the Registered Professional Engineer in charge of the Project, or the Certified Operator of the system from every dead-end line and every major looped line for bacteriological examination. Water being collected for testing shall not have chlorine residual higher than is normally maintained in other parts of the distribution system. No chlorine shall be present which a result of line disinfection is.

3.6.3 No coliform bacteria and no confluent growth indication shall constitute a satisfactory sample when analyzed by the Mississippi Department of Public Health Laboratory or a laboratory certified by the Mississippi State Department of Health.

3.6.4 Contractor is to take every precaution to avoid contaminating the pipe and review his installation procedure with the Engineer to avoid any disinfection problems.

3.7 Service Connections

3.7.1 Provide water service to utility company requirements with reduced pressure backflow preventer if required and water meter with by-pass valves and sand strainer.

3.8 Field Quality Control

3.8.1 Test water distribution system pipe sized installed below grade and outside buildings in accordance with following procedures:

**All pipe work shall be tested at the pressure and leakage tests equal to two (2) times the design working pressure of the pipe and maintain said pressure for not less than two hours. In accordance with AWWA C605-05 Section 7.3.5, hydrostatic test pressure shall not be less than 1.25 times the maximum anticipated sustained working pressure at the highest point along the test section for all PVC pipe, or as required by the local utility company, whichever is greater.

**Furnish, install, and operate the necessary connections, pump, meter, and gauges. Leakage shall not exceed that permitted by AWWA Specifications C600-64 for mechanical joint and push-on joint pipe. Prior to running any field test, meter shall be tested, sealed, and approved by applicable governing authority at Contractor's expense.

**Locate and repair all leaks and repeat tests until test results are satisfactory and in compliance with this section.

**Furnish copy of results of meter test and hydrostatic pressure test to Engineer in Charge upon completion of water distribution backfilling operations.

END OF SECTION

DIVISION TWO - SITEWORK

SECTION 02722 - SANITARY SEWER COLLECTION SYSTEM

1.0 SCOPE

1.1 This work shall consist of all labor, materials, equipment, tools and services required for the furnishing, installing and testing of all gravity sewer pipe.

2.0 PRODUCTS

2.1 Gravity Sewer Pipe

2.1.1 Poly Vinyl Chloride (PVC) sewer pipe and fittings conforming to ASTM D-3034, SDR-26 elastomeric gasket joint shall be used for all sewer main.

2.2 Select Backfill Borrow Material - Sandy Soil - USC Group SC, SM, SP or SW, free of large lumps, clods rock or other objectionable matter. When not available as native material in the trench, Select Backfill Material shall be delivered to the site and such material will be referred to as Select Backfill Borrow Material.

2.3 Casing pipe - per the drawings, as applicable.

2.4 Pre-cast concrete risers, cone sections and adjusting rings - conform to ASTM C-478.

2.5 Riser joints - rubber gasket, conform to ASTM C-443 install per gasket manufacturer’s recommendation.

2.6 All interior barrel and joint surface areas shall be prepared, coated, and cured as necessary to complete the installation of a coal tar epoxy liner in conformance with the U.S. Corps of Engineers Specification C-200.

2.7 Manhole frame and cover sets - conform to ASTM A-48, Class 30. The bearing surfaces of the frames and covers shall be machined and the cover shall seat firmly into the frame without rocking. Frames and covers shall be painted or dipped in a commercial quality asphaltic paint. Manhole frame and cover shall be 400 pound minimum weight. Cover shall read “SEWER”. Frame shall provide a (minimum) inside dimension of 24 inches.

2.8 Manhole steps - cast iron, ASTM A-48, Class 30, or 12” wide 3/8” steel reinforcing rod encapsulated in a Copolymer Polypropylene Plastic similar to M. A. Plastic Step as manufactured by M. A. Industries, Inc., Peachtree City, Georgia, integrally cast with pre-cast riser and cone sections.

2.9 Concrete (other than pre-cast) - conform to requirements for Class B Concrete, MSHD State Aid Specifications.

2.10 Reinforcement - Grade 40 or grade 60 billet steel conforming to ASTM A-615.

2.11 Entry pipe rubber seal - Kor-n-Seal as manufactured by the Kor-n-Seal Products and installed in the pre-cast manhole section at its place of manufacture. Resilient material shall meet or exceed ASTM C-923, stainless steel parts shall meet or exceed ASTM A-167.

2.12 Approved by the Engineer, foundation material shall consist of select material free of large clumps, clods, large rocks, or other objectionable matter.

3.0 EXECUTION

3.1 General

3.1.1 Contractor’s attention is directed to any geotechnical investigation if prepared in connection with this project.

3.1.2 Contractor shall be responsible for laying out his own work and for the preparation of cut sheets. Cut sheets shall be submitted by Engineer for his review prior to beginning work.

3.1.3 In this project, the Contractor will be tying the sewer main into existing systems and extending into a new system. Tie-ins into the existing sewer system shall adhere strictly as shown in the construction plans.

3.2 Excavation

3.2.1 Excavation shall include the loosening, loading, removing, transporting and disposing of all materials, wet or dry, above or below ground necessary to be removed to construct all sewers included in this contract to the lines, grades and locations shown on the drawings.

3.2.2 In the event that any existing gas pipes, water pipes, sewers, storm drains or poles are blocked or interfered with by the excavation required on this report, the Contractor shall maintain them in continuous operation, and restore them to the same condition as they were prior to the start of construction of this project; all at no additional compensation.

3.2.3 The Contractor shall, at his own expense, furnish and install all temporary sheeting, timbering and bracing required to maintain the excavation in a condition to furnish safe working conditions and to permit the safe and efficient installation of all items of contract work. The Contractor shall further, at his own expense, store up or otherwise protect adjacent to any excavation which might be disturbed during the progress of the work.

3.2.4 Temporary supports must be removed by the Contractor at his own expense after or concurrently with the completion of the permanent facility.

3.2.5 The Contractor shall do all ditching, pumping, well pointing, and bailing, build all drains, and do all other work necessary to keep the excavation clear of ground water, sewage or storm water during the progress of the work, and until the finished work is safe from injury. Where the excavation is wet sand, and suitable construction conditions cannot be obtained by other methods, the Contractor shall install and operate, at his own expense, a pumping system connected with well points, so as to drain the same effectually. All well point holes shall be backfilled with sand after removal. No masonry or pipe shall be laid in water, and water shall not be allowed to rise over masonry until concrete or masonry has set at least 48 hours. All water pumped or drained from the work shall be disposed of in a manner that will not damage adjacent property or other work under construction against flooding.

3.2.6 Whenever the excavation is carried beyond the lines and grades shown on the drawings, the Contractor shall, at his own expense, refill all such excavated space with such material and in such a manner as may be directed and restore any facilities disturbed outside of the allowable trench width as defined in these specifications.

3.2.7 Unsuitable and surplus excavated material not incorporated in the work shall be disposed of by the Contractor at his own expense.

3.3 Trench Excavation

3.3.1 The ground shall be excavated in open trenches, of sufficient width and depth to provide ample room within the limits of the excavation, or lines of sheeting and bracing, for the proper construction of the sewer.

3.3.2 Mechanical excavation of trenches shall be stopped above the final invert grade elevation so that the pipe may be laid on a firm, undisturbed native earth bed.

3.3.3 The width of the trench at the top of the pipe shall not exceed the outside diameter of the sewer pipe plus two feet or 3'-0" total, whichever is greater.

3.4 Bedding

3.4.1 When the native material encountered in the trench bottom consists of a soil unsuitable for receiving the bedding for the pipe, the Engineer may authorize the Contractor to over dig to a depth as specified in the drawings and replace with a select backfill material. The select backfill will be paid for under a separate item; however, should over digging occur where a suitable native soil exists for sub-bedding, the Contractor shall fill the area of over-excavation at his own expense with an acceptable sub-bedding material, thoroughly compacted.

3.4.2 Preparation of the trench bottom and placement of the pipe shall be carefully made so that when in final position, the pipe is true to line and grade.

3.4.3 Select backfill material shall be used to support the pipe and shall be placed in the trench bottom to the depths prescribed and trough as described in the drawings shall be used in the work that does not conform to the appropriate material specifications.

3.5 Laying Pipe

3.5.1 Pipe shall be protected during handling against impact shocks and free fall. Pipe shall be kept clean at all times, and no pipe shall be used in the work that does not conform to the appropriate material specifications.

3.5.2 The laying of pipe in finished trenches shall be commenced at the lowest point, with the spigot ends pointing in the direction of the flow.

3.5.3 All pipe shall be laid with ends abutting and true to line and grade. They shall be carefully centered, so that when laid they will form a sewer with a uniform invert.

3.5.4 Pipe shall be laid accurately, to the line and grade as designated on the drawings. Preparatory to making pipe joints all surface of the portions of the pipe to be jointed or of the factory-made jointing material shall be clean and dry. Lubricants, primers, adhesives, etc., shall be used as recommended by the pipe or joint manufacturers' specifications. The jointing materials or factory fabricated joints shall then be placed, fitted, joined and adjusted in such a workmanlike manner as to obtain the degree of water tightness required. Trenches shall be kept water free and as dry as possible during bedding, laying and jointing and for as long a period as required. As soon as possible after the joint is made, sufficient backfill shall be placed along each side of the pipe to offset conditions that might tend to move the pipe off line and grade.

3.6 Backfilling

3.6.1 All trenches and excavation shall be backfilled as soon as the work has developed sufficient strength to resist backfilling loads and forces and the work shall be prosecuted expeditiously after it has commenced.

3.6.2 All pipe sewers, as soon as laid, shall have the space between the pipe and the bottom and sides of the trench backfilled initially to the spring line of the pipe with a select backfill material. This material shall be carefully and uniformly tamped under the pipe haunches and to the spring line so as to eliminate the possibility of lateral displacement.

3.6.3 No sewer shall be backfilled above the top of the pipe until the sewer elevations, gradient, alignment, bedding and the pipe joints have been checked, inspected and approved by the Engineer, as specified in paragraphs 3.8 through 3.10 of this section.

3.6.4 After the select backfill material has been placed to the spring line and thoroughly tamped and inspected by the Engineer, backfill may then proceed with the placement of natural select backfill material one foot above the top of the pipe. The material shall be carefully and uniformly tamped by self powered mechanical tampers in lifts, not exceeding 8" loose measured, then compacted to a Standard Proctor Density of 95%, per ASTM D-698.

3.6.5 If the Engineer determines that the trench excavation does not provide a natural select backfill one foot above the top of pipe he may authorize the Contractor to furnish a select backfill material, and where so authorized payment for the select backfill material will be made as Select Backfill material.

3.6.6 The balance of the trench shall then be backfilled in lifts not exceeding 8", using the best native material secured from the trench excavation and compacted to remove air spaces to 95% maximum dry density per ASTM
D-698 of finish sub grade.

3.6.7 All surplus excavated material which is not used in backfilling or material not suitable for backfill shall be removed and disposed of by Contractor at his own expense.

3.6.8 The ground surface that has been affected by the Contractor's operation shall be dressed to a smooth and uniform surface reasonably close to the original ground surface and shaped to encourage drainage.

3.7 Water - Sewer Conflict

3.7.1 Whenever sewers must cross under water mains or parallel with them within 10 feet horizontally, the sewer must be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be buried to meet the above requirement, the water main must be relocated to provide this separation or reconstructed with slip-on or mechanical joint cast iron pipe, or encased in concrete, as shown on the plans, for a distance of 10 feet on each side of the sewer. One full length of water main should be centered over the sewer so that both joints will be as far from the sewer as possible.

3.7.2 When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the water main should be constructed of slip-on or mechanical joint, ductile-iron pipe, and the sewer constructed of mechanical joint ductile-iron pipe and both services should be pressure tested to assure water tightness.

3.8 Testing of Sewer Lines

3.8.1 Air Test - Air-checking of this project will be conducted as the project is being installed - at no time will more than four (4) manhole to manhole reaches of pipe be installed before air-checking is performed.

A) After backfilling a manhole to manhole reach of wastewater line, the Contractor shall, at his expense, conduct a Line Acceptance Test using low pressure air. The test shall be performed using the below stated equipment, according to stated procedures and under the supervision of the inspecting engineer.

3.8.2 Equipment -Cherne Air-Loc Equipment as manufactured by Cherne Industries, Inc. of Edina, Minnesota or approved equal. Equipment used shall meet the following minimum requirements.

A) Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.

B) Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.

C) All air used shall be used shall pass through a single control panel.

D) Three individual hoses shall be used for the following connections.

a) From control panel to pneumatic plugs for inflation.

b) From control panel to sealed line for introducing a low pressure air.

c) From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

3.8.3 Procedures - All pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to 25 psig. The sealed pipe shall be pressurized to 5 psig. The plugs must hold against this pressure without having to be braced.

A) After a manhole reach of pipe has been backfilled and cleaned, and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure air shall be introduced into this sealed line until the pressure of any ground water that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize.

B) After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed “Acceptable” if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may over the pipe) shall not be less than the time shown for the given diameters in the following table:

Pipe Diameter in Inches	Minutes
4	2.0
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	8.5
21	10.5
24	11.5

3.9 Deflection Test

3.9.1 Deflection test shall be conducted on all flexible gravity sewer pipe in accordance with ASTM D-3034-81, after the final backfill has been in place at least 30 days. No pipe shall exceed a deflection on 5%.

3.9.2 Test shall be run using a rigid ball or mandrel having a diameter equal to 95% of the diameter of the pipe. The ball or mandrel shall pass between manholes without mechanical pulling devices.

3.10 Infiltration Test

3.10.1 Contractor, if directed by the Engineer, shall furnish, install and maintain a V-notch sharp crested weir in a wood-frame tightly secured at the entrance to the junction manhole to demonstrate to the Engineer the amount of infiltration.

3.10.2 The maximum allowable infiltration shall be 100 gallons per inch diameter per mile per day.

3.10.3 Under soil and ground level conditions where the water table is below the sewer invert the Engineer may, at his option, direct an exfiltration test be made in lieu of an infiltration test. Maximum allowable exfiltration shall be the same as maximum allowable infiltration per Paragraph 3.10.2 above.

The exfiltration procedure shall require an elevation head of two feet which is the height of water above the top of the pipe at the upstream manhole. Exfiltration shall be measured by filling a reach of sewer to the elevation head and observing the quantity of water required to maintain the reach in full condition.

END OF SECTION

DIVISION TWO - SITEWORK

SECTION 02762 – INSPECTION OF UNDERGROUND PIPES

1.0 SCOPE OF WORK

1.1 This work shall consist of the cleaning, lamping, and inspection of all gravity sewer mains and drainage culverts constructed under this contract. All underground pipes to be inspected shall be lamped between manholes, junction boxes, and inlets; cleaned; and either video-inspected or visually-inspected, depending on the size of the pipe.

1.2 SPECIFIED ELSEWHERE .
Concrete Culvert Pipe – 02722
High Density Polyethylene Pipe – 02723
Gravity Sanitary Sewers – 02730

2.0 MATERIALS AND EQUIPMENT

2.1 Contractor shall provide adequate battery-powered lights and mirrors for use during the lamp inspection.

2.2 Contractor shall use a closed circuit video system to remotely inspect the pipe. The television camera used for the inspection shall be one specifically designed and constructed for such inspection. The television camera shall be capable of 360Erotation to allow for more detailed views of pipe joints and connections. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor, video recorder, and other components of the video system shall be capable of producing the picture and quality required to properly evaluate the condition of the pipe being inspected.

3.0 CONSTRUCTION REQUIREMENTS

3.1 CLEANING

3.1.1 Underground pipes shall be cleaned with high pressure water cleaning equipment utilizing a vacuum truck or other suitable method for removing debris from the pipe.

3.1.2 Cleaning shall continue until there is no debris in sewer mains or a maximum of one (1)-inch depth of sand / silt in drainage culverts.

3.1.3 Contractor shall dispose of debris at an approved location and in accordance with all laws regulating such disposal.

3.2 VIDEO INSPECTION

3.2.1 All gravity sewer mains, drainage culverts forty-eight (48) inches in diameter and smaller (round) or seventy-three (73) inches x forty-five (45) inches and smaller (arch) shall be lamped and video inspected. Contractor shall notify the Design Engineer and City Engineer at least forty-eight (48) hours in advance of a scheduled inspection. The Design Engineer and/or the City Engineer or their designees shall be allowed to witness the inspection.

3.2.2 Underground pipes shall be lamped between structures (manholes, inlets, junction boxes, etc.) to verify that they are straight and properly graded without curves or sags.

3.2.3 Contractor shall make a video inspection of the underground pipe and deliver copies of inspection video on a VHS cassette tape to both the Design Engineer and the City Engineer.

3.2.4 If defects of the underground pipe are found, Contractor shall correct the defect at his own expense and then shall clean and video inspect the defected run of pipe as required above. This procedure shall be repeated until the defect is corrected and the pipe segment is accepted.

3.3 VISUAL INSPECTION

3.3.1 Drainage culverts larger than the sizes specified in paragraph 3.2.1 above may be visually inspected by the Design Engineer and/or the City Engineer.

3.4 WARRANTY INSPECTION

3.4.1 No sooner than ten (10) months and no later than eleven (11) months after Substantial Inspection, the Contractor shall clean and video inspect all underground pipes requiring video inspection. This cleaning and video inspection shall be in accordance with paragraph 3.1 and 3.2 above.

3.4.2 If defects of the underground pipe are found, Contractor shall correct the defect at his own expense and then shall clean and video inspect the defective run of pipe as required above. This procedure shall be repeated until the defect is corrected and the Contractor is released from maintenance.

4.0 METHOD OF MEASUREMENT

4.1 There shall be no separate measurement for lamping, cleaning, inspection, or repair of underground pipes, and the cost for this work shall be included in other items bid.

END OF SECTION

DIVISION TWO - SITEWORK

SECTION 02804 – GRINDER PUMP STATIONS

PART 1 - GENERAL

1.1 Description

These Specifications shall govern the furnishing and installation of grinder pump stations for the Authority. The stations shall be installed in accordance with the requirements of these specifications, at the locations and depths indicated on the plans approved by the City and the governing regulatory agencies. The stations shall be of the class, size, and dimension shown thereon.

1.2 General

A. All systems for each project shall be by a single source so as to ensure compatibility of controls and ensure system responsibility.

B. Units shall contain grinder pump(s), discharge piping, controls, and all other necessary parts and equipment required to provide an operating simplex grinder pump station, and shall include the equipment being installed a fiberglass reinforced, corrosion resistant polyester tanks for outside installations. All equipment shall be factory installed, except for externally mounted control panel, gravity sewer inlet hubs and pump assembly, which are to be installed in the field.

C. Simplex units shall be installed in single family residential applications and include a single pump and controls necessary for operation of a single pump, unless a duplex station is required by the City. Duplex units shall be installed in multi-family residential, commercial, and light industrial applications when approved by the Authority. Duplex units shall include two pumps and controls necessary for operation of a duplex pump station.

D. All equipment and materials provided for this project shall be warranted against defects in materials and workmanship for a period of five (5) years from the date the system is tested and accepted. The manufacturer will provide and install new parts free of charge for the duration of the warranty; remanufactured parts will not be accepted.

E. Grinder Pump Manufacturer shall be required to maintain an authorized warranty and repair service center within a fifty (50) mile radius of the project site.

F. Provide electrical power to units as required to meet the testing requirements specified within these specifications. If power is not readily available it will be the responsibility of the person(s) installing the equipment to provide power by whatever means necessary (i.e. generator) to power the equipment for testing.

PART 2 - PRODUCTS

2.1 Description

System shall consist of sewage grinder pump(s), level control switches, discharge piping, and stainless steel lifting chain, for each pump, to be installed in factory built basin. A NEMA 4X fiberglass weatherproof control box shall be supplied for mounting at the sump site or remote from the basin as required.

2.2 Operating Conditions

A. Simplex Stations:
   1. Operating Conditions:
      a. Standard System: Pump shall be capable of producing a minimum flow of ten
      (10) gallons per minute at a total head (static and dynamic) of 90 feet and be capable of pumping at a total head as low as 20 feet at a maximum flow of fifty (50) gallons per minute. Shutoff head shall be 100 feet minimum.

      b. High Head System: Pump shall be capable of producing a minimum flow of ten (10) gallons per minute at a total head (static and dynamic) of 110 feet and be capable of pumping at a total head as low as 20 feet at a maximum flow of fifty (50) gallons per minute. Shutoff head shall be 125 feet minimum.
   2. Motor Rating: 2 HP, 230 volts, single phase, 60 Hz, 3450 RPM. The full load current shall not exceed 13 amps.
   3. Pump shall be a submersible centrifugal grinder pump, positive displacement pumps shall not be considered, manufactured by Myers, model WGL20 Series or approved equivalent.

B. Duplex Stations: Operating conditions will vary depending on application. Motor rating will vary depending on application, rating shall be recommended for certain application and operating conditions by manufacturer. Pumps shall be manufactured be Myers, model WGL20 Series or approved equivalent.

2.3 Design

The pump volute, motor and seal housing shall be cast iron, ASTM A-48, Class 30, and integrally built. Pump shall be designed for pumping normal domestic and commercial sewage including a reasonable amount of foreign objects such as small wood, sticks, plastic, thin rubber, sanitary napkins, disposable diapers, and the like to a fine slurry that will freely pass through the pump and the 1¼" discharge piping. All external mating parts shall be sealed with Buna-N rubber O- Rings on rabbet joints. Gaskets shall not be acceptable. All fasteners exposed to the pumped liquids shall be 300 series stainless steel.

2.4 Electrical Power Cord

A. Electrical power cord shall be water resistant, UL and/or CSA-approved and size according to amp draw for the application, minimum of 14 gauge, 5 lead SOOW. Single cord shall incorporate the power and seal sensor leads. Cords shall be furnished by manufacturer and shall be a minimum of 30 feet in length.

B. The power cable entry into the pump/motor unit of the system shall be designed to prevent water contamination to gain entry even in the event of wicking or capillary attraction. Seal shall be a compression fitting with Buna-N sealing ring in the gland.

2.5 Motors

A. Each pump shall be driven by a Submersible Electric Motor. The motor shall be oil filled. Motor shall be NEC Code D for continuous duty, capable of sustaining 10 starts per hour. The pump and motor shall be produced by one manufacturer and shall be of submersible design.

B. The stator, rotor and bearings shall be mounted in a sealed submersible frame. The stator winding shall be of the open type with Class F insulation, (155° C or 311° F), NEMA L design (single phase) or NEMA B design (three phase). Single phase motors shall be capacitor start, capacitor run type for high start torque.

C. Pump shall be equipped with thermal sensors imbedded in phase of the winding to protect the motor from overheating. Switch(s) shall open at a temperature recommended by the manufacturer and turn the pump off and automatically reset when it cools to a temperature recommended by the manufacturer.

D. No special tools shall be required for pump and motor disassembly. The stator must be capable of being repaired or rewound by a local motor service center. Pump must be capable of being serviced in the field.

E. The pump and motor shall be specifically designed so that they may be operated partially or completely submerged in the liquid being pumped without compromise. The pump shall not require cooling water jackets.

2.6 Bearings and Shaft

A. Motor shall have an upper single row ball radial bearing and a lower single row ball thrust bearing. Ball bearings shall be designed for 50,000 hours B-10 life.

B. The common motor pump and grinder shaft shall be machined from solid 400 series stainless steel and be designed for minimum shaft overhang.

C. The shaft shall be threaded to mount the pump impeller and grinder impeller.

2.7 Seals

Motor shall be protected by two seal. Seal face shall be carbon, when rotating, or ceramic, when stationary. All hardware is to be 300 series stainless steel and sealing elastomers are to be Buna- N Rubber. Sealed housings shall contain moisture sensing probes that shall activate a warning light in the control panel if moisture enters the sealed area.

2.8 Impeller

Shall be bronze or cast iron construction and non-overloading. Impeller shall be multi-vane, centrifugal type, semi-open design. Impeller shall be hydraulically and statically balanced.

2.9 Grinder Cutters

Grinder cutters shall be in combination with the pump impeller and attached to the common motor and pump shaft. Grinder shall consist of a grinder impeller and shredding ring. The grinder cutters shall be on the suction side of the pump impeller and discharge directly into the impeller inlet. Grinder cutters shall be capable of grinding all materials found in domestic, including plastic, rubber, sanitary napkins, disposable diapers and wooden articles into a slurry of fine ground

particles with dimensions no greater than ¼ inch in any direction. Grinder cutters and shredding shall be hardened 400 series stainless steel with a minimum hardness of 55 Rockwell C.

2.10 Painting/Coating

The pump shall have a High Build Epoxy protective coating on all outside surfaces.

2.11 Testing

Commercial testing at the factory shall be required and include the following:

A. The pump shall be visually inspected to confirm that it is built in accordance with the specification as to HP, voltage, phase, and hertz.

B. The stator motor leads shall be tested for integrity using a megohmmeter at the highest setting.

C. Pump shall be allowed to run dry to check for proper rotation.

D. Discharge piping shall be attached; the pump submerged in water and amp readings shall be taken in each leg to check for an imbalanced stator winding. If there is a significant difference in readings, the stator windings shall be checked with a bridge to determine if an unbalanced resistance exists. If so, the stator will be replaced.

2.12 Basin

A. Basin – The diameter shall be a minimum 24 inch and depth shall be a minimum 5 foot deep for simplex units. Depth may increase depending on location of basin and gravity inlet pipe. Duplex units shall be sized depending on the application and shall meet the manufacturer's recommendations.

B. Basin Materials – Molded Fiberglass Reinforced Polyester Resin: System shall be suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with wastewater collection systems. Basins shall have a minimum thickness of ¼", or as required to meet the requirements below for depth required for project. Reinforcing materials shall be commercial grade "E" mat, continuous roving, chopped roving, roving fabric, or a combination.

C. Inner and Outer Surfaces – All surfaces shall be smooth and resin rich, free of cracks and porosity, with uniform molded in color and thickness. Air bubbles will not be acceptable. Fiber-reinforced polyester basin shall not have any blisters larger than ½ inch in diameter. Surface pits shall be less than ¾ inch in diameter and 1/16 inch in depth Wrinkles on interior surfaces shall be less than 1/8 inch in depth. Both exterior and interior surfaces shall be smooth with no sharp projections or exposed fibers.

D. Tank Wall – Wall thickness shall provide the aggregate strength necessary to meet the tensile and flexural physical properties requirements. The basin wall must be designed to withstand wall collapse or buckling based on:

1. Minimum dynamic-load rating 16,000 ft-lbs. Rating shall be established by basin not leaking, cracking or suffering any other damage when load tested at 40,000 ft-lbs and shall not deflect vertically downward more than ¼ inch at the point of load application when loaded to 24,000 lbs.
2. Conditions: Hydrostatic Pressure of 62.4 lbs/sf, Saturated Soil Weight 120 lbs/cf, and Soil Modulus of 700 lbs/sf
3. Test shall be as specified in ASTM D3753, latest edition, Section 6.
4. Tank wall must be constructed to withstand or exceed (2) two times the actual imposed loading on any depth of basin.

E. Tank Bottom – The basin bottom shall be of sufficient thickness to withstand applicable hydrostatic uplift pressure. In saturated conditions, the center deflection of the empty basin bottom shall be less than 3/8" (elastic deflection) and shall not interfere with bottom pump mounting requirements. Any mounting studs, plates, cap screws into tank bottom should be stainless steel and resin covered except for threads. Any inserts should be stainless steel or brass and resin covered except for threads.

F. Tank Collar (Anti-Flotation) – A means to counteract buoyancy forces shall be provided on the tank bottom in the form of a ring, and shall extend a minimum of 2" beyond the O.
D. of the basin wall. Wall and collar should be blended with a radius not to exceed 1 ½" beyond wall O.D.

G. Venting – Tank shall be vented to the atmosphere via non-degradable integrated venting screen at the ground level with at least 10 square inches of perforated surface area.

H. Capacity – Tanks with a nominal outer diameter of 24" shall be capable of holding at least 45 gallons of water in the bottom 16" (antifloat region), and a minimum of 28 gallons of water per vertical foot above the antifloat region.

2.13 Basin Cover

A. A one piece, solid polypropylene, fiber-reinforced polyester, or aluminum (24" or 30" dia. basins) cover or aluminum (36" and larger dia. Basins) cover shall be provided for each installation. The cover shall be constructed for a 250 PSF load. Hatch shall be attached to the basin.

B. The cover shall be grass green in color if polypropylene or fiber-reinforced polyester. The cover surface shall have a non-skid design, and shall be water-tight. Cover shall be bolted to the basin with stainless steel cap screws for "light duty" loading. Design of cover shall allow for basin to be mounted flush with ground.

C. Aluminum covers shall include a single leaf hatch of minimum size to access all valves and remove the pump(s) from the basin without having to remove the cover. Hatch shall be equipped with stainless steel hinges and automatic hold open arms and a padlock hasps.

D. Provide a 2" mushroom vent for cover. Note: If inlet pipe is connected to vent stack in house, vent on basin cover is not required.

2.14 Piping and Appurtenances

A. Pump Discharge:

1. Simplex units shall consist of a stainless steel or schedule 80 PVC discharge piping which is connected to a check valve, shutoff valve, and hydraulic cast iron seal flange or stainless steel quick disconnect that connects the discharge piping to the force main via a flex hose. Gate valve shall remain attached to force main when pump, check valve, and discharge piping are removed from the basin for maintenance.
2. Duplex units shall consist of stainless steel or schedule 80 PVC discharge piping, shutoff valves, check valves, discharge elbow, and stainless steel guide rail(s).

B. Check valve shall be sch. 80 pvc, coated cast iron, stainless steel, or brass construction and of either swing or ball type design to provide unobstructed flow through the valve body when the pump is pumping flow and close when the pump shuts off preventing flow from entering the basin from the system. The ball type valves shall incorporate a clean- out port that does not require the body of the valve to be removed. Check valve shall be rated for 150 psi pressure minimum.

C. Ball type shutoff valve: Handle shall be near the top of basin, within reach for service personnel. Shutoff valve shall be rated for 150 psi pressure minimum. Valve shall be sch. 80 PVC, coated cast iron, stainless steel, or brass.

D. Seal flange or quick disconnect shall be capable of being disconnected without entrance into the basin by personnel. Seal flange shall automatically seal pump if a discharge elbow is provided or be an integral part of the discharge piping or check valve allowing access from the top of the basin by maintenance personnel. Quick disconnect shall be located as to allow access from the top of the basin by maintenance personnel.

E. An adequate length stainless steel chain or nylon rope shall be supplied for removing the pump. The chain/rope shall be of sufficient length and strength for easy removal. It shall not be required to lift on the discharge piping to remove the pump.

F. Inlet Flange: One-piece, flexible basin inlet fitting for 4" SCH 40 plastic pipe for residential or 6" SCH 40 plastic pipe for commercial or as required by the Authority shall be shipped loose for field installation.

G. No male threaded PVC fittings shall be allowed. Couplings to convert from PVC piping to threaded connections shall be brass.

2.15 Junction Box

A. A U.L. listed, NEMA Type 6 submersible rated junction box shall be provided. Junction box shall be formed from corrosion resistant, flame retardant thermoplastic. The enclosure shall be of adequate thickness and properly reinforced to provide good mechanical strength. The junction box shall have a fully gasketed, hinged cover that is held in place by stainless steel screws.

B. An adequate number of sealing-type cord grips shall be supplied for incoming pump and level control cords. The cord grips shall be made of non-corrosive material such as PVC or nylon, and shall make an effective seal around the wire jacket.

C. The junction box shall have a PVC solvent weld socket with an integral 1½" NPT pipe for attaching basin conduit hub. The hub shall be made of a corrosion resistant material and shall be of adequate size to accommodate the number of wires required for pump and level control operation.

D. The incoming wires shall be sealed by external means so that condensation from the conduit or groundwater will not enter the enclosure. The interior of the enclosure shall be of adequate size to accommodate the wires and connections for pump and level control operation.

E. The wires running between the control panel and the junction box shall be color-coded and fastened to the pump and level controls by means of adequately sized and insulated twist lock or crimp connectors.

2.16 Electrical Control Panel and Appurtenances

A. Control Panel Model / General Construction
   1. Control Panel – shall be supplied by pump manufacturer with Float Switch Operation. Panel shall include a Hand-Off-Automatic switch for each pump.
   2. Simplex or Duplex – Weather Proof Controller with Alarm meeting U.L. Standard 508.

B. General Operation / Construction
   1. A complete wiring diagram and installation instructions shall be provided. The control panel assembly shall be completely factory tested and shall be "UL" 508A listed and labeled. Enclosure shall have nameplate with model number, voltage, phase, hertz, ampere rating and horsepower rating.
   2. Run lights, failure lights, test/silence push button and hand on-off-automatic switch shall be provided. The test/silence button shall output alarm for a test and silence the alarm when alarm is already activated for a failure or other situation. Switch and lights shall be properly labeled as to the function of each. Duplex pumps shall also provide switch to manually run one or both pumps independently of the other.
   3. Motor Contactors. The motor contactor shall be a heavy duty definite purpose rated contactor sized to meet NEC requirements. It shall provide the electrical start / stop control for each pump along with an integral overload protection and have 120 volt operating coil. Contactors shall be Culter Hammer or approved equal.
   4. The features shall be integrated on a single control board with scope for future expansion. The compactness of the control board shall eliminate the need for several discrete components resulting in ease of serviceability, reduction in probability of failure and lower heat generation. The plug-ins feature of the control board shall enhance ease of serviceability by eliminating the need for all manual wiring. The control board shall operate on a low voltage DC.

2.17 Control Panel/Testing

A. Factory Tests – Each control panel shall receive a factory test to ensure proper operation prior to shipment. Factory Tests shall include at a minimum:
   1. All control logic functions, including: turn on, turn off, alarms, etc.
   2. All fuses and circuit breakers
   3. All indicator lights and switches
   4. Audible and visual alarm indicators (when provided).
   5. Power transfer circuit to pump motor
   6. Float switch input circuits (for float operated models)
   7. Pressure level operation (for pressure transducer operated models)
   8. The panel shall be connected to a representative test pump. The panel shall be tested for proper motor starting and running operation

B. Enclosure

1. Durable NEMA 4X Enclosure, made from a poly carbonate material and intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose directed water; undamaged by the formation of ice on the enclosure. The resin system also shall include a flame retardant to obtain a flammability rating which meets

U.L. 94V-O. Heat distortion temperature shall be 350 degrees Fahrenheit. The resin system shall be resistant to ultraviolet light.

2. Removable non-metallic hinged door with standard lockable stainless steel latches, for safe operation indoor and outdoor.
3. Non-Conductive Standard Molded Sub-Door (Dead Front). The sub-door will isolate the user from energized components and line voltage.
4. Non-Conductive Injected Molding Back Panel The back panel shall have a raised platform for mounting circuit breakers, a heavy-duty parallel ground lug, housing for motor contractors and elevated terminal strip.
5. Inside Sub-Door Quick disconnect circuit board for easy replacement and troubleshooting. Spare fuses for Alarm and Control fuse replacement. The inner door shall include a screwdriver for ease of field service.

C. Alarms / Indicators

1. Visual Alarm Circuitry– A top mounted high intensity flashing red light with various flashing modes depending on alarm condition. The panel will have an individual alarm circuit fuse.
2. Audible Alarm Circuitry – Audible piezo alarm, +/- 95 dB within 2 feet, with a side mounted touch to silence pad and circuitry feature.
3. Individual Control and Alarm Fuses with fail indicator lights. Each fuse shall have an individual fuse “blown” indicator light for simple troubleshooting.
4. Control, Alarm, Pump Run and Float Indicator lights. Pump Run lights shall be provided for each motor and mounted on the sub door, along with a separate control circuit power light and alarm circuit power light. The float operated panels shall have float status indicator lights for both the simplex and duplex models.

D. Circuit Breakers

1. Control Circuit Breakers. The 120 Volt common control circuit shall be protected by an auxiliary single (1) pole circuit breaker. Breaker shall be rated 10,000 Amps interrupt current (10KAIC). The circuit breakers shall be accessible through the sub door.
2. Motor Circuit Breakers. The pump breakers shall be thermal magnetic trip devices and provide for individual motor disconnect and overload / short circuit protection as required by the NEC rating for motor branch circuit protection. Breaker shall be rated 10,000 Amps interrupt current (10KAIC). The voltage rating shall match that of the panel incoming service. All circuit breakers shall be accessible through the sub door.

E. Level Controls

1. Float Switch Control Operation

a. The control panel shall provide terminal strip inputs for: Simplex: pump off, pump on, and alarm float controls; Duplex: lead pump on, lag pump on, pumps off, and alarm float controls.

b. The controller shall provide float switch status indicator lights. The indicator LED's shall activate to indicate the closure of each of the float switches. The indicator LED's shall also flash to indicate float switch failure. The out of sequence or float failure indicators shall remain activated until the next pump down sequence after the fault has been corrected. A chirping audible alarm shall also be activated when a float switch failure or out of sequence operation is detected.

2. Float Controls

a. Simplex control panel operation shall be automatically controlled by 3 (simplex) or 4 (duplex) mercury level controls. Float switches shall control off, on and alarm functions.

b. Float switch shall be capable of operating at temperatures between 32 and 170° F. Float switches shall activate and deactivate between 5 degrees above horizontal and 5 degrees below horizontal. Float switch shall be constructed with a polypropylene outer shell for durability and

resistance to wastewater environment. Outer shell shall be filled with polyurethane foamed interior to provide best buoyancy, water tight integrity and protect the mercury switch.

c. Float switches shall be of normally open type.

d. Float switch cables shall be made of chlorinated polyethylene, type SJOOW, 18 AWG, 2-wire type. Float switch contacts and shall be capable of handling 10 amps at 115 VAC or 3 amps at 240 VAC.

e. Float switch shall be third party safety listed by UL, US and shall be capable of operating intrinsic safe relays.

f. Float switches shall have an external zinc plated cast iron weight. Weight shall be of the split design and shall be easily adjustable for tether length. Float switch weights made of heavy metals which may contaminate the waste flow stream shall not be acceptable.

2.18 Spare Parts

The following spare pumping equipment items shall be provided to the City at the rate of one

(1) for every twenty (20) simplex or duplex units installed in a project, a minimum of one of each of the items shall be provided for all projects where five (5) or more units is installed:

1. Grinder pumps
2. Liquid level controls
3. Control panels
4. Check valves
5. Shut-off valves

PART 3 - EXECUTION

3.1 Installation

A. Install pumps and accessories in accordance with the manufacturer's recommendations, and Authority.

B. Align, adjust, and lubricate in accordance with the manufacturer's instructions and leave in proper working condition.

C. Perform any required touch-up painting in accordance with recommendations of paint system or coating manufacturer.

3.2 Field Quality Control

A. General: Retain a qualified representative of the manufacturer to perform the following services if multiple pumping units are installed or use a manufacturer approved contractor for installation and testing, as required by the City.

B. Required Manufacturer Services:

1. Equipment Installation:
   a. Oversee installation of the equipment and accessories specified herein.
   b. Inspect the completed installation and note deficiencies.
   c. Be present and assist CONTRACTOR during the start-up, adjusting, and field testing of completed installation.
2. Furnish test forms and procedures for field testing.
3. The manufacturer's representative shall revisit the job site as often as necessary until all trouble is corrected and the installation is entirely satisfactory to the Authority.
4. Manufacturer's Installation Report:
   a. Prepare manufacturer's installation reports and submit them within 30 days after completion of field testing and operation instruction.

C. Field Testing:

1. Field test and calibrate equipment to demonstrate to the Authority that all equipment will satisfactorily perform the functions and criteria specified within.
2. Provide all test apparatus required at no cost to the City. Testing shall include providing calibrated/certified instruments to verify results.
3. Follow testing procedures recommended by the manufacturer and approved by the City.
4. Motor Field Tests:
   a. Assembly details, motor-rating, and electrical connections, etc., shall be checked for compliance with design.
   b. A motor and cable insulation test for moisture content or insulation defects shall be made.
   c. Prior to submergence, the unit shall be run dry to establish correct rotation and mechanical integrity.
   d. The pump shall be run for 10 minutes submerged.
   e. After operational test (subparagraph d), stop motor and leave the motor submerged for 30 minutes. Then, run the insulation test (subparagraph b) again with the motor still submerged.
5. Seal the pump cable end with a high quality protective covering to make it impervious to moisture or water seepage prior to electrical installation.
6. Start up and testing of grinder pump shall be completed before warranty period begins. Water for testing can be either potable water paid for by contractor or sewage if permitted by the Authority.

END OF SECTION

DIVISION TWO - SITEWORK

SECTION 02840 – SEWER VALVES & APPURTENANCES

PART 1 – GENERAL

1.1 Related Work Specified Elsewhere

A. Excavation and Backfill

B. Water Distribution Pipe

1.2 Quality Assurance

A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
   1. AWWA C500, Gate Valves 3 Inch Through 48 Inch For Water and Other Liquids.
   2. AWWA C508, Swing Check Valves for Ordinary Waterworks Service.
   3. ANSI B16.1, Cast-Iron Pipe Flanges and Flanged Fittings.
   4. ANSI B16.4, Cast-Iron Screwed Fittings.
   5. ASTM A 307, Carbon Steel Externally and Internally Threaded Standard Fasteners.
   6. ASTM A 354, Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners.
   7. ASTM D 1784, Rigid Polyvinyl Chloride Compounds and Chlorinated Polyvinyl Chloride Compounds.
   8. ASTM D 2464, Threaded-Type Schedule 80 PVC Pressure Fittings.
   9. ASTM D 2467, Socket-Type Schedule 80 PVC Pressure Fittings.
   10. MSS SP-80, Bronze Gate, Globe, Angle and Check Valves.
   11. Standards of National Electrical Manufacturer's Association.

B. Operation and Maintenance Data:
   1. Submit a detailed operation and maintenance manual for all valves and appurtenances provided under this Section including the following information:
      a. Product name and number.
      b. Name, address and telephone number of manufacturer and local distributor.
      c. Instruction bulletins for operation, maintenance and recalibration.
      d. Complete parts and recommended spare parts lists.

PART 2 – PRODUCTS

2.1 Materials

A. General:

1. All valves shall have manufacturer's name and working pressure cast in raised letters on valve body.
2. All manual valve operators shall turn right to close unless otherwise specified. Valves shall indicate the direction of operation.
3. Unless otherwise specified all flanged valves shall have ends conforming to ANSI B16.1, Class 125.
4. All buried valves shall be provided with adjustable three piece valve boxes and provided with extension stems, operating nuts and covers unless otherwise shown or specified.
5. All bolts, nuts and studs on or required to connect buried or submerged valves shall be stainless steel.
6. All bolts and studs embedded in concrete required to connect wall pipes to valves and appurtenances specified herein shall be stainless steel.
7. All other bolts, nuts and studs shall, unless otherwise approved, conform to ASTM A 307, Grade B cadmium plated, hot dipped galvanized or stainless steel.
8. Bolts and nuts shall have hexagon heads and nuts.
9. Gasket material and installation shall conform to manufacturer's recommendations.

B. Service Connection to Pressure Sewer Main:

1. Connection Materials
   a. Service Saddle:
      (1) Required for connection to PVC water mains, when saddle used a brass corporation stop shall be included meeting the Specification 0210.
      (2) Straps: double stainless steel straps
      (3) Saddle: brass
      (4) Manufacturer and Model
         (a) Ford Meter Box Company, Inc. Style 202BS
         (b) Or approved equal.
   b. Tapping Tee:
      (1) Electrofusion Type
      (2) Manufacturer: Frialen DAA High Pressure Tapping Tee or approved equal.
2. Service Connection Box:
   a. Location: within 5’ of connection of pressure sewer service line and main pressure sewer transmission mains. Required for all grinder pump and STEP tank effluent pump connections to force mains.
   b. Service Connections shall incorporate an assembly consisting of a check valve, threaded PVC nipple, and shutoff ball valve.

(1) Shutoff ball valve shall be PVC type 1, ASTM D 1784 with EPDM O-rings. Valve shall have "T" type stem with polypropylene handle and be pressure rated for 150 psi minimum (schedule 80). Valve shall be manufactured by Spears, Utility Ball Valves or approved equivalent. End connections shall be threaded.

(2) Check valve shall be ball type. Material shall be PVC type 1, ASTM D 1784 with Nitrile Rubber check ball and seal at the clean-out port. Valve shall be marked with external flow direction arrow and note "this side up" for correct installation and incorporate a clean-out port as not to require the valve body to be removed to service the valve. Valves shall be pressure rated to 100 psi. Valves shall be manufactured by Flomatic, Series 208 or approved equivalent. End Connections shall be threaded.

(3) Service Connection shall have PVC or HDPE adapter on each end. Adapter shall incorporate compression connection (pack joint) and male IP threaded connection to allow valves to be removed from box for replacement or maintenance. All couplings shall be brass.

c. Sewer Service Connection Box shall be sized to provide access to couplings, adapters, shutoff valve and check valve. Box shall be NDS type 1200 meter box meeting the requirements of Section 0210, Paragraph 2.02.C, with GREEN colored cover.

C. Combination Sewage Air Valve:

1. Type: Single Body, Automatic Float Operated Valve. Designed to release accumulated air from pipeline (force main) during system operation and designed to allow large quantities of air to exhaust the pipeline during filling and admit air during draining. Valve must be designed for use with wastewater applications.
2. Working Pressure: capable of working at a pressure range of 3 to 250 psi and pressure tested to 350 psi.
3. Construction:
   a. Body and Cover shall be Cast Iron Class B with epoxy coating
   b. Float and all internal parts shall be stainless steel.
4. Location: At high points along pressure sewer main, or any location where air may become trapped during operation. Valve shall be installed in a vault meeting the requirements of precast manhole sections and be traffic rated.
5. Manufacturer shall be ARI D-020, D-025 or D-023, size shall be as required for air release and intake.
6. Required Accessories:
   a. Back flushing Attachments for flushing as recommended by manufacturer with valves at connection points.

b. Isolation valve and tapping saddle for connection to pressure sewer main. Tapping saddle shall be stainless steel band with brass saddle and buna-n rubber gasket by Ford Meter Box or equal. Isolation valve shall be 2-piece bronze full port ball valve with brass, chrome platted ball and brass stem. Manual lever operator shall be stainless steel. All nipples shall be brass.

D. Gate Valve:
1. Standard: AWWA C509.
2. Type: Non-Rising Stem. Capable of passing a 3" Solid, unless otherwise approved for grinder sewer pump applications by the Authority.
3. Construction:
   a. Body and Bonnet: Cast iron.
   b. Wedges and Trim: Resilient Seat.
   c. Packing: O-ring.
4. End Connections:
   a. Exposed Valves: Flanged, conforming to ANSI B16.1, Class 125, unless otherwise shown.
   b. Buried Valves: Mechanical joint, conforming to ANSI B21.11.
5. Operation: Handwheel for exposed valves in vault and 2" operating nut for buried valves.
6. Manufacturer:
   a. M&H Style 4067.
   b. Or equal.

E. Swing Check Valve:
1. Type: Counter-weighted swing check. Capable of passing a 3" solid.
2. Construction:
   a. Body, Cover, Disk and Levers: Cast Iron
   b. Counterweight Arm: Cast iron
   c. Shaft: 18-8 Stainless Steel
   d. Body Seat: Bronze
   e. Seat Ring: Rubber
   f. Shaft Gland Packing: Compression Type
3. Location: Valve vault adjacent to pump station for solids handling pumps. Vault shall be precast concrete section.
4. Coating: Valve shall be epoxy coated.
5. Manufacturer: Clow F-5382, American Flow Control 50SC or equal.

F. Tapping Sleeve
1. To be used on all hot-tap line connections.
2. Construction
   a. Cast Iron
   b. Split end gaskets

3. End Connection: Mechanical Joint
4. Manufacturer and Model:
    a. M & H Styles 1174 & 1274
    b. Or equal.

2.2 Appurtenances

A. Extension Stems, Stem Guides, Wrenches and Keys:
1. Extension stem shall be at least as large as the stem of the valve it operates.
2. Extensions shall be placed on any operator that is more than 24" below ground. Intermediate stem guide shall be installed for extensions more than 10 feet long.
3. Stem brackets and guides shall be made of cast iron and have fully adjustable bronzed bushed guide block. Fasten brackets to walls with approved expansion bolts.
4. Operating nuts about 2 inches square shall be included with extension stem.
5. Provide operating key or wrench of suitable length and size for each valve that is not readily accessible to direct operation.

B. Extension Bonnets: Shall be provided for all of the filter's isolation valves, filter-to-waste valves, and air scour valves. Extension shall be of adequate length to place top of bonnet as shown on the drawings.

C. Valve Boxes:
1. Location: Provide for all buried valves.
2. Construction:
    a. Heavy pattern cast iron box.
    b. Type: Three-piece adjustable, telescoping.
    c. Inside Diameter: 4-1/2 inches minimum.
    d. Cover: Heavy-duty cast iron marked "JCUA SEWER"
    e. Direction to Open Arrow: Cast in cover.
3. Provide extension stem and operating nut.
4. Operating nut and stuffing box enclosed by lower section which rests on bonnet.

PART 3 – EXECUTION

3.1 Installation

A. Install all valves and appurtenances in accordance with manufacturer's instructions.

B. Install suitable corporation stops at all points shown and required where air binding of pipe lines might occur.

C. Install all valves so that operating handwheels or wrenches may be conveniently turned from operating floor but without interfering with access.

D. Unless otherwise approved install all valves plumb and level. Valves shall be installed free from distortion and strain caused by misaligned piping, equipment or other causes.

E. Valve boxes shall be set plumb and centered with the bodies directly over the valves. Earth fill shall be carefully tamped around each valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face, if less than 4 feet.

3.2 Field Test and Adjustments

A. Adjust all parts and components as required correct operation.

Conduct functional field test of each valve in presence of CITY'S REPRESENTATIVE to demonstrate that each part and all components together function correctly. All testing equipment required shall be provided.

END OF SECTION

DIVISION TWO - SITEWORK

SECTION 02843 – PRESSURE SEWER MAIN AND APPURTENANCES

1.1 SCOPE OF WORK

1.2 This work shall consist of all labor, materials, equipment, tools and services required to furnish and install sewage force mains, fittings, valves, thrust blocks and restrained joints at sites and locations as designated in these specifications and in reasonably close conformity with the lines and grades specified in the Drawings.

1.3 Specified elsewhere: Precast Sewage Pump Station - Section 02732
Air Valves & Vaults for Sewer Pressure Mains - Section 02734

2.1 MATERIALS

2.2 Pipe: At Contractor's option, use any of the following acceptable materials unless otherwise designated on the plans:

2.2.1 Polyvinyl Chloride pipe (for nominal sizes up to and including 12 inches), with integral expanded bells conforming to ASTM D-2241, SDR 26, 160p.s.i. working pressure. Couplings or joints shall be an integral part of the pipe barrel. It shall consist of an expanded bell with grooves to retain a rubber sealing ring conforming to the requirements of ASTM D-1869.

2.2.2 Polyvinyl Chloride pipe conforming to AWWA C-900 (for nominal sizes up to and including 12 inches), Standard dimension ratio shall be not more than 25. Pipe shall be made to cast iron O.D.'s. Each length of pipe shall be stamped with approval of Underwriter's Laboratories, Inc. Pipe couplings or joints shall be an integral part of the pipe barrel, consisting of an expanded bell with a groove to retain a rubber sealing ring. Gaskets shall be factory bonded into the groove.

2.2.3 Polyvinyl Chloride pipe conforming to Uni-Bell PVC pipe association Standard Specification UNI-B-11-85 and AWWA C-905 (for nominal sizes greater than 12 inches). Standard dimension ratio shall be not more than 25. Pipe shall be made to cast iron O.D.'s. Each length of pipe shall be stamped with approval of Underwriter's Laboratories, Inc. Pipe couplings or joints shall be an integral part of the pipe barrel, consisting of an expanded bell with a groove to retain a rubber sealing ring. Gaskets shall be factory bonded into the groove.

2.2.4 Ductile Iron Pipe conforming to ANSI A-21.51 (AWWA C-151) Grade 60- 42-10 Ductile Iron, thickness Class 50. Pipe interior shall be cement mortar lined per ANSI A.21.4 (AWWA C-104). Rubber gasket joints per ANSI A-21.11 (AWWA C-111).

2.3 Gate valves (16" and smaller) shall be of the "resilient seat" type, conforming to AWWA C-509, epoxy coated inside and outside to AWWA C550. End connections shall be standard mechanical joint, complete with restrained glands as specified herein. Valves shall be rated for zero leakage to 200 p.s.i. and 400 p.s.i. hydrostatic test pressure. Valves shall be of the non-rising stem (NRS) design. Gates shall be encapsulated in rubber where exposed to line velocity and shall be field replaceable. Each valve shall have a 2 inch square operating nut and shall open to the left. The entire valve shall be designed and recommended by the manufacturer for application with raw sewage.

2.4 Gate valves (18" and larger) shall be of the "resilient seat" type, conforming to AWWA C-509, epoxy coated inside and outside to AWWA C550. End connections shall be standard mechanical joint, complete with restrained glands as specified herein. Valves shall be rated for zero leakage to 200 p.s.i. and 400 p.s.i. hydrostatic test pressure. Valves shall be of the non-rising stem (NRS) design. Gates shall be encapsulated in rubber where exposed to line velocity and shall be field replaceable. Each valve shall have a 2 inch square operating nut and shall open to the left. Valves shall include a gearing mechanism to assist in opening and closing of the valve. The entire valve shall be designed and recommended by the manufacturer for application with raw sewage.

2.5 Valve boxes shall be supplied for all buried valves. Valve boxes shall be made of good quality cast iron and shall be of the sectional type. The lower section shall be a minimum of five (5) inches in diameter, enlarged to fit around the bonnet of the valve if a two section box is used, or to fit a circular or oval base section if a three section box is used. The upper section shall be arranged to slide or screw down over the adjoining lower section and shall be provided with cast iron lids or covers. Lids or covers shall be marked "Sewer".

2.6 Fittings for pipes 4 inches in size or greater may meet any one of the following specifications, at Contractor's option:

2.6.1 Cast Iron conforming with ANSI A-21.10 (AWWA C-110), 250 p.s.i rated.

2.6.2 Ductile Iron conforming with ANSI A-21.10 (AWWA C-110), 350 p.s.i. rated.

2.6.3 Compact Ductile Iron Fittings conforming with ANSI A-21.53 (AWWA C-153), 350 p.s.i. rated.

All fittings shall be cement mortar lined per ANSI A21.4 (AWWA C-104).

All fittings shall be of the mechanical joint type.

2.7 Mechanical Joint Retainer Glands shall be used for all connections of pipe to fittings and shall be made with a suitable restrained joint system, meeting any one of the following specifications:

2.7.1 For Ductile or PVC Pipe, a suitable ductile iron retainer gland, designed and recommended by the gland manufacturer, for the type of pipe used. Gland shall be manufactured entirely of 60-42-10 ductile iron conforming to ASTM A536-80. Glands shall attach to the pipe barrel through a plurality of individually activated gripping surfaces (wedges). EBAA Iron "Megalug" series or equal.

2.7.2 For PVC Pipe, a heavy ductile iron or fused epoxy coated structural steel (ASTM A36) clamp which employs serrations on its inside surface to firmly grip the outside of the PVC pipe barrel. Clamp shall be specifically designed and recommended for use with the size and thickness class of pipe used. All hardware shall be ductile iron. Uni-flange Series 1300 or approved equal.

2.7.3 For Ductile Pipe only, a ductile iron mechanical joint retainer gland employing cupped-end threaded set screws which conform with the pipe manufacturer's guidelines as to number of set screws and torque to be applied to properly restrain the joint to a rating of not less than 250 p.s.i.

2.8 Pipe Joint Restraint (applicable only for pipe joints within specified distances from fittings--see schedule in Drawings): Use two glands similar in design and materials to the joint retainer glands previously specified, one immediately behind the joint bell and one on the pipe spigot, connected by two or more ductile iron rods spanning across the pipe joint. For ductile pipe, it is also permissible to use mechanical joint pipe with restrained retainer gland, or special "lock-ring" pipe joints.

2.9 Detectable underground utility marker tape for burial with PVC pipe shall be a minimum of 5 mils thick and 3 inches in width. Minimum tensile strength shall be 35 pounds and tape shall elongate not less than 80 percent before breaking. Tape shall be permanently imprinted with an appropriate legend to identify the contents of the pipe (e.g. "Sewer Force Main Below".)

2.10 Concrete shall conform to requirements for Class B concrete, MDOT Standard Specifications.

2.11 Reinforcement shall be grade 40 or grade 60 billet steel conforming to ASTM A-615.

3.1 CONSTRUCTION REQUIREMENTS

3.2 Excavation - General

3.2.1 Excavation shall include the clearing of the site of the work, the loosening, loading, removing, transporting and disposing of all materials, wet or dry, above or below ground necessary to be removed to construct all force mains included in this contract to the lines, grades and locations shown on the Drawings. No burying or burning of trees, stumps, roots, or other debris will be allowed.

3.2.2 Where required, the Contractor shall remove with care all shrubbery, plants, flower planters, flower bed borders, set aside, watered, and kept alive and reset as before construction work. The Contractor shall furnish and install replacement plants which die as a result of construction operations.

3.2.3 In areas where force main will be installed in close proximity to trees designated to remain, the major root systems of the trees shall be protected from damage. Where necessary, contractor shall install force main by tunneling underneath the tree roots.

3.2.4 The Contractor shall, at his own expense furnish and install all temporary sheeting, timbering and bracing required to maintain the excavation in a condition to furnish safe working conditions and to permit the safe and efficient installation of all items of contract work. The Contractor shall further, at his own expense, shore up or otherwise protect all fences, buildings, walls, walks, curbs, or other property adjacent to any excavation which might be disturbed during the progress of the work, except for such facilities which are within the allowable trench limits and are designated for removal and restoration.

3.2.5 Temporary supports must be removed by the Contractor at his own expense after or concurrently with the completion of the permanent facility.

3.2.6 The Contractor shall do all ditching, pumping, well pointing, and bailing, build all drains, and do all other work necessary to keep the excavation clear of ground water, sewage or storm water during the progress of the work, and until the finished work is safe from injury. Where the excavation is wet sand, and suitable construction conditions cannot be obtained by other methods, the Contractor shall install and operate, at his own expense, a pumping system connected with well points, so as to drain the same effectually. All well point holes shall be backfilled with sand after removal. No masonry or pipe shall be laid in water, and water shall not be allowed to rise over masonry until concrete or masonry has set at least 48 hours. All water pumped or drained from the work shall be disposed of in a manner that will not damage adjacent property or other work under construction. Necessary precautions shall be taken to protect all construction against flooding.

3.2.7 Whenever the excavation is carried beyond the lines and grades shown on the Drawings, the Contractor shall, at his own expense, refill all such excavated space with such material and in such manner as may be directed.

3.2.8 Unsuitable and surplus excavated material not incorporated in the work shall be disposed of by the Contractor at his own expense.

3.2.9 In the event that any existing gas pipe, water pipes, conduits, sewers, tile drains or poles are blocked or interfered with by the excavation required on this project, the Contractor shall maintain them in continuous operation, and restore them to the same condition as they were prior to the start of construction of this project. Gas pipes or electrical power distribution facilities which are disturbed in any way shall be inspected and repaired (if necessary) by the utility owner. All at no additional compensation.

3.2.10 Any culvert pipe joint exposed by excavation shall be wrapped with an approved geotextile filter fabric, three feet in width, before backfilling, at no additional compensation.

3.3 Trench Excavation

3.3.1 The ground shall be excavated in open trenches, of sufficient width and depth to provide ample room within the limits of the excavation, or lines of sheeting and bracing, for the proper construction of the force main.

3.3.2 Mechanical excavation of trenches shall be stopped above the final invert grade elevation so that the pipe may be laid on a firm, undisturbed native earth bed.

3.3.3 The width of the trench at the top of the pipe shall not exceed the outside diameter of the pipe plus two feet. The maximum allowable trench width at the ground surface shall not exceed the outside diameter of the pipe, plus twice the depth of cut. Restoration of disturbed facilities as a pay item will only be allowed within these limits.

3.4 Bedding

3.4.1 When the native bedding material encountered in the trench bottom consists of a material deemed by the Engineer to be unsuitable for pipe bedding, the Contractor shall over dig to a depth as specified in the Drawings and replace with bedding material. Should over digging occur where a suitable native soil exists for bedding purposes, the Contractor shall fill the area of over-excavation with an acceptable bedding materials specified, but at Contractor's expense.

3.4.2 Trenches shall be dry when the trench bottom is prepared. A continuous trough shall be pared or excavated to receive the bottom quadrant of the pipe barrel. In addition, bell holes shall be excavated so that after placement, only the barrel of the pipe receives bearing pressure from the trench bottom.

3.4.3 Preparation of the trench bottom and placement of the pipe shall be carefully made so that when in final position, the pipe is true to line and grade.

3.4.4 Bedding material equal to Classes I, II, or III, as described in ASTM D2321 shall be used for all flexible pipe bedding, haunching and initial backfill provided the proper strength pipe is used with the specified bedding to support the anticipated load.

3.5 Laying Pipe

3.5.1 Pipe shall be protected during handling against impact shocks and free fall. Pipe shall be clean at all times, and no pipe shall be used in the work that does not conform to the appropriate specifications.

3.5.2 Pipe shall be laid accurately, to the line and grades with fittings and valves at the required locations as designated in the Drawings. Preparatory to making pipe joints all surfaces of the portions of the pipe to be jointed or of the factory-made jointing material shall be clean and dry. Lubricants, primers, adhesives, etc., shall be used as recommended by the pipe or joint manufacturer's specifications. The jointing materials or factory fabricated joints shall then be placed, fitted, joined, and adjusted in such a workmanlike manner as to obtain the degree of water-tightness required.

3.5.3 Trenches shall be kept water-free and as dry as possible during bedding, laying, and jointing and for as long a period as required. As soon as possible after the joint is made, sufficient backfill material shall be placed along each side of the pipe to offset conditions that might tend to move the pipe off line and grade.

3.5.4 Wherever necessary to deflect pipe from a straight line, either in the horizontal or vertical plane, the degree of deflection shall not exceed maximum permissible deflections as recommended by pipe manufacturer.

3.5.5 Where force mains cross water mains, adjust force main laying lengths so that sewer joints are equidistant and as far as possible from the water main joints.

3.6 Backfilling

3.6.1 All trenches and excavation shall be backfilled as soon as the work has developed sufficient strength to resist backfilling loads and forces and the work shall be prosecuted expeditiously after it has commenced.

3.6.2 No pipe shall be backfilled above the top of the pipe until the pipe elevations, alignment and the pipe joints have been checked, inspected and approved by the Engineer.

3.6.3 All pipes as soon as laid shall have the space between the pipe and the bottom and the sides of the trench backfilled to the spring line of the pipe with a select sandy material. This material shall be thoroughly compacted by hand or mechanical means.

3.6.4 Backfill shall then proceed with the placement of select sandy material in 6 inch layers to one foot above the top of the pipe. This backfill shall be compacted by mechanical compactor to not less than 90% Standard Proctor Density.

3.6.5 Compaction of Pipe Trenches

3.6.5.1 In areas where pipe trenches are <u>not</u> under or immediately adjacent to existing or proposed structures, roads, driving surfaces, or sidewalks, the material will be compacted to 90% Standard Proctor Density.

3.6.5.2 In areas where pipe trenches are under or immediately adjacent to existing or proposed structures, roads, driving surfaces, or sidewalks, the material will be compacted to 95% Standard Proctor Density

3.6.6 The select sandy backfill referred to in paragraphs (c) through (e) above shall be a sandy, cohesionless material, no more than 20 percent (by weight) of which shall pass the No. 200 sieve. The materials shall be well- graded to make it easily compactible. The moisture content when placed in the trench shall be reasonably close enough to optimum so as to not adversely affect proper compaction.

3.6.7 Where the native excavated soil does not meet the requirement for select sandy backfill, the Engineer may authorize the replacement for such unsuitable material with contractor-furnished select sandy backfill. All surplus or unsuitable material not used in backfilling shall be disposed of off-site by Contractor.

3.7 All PVC pipe installations require that metalized tape be buried in the backfill approximately 12 inches above the pipe.

3.8 Gate valves, with valve boxes, shall be installed on force mains in the locations and as detailed in the Drawings, and in strict accordance with manufacturer's recommendations.

3.9 Connections to Existing Facilities

3.9.1 Connections to existing facilities and force mains shall conform with the Drawings. All pump stations shall remain in continuous operation throughout the construction period, except possible brief periods, during which time the necessary new piping connections may possibly be made. Contractor must coordinate these shut-down periods at least 24 hours in advance with the Owner's operating personnel and accurately determine the duration of the possible shut-down for each affected pump station.

3.9.2 All work affecting the operation of existing pump stations, force mains, or other facilities must be scheduled so that interruption of the normal operation of the existing system occurs during a sustained dry weather period, so that overflows or bypasses do not occur at upstream pump stations or systems. The Contractor shall provide, as necessary, temporary pumping equipment, force mains, and/or pumping trucks to maintain continual service. All by-pass pumping around portions of the system will be performed in a manner to ensure all sewer is contained within the sanitary sewer system.

3.10 General Requirements

3.10.1 Contractor shall install all pressure sewer main at no less than 3'-0" from the existing ground elevation to the top of the sewer main.

3.10.2 All connections between pipe and fittings shall be made with an approved restrained joint system. In addition, all pipe joints within a distance which is tabulated in the Drawings from a fitting must also employ an approved restrained joint system. The assembly and installation of each restrained joint system shall be in strict accordance with the manufacturer's printed instructions and in the presence of a representative of the Engineer.

3.10.3 Concrete thrust blocks shall also be installed in addition to any type of joint restraint system. Concrete thrust blocks are to be installed according to the plan dimensions and details, placed between the fittings and undisturbed earth. Thrust blocks are also required at all bends of 11 1/2 degrees or more, unless specifically waived by the Engineer because of unusual conditions at a specific fitting.

3.10.4 For all pipe sizes and types, install only full lengths of pipe adjacent to fittings, except in unusual circumstances.

3.11 Testing

3.11.1 Pressure testing shall be conducted on all pipe and fittings by the Contractor at his expense and in the presence of the Engineer or his representative. The test shall be conducted by filling the pipe with water from an approved source under a pressure of not less than 100 p.s.i. as measured at the average elevation of the pipe to be tested. There shall be no visible leakage at any point, and the total amount of leakage shall not exceed 20 gallons per 24 hours per inch diameter per mile as measured over a period of two hours.

4.1 Separation Between Sewer and Water Lines

4.1.1 Horizontal and Vertical Separation

Sewer mains (including force mains) shall be laid at least 10 feet horizontally and 18 inches vertically from any existing or proposed water main. The distance shall be measured edge to edge. Sewer lines should always be installed below water lines and the bottom of the water line should be at least 18 inches from the top of the sewer line.

4.1.2 Special Conditions

Where local conditions prevent adequate horizontal and vertical separation, the appropriate reviewing agency may allow the sewer line to be laid closer to the water line if supported by adequate data from the design engineer. Each situation will be reviewed on a case by case basis. In this situation, all three of the following conditions must be met:

4.1.2.1 If the 10 foot horizontal separation between water and sewer lines cannot be maintained then the water line should be ductile iron with water joints located at the maximum distance possible from sewer line joints. PVC pipe may be used if it is protected by a steel casing. Also the water and sewer lines must be in separate trenches with adequate space for maintenance. In some cases, special sewer line construction procedures may be required.

4.1.2.2 Where the 10 foot horizontal and 18 inch vertical separation cannot be maintained, condition 1. must be met and the sewer line shall be constructed according to water main standards.

4.1.2.3 Where sewer lines cross under water lines, the pipe segments should be centered to provide maximum spacing of joints of both water and sewer lines. A vertical separation of at least 18 inches should be maintained (water over sewer).

END OF SECTION

Magnolia Walk Subdivision – Phase 2

Lobouy Rd. and Magnolia Blvd.
Harrison County, Mississippi

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

Prepared for

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Project No. 20-013

STORMWATER POLLUTION PREVENTION PLAN

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Project Narrative

Project Description

The proposed project consists of 42 lot residential subdivision in Harrison County, MS (see attached drawings). The proposed project consists of approximately 24.62 +/- acres. Construction of the project will require site clearing, grubbing, utility installation, and roadwork.

Location

The proposed project will be located at the end of Magnolia Loop near the intersection of Magnolia Blvd. and Lobouy Rd., in Harrison County, Mississippi, as shown in the attached exhibits.

Access

There will be two means of access to the subject development. One from of Magnolia Loop south to Magnolia Blvd and to the north at Elm Rd. as depicted in the drawings.

Planned Work

The proposed project shown will be constructed in one (1) phase. The total development, including neutral ground, is planned to be approximately 24.62 +/- acres.

Soils

Existing sandy soil and hydric soil.

Construction Implementation Sequence

The following construction implementation sequence is planned to minimize the amount of sediment movement on site and sediment loss from the project site. Property line and construction boundary silt fence, silt-protection of the drainage system and double silt fencing along existing sensitive areas such as wetlands, ditches, etc. will be placed during construction to maintain project erosion control. Installation and maintenance of these measures are considered critical for controlling sediment movement at this project site. Activities will not begin until all permits have been obtained and the work is authorized. Construction is expected to take 6 to 8

months, weather permitting. It is important that appropriate construction workers are aware of the SWPPP and have ready access to it. The owner or prime contractor must inspect and maintain controls, recording damages or deficiencies and corrective measures, and complete monthly inspection reports using the form provided by MDEQ. Problems should be corrected within 24 hours or as soon as practicable after an inspection. Changes to correct deficiencies in the SWPPP should also be made as soon as practicable after the inspection. The SWPPP must accurately reflect the site and construction and be corrected if it does not.

Construction Activities Sequence

Major construction activities will be scheduled and carried out in a manner consistent with routine construction practices per approved plans and specifications. The following list provides a general schedule of the events that will occur during construction as well as the sequence in which the events are proposed:

1. Install erosion control measures in areas to be disturbed in accordance with the erosion control plan such as construction entrance and silt fencing
2. Clear and grub the site as per plan
3. Stabilize excavated areas
4. Install underground utilities
5. Construct roadway base and surface courses
6. Plant grass seed and provide permanent stabilization
7. Remove temporary erosion control measures after construction approval

Site Preparation

Prior to actual clearing and grubbing and stripping of any type of construction, a silt fence shall be placed along the perimeter of the development, in particular the down-slope edges of the area being developed and along the any protected wetland boundary if applicable.

Construction Access

Access to the development shall consist of two entrances off Magnolia Loop and Elm Rd. as shown. This ingress/egress point shall be stabilized with crushed limestone, to a minimum thickness of eight inches (8”). The limestone shall be graded smooth, and maintained in that

condition, for the duration of construction. The area of the limestone surface shall be a minimum of 20 feet wide by 50+/- feet long. Accumulated mud and debris shall be regularly removed from the entrance areas to prevent tracking onto public roads.

Sediment Control Measures

This project will be constructed utilizing associated sediment control measures. Silt fences, hay bales, and energy dissipation devices will be utilized and shall be installed in the following sequence to minimize soil movement and loss off the site:

1) Silt Fence: Silt fence shall be installed according to the manufacturer's recommendations.
    a. Install a single line of silt fence barrier around the project perimeter property lines and install a double line of silt fence along the down slope sides of all environmentally sensitive areas such as delineated wetlands, existing ditches, and waterways, etc. prior to the clearing and grubbing operation.
    b. Silt fence shall be removed no sooner than 30 days after work is completed and established with a good stand of grass vegetation.

Vegetation

Site development will proceed in a planned sequence and every attempt will be made to preserve existing vegetation to reduce erosion. All disturbed sites will be managed and re-vegetated as soon as practicable after final grading. Where applicable, disturbed areas will be stabilized by temporarily seeding, permanent seeding, and/or mulching or by leaving the existing forest floor intact. When a disturbed area will be left undisturbed or unattended for fourteen (14) days or more, appropriate temporary or permanent vegetative practices shall be implemented immediately. The use of heavy equipment in those areas are to be re-vegetated.

Maintenance Plan

Both the short-term (during construction) and long-term (after construction) maintenance needs are addressed herein.

Short Term (During Construction)

When a disturbed area, including stockpiled materials, will be left undisturbed or unattended for fourteen (14) days or more, appropriate temporary or permanent vegetative practices shall be implemented immediately. These areas will be seeded in accordance with planting schedule, rate of application, and planting preparation outlined in the MDEQ seeding chart, or shall be lined with an erosion and sediment control blanket or shall be mulched per MDEQ requirements. All erosion and sediment control practices will be checked for stability and operation following every runoff producing rainfall, but not less than once per week. Any needed repairs and/or replacement shall be made immediately to maintain the performance as designed.

Permanent seeding will be established on disturbed areas. This may include mulching or hydro-seeding. Biodegradable erosion control matting may be used to assist in establishing permanent stabilization on steep slopes.

Sediment shall be removed from the upstream side of the silt fence when it accumulates to approximately six inches (6") deep at the fence. The silt fence shall then be replaced as necessary to maintain a continuous barrier.

All vegetated areas will be fertilized, and re-vegetated as necessary to maintain a dense plant establishment.

Certain structural erosion control measures shall be implemented as necessary. The measures include diverting flows from exposed soils and/or otherwise limiting runoff from exposed areas. Other structural methods will include silt fence, earth dikes, drainage swales, outlet protection, and equivalent sediment controls.

Silt fencing and a sediment barrier may be utilized to intercept and retain sediment from disturbed areas during construction activities. Silt fencing will consist of synthetic fabric attached to supporting posts and shall be entrenched. Sediment barriers will be constructed of filter fabric, natural stone, concrete rip-rap, or other acceptable materials. These structures will be installed downslope of the disturbed areas or in minor swales or ditch lines that have been constructed the sole purpose of facilitating stormwater drainage. Silt fencing and sediment barriers will not be installed in live streams or in areas where surface flow is anticipated t exceed one (1) cubic foot per second (cfs). These structures will be installed as necessary and will be maintained until

other permanent erosion control methods can be installed. Structures will be cleaned out when it has reached 1/3 to 1/2 height of the control.
Sediment barriers, such as silt fencing, block and gravel, etc., or excavated impoundment areas will be constructed around storm drain inlets located within the project boundaries.

Sediment basins consist of a depression created in the earth suitably located to collect sediment laden surface water to allow settlement of suspended soil partials before storm water is allowed to exit the site. The basin shall include a flat bottom, lined emergency spillway, interior porous baffles, and a floating skimmer. The flat bottom and baffles will spread the flow across the basin and increase deposition of sediment in the basin. The skimmer dewaters the basin from the top of the water column where the water is cleanest and increases the amount of sediment captured. The skimmer also allows the basin to fill and then slowly drain over several days. Structures will be cleaned out when it has reached 50% capacity of the control.

Ditch checks shall consist of straw wattles designed to control concentrated flows of water in a ditch or swale. They are normally constructed in a series spaced such that the top elevation of the downstream wattle is at the same elevation as the ground at the nearest upstream wattle. Ditch checks will slow the flow of water which will help establish vegetation and will also trap sediment.

Wattles may be used to minimize erosion by shortening the slope lengths, reducing water flo velocities and trapping sediment on site. Wattles are made of either weed-free certified straw or excelsior and encased in the UV degradable plastic netting or 100% biodegradable burlap with a standard size of 12” in diameter and 25’ in length, weighting approximately 35#. On slopes, installation should be o the contour with a slight downslope to prevent ponding behind the wattle. Wattles should always be installed in shallow trenches constructed on the contour. Anchoring the wattles is necessary and can be accomplished using 1”x1”x18”-24” wood stakes penetrating through the center of the wattle and in the soil approximately 6”. The frequency of anchoring should be a minimum of 4-5 stakes, equally spaced, per 25’ of the wattle installation.

Long Term

Long Term (After Construction)

All vegetated areas will be maintained in an adequate condition to provide proper ground cover and to reduce to potential for erosion and soil loss, until taken over by the City/County. Where vegetation is lost, the area shall be fertilized, re-mulched and re-seeded as necessary to restore proper ground cover.

In order to ensure the effectiveness of the erosion and sediment control practices incorporated into this erosion control plan, the contractor will regularly inspect and maintain the stormwater control devices referenced above throughout the construction of the project.

As needed, new employees and/or parties responsible for maintaining the site will be informed about the requirements of the Maintenance Plan.

All measures will be maintained in good working order and repaired within 24 hours of any reported problem. Permanent corrective measures shall be implemented within 5 days of the inspections. If permanent corrective measures cannot be implemented within the time frame provided, the Owner/Contractor shall contact MDEQ. Silt barriers and sediment traps will be inspected for depth of sediment, tears, breaches, and general integrity of a weekly basis. Sediment buildup behind silt barriers and in sediment traps will be removed when it has reached one half of the height of the barrier or one half of the volume of the sediment trap. A maintenance inspection report will be made after each weekly inspection and will be filed and retained on the jobsite by the contractor.

Good Housekeeping

The following good housekeeping practices will be practiced at the site throughout the construction project:

- All onsite materials shall be stored in a neat, orderly manner in their appropriate containers
- Products will be kept in their original containers with the original manufacture's label
- Manufacturer's recommendations for the proper use and disposal of materials will be followed
- The site superintendent will inspect the site daily to ensure proper onsite use and disposal of all materials

- The Contractor shall clearly indicate on a site map within the SWPPP a designated area for concrete truck washout. The location shall be approved by the Owner or their authorized representative prior to its usage. The washout area must be in a location that captures the residual concrete and prevents it from migrating to natural or manmade drainage ways and/or to surface waters. It is the responsibility of the Contractor to monitor this area and to ensure that all residual concrete is captured and handled appropriately and/or as directed by the Owner or their authorized representative. During final site cleanup, the Contractor shall remove from the project site all residual concrete produced by the washout operations.

Additional SWPPP Notes

- Contractor shall stockpile topsoil for use in landscaping
- Contractor shall line all proposed swales and detention pond slopes with erosion and sediment control blankets as shown
- Contractor shall roughen all 4:1 cut slopes by disking prior to seeding
- Contractor shall be responsible for seeding with permanent seed any disturbed areas within 7 days (see owner for type of landscape to be used)
- All equipment maintenance and repair shall be done in area shown on erosion control plan
- Trash receptacles shall be placed at convenient locations through the site
- The main metal trash collection bin shall be placed near the corner of the construction entrance. Contractor shall coordinate pickup with the County or refuse disposal providers and shall ensure that collection is done with a minimum of once a week. No construction waste sill be burned or buried on the construction site. All hazardous waste materials will be disposed of in the manner specified by the local and/or State regulations. All sanitary waste will be collected from the portable units as required. once the project is completed, all sanitary waste generated on the site will be removed and disposed of properly.
- All spills will be cleaned up immediately!!!
- Spills of toxic or hazardous materials will be reported to the appropriate governmental agency.

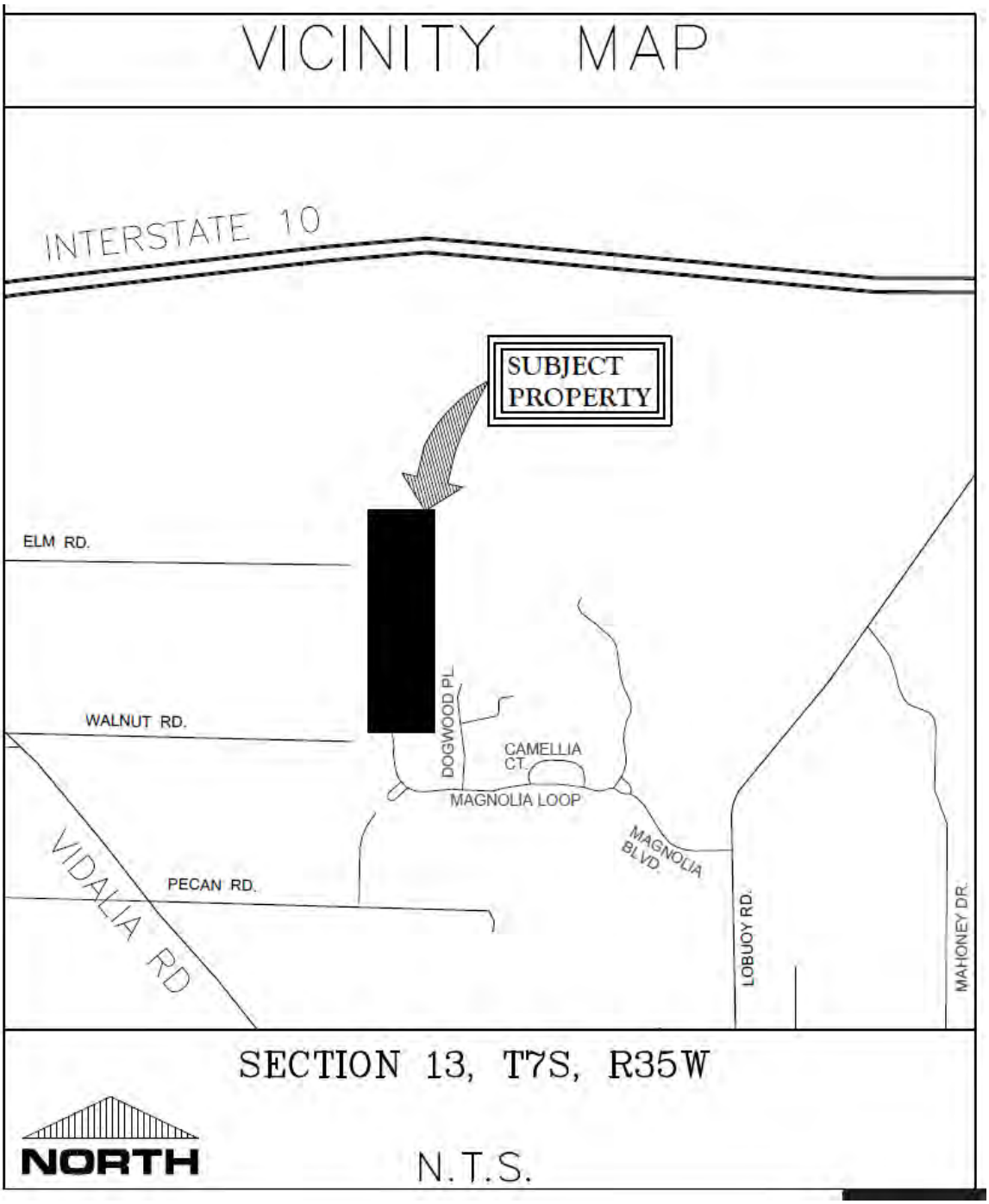
- Materials and equipment necessary for spill cleanup will be kept onsite within the material storage area. Equipment and materials will include but not necessarily be limited to brooms, dust pan, mops, rags, safety equipment, gloves, goggles, absorbent material, sand, sawdust, and plastic/metal trash containers.
- All equipment repair and maintenance shall be done in an area designated on the stormwater management plan or off-site.
- Contractor shall check all disturbed area, erosion and sediment controls after each significant rainfall but not less than 4 times per week and after rainfall events that produce a discharge. Repairs will be made within 24 hours of event.
- Contractor shall remove any sediment from silt fence, check points, and inlet protection devices whenever sediment is accumulated when it has reached 1/3 to 1/2 height of the control and 50% capacity of the sediment basins. Contractor shall maintain all vegetated areas to provide proper ground cover by reseeding, fertilization, or mulching.
- A temporary office and portable toilet buildings shall be located at the or near the job trailer or lay-down yard and at locations so that no part of the project is more than 1,000 feet from a toilet facility if possible. These structures shall be maintained on a regular schedule by a licensed disposal company.
- The owner's intention is to balance the dirt on the property in order to fill in low areas and to install gravity sewer where possible in order to eliminate a sewer pump station.

Seeding Chart for the State of Mississippi

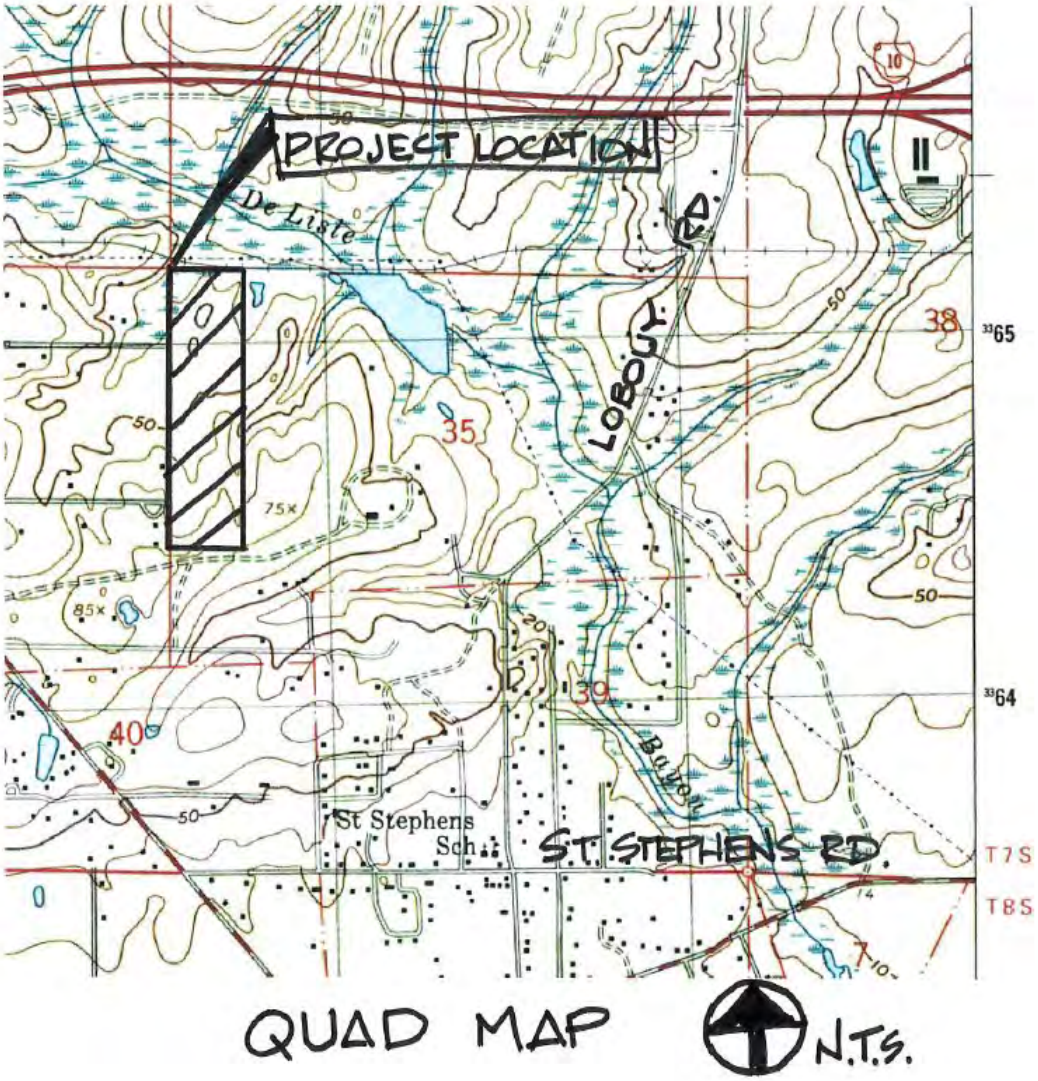
SPECIES	SEEDING RATE/ACRE	PLANTING TIME	DESIRED pH RANGE	FERTILIZATION RATE/ACRE	METHOD OF ESTABLISHMENT	ZONE OF ADAPT-ABILITY[1]
Common Bermuda	15 lbs. alone 10 lbs. mixture	311 - 7115 911 - 11/30	6.0 - 7.0	600 lbs. 13-13-13	seed or sod	All
Bahia	40 lbs. alone 30 lbs. mixture	3/1 - 7115 911 - 11130	6.0 - 7.0	600 lbs. 13-13-13	seed	Central South
Fescue	40 lbs. alone 30 lbs. mixture	911 - 11130	6.0 - 7.0	600 lbs. 13-13-13	seed	North Central
Saint Augustine	--	311 - 7115	6.0 - 7.0	600 lbs. 13-13-13	sod only	Central South
Centipede	4 lbs. alone 2.5 lbs. mix	311 - 7115	6.0 - 7.0	600 lbs. 13-13-13	seed or sod	All
Carpet Grass	15 lbs. alone 10 lbs. mixture	311 - 7115	6.0 - 7.0	600 lbs. 13-13-13	seed or sod	All
Oysia Grass	--	3/1 - 7115	6.0 - 7.0	600 lbs. 13-13-13	sod only	All
Creeping Red Fescue	30 lbs. alone 22.5 lbs. mix	911 - 11/30	6.0 - 7.0	600 lbs. 13-13-13	seed	All
Weeping Lovegrass	10 lbs. alone 5 lbs. mix	3/1 - 7/15	6.0 - 7.0	600 lbs. 13-13-13	seed	All
Sericca Lcspedeza	40 lbs.	311 - 7115 911 - 11130	6.0 - 7.0	400 lbs. 6-24-24	seed	All
*Wheat	90 lbs. alone	9/1 - 11130	6.0 - 7.0	600 lbs. 13-13-13	seed	All
Ryegrass	30 lbs.	911 - 11/30	6.0 - 7.0	600 lbs. 13-13-13	seed	All
*White Clover	5 lbs.	9/1 - 11130	6.0 - 7.0	400 lbs. 6-24-24	seed	All
*Crimson Clover	25 lbs. alone 15 lbs. mix	9/1 - 11130	6.0 - 7.0	400 lbs. 6-24-24	seed	All
*Hairy Vetch	30 lbs.	9/1 - 11130	6.0 - 7.0	400 lbs. 6-24-24	seed	All
*Browntop Millet	40 lbs. alone 15 lbs. mix	4/1 - 8/30	6.0 - 7.0	600 lbs. 13-13-13	seed	All

* Annuals. For permanent seeding, annuals can only be used in a mixture with perennials.

Site Location Map


VICINITY MAP
INTERSTATE 10
SUBJECT PROPERTY
ELM RD.
WALNUT RD.
DOGWOOD PL.
CAMELLIA CT.
MAGNOLIA LOOP
MAGNOLIA BLVD.
VIDALIA RD
PECAN RD.
LOBUOY RD.
MAHONEY DR.
SECTION 13, T7S, R35W
NORTH
N.T.S.

USGS 7.5 Minute Quadrangle Map



Erosion Control Plan and Details

(see attached Sediment Control Plan and Details)

Appendix A – Drainage Calculations

See Attached

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A DESIGN-BUILD COMPANY

November 22, 2021

Jaclyn Turner, P.E.
Harrison County Engineer
15309 Community Road
Gulfport, MS 39503

RE: Magnolia Walk (Phase II) Drainage Analysis Summary

Mrs. Turner:

Please find attached herein the drainage analysis for the referenced project. A hydrology map, Page 3 of the report, has been provided for your convenience concerning catchment areas, flow lengths, etc.

The project was analyzed using a 25-yr storm intensity for pond storage volumes and conveyance systems within the subdivision. The subject property was broken down into three sub-basins within the boundaries of Phase II. Based on the calculations, the site will require a cumulative storage of 25,581 cf.

The existing pond surface is equal to 368,324 sf. With minimal levee work and an outfall structure in place, the pond can easily hold the storage required for Phase II. However, it is my recommendation to size the existing pond considering the entire property to avoid piecemealing each phase. That analysis and recommendations shall be forthcoming in a subsequent report.

The allowable offsite flow to adjacent properties (pre-development flow) is calculated 25.84 cfs and the post-development offsite flow is calculated to be 24.34 cfs. The total pre-development flow is 31.21 cfs and total post-development flow is 73.05 cfs for all runoff.

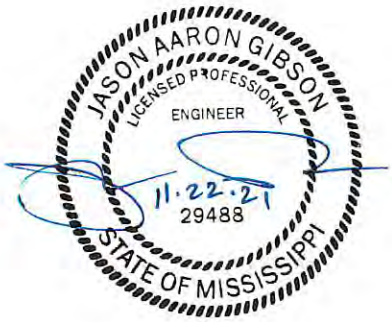
An equivalent pre-development Q was used to determine the pond storage volumes for each post-development sub-basin and is equal to the post-development areas that contribute to the pond. Pre-development intensities and runoff values were used for the equivalent pre-development Q.

970 Tommy Munro Dr., Ste. D | Biloxi, MS 39532 | jason.acad@gmail.com | Phone: 228-437-7533

Based on the provided calculations and the evidence submitted herein, the proposed project will not negatively impact the downstream drainage system and will not contribute any additional flow to the drainage basin outfall within the design parameters.

Sincerely,

Jason Gibson, P.E. in MS & AL
Owner - ACAD, llc



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DRAINAGE ANALYSIS FOR:

MAGNOLIA WALK SUBDIVISION

11/22/2021

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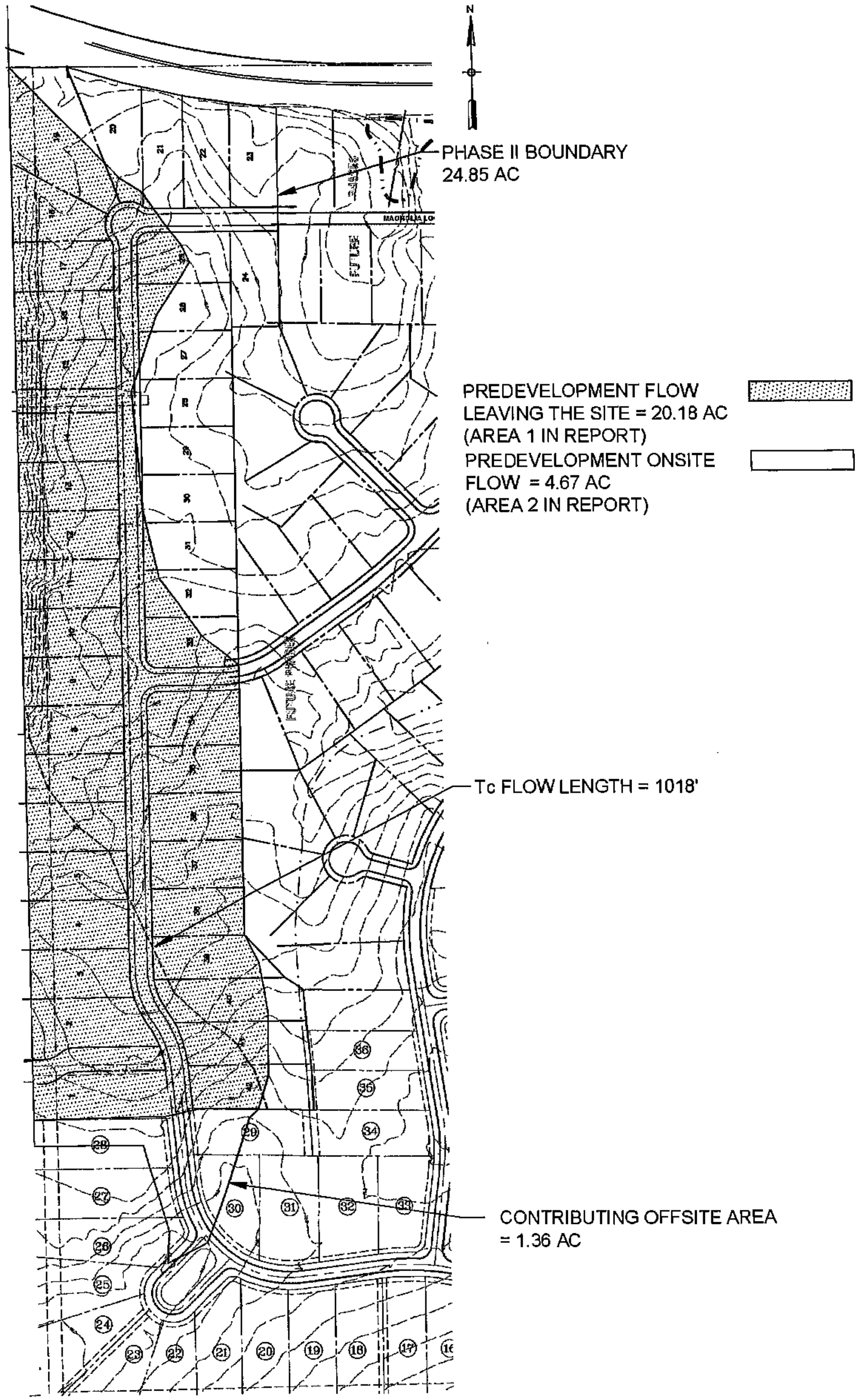
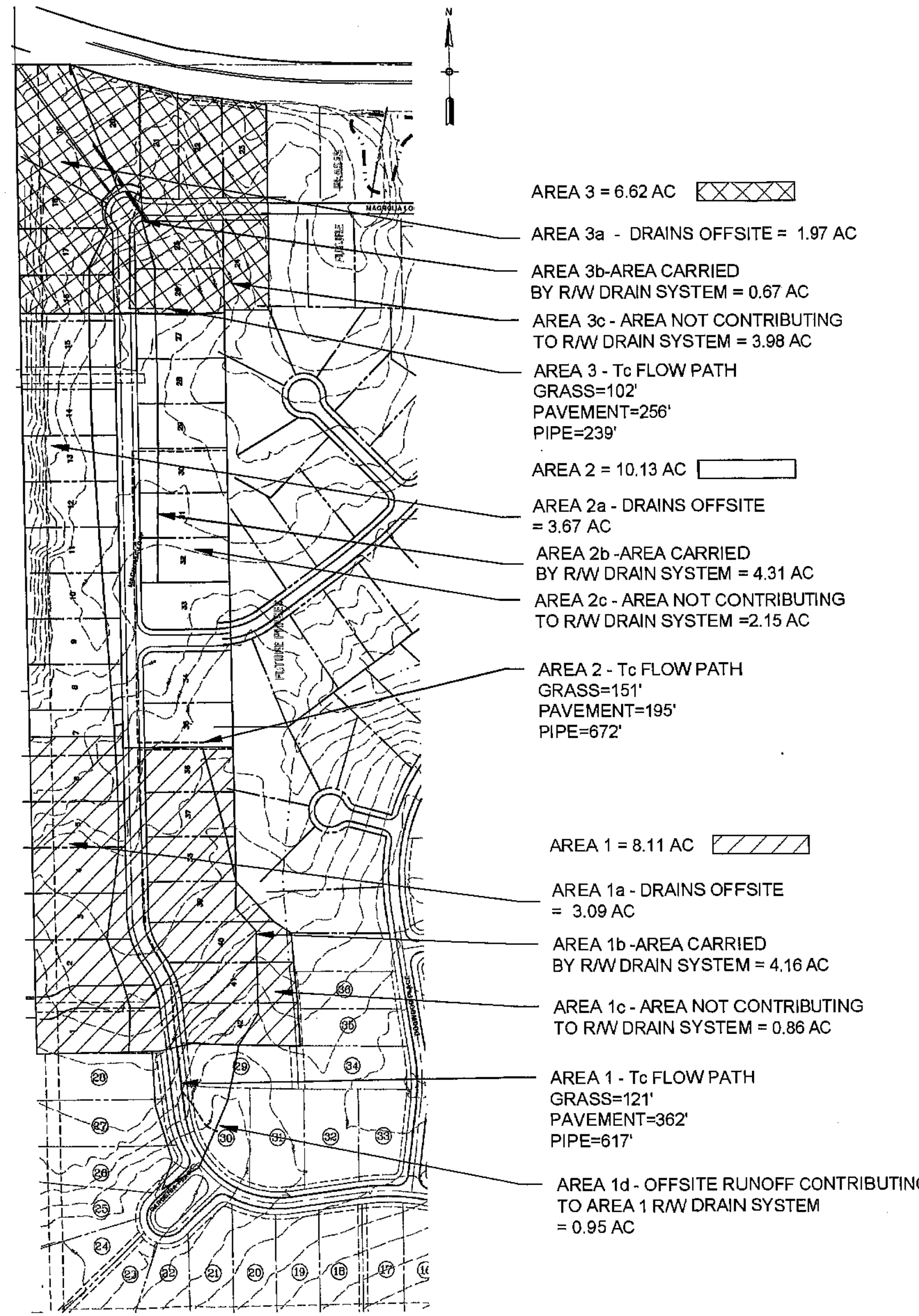


PRE-DEVELOPMENT AREAS
NTS



POST-DEVELOPMENT AREAS
NTS

PROJECT:
MAGNOLIA WALK SUBDIVISION
PHASE II DRAINAGE STUDY
HARRISON COUNTY, MS

ACAD Advanced Construction & Development
970 TOMMY MUNRO DR., STE. D
BILOXI, MS 39532
P: 228-437-7533
JASON.ACAD@GMAIL.COM

SHEET TITLE:
DRAINAGE STUDY MAP

SHEET:
3

Surfaces

PRE-DEVELOPMENT SURFACES

Area (Onsite)	1,082,466.00 sf
Grass/Pervious	1,082,466.00 sf
Impervious	0.00 sf
Off Site	59,256.00 sf
Total Area	1,141,722.00 sf

Impervious Surfaces from CAD/Estimates

42 Lots

Houses	92,400 sf	2200 sf ea
D/W	41,580 sf	22'x45'
R/W	65,265 sf	CAD
S/W	17,520 sf	4380'x4'
Total	216,765 sf	

COEFFICIENT

% Area	Coef	Wtd Coef
94.80994	0.25	0.25
0	0.9	
5.190055	0.25	

POST-DEVELOPMENT SURFACES

Area (Onsite)	1,082,466.00 sf
Grass/Pervious	865,701.00 sf
Subtract for Ponds	sf
Impervious	216,765.00 sf
Off Site	41,181.00 sf
Total Area	1,123,647.00 sf
Total Area (Acres)	25.80

% Area	Coef	Wtd Coef
81	0.3	
20	0.9	0.420151

Rational Method - Pre-Development Flow

PROJECT: **Magnolia Walk** Date: 22-Nov-21
Proj #: **7-21e**

PRE-DEVELOPMENT **25-year Storm**

1	C (nonweighted) =	0.25	
2	Region 3		
3	ΣTc =	42.19	(min)
4	I=	4.6	(in/hr)
	Area draining onsite		
5	A=	4.67	(acres)
6	Q=CIA	5.37	(cfs)
	Area draining offsite		
7	A =	20.18	(acres)
8	Q=CIA	23.21	(cfs)
	Offsite Area C=0.42 (drains offsite)		
9	A =	1.36	(acres)
10	Q=CIA	2.63	(cfs)
	Allowable Offsite Flow		
11	Q=	25.83	(cfs)

Max. Elev. 70.50
Min. Elev. 38.00

ΣL =	1018	overland flow length (ft)
S =	0.0319	av. slope of length of flow (ft/ft)

Sheet Flow <300'

L 1=	300	overland flow length (ft)
n =	0.8	Manning roughness coefficient
I =	4.60	rainfall intensity (in/hr) assume
Tc1	38.04	(min)

Shallow Concentrated Flow

Surface	Unpaved	
L2=	718	(ft)
V(ave)	2.88	(ft/s)
Tc2=	4.15	(min)

Rational Method - Post-Development Flow - Area 1

PROJECT: **Magnolia Walk** Date: 22-Nov-21
Proj #: **7-21e**

25-year Storm

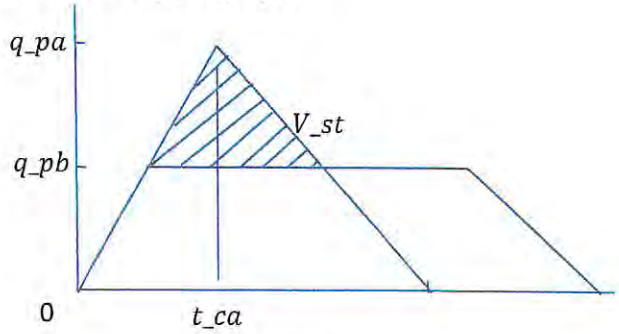
Max. Elev. 75.00
Min. Elev. 58.00

1	C (nonweighted) =	0.42	
	Region 3		
2	ΣTc =	33.41	(min)
3	I=	5	(in/hr)
	Area 1a (drains offsite)		
4	A=	3.09	(acres)
5	Q=CIA	6.49	(cfs)
6	**Area 1b (r/w system)**		
7	A =	4.16	(acres)
8	Q=CIA	8.74	(cfs)
9	**Area 1c (drains to pond)**		
10	A =	0.86	(acres)
11	Q=CIA	1.81	(cfs)
9	**Area 1d (offsite flow to r/w system)**		
10	A =	0.95	(acres)
11	Q=CIA	2.00	
	ΣQ=	12.54	(cfs)
	Equivalent Pre Dev Q=	6.87	(cfs)

ΣL =	1018	overland flow length (ft)
S =	0.0167	av. slope of length of flow (ft/ft)
Sheet Flow	<300'	
L 1=	121	overland flow length (ft)
n =	0.8	Manning roughness coefficient
I =	4.90	rainfall intensity (in/hr) assume
Tc1	26.13	(min)
Shallow Concentrated Flow		
Surface	Paved	
L2=	362	(ft)
V(ave)	2.63	(ft/s)
Tc2=	2.30	(min)
Pipe Flow		
L=	617	(ft)
V(ave)=	2.59	(ft/s)
A=5.97 ac Tc3=	4.98	(min)

Detention Calculation: Rational Stormwater Hydrograph

$V\_st=(0.08264)(Qpa - Qpb)(tca)$



Q_pa	12.54	Post-development runoff discharge (cfs)
t_ca	0.56	Post-development time of concentration (hours)
Q_pb	6.87	Outflow peak discharge (cfs)
V_st	**0.26**	Storage volume required (*ac-ft*)
	11367	(cf) Required

Rational Method - Post-Development Flow - Area 2

PROJECT: **Magnolia Walk** Date: 22-Nov-21
Proj #: **7-21e**

25-year Storm

Max. Elev. 30.85
Min. Elev. 30.25

1 C (nonweighted) = 0.42

ΣL = 300 overland flow length (ft)
S = 0.0020 av. slope of length of flow (ft/ft)

Region 3
2 ΣTc = 12.25 (min)
3 I= 7.4 (in/hr)

Sheet Flow <300'
L 1= 151 overland flow length (ft)
n = 0.011 Manning roughness coefficient
I = 7.20 rainfall intensity (in/hr) assume
Tc1 3.69 (min)

Area 2a (drains offsite)
4 A= 3.67 (acres)
5 Q=CIA 11.41 (cfs)
6 **Area 2b (r/w system)**
7 A = 4.31 (acres)
8 Q=CIA 13.40 (cfs) (cfs)
9 **Area 2c (drains to pond)** (cfs)
10 A = 2.15 (acres) (cfs)
11 Q=CIA 6.68 (cfs)

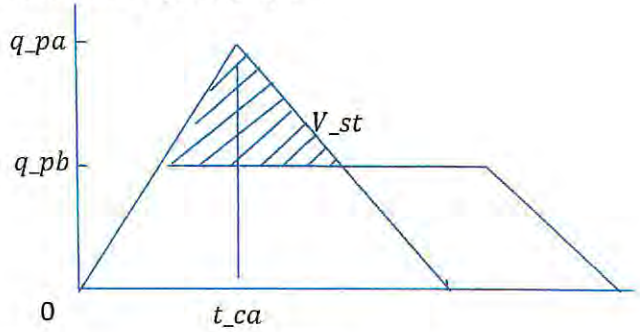
Shallow Concentrated Flow
Surface Paved
L2= 195 (ft)
V(ave) 0.91 (ft/s)
Tc2= 3.57 (min)

Pipe Flow
L= 672 (ft)
V(ave)= 2.59 (ft/s)
A=6.46 ac Tc3= 4.98 (min)

ΣQ= 20.08 (cfs)
Equivalent Pre Dev Q= 7.43 (cfs)

Detention Calculation: Rational Stormwater Hydrograph

$V\_st=(0.08264)(Qpa - Qpb)(tca)$



Q_pa	20.08	Post-development runoff discharge (cfs)	TIME
t_ca	0.20	Post-development time of concentration (hours)	
Q_pb	7.43	Outflow peak discharge (cfs)	
V_st	**0.213**	Storage volume required (*ac-ft*)	
	9300	(cf) Required	

Rational Method - Post-Development Flow - Area 3

PROJECT: **Magnolia Walk** Date: 22-Nov-21
Proj #: **7-21e**

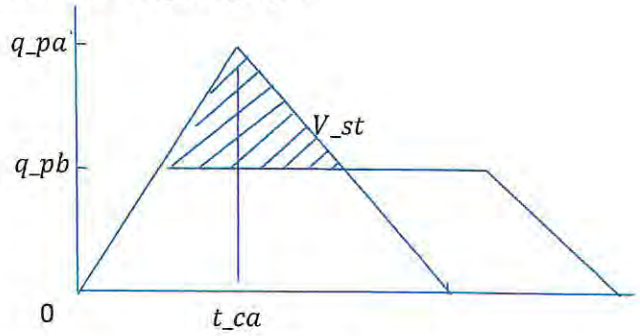
25-year Storm

Max. Elev. 46.25
Min. Elev. 32.00

1	C (nonweighted) =	0.42				
				ΣL =	300	overland flow length (ft)
	Region 3			S =	0.0475	av. slope of length of flow (ft/ft)
2	ΣTc =	7.82 (min)				
3	I=	8.1 (in/hr)		Sheet Flow	<300'	
	Area 3a (drains offsite)			L 1=	238	overland flow length (ft)
4	A=	1.97 (acres)		n =	0.011	Manning roughness coefficient
5	Q=CIA	6.70 (cfs)		I =	7.20	rainfall intensity (in/hr) assume
6	**Area 3b (r/w system)**			Tc1	1.88	(min)
7	A =	0.67 (acres)				
8	Q=CIA	2.28 (cfs)	(cfs)	Shallow Concentrated Flow		
9	**Area 3c (drains to pond)**		(cfs)	Surface	Paved	
10	A =	3.98 (acres)	(cfs)	L2=	256	(ft)
11	Q=CIA	13.54 (cfs)		V(ave)	4.43	(ft/s)
				Tc2=	0.96	(min)
				Pipe Flow		
				L=	239	(ft)
	ΣQ=	15.82 (cfs)		V(ave)=	2.59	(ft/s)
	Equivalent Pre Dev Q=	5.35 (cfs)	A=4.65 ac	Tc3=	4.98	(min)

Detention Calculation: Rational Stormwater Hydrograph

$V\_st=(0.08264)(Qpa - Qpb)(tca)$



Q_pa	15.82	Post-development runoff discharge (cfs)
t_ca	0.13	Post-development time of concentration (hours)
Q_pb	5.35	Outflow peak discharge (cfs)
V_st	**0.113**	Storage volume required *(ac-ft)*
	4914	(cf) Required

Culvert Flow Rates

15		18		24		30		36		42	
a=	1.23	a=	1.77	a=	3.14	a=	4.91	a=	7.07	a=	9.62
n=	0.012	n=	0.012	n=	0.012	n=	0.012	n=	0.012	n=	0.012
p=	3.93	p=	4.71	p=	6.28	p=	7.85	p=	9.42	p=	10.99
R=	0.3125	R=	0.375	R=	0.5	R=	0.625	R=	0.75	R=	0.875
s (%)	Q (cfs)	s (%)	Q (cfs)	s (%)	Q (cfs)	s (%)	Q (cfs)	s (%)	Q (cfs)	s (%)	Q (cfs)
0.25	3.50	0.25	5.69	0.25	12.25	0.25	22.21	0.25	36.11	0.25	54.47
0.3	3.83	0.3	6.23	0.3	13.42	0.3	24.33	0.3	39.56	0.2	48.72
0.35	4.14	0.35	6.73	0.35	14.49	0.35	26.27	0.35	42.73	0.35	64.45
0.4	4.42	0.4	7.19	0.4	15.49	0.4	28.09	0.4	45.68	0.4	68.90
0.45	4.69	0.45	7.63	0.45	16.43	0.45	29.79	0.45	48.45	0.45	73.08
0.5	4.95	0.5	8.04	0.5	17.32	0.5	31.40	0.5	51.07	0.5	77.03
0.55	5.19	0.55	8.44	0.55	18.17	0.55	32.94	0.55	53.56	0.55	80.79
0.6	5.42	0.6	8.81	0.6	18.97	0.6	34.40	0.6	55.94	0.6	84.38
0.65	5.64	0.65	9.17	0.65	19.75	0.65	35.81	0.65	58.23	0.65	87.83
0.7	5.85	0.7	9.52	0.7	20.49	0.7	37.16	0.7	60.42	0.7	91.14
0.75	6.06	0.75	9.85	0.75	21.21	0.75	38.46	0.75	62.54	0.75	94.34
0.8	6.26	0.8	10.17	0.8	21.91	0.8	39.72	0.8	64.60	0.8	97.44
0.85	6.45	0.85	10.49	0.85	22.58	0.85	40.95	0.85	66.58	0.85	100.44
0.9	6.64	0.9	10.79	0.9	23.24	0.9	42.13	0.9	68.51	0.9	103.35
0.95	6.82	0.95	11.09	0.95	23.87	0.95	43.29	0.95	70.39	0.95	106.18
1.5	8.57	1.5	13.93	1	24.50	1	44.41	1	72.22	1	108.94

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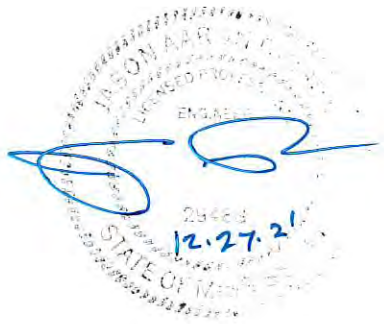
A DESIGN-BUILD COMPANY

DRAINAGE ANALYSIS FOR:

MAGNOLIA WALK SUBDIVISION DETENTION POND STUDY



12/27/2021

ACAD
ADVANCED
CONSTRUCTION & DEVELOPMENT
A DESIGN-BUILD COMPANY

December 24, 2021

Jaclyn Turner, P.E.
Harrison County Engineer
15309 Community Road
Gulfport, MS 39503

RE: Magnolia Walk Detention Pond Study

Mrs. Turner:

Please find attached herein the drainage analysis for the referenced project. A hydrology map (Section A of the report) has been provided for your convenience concerning catchment areas, flow lengths, etc. The TR-55 method was used for this analysis due to the size of the sub-basin.

The parcel was analyzed using a 100-yr storm intensity for pond storage volumes for all completed and forthcoming phases. The existing pond has 280 acres south of the railroad that contributes to the pond inflow at 428 cubic foot per second (cfs) and six 58"x36" reinforced arch concrete pipes, Type I flow conditions, that contribute from the north at 31 cfs underneath the rail. The allowable discharge from the pond, therefore, is 459 cfs. The proposed discharge is designed to produce a discharge of 150 cfs in order to accommodate a drawdown time that exceeds 24 hours. The proposed development will generate an additional 144 cfs of water that will be detained.

An inspection was performed on December 12th and no pipes could be found under the railroad due to high water caused by recent rains in combination with heavy vegetation; hence the reason Type I flow was chosen for the analysis. Google Earth images were used to identify the pipe sizes and the number of barrels conveying water. The images of the culverts are attached in Section G of the report.

The pond's normal surface elevation is 23.4 feet. A 100-yr event will cause the pond to crest at an elevation of 24.7 feet (Section F). Therefore, the pond levee/top of weir shall be set at 25.7 feet to accommodate 1 foot of freeboard. The existing pond surface is equal to 432,207 sf. The required storage is calculated to be 564,105 cubic feet. This will require 1.3 feet of storage. The weir invert is to be set at 23.4 feet.

It is my recommendation to modify the existing spillway to accommodate an earthen weir 27 feet long with a channel depth of 2.3 feet deep. This should require minimal work as most of the pond levee exceeds 25.7 feet in elevation. Work in and around the existing outfall is anticipated to accomplish this.

970 Tommy Munro Dr., Ste. D | Biloxi, MS 39532 | jason.acad@gmail.com | Phone: 228-437-7533

Based on the provided calculations and the evidence submitted herein, the proposed project will not negatively impact the downstream drainage system and will not contribute any additional flow to the drainage basin outfall within the design parameters.

Sincerely,

Jason Gibson, P.E. in MS & AL
Owner - ACAD, llc

970 Tommy Munro Dr., Ste. D | Biloxi, MS 39532 | jason.acad@gmail.com | Phone: 228-437-7533

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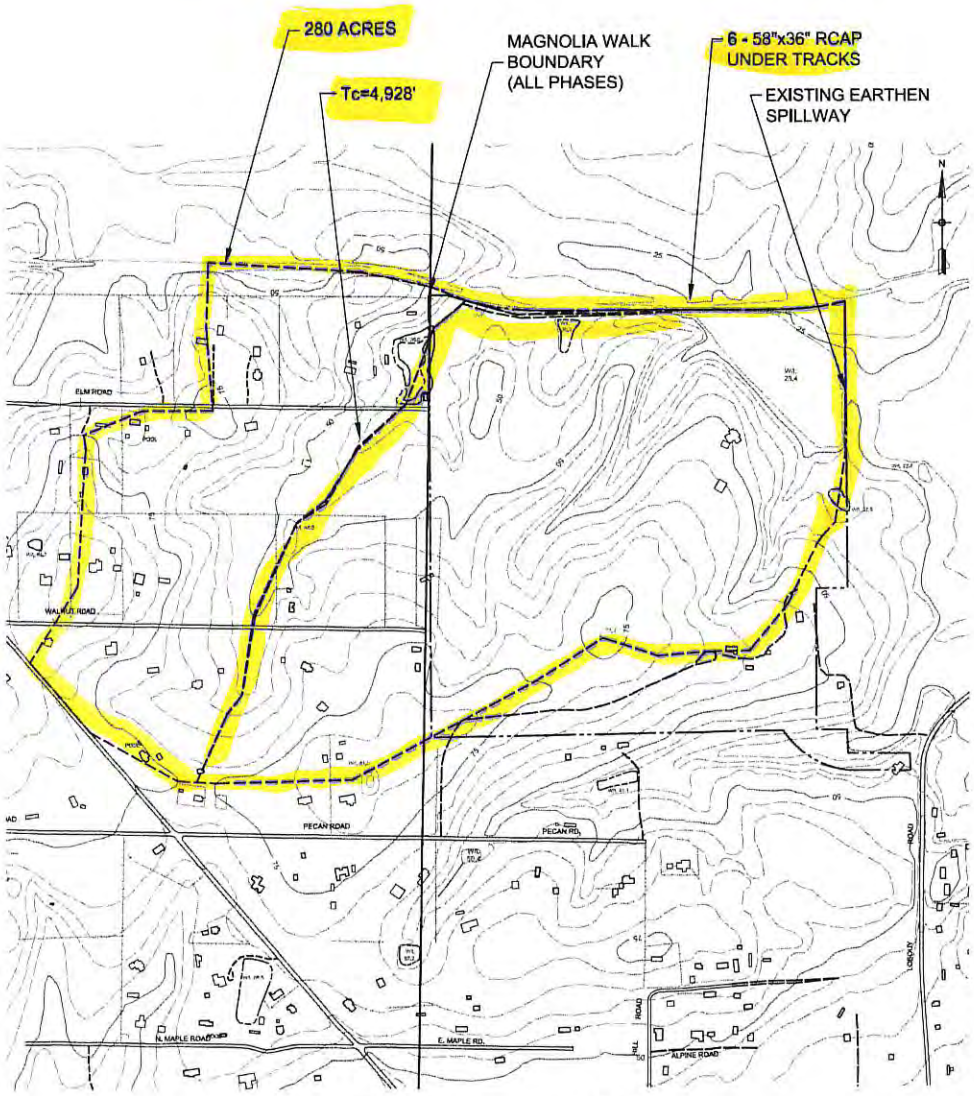
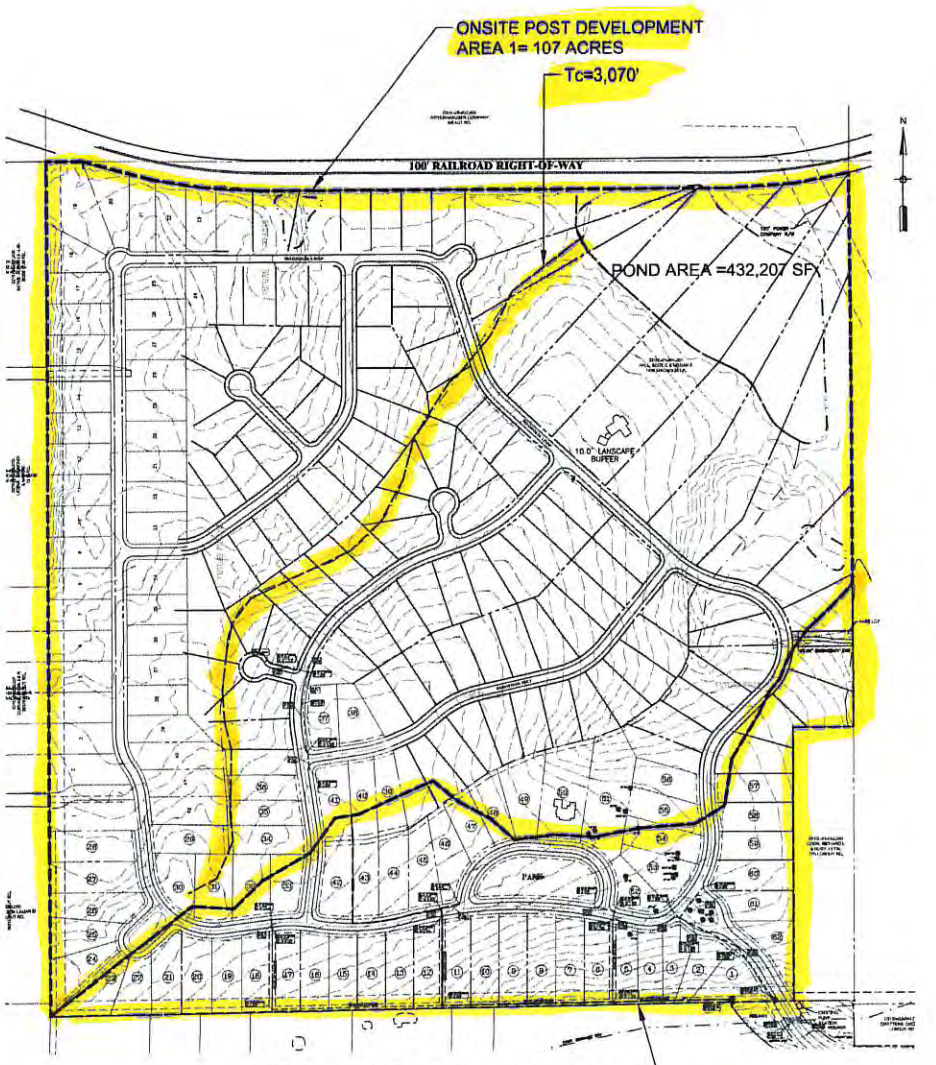
SECTION A



PRE-DEVELOPMENT AREAS
NTS



POST-DEVELOPMENT AREAS
NTS

PROJECT
MAGNOLIA WALK SUBDIVISION
DETENTION POND STUDY

SHEET TITLE
HYDROLOGICAL AREAS

SHEET
A

SECTION B

Project Description

File Name ..... 100-yr Pre Development SPF

Project Options

Flow Units	CFS
Elevation Type	Depth
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Dec 21, 2021	00:00:00
End Analysis On	Dec 22, 2021	00:00:00
Start Reporting On	Dec 21, 2021	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	1
Nodes	1
Junctions	0
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1		Time Series	100-yr	Cumulative	inches				0.00	

Subbasin Hydrology

Subbasin : Predevelopment

Input Data

Area (ac)	280.00
Peak Rate Factor	484.00
Weighted Curve Number	60.00
Rain Gage ID	HarrisonCounty

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Fair	280.00	B	60.00
Composite Area & Weighted CN	280.00		60.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Subbasin Summary

SN	Subbasin ID	Area (ac)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Predevelopment	280.00	484.00	60.00	12.60	7.08	1981.84	428.83	0 03:14:18

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	300	0.00	0.00
Slope (%) :	.4	0.00	0.00
2 yr, 24 hr Rainfall (in) :	5.80	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	73.12	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	3307	0.00	0.00
Slope (%) :	.9	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.53	0.00	0.00
Computed Flow Time (min) :	36.02	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	1320	0.00	0.00
Channel Slope (%) :	.8	0.00	0.00
Cross Section Area (ft^2) :	15	0.00	0.00
Wetted Perimeter (ft) :	21.97	0.00	0.00
Velocity (ft/sec) :	0.26	0.00	0.00
Computed Flow Time (min) :	85.16	0.00	0.00

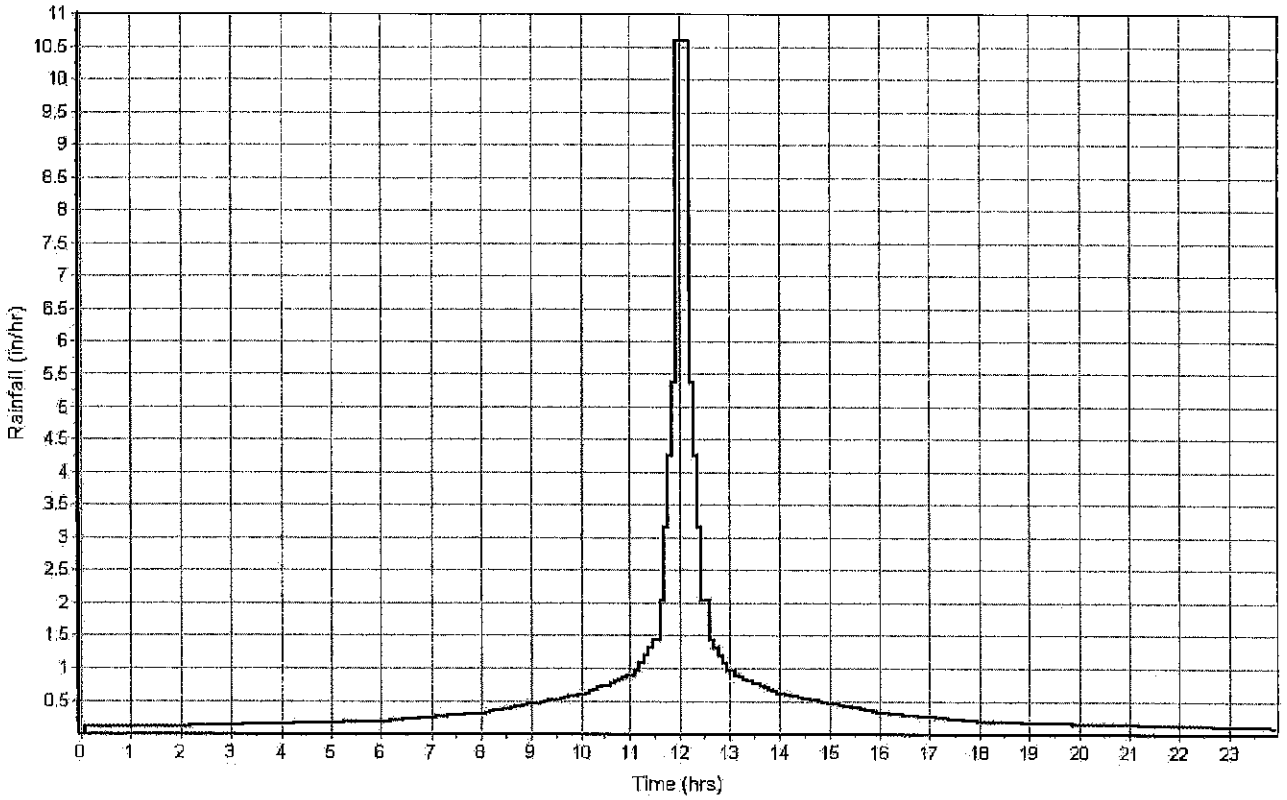
Total TOC (min) 194.31

Subbasin Runoff Results

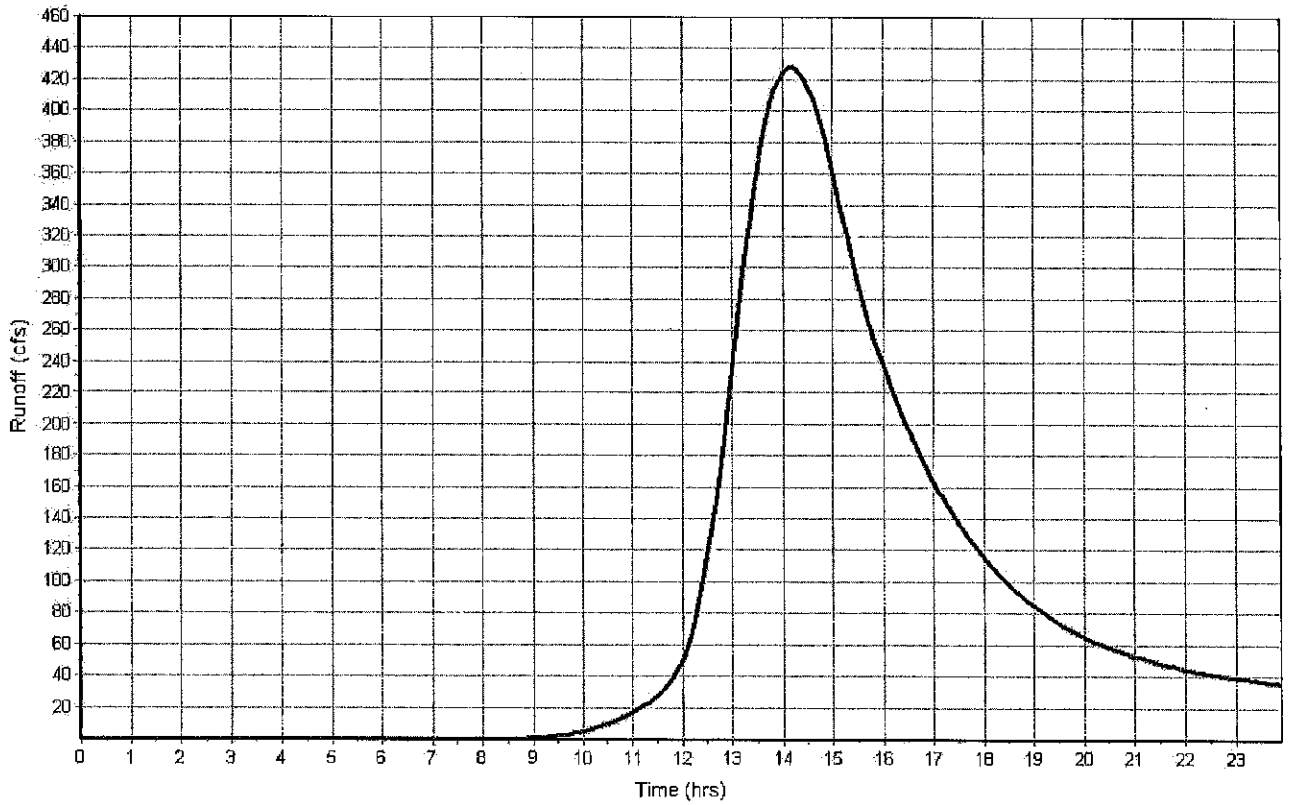
Total Rainfall (in)	12.60
Total Runoff (in)	7.08
Peak Runoff (cfs)	428.83
Weighted Curve Number	60.00
Time of Concentration (days hh:mm:ss)	0 03:14:19

Subbasin : Predevelopment

Rainfall Intensity Graph



Runoff Hydrograph



SECTION C

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.3.206 (Build 0)

****
Project Description
****
File Name ..... 100-yr Post Development.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration..... SCS TR-55
Storage Node Exfiltration.. None
Starting Date DEC-21-2021 00:00:00
Ending Date DEC-22-2021 00:00:00
Report Time Step 00:05:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 1
Number of nodes 1
Number of links 0

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Peak Rate Factor
Post-Development	107.00	484.00

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Out-01	OUTFALL	24.30	0.00	0.00	

Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	114.090	12.795
Surface Runoff	6.217	0.697
Continuity Error (%)	-0.000	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	62.137	20.248
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

****
Composite Curve Number Computations Report
****

Subbasin Post-Development

Soil/Surface Description	Area (acres)	Soil Group	CN
Woods, Fair	107.00	B	60.00
Composite Area & Weighted CN	107.00		60.00

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where:

Tc = Time of Concentration (hrs)
n = Manning's Roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
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V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)

V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin Post-Development

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	0.80	0.00	0.00
2 yr, 24 hr Rainfall (in):	5.80	5.80	5.80
Velocity (ft/sec):	0.09	0.00	0.00
Computed Flow Time (minutes):	55.42	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	2595.00	0.00	0.00
Slope (%):	1.46	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	1.95	0.00	0.00
Computed Flow Time (minutes):	22.18	0.00	0.00

==========

Total TOC (minutes): 77.60

==========

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days hh:mm:ss
Post-Development	12.60	7.08	307.84	60.000	0 01:17:36

Analysis began on: Fri Dec 24 10:23:04 2021
Analysis ended on: Fri Dec 24 10:23:05 2021
Total elapsed time: 00:00:01

SECTION D

Total Inflow (cfs): 0.67, 392.79

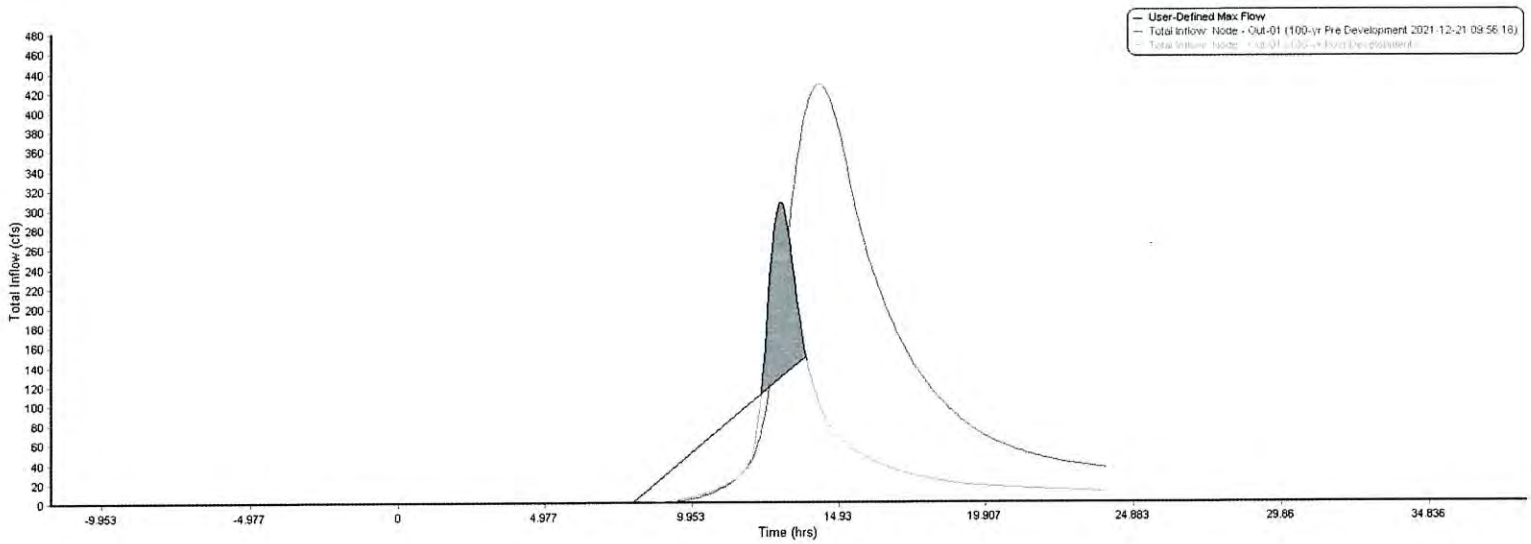


Figure 1: Storage curves

Total Inflow Summary Table

Time period
From: 12/21/2021, 12:00:00 AM
To: 12/22/2021, 12:00:00 AM

Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 150

Element ID	Out-01	Out-01
Maximum Total Inflow (cfs)	428.12	307.25
Minimum Total Inflow (cfs)	0.00	0.00
Event Mean Total Inflow (cfs)	80.12	31.45
Duration of Exceedances (hrs)	N/A	N/A
Duration of Deficits (hrs)	N/A	N/A
Number of Exceedances	N/A	N/A
Number of Deficits	N/A	N/A
Volume of Exceedance (ft³)	N/A	N/A
Volume of Deficit (ft³)	N/A	N/A
Total Inflow Volume (ft³)	6893181.85	2706434.49
Detention Storage (ft³)	564105.11	564105.11

SECTION E

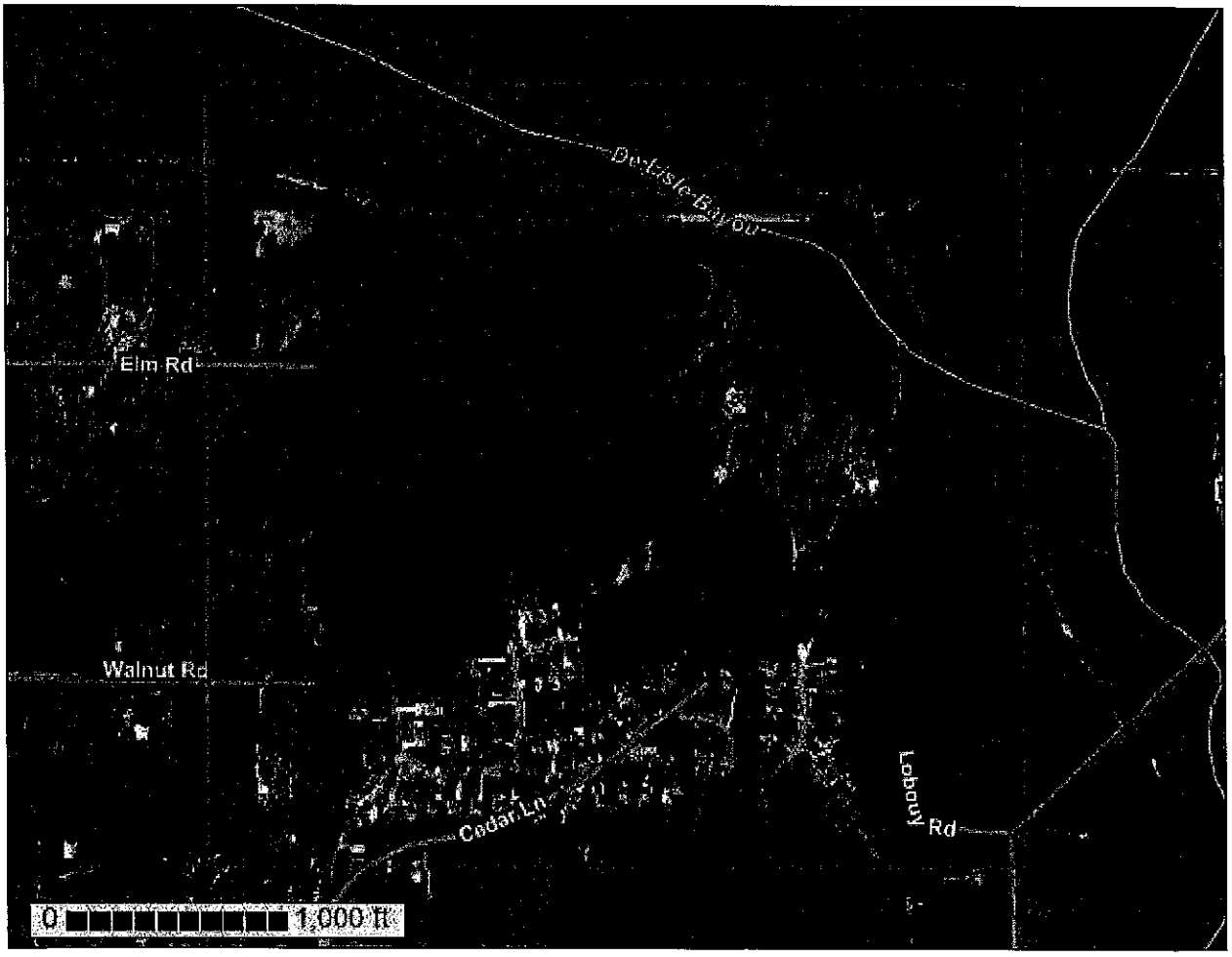
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Harrison County, Mississippi



December 19, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

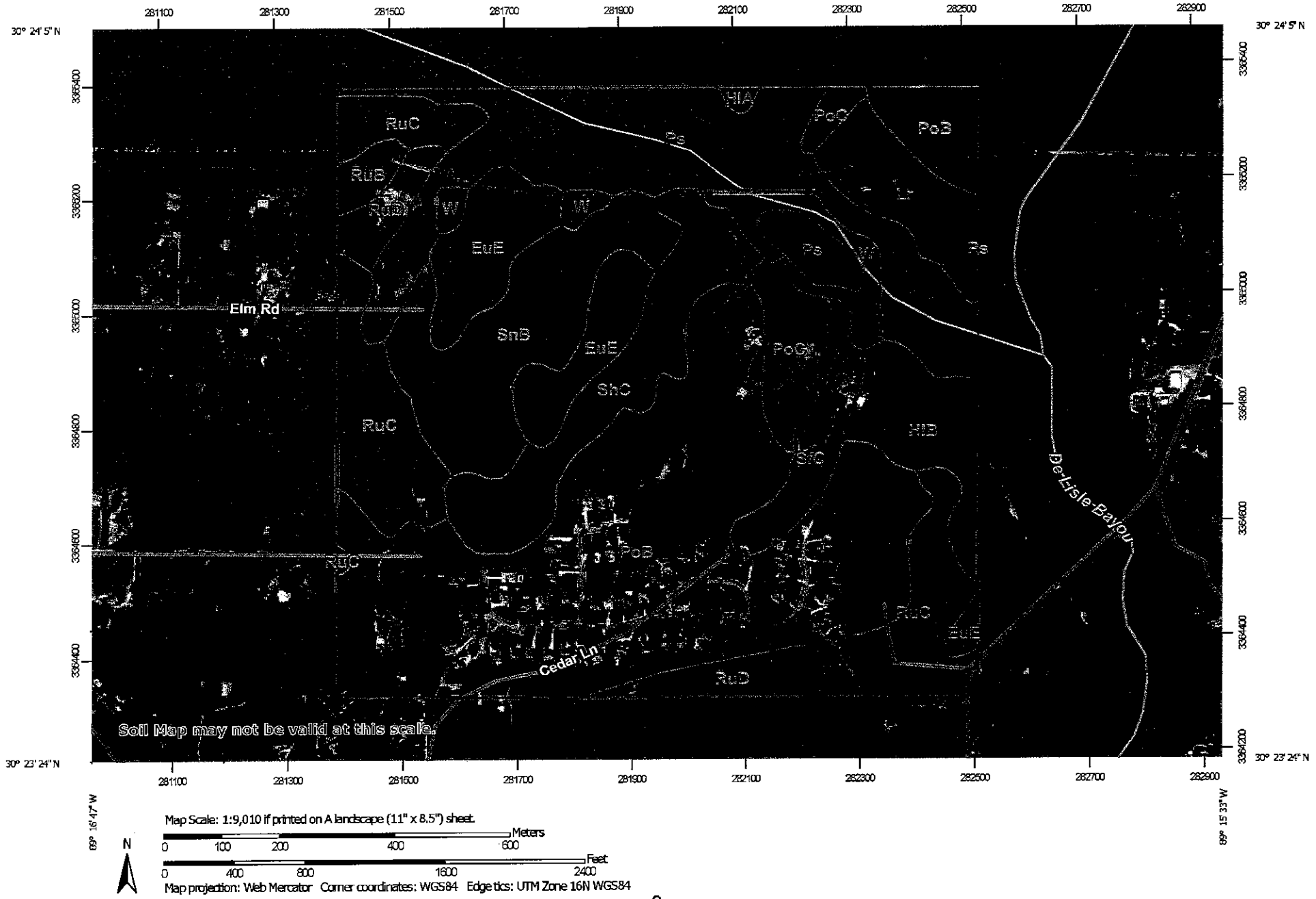
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


89° 16' 47" W
89° 15' 33" W
30° 24' 5" N
30° 23' 24" N
281100
281300
281500
281700
281900
282100
282300
282500
282700
282900
3365400
3365200
3365000
3364800
3364600
3364400
3364200
RuC
RuB
RuD
W
EuE
SnB
ShC
HlA
PoC
PoB
Ps
HlB
StC
Elm Rd
Cedar Ln
De Lisle Bayou
Soil Map may not be valid at this scale.
Map Scale: 1:9,010 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 100 200 400 600
Feet
0 400 800 1600 2400
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Harrison County, Mississippi
Survey Area Data: Version 18, Sep 16, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2018—Nov 16, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (Magnolia Walk)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
EuE	Wadley and Poarch soils, 8 to 17 percent slopes	18.3	6.2%
HlA	Harleston fine sandy loam, 0 to 2 percent slopes	0.6	0.2%
HlB	Harleston fine sandy loam, 2 to 5 percent slopes	11.3	3.8%
Lr	Lakeland fine sand	10.5	3.6%
PoB	Poarch fine sandy loam, 2 to 5 percent slopes	98.8	33.5%
PoC	Poarch fine sandy loam, 5 to 12 percent slopes	8.4	2.9%
Ps	Ponzer and Smithton soils	44.2	15.0%
RuB	Ruston fine sandy loam, 2 to 5 percent slopes	2.4	0.8%
RuC	Ruston fine sandy loam, 5 to 8 percent slopes	31.1	10.5%
RuD	Ruston fine sandy loam, 8 to 12 percent slopes (smithdale)	9.6	3.2%
SfC	Saucier fine sandy loam, 5 to 8 percent slopes	8.1	2.7%
ShC	Saucier, Smithton, and Susquehanna soils, rolling	19.6	6.7%
SnB	Saucier-Susquehanna complex, 2 to 5 percent slopes	24.4	8.3%
W	Water	7.8	2.6%
Totals for Area of Interest		**295.0**	**100.0%**

Map Unit Descriptions (Magnolia Walk)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made

up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Harrison County, Mississippi

EuE—Wadley and Poarch soils, 8 to 17 percent slopes

Map Unit Setting

National map unit symbol: 2z3t3
Elevation: 20 to 260 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Wadley and similar soils: 42 percent
Poarch and similar soils: 33 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wadley

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Sandy and loamy loamy marine deposits derived from sedimentary rock

Typical profile

A - 0 to 6 inches: loamy fine sand
E - 6 to 73 inches: fine sand
Bt - 73 to 83 inches: sandy loam

Properties and qualities

Slope: 8 to 17 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Poarch

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Shoulder, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy fluviomarine deposits derived from sedimentary rock

Typical profile

Ap - 0 to 7 inches: fine sandy loam
E - 7 to 12 inches: loam
Bt - 12 to 32 inches: loam
Btv1 - 32 to 66 inches: loam
Btv2 - 66 to 80 inches: fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 39 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Mclaurin

Percent of map unit: 10 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Smithdale

Percent of map unit: 8 percent
Landform: Interfluves
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Smithton

Percent of map unit: 7 percent
Landform: Flood-plain steps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

HlA—Harleston fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t42d
Elevation: 0 to 300 feet
Mean annual precipitation: 52 to 69 inches
Mean annual air temperature: 52 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Harleston and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Harleston

Setting

Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from sedimentary rock

Typical profile

A - 0 to 4 inches: fine sandy loam
E - 4 to 9 inches: fine sandy loam
BE - 9 to 13 inches: fine sandy loam
Bt1 - 13 to 24 inches: sandy loam
Bt2 - 24 to 43 inches: fine sandy loam
Bt3 - 43 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Stough

Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Smithton

Percent of map unit: 5 percent
Landform: Drainageways on flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Bibb

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

HlB—Harleston fine sandy loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t42f
Elevation: 20 to 250 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 200 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Harleston and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Harleston

Setting

Landform: Marine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy alluvium derived from sedimentary rock

Typical profile

Ap - 0 to 4 inches: fine sandy loam
E - 4 to 9 inches: fine sandy loam
BE - 9 to 13 inches: sandy loam
Bt1 - 13 to 43 inches: fine sandy loam
Bt2 - 43 to 80 inches: sandy clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Bibb

Percent of map unit: 7 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Stough

Percent of map unit: 4 percent
Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread

Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Smithton

Percent of map unit: 4 percent
Landform: Depressions, drainageways
Landform position (three-dimensional): Tread, talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Lr—Lakeland fine sand

Map Unit Setting

National map unit symbol: c4xn
Elevation: 40 to 300 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 270 to 335 days
Farmland classification: Not prime farmland

Map Unit Composition

Lakeland and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lakeland

Setting

Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

H1 - 0 to 43 inches: fine sand
H2 - 43 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Poarch

Percent of map unit: 6 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Eustis

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Latonia

Percent of map unit: 4 percent
Landform: Terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

PoB—Poarch fine sandy loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t42h
Elevation: 30 to 340 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Poarch and similar soils: 85 percent
Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Poarch

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy fluviomarine deposits derived from sedimentary rock

Typical profile

Ap - 0 to 7 inches: fine sandy loam
E - 7 to 12 inches: loam
Bt - 12 to 32 inches: loam
Btv1 - 32 to 66 inches: loam
Btv2 - 66 to 80 inches: fine sandy loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 39 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Malbis

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Escambia

Percent of map unit: 5 percent
Landform: Terraces, interfluves
Landform position (two-dimensional): Footslope, toeslope, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Linear, concave
Across-slope shape: Concave

Hydric soil rating: No

Harleston

Percent of map unit: 5 percent
Landform: Marine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

PoC—Poarch fine sandy loam, 5 to 12 percent slopes

Map Unit Setting

National map unit symbol: c4xz
Elevation: 0 to 300 feet
Mean annual precipitation: 48 to 75 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 200 to 335 days
Farmland classification: Not prime farmland

Map Unit Composition

Poarch and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Poarch

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

H1 - 0 to 7 inches: fine sandy loam
H2 - 7 to 32 inches: loam
H3 - 32 to 66 inches: loam

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 30 to 60 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Smithton

Percent of map unit: 7 percent
Landform: Terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Harleston

Percent of map unit: 4 percent
Landform: Stream terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Smithdale

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Ps—Ponzer and Smithton soils

Map Unit Setting

National map unit symbol: c4y0
Elevation: 0 to 300 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 270 to 335 days
Farmland classification: Not prime farmland

Map Unit Composition

Ponzer and similar soils: 59 percent
Smithton and similar soils: 18 percent
Minor components: 23 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ponzer

Setting

Landform: Drainageways
Landform position (three-dimensional): Dip
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Decomposed organic material over loamy alluvium

Typical profile

Oa - 0 to 24 inches: muck
H2 - 24 to 52 inches: loam
H3 - 52 to 72 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Description of Smithton

Setting

Landform: Terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 1 inches: fine sandy loam
H2 - 1 to 10 inches: fine sandy loam
H3 - 10 to 38 inches: fine sandy loam
H4 - 38 to 72 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches

Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

St. lucie

Percent of map unit: 8 percent
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hyde

Percent of map unit: 8 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Handsboro

Percent of map unit: 7 percent
Landform: Tidal flats
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

RuB—Ruston fine sandy loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2tjks
Elevation: 150 to 460 feet
Mean annual precipitation: 55 to 68 inches
Mean annual air temperature: 59 to 70 degrees F
Frost-free period: 200 to 260 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ruston and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ruston

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-loamy fluviomarine deposits derived from sedimentary rock

Typical profile

Ap - 0 to 4 inches: fine sandy loam
E - 4 to 8 inches: sandy loam
Bt - 8 to 23 inches: sandy clay loam
Bt/E - 23 to 36 inches: sandy loam
B't - 36 to 84 inches: sandy clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Bama

Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Smithdale

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

RuC—Ruston fine sandy loam, 5 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2shsb
Elevation: 50 to 500 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ruston and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ruston

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Fine-loamy marine deposits derived from sedimentary rock

Typical profile

Ap - 0 to 4 inches: fine sandy loam
E - 4 to 8 inches: sandy loam
Bt1 - 8 to 23 inches: sandy clay loam
Bt2 - 23 to 84 inches: sandy clay loam

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Ora

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Bibb

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Smithdale

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

RuD—Ruston fine sandy loam, 8 to 12 percent slopes (smithdale)

Map Unit Setting

National map unit symbol: c4y4
Elevation: 0 to 300 feet
Mean annual precipitation: 48 to 75 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 200 to 335 days
Farmland classification: Not prime farmland

Map Unit Composition

Smithdale and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Smithdale

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits

Typical profile

H1 - 0 to 11 inches: fine sandy loam
H2 - 11 to 38 inches: loam
H3 - 38 to 80 inches: loam

Properties and qualities

Slope: 8 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Smithton

Percent of map unit: 10 percent
Landform: Terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

SfC—Saucier fine sandy loam, 5 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w8y0
Elevation: 20 to 380 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Saucier and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saucier

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy over clayey fluviomarine deposits derived from sedimentary rock

Typical profile

A - 0 to 5 inches: fine sandy loam
BA - 5 to 12 inches: fine sandy loam
Bt - 12 to 26 inches: loam
Btv - 26 to 38 inches: loam
2Btv - 38 to 48 inches: silty clay loam
2Bt - 48 to 72 inches: silty clay loam

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.04 to 0.20 in/hr)
Depth to water table: About 18 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Malbis

Percent of map unit: 6 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Escambia

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear

Across-slope shape: Concave
Hydric soil rating: No

Susquehanna

Percent of map unit: 3 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Atmore

Percent of map unit: 2 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

ShC—Saucier, Smithton, and Susquehanna soils, rolling

Map Unit Setting

National map unit symbol: c4y8
Elevation: 0 to 300 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 270 to 335 days
Farmland classification: Not prime farmland

Map Unit Composition

Saucier and similar soils: 45 percent
Smithton and similar soils: 20 percent
Susquehanna and similar soils: 10 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saucier

Setting

Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy over clayey marine deposits

Typical profile

H1 - 0 to 12 inches: fine sandy loam
H2 - 12 to 48 inches: loam

H3 - 48 to 60 inches: silty clay loam
H4 - 60 to 72 inches: clay

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 30 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Hydric soil rating: No

Description of Smithton

Setting

Landform: Terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 1 inches: fine sandy loam
H2 - 1 to 10 inches: fine sandy loam
H3 - 10 to 38 inches: fine sandy loam
H4 - 38 to 72 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Description of Susquehanna

Setting

Landform: Coastal plains

Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey marine deposits

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 77 inches: clay

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Poarch

Percent of map unit: 9 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Harleston

Percent of map unit: 8 percent
Landform: Stream terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Atmore

Percent of map unit: 8 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

SnB—Saucier-Susquehanna complex, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2w8y1
Elevation: 20 to 380 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Saucier and similar soils: 50 percent
Susquehanna and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saucier

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy over clayey fluviomarine deposits derived from sedimentary rock

Typical profile

A - 0 to 5 inches: fine sandy loam
BA - 5 to 12 inches: fine sandy loam
Bt - 12 to 26 inches: loam
Btv - 26 to 38 inches: loam
2Btv - 38 to 48 inches: silty clay loam
2Bt - 48 to 72 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.04 to 0.20 in/hr)
Depth to water table: About 18 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0

Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Description of Susquehanna

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty clay fluviomarine deposits over clayey fluviomarine deposits derived from sedimentary rock

Typical profile

Ap - 0 to 3 inches: fine sandy loam
E - 3 to 7 inches: fine sandy loam
Btss - 7 to 42 inches: clay
2Btssg - 42 to 60 inches: clay

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Poarch

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Atmore

Percent of map unit: 5 percent
Landform: Depressions

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Malbis

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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SECTION F

Job No. Mag Walk Sheet ____ of ____
Project ____
Subject Hydro Area 3 L's
Prepared By J. Gibson Date 12.24.21
Checked By ____

Area 1 Post Dev (10.7 Ac)
L_1 = 300' @ 0.89 grass
L_2 = 2595' @ 1.46 90

Area 2 Post Dev (Phase I) (32 Ac)
L_1 = 300' @ 1.29 grass
L_2 = 295' @ 2.62 Paved
L_3 = 1265' @ 2.20 Pipe

Pre Dev (280 Ac)
L_1 = 300' @ 0.47 grass
L_2 = 3307' @ 0.97 unpaved/shallow
L_3 = 1320' @ 0.89 channel

$A = 3 + 2(3)(2)$
$= 15 \text{ ft}^2$
$P = 3 + 2(3)\sqrt{10}$
$= 21.97'$

Job No. Mag Walk Sheet ____ of ____
Project Culvert Flow under rail
Subject ____
Prepared By J. Gibson Date 12/24/21
Checked By ____

$$Q = A\sqrt{\frac{2g\Delta h}{\frac{2gn^2L}{R^{4/3}} + ke + 1}}$$

Type I Flow w/smooth tapered inlet throat
$ke = 0.534$
$n = 0.30$ Concrete bottom

42" (58 x 36 RCAP)

$A = 12.56\ ft^2$
$h = 1'$
$g = 32.2\ ft/sec^2$
$L = 65'$
$P = 12.56'$
$R = A/P = 1$

$$Q = 12.56\sqrt{\frac{64.4}{\frac{376.74}{1} + 0.534 + 1}}$$

$Q = 5.18\ cfs \times$ 6 Culverts

$= 31.07\ cfs$

Job No. Mag Walk Sheet ____ of ____
Project Detention pond water surface
Subject elevation & weir calcs.
Prepared By J. Gibson Date 12.24.21
Checked By ____

Detention Pond $A = 432,207\ ft^2$ (measured on AutoCAD)

Volume Req'd = 564,105 ft3

$\therefore \frac{564,105}{432,207} = 1.3' + 1'\text{ (Freeboard)} = \boxed{2.3'}$

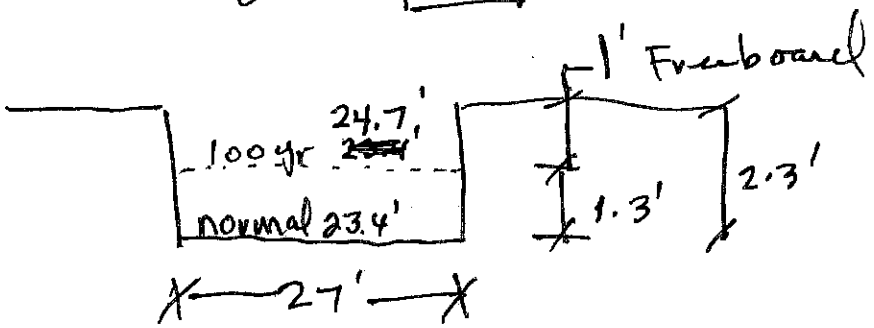
100-yr storm 23.4' (normal water surface EL)
2.3'
25.7' TOP of weir/levee (minimum)

Weir

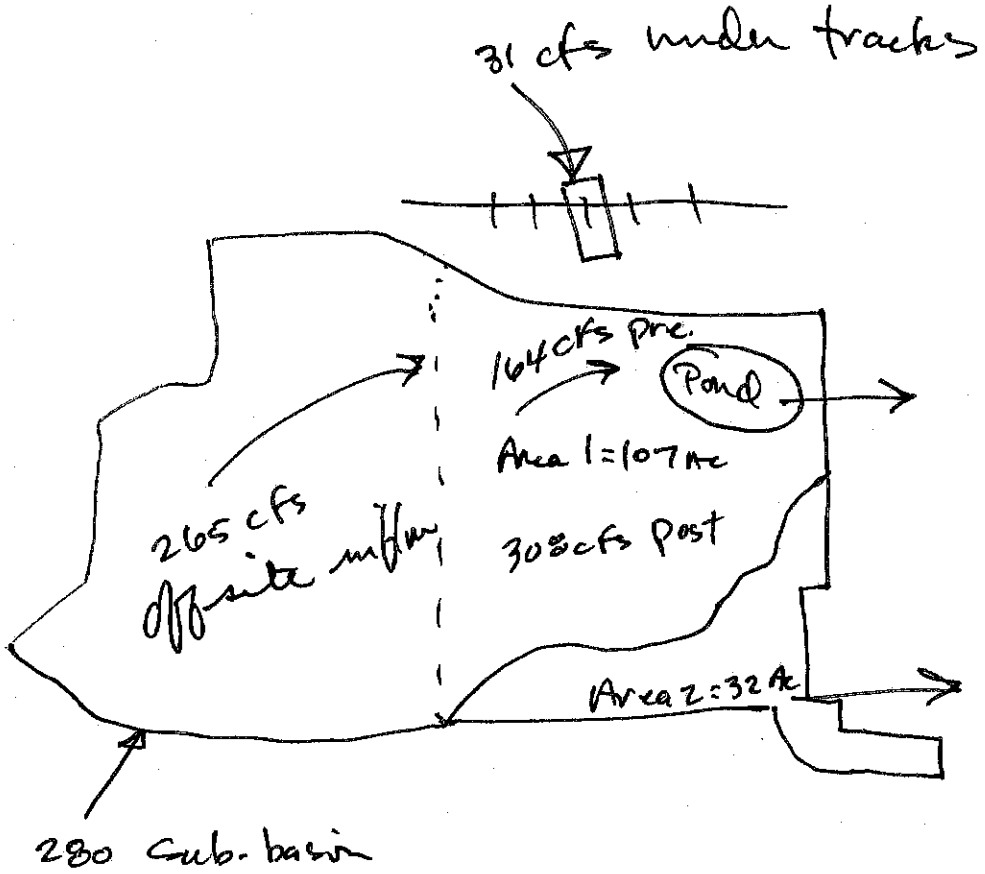
$Q = 2/3 \times C_d \times b \times (2g)^{0.5} (h)^{3/2}$ $C_d = 0.611 + 0.025\left(\frac{23.4'}{25.7'}\right) = 0.68$

$Q = 150\ cfs = 2/3 \times 0.68 \times b \times (2 \cdot 32.2)^{.5} \times (1.3)^{3/2}$

$\therefore b = 27.83'$ use 27'



Job No. Mag Walk Sheet ____ of ____
Project ____
Subject Subbasin Flow Diagram
Prepared By J. Gibson Date 12.24.21
Checked By ____



Pre-development
Total Inflow to pond
265 cfs offsite
164 cfs onsite
31 cfs Tracks
460 cfs

onsite pre/post
308
164
Δ = 144 cfs amount to be detained

SECTION G

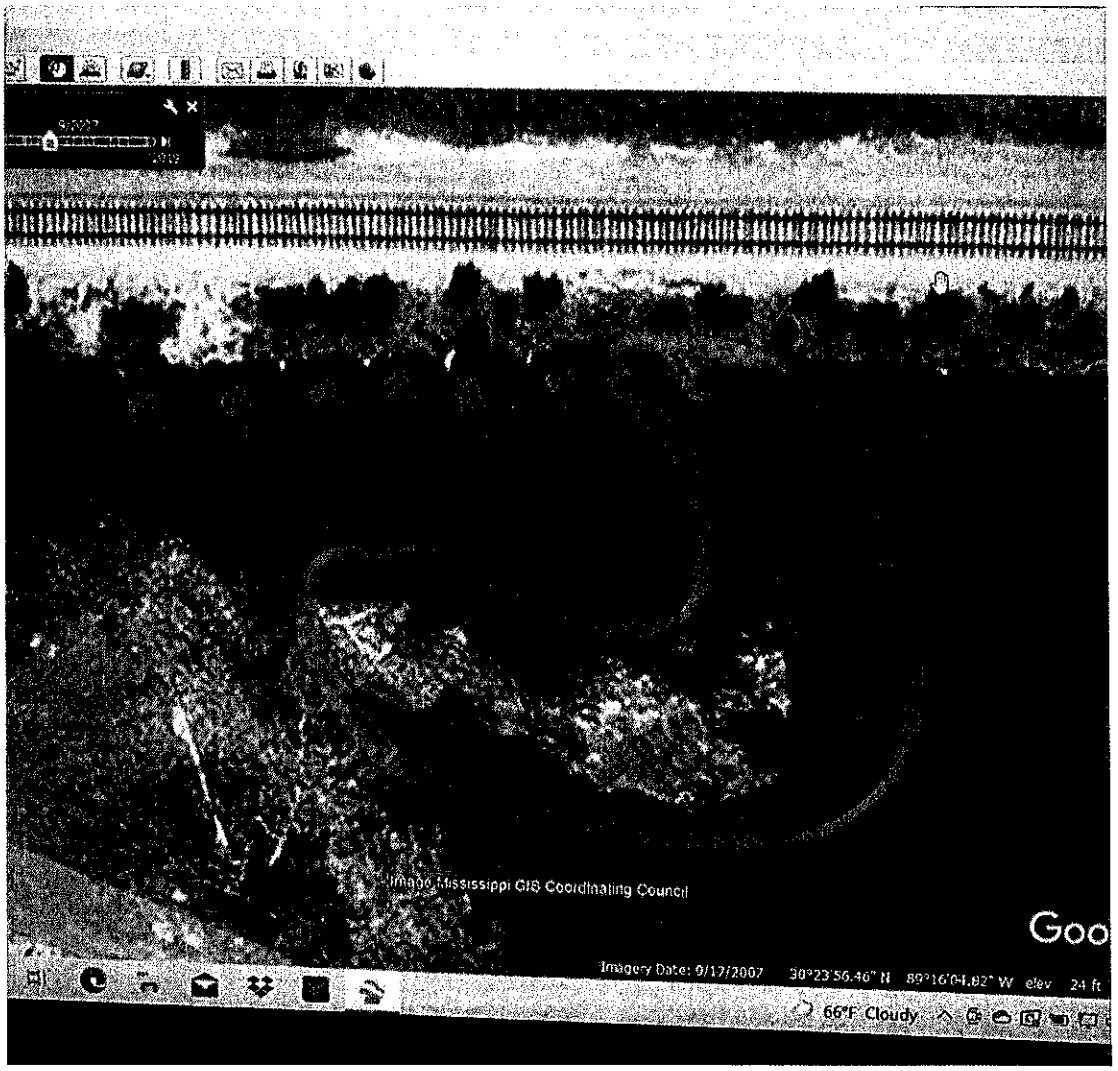


Figure 1: Inflow culverts underneath the rail