CITY OF QUITMAN

STORMWATER IMPROVEMENTS PLAN 2025

MDEQ MUNICIPALITIES AND COUNTIES WATER INFRASTRUCTURE PROGRAM

City of Quitman Stormwater Improvements Plan

Executive Summary

Purpose:

To provide recommendations to improve stormwater infrastructure in Quitman, ensuring public safety, protecting property, and enhancing community resilience.

Key Findings:

- **Flooding Issues**: Quitman experiences localized flooding due to overwhelmed drainage systems, undersized culverts, and clogged channels, even outside FEMA flood zones.
- **Impact**: Flooding disrupts daily life, damages property, and poses safety risks for residents and emergency responders.
- **Drainage Basins**: Quitman's stormwater flows into two basins—Chickasawhay River (west/south) and Archusa Creek (east/south).
- **Ordinances:** In addition to infrastructure improvements, the City should consider devlopment and adoption of a comprehensive Stormwater Management Ordinance.
- **Infrastructure**: Infrastructure improvements are needed throughout the City to alleviate flooding issues.

Key Stats

18
Sites/Areas Evaluated

$15.2M
Total Estimated Cost of Initial Needed Improvements

5
Drainage Basins Studied

Benefits

- **Reduced Flooding**: Handle 25-year to 100-year storms, minimizing street and property flooding.
- **Improved Safety**: Clear roads for emergency vehicles and citizens.
- **Economic Protection**: Prevent costly damage to homes, businesses, and infrastructure.
- **Environmental Health**: Reduce pollution in local businesses/residences, local waterways and restore natural habitats.

Proposed Improvements

1. Napp/Bailey Avenue - Increase pipe size (58"x 36" arch pipe) and additional inlets
2. Railroad Culvert at Middle School - Increase pipe size - double 60" diameter culverts
3. Elementary/High School - Increase pipe size (42" diameter pipe) and remove concrete ramp
4. Railroad Culvert at Sycamore Street - Replace with double 6'x4' box culvert and improve inlet
5. Railroad Culvert at West Franklin Street - Replace with 4-60" RCP pipes, add scour protection
6. Archusa/Railroad Avenues Culverts & Channel - Trapezoidal Channel and box improvements
7. West Donald Street Culvert - Replace with double 10'x5' box culvert (In Construction)
8. Harris/Dart Channel - Trapezoidal channel and replace undersized culverts
9. Cypress Street and Archusa Avenue Culverts - Replace with 24" RCP pipes and regrade ditches
10. Kirkland Channel - Replace culverts with double 44"x27" pipes and reroute channel
11. North Jackson Avenue - Replace 16" pipe with 36" RCP and add curb inlets
12. Shirley Drive Culvert - Replace with double 44"x27" arch pipes
13. Stokes Circle Culvert - Replace with triple 51"x31" arch pipes
14. Anderson/Dogwood Culvert - Replace with double 58"x36" arch pipes
15. Archusa Avenue/Cypress Street Area - Clean and Reestablish channel
16. Pineview Circle Area - Clean and regrade ditches

Additional Recommendations

- Development and adoption of a comprehensive Stormwater Management Ordinance
- Community Outreach & Education Effort
- Stormwater Maintenance Activities
    - City and Community Efforts required

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INTRODUCTION

Stormwater Management and Localized Flooding in Quitman

Effective stormwater management is essential for ensuring the safety, functionality, and long-term sustainability of any community. While the majority of Quitman is located within Zone X, meaning it is classified by the Federal Emergency Management Agency (FEMA) as an area with minimal flood risk, the City has still experienced significant localized flooding events in recent years. Zone X areas are generally outside the 100-year floodplain, meaning they have less than a 1% annual chance of flooding. However, localized flooding can still occur due to heavy rainfall overwhelming drainage systems, highlighting the need for infrastructure improvements to mitigate future risks. The following figure depicts the flood zones surrounding the City.

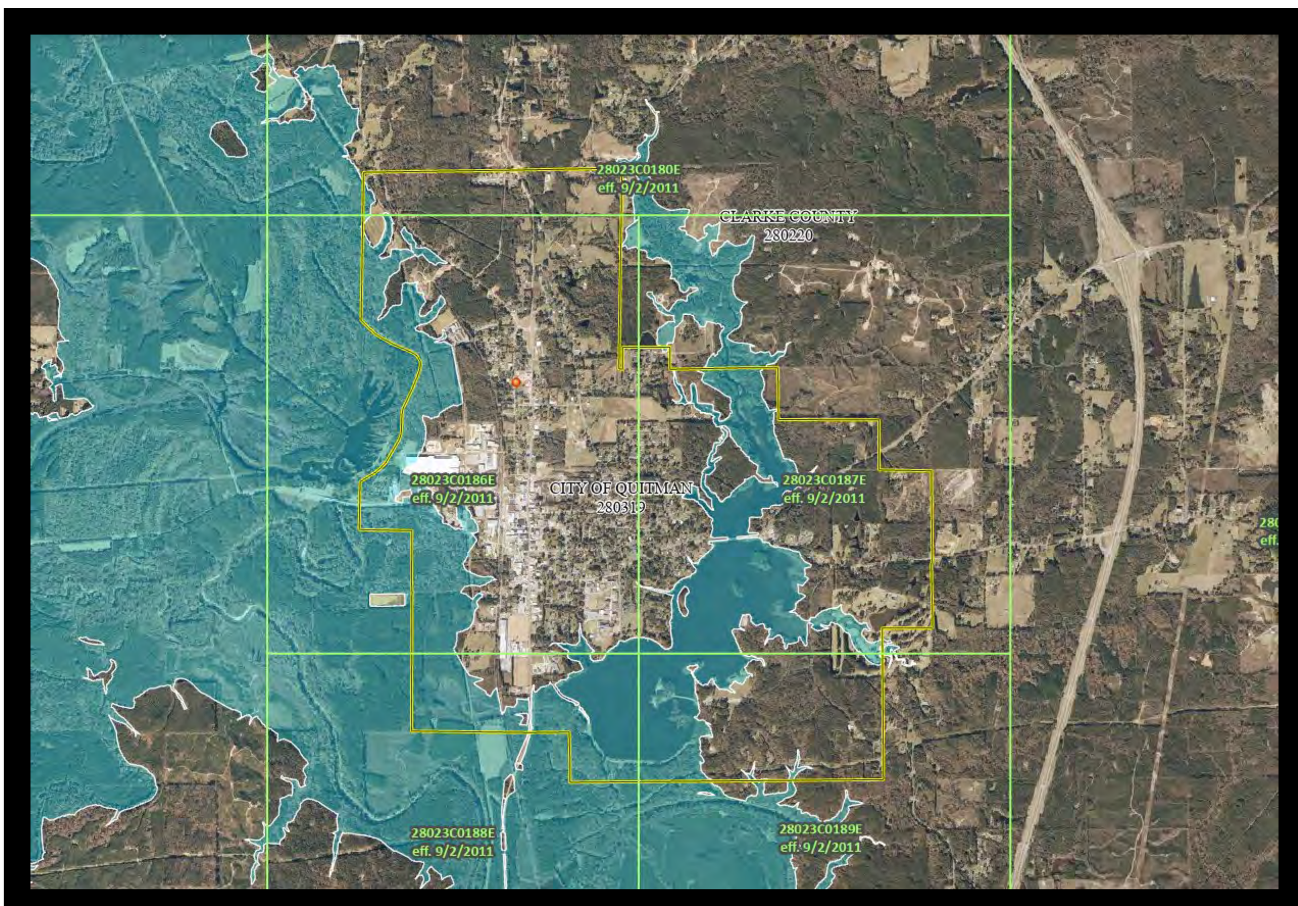


Figure 1 – Flood Zones Surrounding Quitman

Flooding can happen in different ways depending on the source and behavior of excess water. Two primary types of flooding are **localized flooding** and **floodplain flooding**, each with distinct causes, characteristics, and impacts.

Understanding Localized vs. Floodplain Flooding

Localized flooding, often referred to as flash flooding, occurs in small, specific areas due to intense, short-duration rainfall, often overwhelming drainage systems and causing rapid water accumulation. It is usually exacerbated by impervious surfaces in urban areas, leading to swift runoff and immediate inundation of streets, homes, and infrastructure. In contrast, typical flood zone flooding, also known as riverine flooding, occurs in designated floodplains adjacent to rivers, streams, or lakes, and is often the result of prolonged, widespread rainfall. This type of flooding develops more slowly, as water levels gradually rise over hours or days, and it is influenced by upstream contributions, groundwater discharge, and the cumulative effect of large catchment areas. While localized flooding tends to have a sudden onset and shorter duration, typical flood zone flooding can persist for extended periods, causing widespread damage over larger areas. Understanding these differences is crucial for implementing appropriate flood management and mitigation strategies tailored to the specific risks and dynamics of each type.

The Impact of Localized Flooding in Quitman

Unlike large-scale floods that affect broad regions, localized flooding can occur in areas that are not typically prone to such risks. Recent events in Quitman have illustrated how intense rainfall can overwhelm existing infrastructure and lead to significant issues, even in areas outside traditional flood zones.

Quitman has faced multiple localized flooding events. Intense rainfall has overwhelmed drainage systems, causing water to pool in streets, disrupt traffic, and damage homes and businesses. The consequences of these types of flooding events go beyond temporary inconveniences and include the following risks/impacts:

- **Public Safety Risks:** Flooded streets create hazardous driving conditions, increasing the likelihood of accidents and emergency response delays. Pedestrians may also be at risk when crossing flooded areas.

- **Property Damage:** Water intrusion can damage homes, businesses, and public infrastructure, leading to costly repairs. Repeated flooding events may also lower property values over time.

- **Economic Impacts:** Business closures and reduced customer access during floods result in financial losses for local shops and service providers.

- **Environmental Concerns:** Floodwaters can carry pollutants, such as oil, chemicals, and debris, into local water bodies, affecting water quality and disrupting ecosystems.

Downtown Quitman has been particularly affected, with road closures and accessibility issues creating difficulties for residents, emergency responders, and local businesses. Heavy rainfall repeatedly caused streets in downtown Quitman to become inundated, leading to traffic disruptions, property damage, and challenges for local businesses. The floods have resulted in road closures, damage to homes and public buildings, and heightened concerns about public safety and economic stability.

The Stormwater Improvements Plan

This Stormwater Improvements Plan aims to address these pressing issues by providing recommendations for enhancing Quitman's stormwater management infrastructure. Through strategic improvements and upgrades, the plan seeks to provide methods to reduce the frequency and severity of localized flooding events, thereby improving safety, protecting property, and fostering a more resilient and sustainable community for the residents of Quitman.

Typical proposed projects will include culvert replacement, channel improvements, and construction of new storm drain networks. After the initial needs determination, the following individual sites were selected for further study. The list of locations was ranked with the most pressing needs at the top of the list. These sites are shown on Figure 2.

1. Napp/Bailey Avenue
2. Railroad Culvert at Middle School
3. Elementary/High School
4. Howard Industries Parking Lot
5. Railroad Culvert at Sycamore Avenue
6. Railroad Culvert at West Franklin Street
7. Archusa Avenue Storm Drain System
8. West Donald Street Culvert Replacement

9. Harris/Dart Channel
10. Cypress Street and Archusa Avenue Culverts
11. Kirkland Channel
12. North Jackson Avenue
13. Shirley Drive Culvert
14. Stokes Circle Culvert
15. Anderson/Dogwood Culvert
16. Hickory/Sycamore Area
17. PW 1 - Archusa Avenue/Cypress Street Area
18. PW 2 - Pineview Circle Area

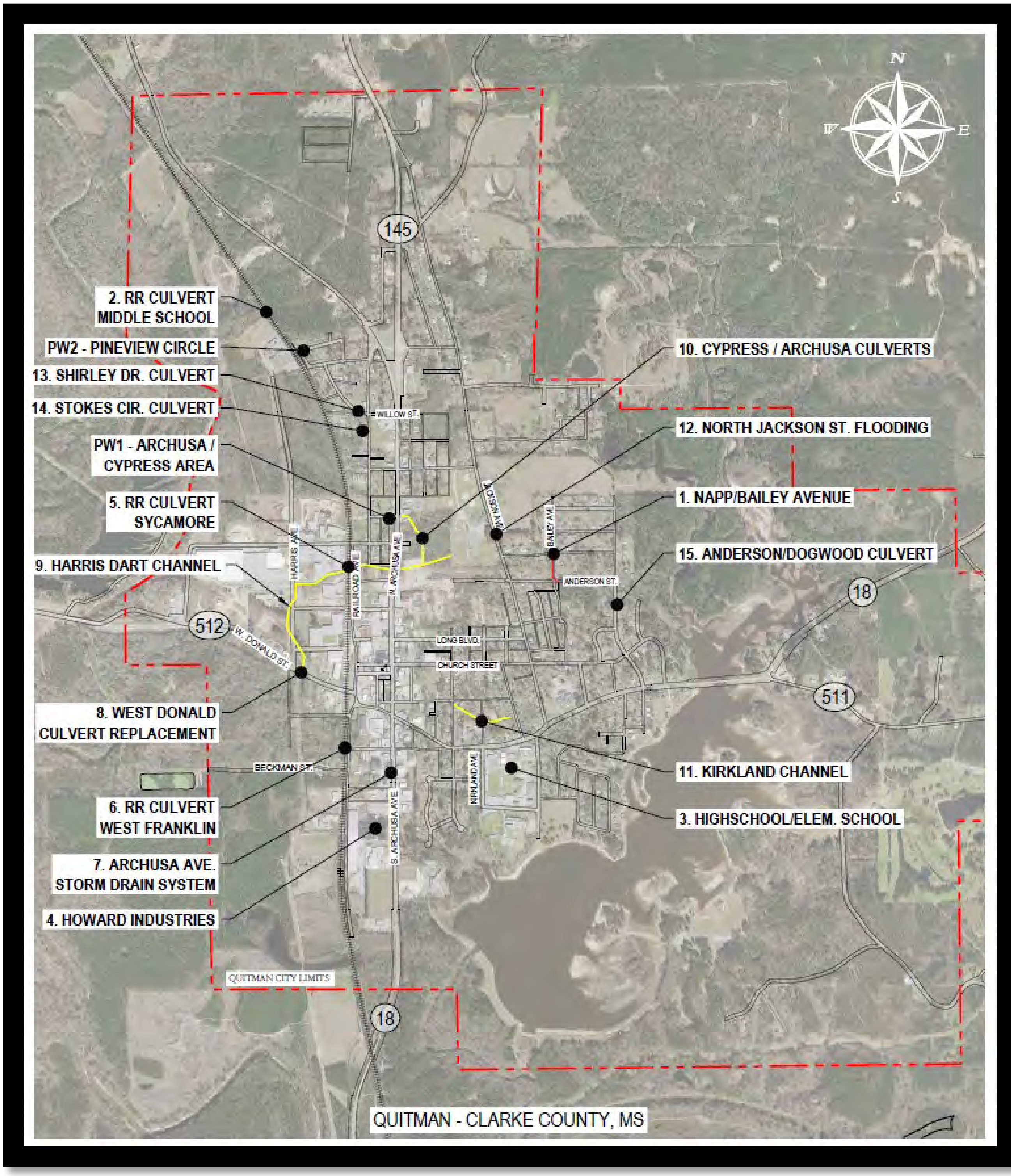


Figure 2 – Location List

BACKGROUND

Quitman, Mississippi has experienced significant rainfall events in recent years, highlighting the need for effective stormwater management. Analysis of rainfall data from January 2020 to July 2024 reveals that the City has seen numerous heavy rainfall days, with the top 100 days each recording substantial precipitation amounts. The most notable of these events include instances where rainfall exceeded 4 inches in a single day, contributing to localized flooding and infrastructure challenges. This pattern underscores the variability and intensity of weather patterns affecting Quitman. The accompanying chart provides a visual representation of these top 100 rainfall days, illustrating the distribution and magnitude of these precipitation events.

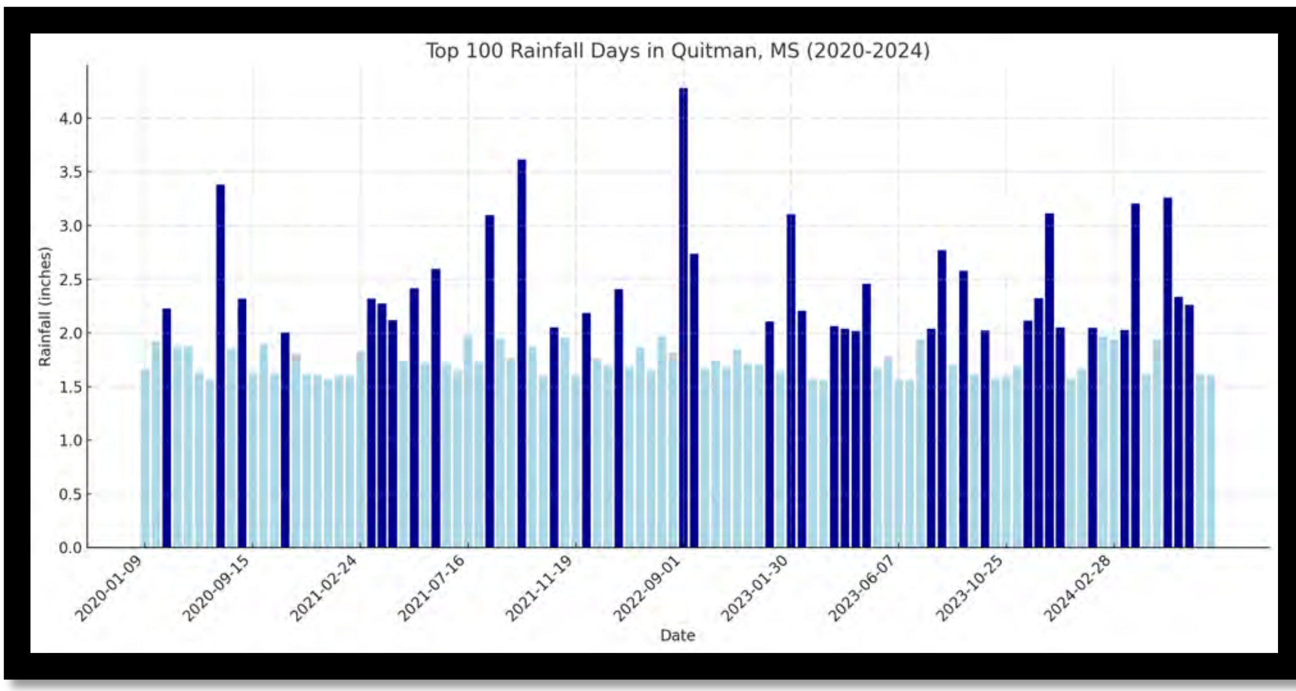


Figure 3 – Top 100 Rainfall Days Since 2024

Flooding can occur in the days following a rainfall event due to several hydrological processes and factors that influence the movement and accumulation of water in an area. Unfortunately, the effects of rainfall may be delayed and cause flooding in the following days. The following details how rainfall can lead to delayed flooding:

1. Soil Saturation and Infiltration

- **Infiltration Capacity**: The rate at which soil can absorb water decreases as the soil becomes saturated. During prolonged or heavy rainfall, the soil reaches its infiltration capacity, leading to excess water on the surface.

- **Delayed Runoff**: After the soil is saturated, additional rainfall becomes surface runoff. This runoff can take time to accumulate and travel to larger water bodies, contributing to delayed flooding.

2. Groundwater Recharge and Discharge

- **Groundwater Recharge**: Rainfall infiltrates the soil and percolates down to recharge groundwater aquifers. This process can be slow, and the added groundwater can eventually raise the water table.
- **Delayed Groundwater Discharge**: Elevated groundwater levels can lead to increased discharge into streams, rivers, and lakes over time, contributing to flooding even days after the initial rainfall.

3. River and Stream Flow

- **Upstream Contributions**: Rainfall in upstream areas of a watershed takes time to flow downstream. This means that areas downstream may experience rising water levels and flooding days after the upstream rainfall event.
- **Lag Time**: The time it takes for water to travel from where it fell as rain to where it contributes to flooding in a river or stream is known as lag time. This can vary based on the distance, terrain, and river dynamics.

4. Urbanization and Impervious Surfaces

- **Impervious Surfaces**: Urban areas with surfaces such as roads, rooftops, and parking lots prevent water from infiltrating into the ground, leading to increased surface runoff.
- **Stormwater Drainage Systems**: Urban drainage systems can become overwhelmed during heavy rainfall, causing water to back up and flood areas days after the rainfall if the system cannot handle the delayed runoff.

5. Reservoir and Dam Operations

- **Controlled Releases**: Reservoirs and dams may release water in a controlled manner to manage capacity after significant rainfall. These releases can lead to downstream flooding if the receiving water bodies cannot accommodate the additional water.
- **Spillover Effects**: Excessive rainfall can cause reservoirs to reach their capacity and spill over, contributing to flooding downstream.

6. Catchment Characteristics

- **Catchment Size and Shape**: The size and shape of a catchment area influence how quickly and how much water reaches rivers and streams. Larger catchments with complex drainage networks may experience delayed flooding.

- **Land Use and Vegetation**: Areas with less vegetation and more exposed soil have higher runoff rates, contributing to quicker but possibly prolonged flooding as the water moves through the system.

7. Pre-existing Conditions

- **Antecedent Moisture Conditions**: The level of soil moisture before a rainfall event can significantly impact flooding. If the ground is already saturated from previous rains, the likelihood of flooding increases.

These processes have manifested in several significant flooding events in Quitman in recent years. The following images capture scenes from recent years of streets inundated with water, obstructing traffic and causing hazardous conditions. Several areas show extensive water coverage, with water levels rising above sidewalks and encroaching on buildings. Vehicles parked along the streets are partially submerged, and some roads are entirely covered by water, making them impassable. These images are representative and do not reflect the full extent of the flooding or every flooding event that has occurred. However, these images do illustrate how the flooding events disrupt daily life in Quitman, demonstrating the urgent need for effective stormwater management solutions to mitigate such occurrences in the future.

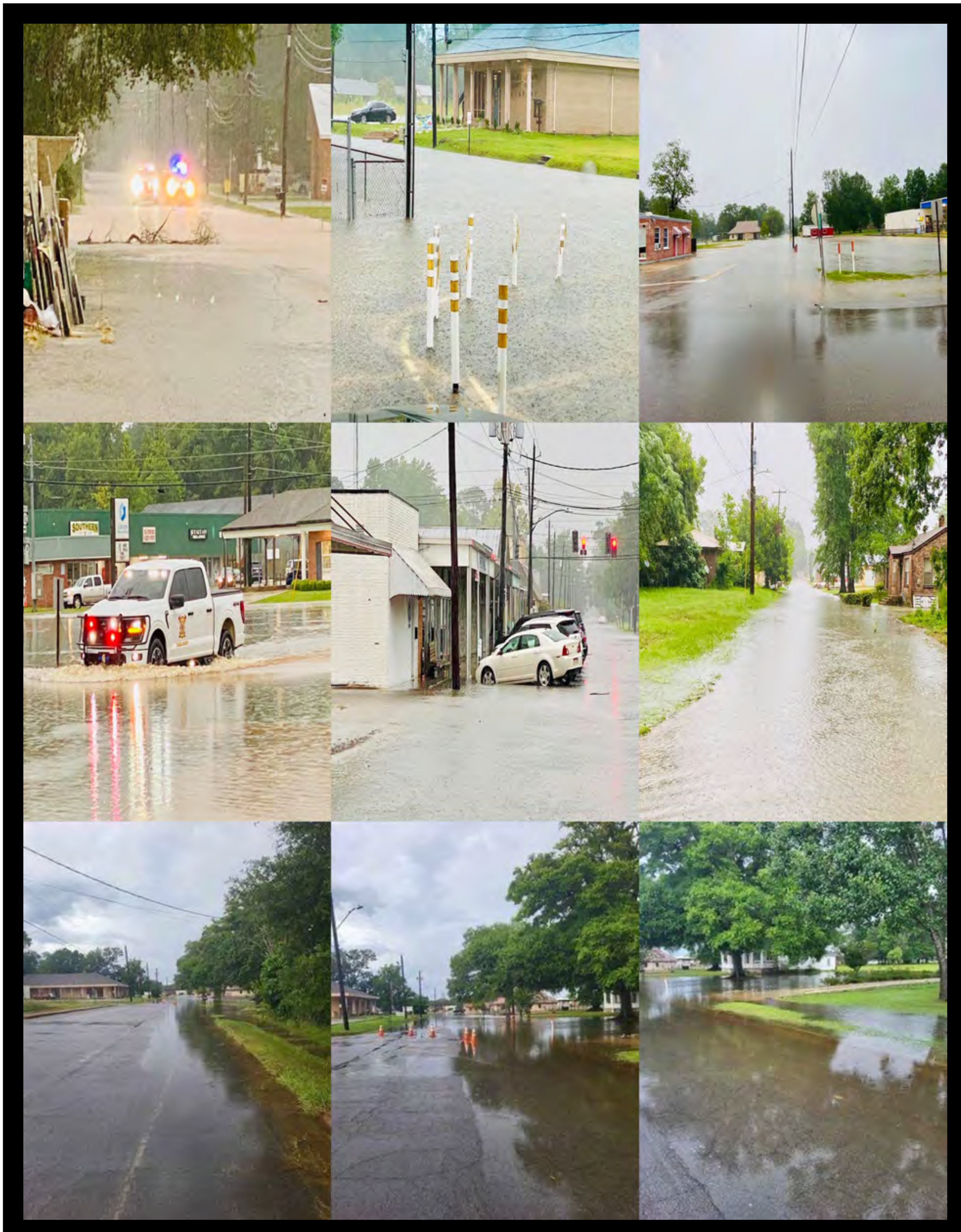


Figure 4 – July 2024 Flooding

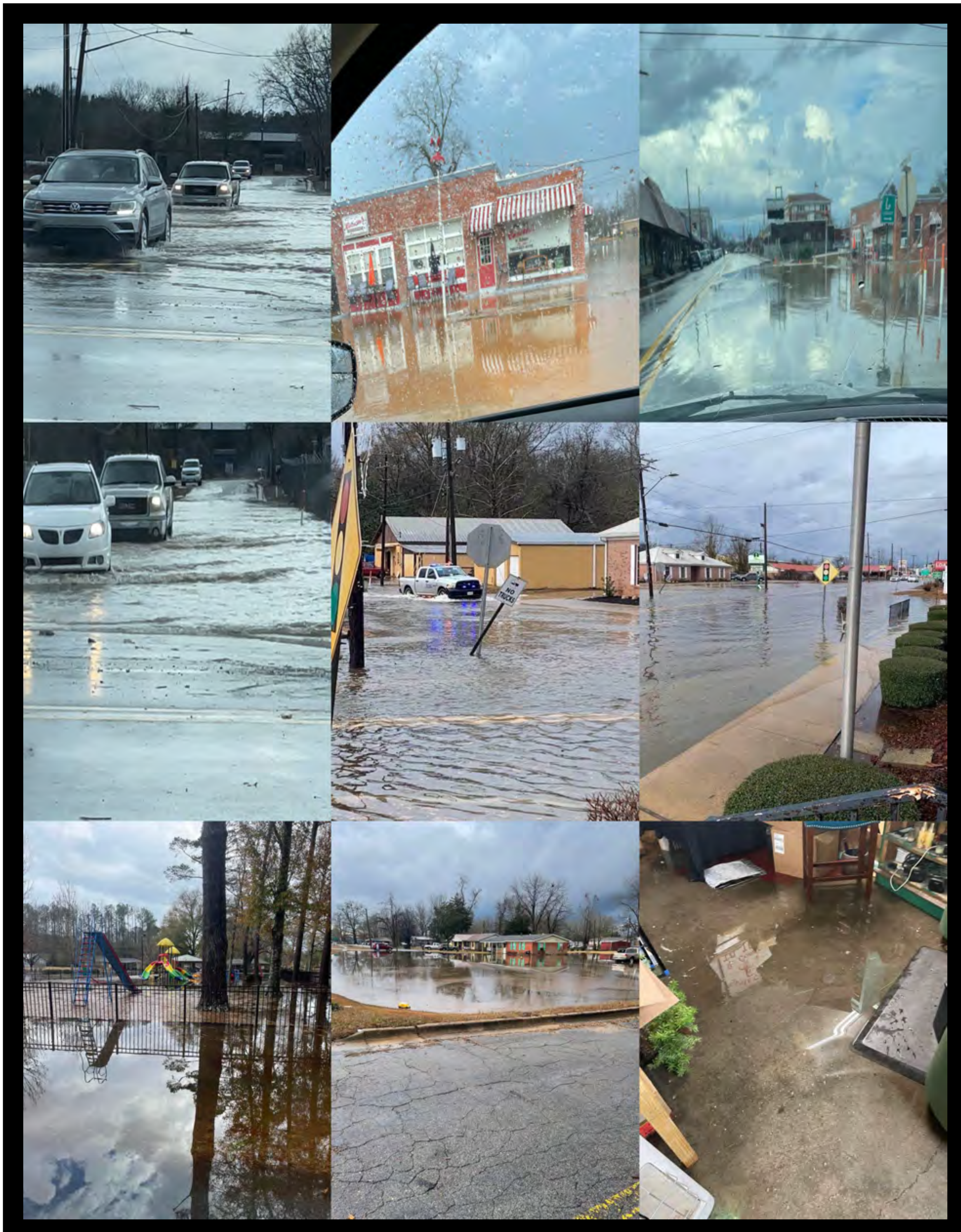


Figure 5 – January 2023 Flooding

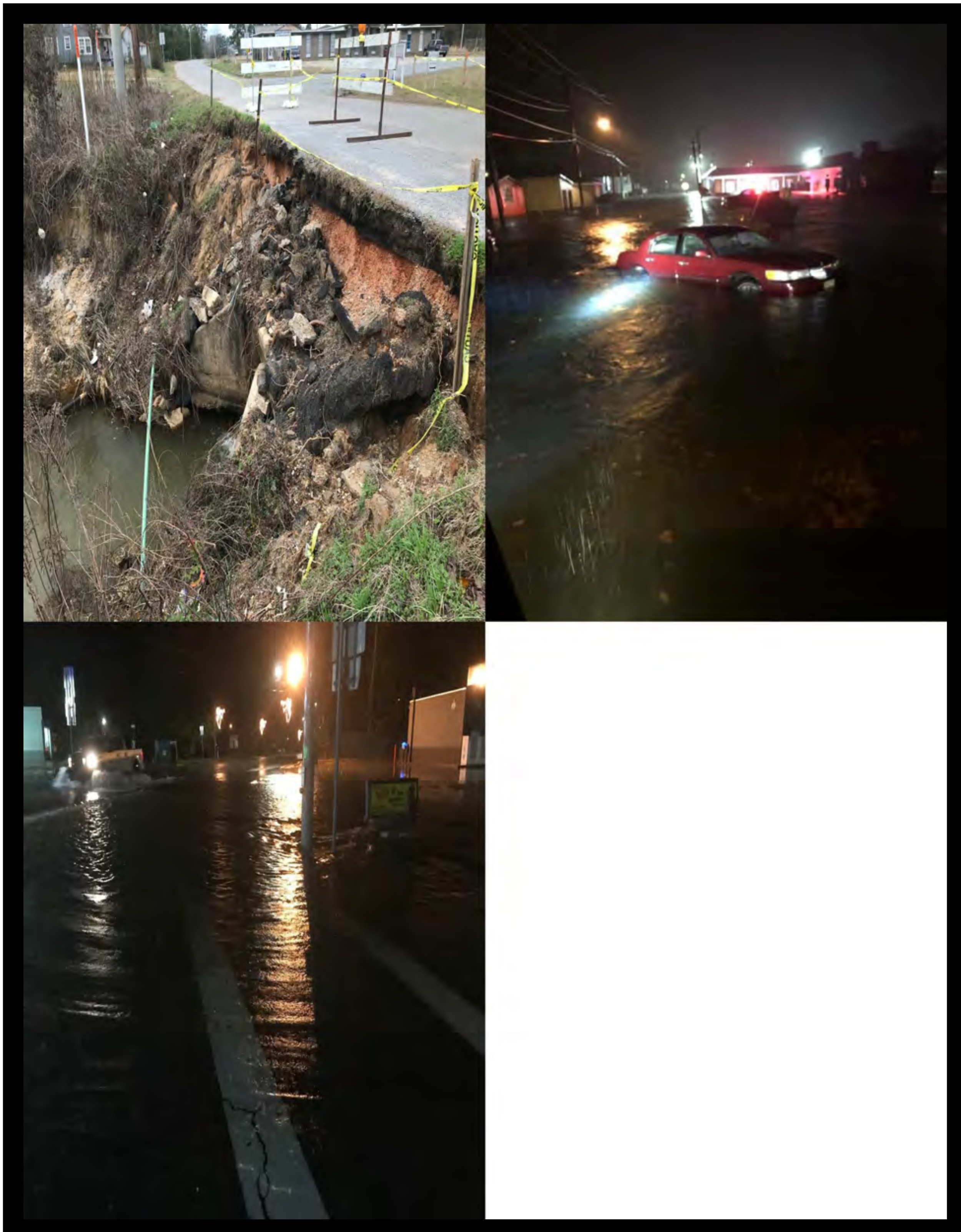


Figure 6 – January 2018 Flooding

LOCAL DRAINAGE SYSTEM

Investigation And Analysis

In addition to field survey information for the project sites, additional topographic information was obtained with Light Detection and Ranging (LiDAR)[1] data obtained from the Mississippi Automated Resource System (MARIS). The source of the LIDAR data is a project performed by the Mississippi Department of Environmental Quality (MDEQ). The LIDAR data was collected in 2013 under USGS Contract No. G16PC0057, Task Order No. G12PD00125.

The hydrology at each site was assessed using standard methods such as USGS Regression Equations and NRCS Unit Hydrographs[2]. Watershed parameters were obtained from USGS Topographic Mapping for Clarke County, Google Earth aerial images, 2014 National Agricultural Imagery Program aerial images of Clarke County, and National Resources Conservation Service Web Soil Survey data for Clarke County.

Site visits were conducted at each of the flood locations to obtain a visual sense of the natural drainage patterns. Stormwater modeling and calculations were also completed for ditches, culverts, and other hydraulic structures to determine required improvements.

Note that the Chickasawhay River backwater will affect a few of the project sites. Since it is unlikely that the river will crest at the same time as the smaller streams of the projects, backwater was not taken into effect in the design of project structures.

Quitman Drainage Basins

Stormwater runoff in the City of Quitman drains to one of two basins: that of the Chickasawhay River (generally to the west/south) or that of Archusa Creek (generally to the east/south). Stormwater is conveyed to these streams via a system of ditches, culverts, curb and gutter streets, and storm drain networks. Figure 7 illustrates the study drainage basins and indicates the divide between the Chickasawhay River and Archusa Creek basins.

[1] LiDAR is a remote sensing technology that uses lasers to create 3D models of the Earth's surface.
[2] Hydrology calculations are mathematical equations that estimate water flow and storage in a given area over time.

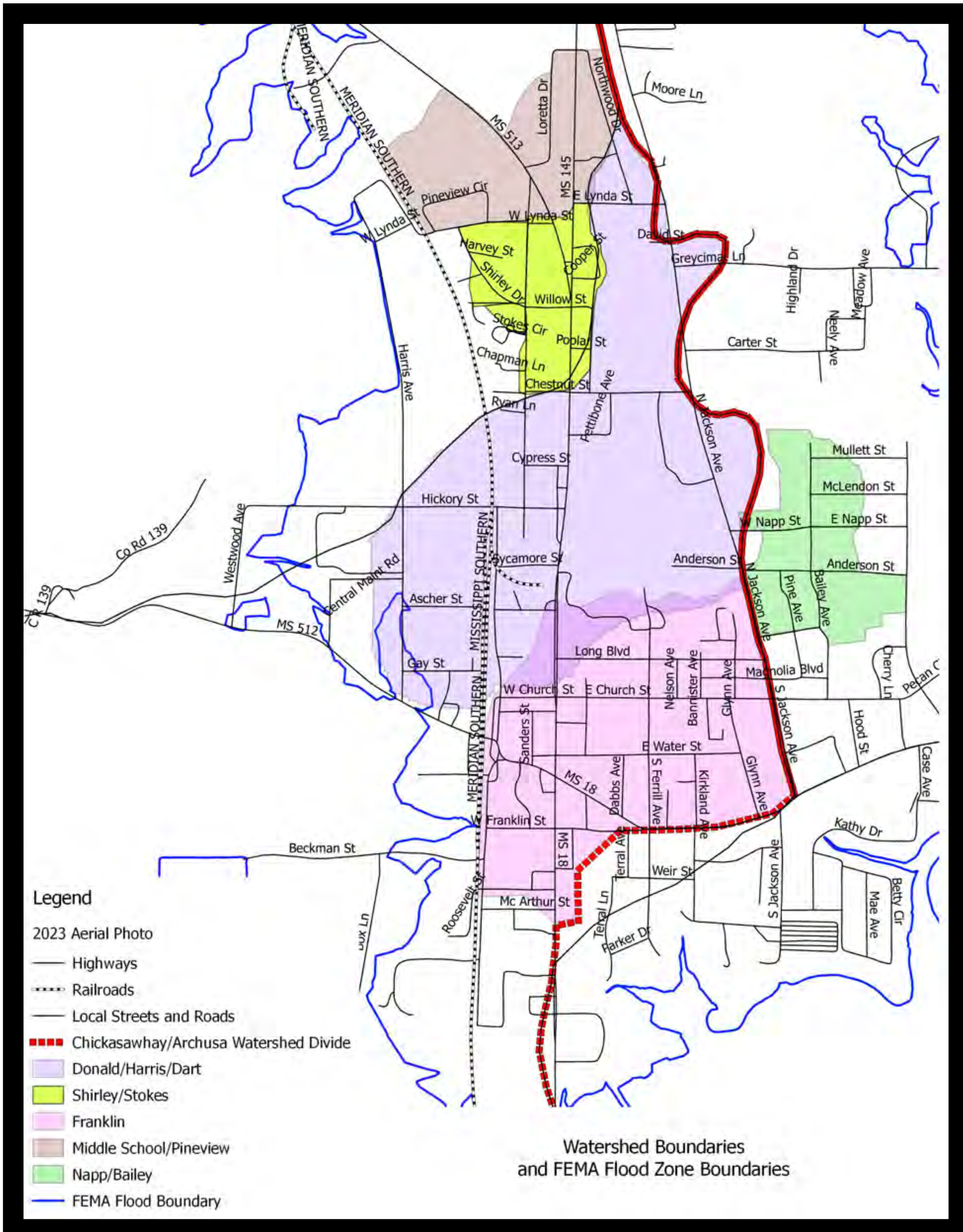


Figure 7 – Drainage Basins within Quitman

RECOMMENDATIONS AND CONCLUSIONS

Consideration of a Stormwater Management Ordinance

In addition to infrastructure improvements, it is recommended that the City of Quitman consider the development and adoption of a comprehensive stormwater management ordinance. Such an ordinance would establish regulatory guidelines for managing stormwater runoff, improving drainage system performance, and protecting water quality. Key focus areas of the ordinance may include:

- Erosion and sediment control to reduce soil loss and downstream sedimentation.
- Regulation of new developments and redevelopments to ensure adequate stormwater management infrastructure is incorporated into site plans.
- On-site detention and retention requirements to prevent excessive runoff from overwhelming the drainage system.
- Floodplain management to minimize flood risks and protect natural flood storage areas.
- Water quality control measures to reduce pollutants entering local waterways.

As part of the ordinance, it is recommended that hydraulic structures and drainage systems be designed to accommodate peak runoff flows based on the type of roadway or development. For subdivisions and minor roads, infrastructure should be designed to manage the peak runoff flow generated by a 24-hour, 25-year recurrence interval storm without overtopping. However, for major arterials and highways, a higher standard should be applied, requiring infrastructure to accommodate a 24-hour, 100-year recurrence interval storm. This tiered design approach ensures that stormwater infrastructure is appropriately scaled to handle significant rainfall events while minimizing flood risks and maintaining roadway functionality.

Exceptions to this standard may be considered on a case-by-case basis, particularly in instances where physical constraints, existing structures, or limited rights-of-way present challenges to full compliance. However, any deviations should be carefully evaluated to ensure that they do not contribute to increased flood risk or compromise the overall effectiveness of the stormwater management system.

To aid in the development of a local stormwater ordinance, the U.S. Environmental Protection Agency (EPA) provides sample ordinances that could serve as useful references. These model ordinances cover various aspects of stormwater management, including nonpoint source pollution control, urban runoff reduction, and watershed protection. The City of Quitman may consider reviewing and adapting relevant components from these resources to align with local needs and regulatory conditions. More information on these sample ordinances can be found at the following link: **EPA Urban Runoff Model Ordinances**

By implementing both targeted infrastructure upgrades and regulatory measures, Quitman can significantly enhance its stormwater management capabilities. This comprehensive approach will lead to improved flood resilience, reduced property damage, and a more sustainable drainage system for the long-term benefit of residents and businesses.

Stormwater Drainage Improvements

When addressing flooding through stormwater drainage improvements, it is essential to follow a strategic, phased approach that prioritizes modifications to the largest downstream structures first. This methodology ensures that the most substantial and immediate improvements are achieved while maintaining the overall effectiveness of the drainage network.

Downstream structures, including large culverts, open channels, and retention basins, serve as primary pathways for collecting and transporting stormwater runoff. These structures are designed to manage and temporarily store large volumes of water, allowing for controlled discharge and reducing the likelihood of flooding in both urban and suburban areas. If these critical components lack sufficient capacity or efficiency, they can quickly become overwhelmed, causing water to back up and overflow into streets, properties, and infrastructure.

By first enhancing the capacity and functionality of these downstream elements, the entire drainage system becomes more resilient. Once these improvements are in place, subsequent enhancements to upstream drainage infrastructure—such as smaller culverts, storm drains, and localized detention systems—can be implemented with confidence that the increased water flow will be properly managed and conveyed downstream. This bottom-up approach prevents unintended consequences, such as excessive water accumulation in areas where downstream capacity is insufficient.

Establishing a robust downstream drainage network creates a foundation for ongoing stormwater management improvements throughout Quitman. The following capital improvements have been identified as necessary steps to enhance stormwater drainage and mitigate localized flooding risks. Supporting data, including hydrologic and hydraulic analyses, can be found in the Appendices.

Capital Improvements Projects

1. Napp/Bailey Avenue

This site is an existing storm drain system in the vicinity of Napp Street, Anderson Street, and Bailey Avenue. The drainage area of the system is approximately 37-acres at its outlet (near the intersection of Bailey Avenue and Anderson Street). The hydrology and hydraulics of the existing system were assessed to determine the appropriate size for the replacement pipe culverts.

The downstream flowline at the outlet of the system is approximately 230.2. The size of the most downstream section is an elliptical pipe of dimensions 36" x 24". This size pipe extends upstream for approximately 123-ft, where it changes to a 24" round pipe section and runs upstream for approximately 446-ft. to the intersection of Napp Street and Bailey Avenue.

The computer program Hydraflow Storm Sewers by Intelisolve was used to model the existing and the proposed storm drain systems. A 25-year design storm is commonly used to size storm drain systems for residential subdivisions. However, the existing storm drain system does not appear adequate to handle the runoff resulting from smaller storms (for example, a 5-year recurrence interval storm). The existing system also lacks sufficient inlet capacity.

The existing storm drains should be replaced with larger-sized pipes, and additional inlets be added to the system to ensure that runoff gets into the system. It is possible that these upgrades could also include the installation of additional pipes, swales and ditches. An example of an upgraded system would be to use a double line of 58" x 36" arch pipe in place of the 36" x 24" and 24" pipe runs.

2. Railroad Culvert at Middle School

This structure is a single round 36" concrete pipe beneath the railroad, located near the Middle School. The drainage area of the stream at this location is approximately 84-acres. According to the 2024 survey data, the downstream flowline of the existing pipe is 223.42, and its length is about 33-ft. The upstream flowline is 223.76, and the top of the railroad rail is about elevation 231. The computer program Hydraflow Hydrographs by Intelisolve was used to compute peak runoff from the 84-acre drainage area. The NRCS Curve number method was used.

Under existing conditions this structure is adequate to handle less than a 25-year recurrence interval peak flow without overtopping the railroad. Replacing the culvert with a double line of

60" diameter pipe will allow the passage of the 100-year flow. The upstream headwater created by the proposed double 60" pipe was compared to the theoretical 100-year elevation under unrestricted ('without culvert') condition.

Additionally, the Middle School driveway will need increased drainage capacity as well. Initial recommendations are for a double 6’x3’ box, but this will not pass a 100 yr flood event without overtopping due the lack of capacity downstream.

The proposed double 60" pipe would not increase the 100-year water-surface headwater elevation appreciably over that of unrestricted conditions. This was checked due to the existence of a home at 301 Pineview Circle which experienced flooding recently.

3. Elementary/High School

The existing drainage system at the Elementary and High School location is inadequate to pass the 25-year storm. The portion of the system on the north end of the property drains out towards South Jackson Ave, beneath that street and subsequently across residential areas and beneath Kathy Circle to its outlet. The existing and recommended pipe sizes for the storm drain system are given in the appendix. The storm drain which runs beneath Jackson, across the residential area, and beneath Kathy Circle should be upsized to a 42” pipe. The recommended system will handle the 25-year flow.

Another recommendation at Elementary School is to remove a concrete ramp between buildings. This concrete ramp has been constructed with two small openings which are intended to allow water to flow from the interior of the school property out to Jackson. However, these openings are not adequate and block the flow (per school staff). Replacement of the concrete ramp with a metal ramp that would either span the opening or have minimal number of vertical supports is recommended.

Figure 8 – Existing Concrete Ramp

4. Howard Industries Parking Lot

Howard Industries has proposed improvements at the site near McArthur and Railroad Avenue. LIDAR topographic data from 2013 indicates that portions of the proposed Howard Industries site's parking lot had elevations as low as 226, matching the lowest points of McArthur Street and the surrounding area. This likely contributed to stormwater ponding in the lot. Between 2019 and 2024, the parking lot was reconstructed, raising elevations by approximately two feet. However, Howard Industries, as part of its proposed site improvements, must ensure that its project does not contribute to or exacerbate flooding in the area. The City should consider requiring that no additional stormwater flows from Howard Industries' improvements be directed into the McArthur Street storm drain system or the railroad ditch. It is Howard Industries' responsibility to design its project in a way that prevents adverse impacts on surrounding properties, businesses, and City infrastructure. Any necessary modifications to mitigate stormwater impacts should be incorporated into their design to ensure that all downstream structures can accommodate the 100 year post-project stormwater flows.

5. Railroad Culvert at Sycamore Street

This culvert is located downstream of Railroad Avenue, between Hickory Street and Ascher Street. The drainage area of the stream at this location is approximately 170-acres. The downstream flowline of the existing pipe is 219.10, and its length is 33-ft. The upstream flowline is 219.39. The downstream ditch section is approximately 5-ft in width and has a longitudinal slope of 0.004 ft/ft. A Manning's "n" value[3] of 0.045 was selected to model the roughness of the channel portion and 0.08 for the floodplain portion. The computer program Hydraflow Hydrographs by Intelisolve was used to compute peak runoff from the 170-acre drainage area. The NRCS Curve number method was used.

Immediately downstream of this pipe is a 100-ft long culvert which carries the ditch beneath a spur railroad line. This pipe is a 58" x 36" concrete arch section, with upstream flowline of 218.29 and downstream flowline of 217.86.

The railroad culvert and the spur culvert are only adequate to handle a peak flow between a 5-year and 10-year recurrence interval without overtopping the railroad. Part of this is due to tailwater from the downstream ditch. There is an additional culvert at the intersection of Sycamore and Railroad Ave that should be analyzed in the future if the proposed improvements do not provide relief.

The recommended replacement structure would replace both of these culverts (Structure B and the spur culvert). This replacement structure would be 155-ft in length. A double 6-ft by 4-ft box culvert with an improved inlet would allow the passage of approximately the 50-year peak flow beneath the rail line and the spur with a headwater elevation around elevation 227.3. In conjunction with the proposed channel improvements (see item 11), this structure is adequate to pass the 100-year peak flow without overtopping the railroad.

6. Railroad Culvert at West Franklin Street

This structure, a double line of 54" diameter concrete pipe, is located downstream of Railroad Avenue near its intersection with West Franklin Street. The drainage area of the stream at this location is approximately 215-acres. The downstream flowlines are 218.03 and 218.88, and their length is about 35-ft. The upstream flowlines are 218.5 and 219.06, and the top of the railroad

[3] Manning's N - roughness coefficient that varies based on the channel surface.

rail is about elevation 230. The downstream ditch section is approximately 4-ft in width and has a longitudinal slope of 0.014 ft/ft.

Under existing conditions this crossing is adequate to handle a 25-year recurrence interval peak flow without overtopping the railroad. There appears to be a scour hole downstream of the crossing; the flowline there is about 4.5-feet lower than the upstream invert of the double culverts. It is recommended to install a longer culvert so that the slope will not be too steep. Replacing the existing culverts with four lines of 60" RCP (Reinforced Concrete Pipe) will allow the passage of the 100-year flow without overtopping Railroad Avenue. The length should be 150-feet. It is also recommended to install scour protection at the outlet to prevent further erosion.

7. Channel and Culverts between Railroad and Archusa Avenues

Recommendations for this system begin at the downstream end with replacement of the culvert under Railroad Avenue with a double 10-ft x 5-ft box culvert. A trapezoidal channel with 8-ft bottom width and 3:1 side slopes is recommended from this culvert upstream for approximately 500 feet. The three existing driveway culverts within this reach should be eliminated or replaced (one driveway appears to be unused). Replacements should also be double 10-ft x 5-ft box culverts.

Upstream of the recommended channel improvements is an existing culvert which runs between buildings and apparently underneath an old greenhouse structure. Because there is only about 20-ft between buildings, the largest size which fits in this location is a 73" x 45" arch pipe. This pipe would carry a flow between 2 yr and 5 yr. This is less than the recommended 25 yr flow but it is more capacity than the existing 42" affords. Upstream of this, at Arcusa Avenue a 10-ft by 3.5-ft box culvert is recommended, which would carry a peak flow between the 5-yr and 10-yr. The size of this structure is constrained by existing streets and buildings.

Another possible scenario is a relief system which could be constructed beneath Water St/Sanders/W Depot which would divert water from the channel (downstream side of East Water near Carlson) and run it west underneath the streets in a box culvert. At a point near the intersection of Railroad Avenue and West Depot Street, the box culvert would turn and head South. A new channel could be constructed from the outlet to the upstream side of the new Railroad Avenue culvert.

8. West Donald Street Culvert

The drainage area of the stream crossing at Donald Street is 0.43 square miles. According to the 2024 survey data, the existing structure is a 5-ft concrete box culvert with a downstream flowline of 207.58, an upstream flowline of 212.96, and a length of about 38-ft. The top of Donald Street is about elevation 218. The USGS computer application StreamStats was used to compute peak runoff at the Donald Street location.

The existing structure is adequate to handle less than a 25-year recurrence interval peak flow without overtopping the street. Replacing the culvert with a double 10' x 5' box culvert will allow the passage of the 50-year flow. The upstream headwater created by the proposed box culvert was compared to the elevation of Gay Street upstream to ensure that the box would not create an adverse backwater condition. As of this writing, this project is in construction.

9. Harris/Dart Channel

Recommendations for this stream begin at the downstream end with replacement of the culvert beneath West Donald Street with a double 10-ft x 5-ft box culvert (see Item 10). A trapezoidal channel with 20-ft bottom width and 3:1 side slopes is recommended from this culvert upstream to Railroad Avenue (approximately 2,500 feet). Upstream of Railroad Avenue, the proposed channel cross-section is a 10-ft wide trapezoidal shape with 3:1 side slopes. These channel improvements, in conjunction with the following recommended culvert replacements, will allow the channel to carry the 10-year flow within its banks.

The existing culverts beneath Gay Street and Harris Avenue within this reach should be replaced. The recommended size at each of these three crossings is a triple 73" x 45" reinforced concrete arch pipe. The existing culverts underneath the railroad main line and spur should be replaced with a double 8-ft by 4-ft reinforced concrete box culvert (see Item 5). The existing box culvert at Railroad Avenue is also undersized and should be replaced with a double 6-ft by 4-ft reinforced concrete box culvert. There is an additional culvert where this channel intersects Archusa Avenue that should be analyzed in the future if the proposed improvements do not provide relief.

10. Cypress Street and Archusa Avenue Culverts

At this location, the existing 14" concrete culvert beneath Cypress Street has an adverse slope and is inadequate to carry the 25-year flow. A 24" reinforced concrete pipe is recommended as replacement. The existing 12" corrugated plastic pipe downstream should also be replaced with a 24" reinforced concrete pipe. Ditches upstream and downstream of these culverts should be regraded so that they drain well. Since the drainage area is relatively small (1.3 acres), the Rational Method was used to compute the hydrology for these two pipe culverts. The culverts were modeled with Hydraflow Storm Sewers software.

Downstream, the ditch flow enters a culvert beneath Archusa Avenue. According to plans obtained from the Mississippi Department of Transportation, the original Archusa Avenue culvert was a 3-ft width by 2-ft height box culvert, 37-ft in length. The box culvert has apparently been lengthened to 113-ft since the time of its construction. Another pipe culvert appears to be joined to the box culvert. The drainage area at the upstream side of Archusa Avenue is 13 acres, but the combined drainage area of the box culvert and additional pipe culvert is approximately 64 acres. Replacement of the box culvert with a single 58" by 36" reinforced concrete arch pipe is recommended. The proposed culvert will be capable of handling the 25-year flow with a resulting headwater elevation of 227.9.

Downstream of the box culvert is an abandoned concrete slab area. The ditch is carried beneath this concrete slab area via a culvert or culverts of unknown diameter, slope and length. The slab area presents a significant blockage to flow, not only from its culverts but because it is raised above the floodplain so that water cannot flow in the overbanks. It is recommended that the ditch be daylighted in this area, by demolishing the slab and excavating any fill which lies within the floodplain. This will provide a free outlet and reduce flooding of the ditch.

11. Kirkland Channel

At this site, a double line of 24" concrete culverts carry a ditch beneath Kirkland Avenue. Analysis shows that stormwater flowing from upstream will cross a low point in the street before the culverts flow full. The street is also low in elevation when compared to the floodplain; there is only about 2 feet of difference between the flowline of the culverts and the low point of the street. The culverts appear to be about 200 feet in length and they appear to run between two homes. This crossing is not sufficient to handle the 2-year flow without overtopping the low spot over the street.

Replacement along the current alignment would be difficult. One solution would be to replace the existing culverts with shorter culverts and daylight the downstream end, re-routing the ditch around the houses. A modified channel section with 4-foot bottom width and 3:1 side slopes would carry approximately the 25-year flow if set on a 0.2% grade. This improved channel should extend from South Ferrill Avenue upstream to Glynn Avenue. If combined with a double line of 44” x 27” reinforced concrete pipes, this would lower the 2-year and 10-year water-surface profile upstream of Kirkland Avenue. The installation of larger pipes is made problematic by site conditions.

12. North Jackson Avenue

This crossing consists of two culverts carrying the upper end of the Harris/Dart channel beneath North Jackson Avenue. They are a 25” x 25” concrete box culvert and a 16” diameter concrete pipe. According to the survey data, the flowline of the 16” pipe is about 4 feet below that of the box culvert. This indicates that the ditch flowline has dropped since the construction of the box culvert. The channel downstream of the culverts was checked and found to be sufficient to carry approximately the 25-year flow within the channel banks.

The capacity of the existing culverts is less than the 25-year flow. The roadway directly above the culverts is higher than that of the roadway further to the south. Water will escape from the left overbank and overtop the low portion of the road. It is recommended to replace the 16” pipe with a 36” diameter reinforced concrete pipe. It is not necessary to remove the box culvert unless it interferes with construction of the new pipe culvert. The 36” diameter culvert will pass the 25-year flow with a headwater that is lower than the lowest top-of-road. Hydrologic and hydraulic data and output for this site can be found in Appendix N.

Jackson Avenue between Anderson Street and Church Street is subject to street flooding. Using the rule of thumb that there should be one curb inlet per 200 feet, the number of curb inlets along Jackson Street is less than desirable. While there should be about seven curb inlets on each side of the street, there are only three. An increase in the number of curb inlets is recommended.

13. Shirley Drive Culvert

At this location, the existing 24” diameter reinforced concrete culvert is not sufficient to carry the 10-year or 25-year flow. A double line of 44” by 27” reinforced concrete arch pipes will handle the 25-year flow without overtopping the street and is recommended. Both this crossing and the Stokes Circle culvert lie along the same concrete-lined ditch, and both crossings were modeled together in the same stream reach, using HECRAS.

14. Stokes Circle Culvert

According to the survey, the existing crossing at Stokes Circle has a box culvert on the upstream side and a 32” round culvert on the downstream side. This structure was modeled as a 32” round culvert and is not sufficient to carry the 10-year or 25-year flow. A triple line of 51” by 31” reinforced concrete arch pipe is recommended, which will handle the 25-year flow.

15. Anderson/Dogwood Culvert

The existing structure is a single round 36" corrugated plastic pipe beneath Dogwood Avenue, located near its intersection with Anderson Street. The drainage area of the stream at this location is approximately 55-acres. The upstream and downstream flowlines were estimated using the LIDAR topographic data. The length of the existing pipe is about 180-ft. The computer program Hydraflow Hydrographs by Intelisolve was used to compute peak runoff from the 55-acre drainage area. The NRCS Curve number method was used.

Under existing conditions this structure is adequate to handle less than a 25-year recurrence interval peak flow without overtopping the street. Replacing the culvert with a double 58” x 36" diameter concrete arch pipe will allow the passage of the 25-year flow. The FHWA computer program HY-8 was used to analyze the culverts.

16. Hickory/Sycamore Area

This area is roughly bounded by Railroad Avenue to the west, Hickory Street on the north, Archusa Avenue on the east, and Sycamore Street on the south. It is bisected by the uppermost portion of the Harris/Dart channel (see Item 11). The Harris/Dart channel analysis shows that the culverts at Railroad Avenue and at the railroad and main line have an obstructive effect on flow in the channel and floodplain. Construction of the proposed Harris/Dart channel improvements and culvert replacements will lower the backwater effects and provide relief from flooding in the Hickory/Sycamore Area. Figure 8 illustrates the difference in inundation area between existing conditions and proposed conditions for the 25-year flow.

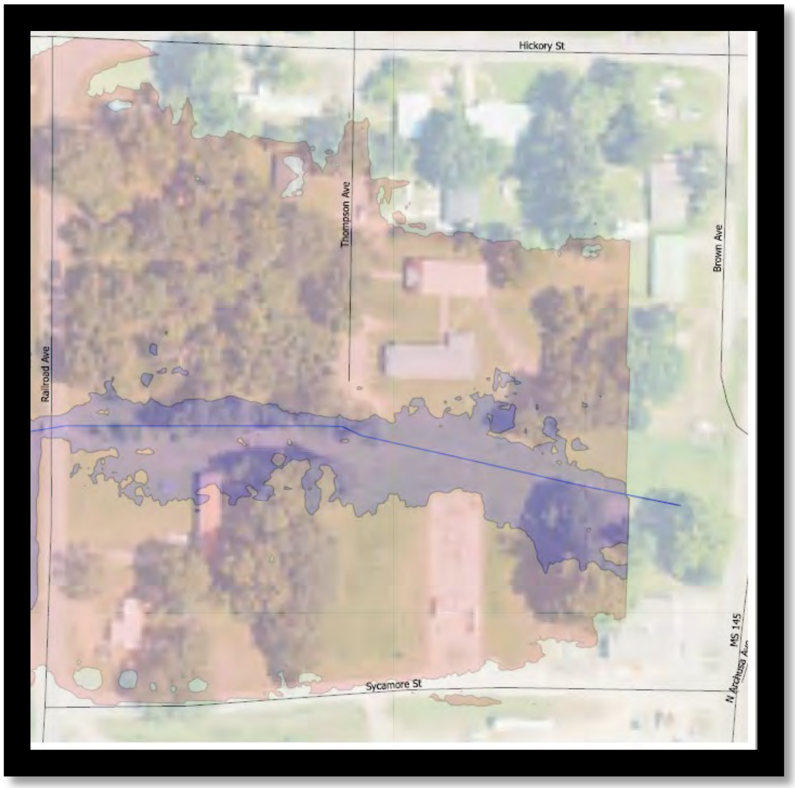


Figure 9 -Inundation area of the 25-year flow for existing conditions (in red) and proposed conditions (in blue).

Public Works Improvement Projects

The local ditches and culverts currently lack sufficient carrying capacity, resulting in inadequate drainage paths for stormwater flow. In areas without a defined relief path, this deficiency leads to overland flow and street flooding. To address this issue, the Public Works Department could gradually restore the carrying capacity of ditches and swales over time.

1. Archusa Avenue/Cypress Street Area

For example, the roadside ditch along Archusa Avenue near Cypress Street is covered with silt and vegetation. Cleaning this ditch would improve conditions along Archusa Avenue. See Figure 8.

Figure 10 - Ditch along Archusa Avenue near Cypress Street

2. Pineview Circle Area

Issues on Pineview Circle are related to the undersized culvert beneath the railroad, and inadequate drainage provided by the ditches and culverts along the street. The replacement of the existing railroad culvert will have a significant positive impact on water-surface elevations upstream of the railroad (see Item 2 discussion above). In addition to that culvert replacement, it is recommended that ditch improvements be implemented to assist in conveying water from the street and along the rear of homes on Pineview Circle. The existing ditches should be cleaned and graded to a constant slope. If any of the culverts along Pineview Circle are on an adverse slope, they should be replaced.

Potential Stormwater Maintenance Activities and Public Awareness Considerations

Effective stormwater management requires ongoing maintenance efforts to ensure that drainage systems remain functional and capable of handling stormwater runoff efficiently. Various maintenance activities can contribute to the overall improvement of stormwater infrastructure by reducing blockages, preventing erosion, and maintaining the capacity of drainage facilities.

These types of maintenance efforts can be undertaken by municipalities, property owners, or community members, depending on available resources and priorities.

To promote awareness and encourage public involvement, the City of Quitman may consider developing a community education initiative focused on stormwater management. Such an initiative could provide residents and property owners with information on how routine maintenance activities can help reduce localized flooding, improve water quality, and protect public infrastructure. Educational outreach efforts could include workshops, informational materials, or community clean-up events aimed at reinforcing the importance of maintaining stormwater systems.

Below are several common stormwater maintenance activities that could be beneficial in preserving and enhancing the performance of the drainage infrastructure:

1. Catch Basin Cleaning

Catch basins are designed to capture runoff and direct it into the stormwater system, but over time, they can become clogged with leaves, trash, sediment, and other debris. Routine cleaning of catch basins can help ensure proper drainage by preventing blockages that may lead to localized flooding, water pooling on roadways, and unnecessary strain on stormwater pipes. Periodic removal of debris can also help improve water quality by preventing pollutants from entering waterways.

2. Storm Drain Inspection and Maintenance

Storm drains are critical components of the City's stormwater infrastructure, designed to collect and transport runoff. Regular inspection and maintenance of storm drains can help identify blockages, structural issues, or sediment buildup that could reduce drainage efficiency. Removing obstructions and ensuring unobstructed water flow can reduce standing water, minimize roadway flooding, and extend the lifespan of drainage infrastructure.

3. Gutter and Downspout Cleaning

Gutters and downspouts help direct rainwater away from buildings and prevent erosion around foundations. When these systems become clogged with leaves or debris, they can overflow, leading to water damage and improper drainage. Routine cleaning of gutters and downspouts can help maintain proper water flow, reduce the risk of damage to structures, and minimize excess runoff that could contribute to localized flooding. Property owners may benefit from guidance on best practices for keeping these systems clear.

4. Sediment and Erosion Control

Erosion can contribute significant amounts of sediment to stormwater runoff, which can clog drainage systems and reduce the capacity of stormwater detention areas. Implementing erosion control measures—such as installing silt fences, erosion control blankets, or sediment traps—can help minimize the movement of soil and sediment into drainage systems. These measures are particularly important for construction sites, areas with disturbed soil, or locations near water bodies where erosion could impact stormwater infrastructure.

5. Vegetation Management in Drainage Channels

Drainage channels play a key role in conveying stormwater, but excessive vegetation can obstruct flow and reduce system capacity. Managing vegetation in and around drainage channels may involve mowing, trimming overgrown plants, and removing invasive species that can hinder water movement. Vegetation control efforts should balance maintaining water flow with preventing soil erosion and protecting natural habitats.

6. Detention and Retention Pond Maintenance

Routine maintenance of detention and retention ponds involves removing debris, controlling algae growth, and inspecting the integrity of embankments and outlets. This ensures the ponds function effectively for stormwater storage and treatment.

7. Inspection and Repair of Stormwater Infrastructure

Pipes, culverts, and outfalls are essential components of stormwater drainage systems, but they can deteriorate over time due to weathering, sediment buildup, or structural wear. Periodic inspection of stormwater infrastructure can help identify cracks, leaks, or damage that could impact drainage performance. Addressing necessary repairs in a timely manner can prevent larger issues that may lead to costly damage or system failures.

8. Inlet and Outlet Structure Maintenance

Inlets and outlets regulate the movement of stormwater within drainage systems, ensuring controlled water flow through pipes, channels, and detention areas. Maintaining these structures by removing blockages, repairing structural damage, and ensuring proper function can help prevent system backups, improve drainage efficiency, and mitigate flooding risks in surrounding areas.

9. Leaf and Yard Waste Collection

Organic material such as leaves, grass clippings, and other yard waste can contribute to storm drain blockages and reduce the capacity of drainage systems. Community-based leaf and yard waste collection programs can help prevent organic material from accumulating in storm drains and water bodies. Encouraging residents to properly dispose of yard waste—either through designated collection programs or composting initiatives—can support stormwater system efficiency and reduce maintenance burdens.

10. Stormwater Pond Dredging

Stormwater ponds serve a critical function by temporarily storing runoff, allowing sediments to settle, and reducing pollutant loads before water is discharged into natural waterways. However, over time, sediment accumulation can reduce pond storage capacity and decrease efficiency. Periodic dredging of stormwater ponds may help restore their intended function by removing excess sediment, maintaining adequate water depth, and preventing downstream pollution. Proper dredging techniques can also improve water quality and support aquatic habitats within the pond ecosystem.

11. Inspection of Permeable Pavements

Permeable pavements, such as porous asphalt, pervious concrete, and permeable interlocking pavers, allow rainwater to infiltrate the ground, reducing surface runoff and promoting groundwater recharge. However, sediment and debris can clog the pores in these surfaces, decreasing their effectiveness. Routine inspections and maintenance, such as vacuum sweeping, pressure washing, or sediment removal, can help preserve the permeability of these surfaces and ensure continued stormwater infiltration.

12. Installation and Maintenance of Rain Barrels and Cisterns

Rain barrels and cisterns are effective methods for capturing and reusing rainwater from rooftops, reducing the volume of stormwater entering drainage systems. Encouraging residents and businesses to install these systems could help manage runoff and support water conservation efforts. However, proper maintenance is necessary to ensure functionality. This may involve periodic cleaning, checking for leaks, and preventing mosquito breeding. Outreach programs could provide best practices for maintaining these systems and maximizing their benefits.

13. Monitoring and Managing Illicit Discharges

Illicit discharges occur when pollutants such as oil, chemicals, sewage, or industrial waste enter the stormwater system through unauthorized connections or improper disposal. Identifying and eliminating these discharges is critical for protecting water quality and ensuring compliance with stormwater regulations. Regular inspections, water quality monitoring, and public reporting mechanisms may help detect illicit discharges. Community education efforts could focus on helping residents recognize and report potential sources of pollution.

14. Use of Hydrodynamic Separators

Hydrodynamic separators are specialized devices installed within the stormwater drainage system to capture and remove sediments, oils, and floatable debris from runoff before it is discharged into waterways. These systems help reduce pollutant loads and improve downstream water quality. Routine maintenance of hydrodynamic separators is necessary to ensure continued efficiency, including removing accumulated pollutants and inspecting system components for proper operation.

15. Wetland Restoration and Maintenance

Wetlands play a natural role in stormwater management by filtering pollutants, reducing flood risks, and providing habitat for wildlife. Restoring and maintaining wetlands within the municipality may enhance their ability to store and slow stormwater runoff. Potential activities include:

- Planting native wetland vegetation to stabilize soils and improve water filtration.
- Removing invasive species that can disrupt the ecosystem and reduce wetland functionality.

- Ensuring proper water flow through wetland areas by addressing obstructions or sediment buildup.

Wetland preservation and restoration efforts can support both stormwater management and environmental conservation goals, contributing to overall watershed health.

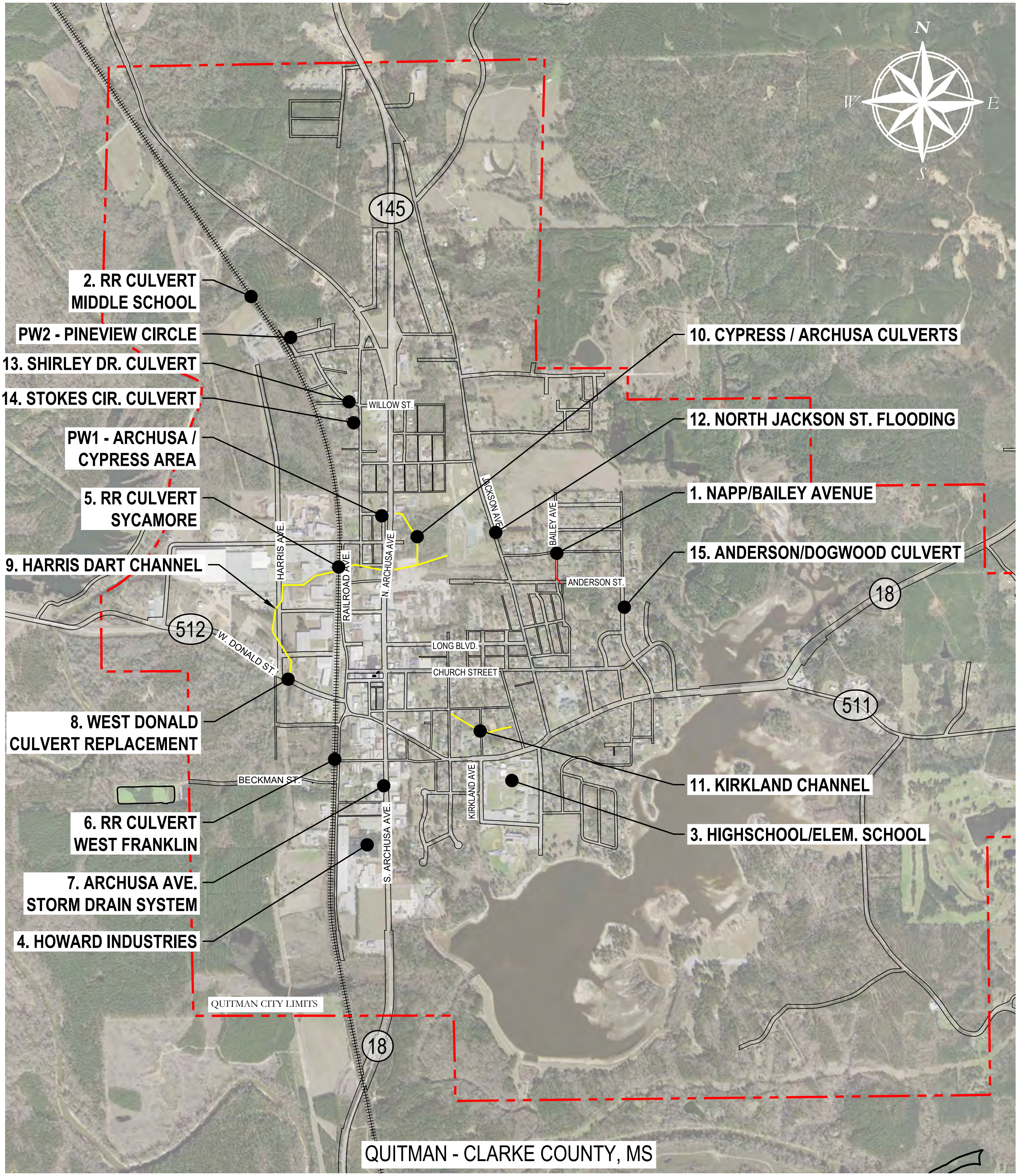
Encouraging Community Engagement in Stormwater Maintenance

While many of these maintenance activities require municipal oversight, there are several ways in which property owners, business owners, and local organizations can contribute to improving stormwater management within the community. The City of Quitman may explore opportunities to promote public awareness and engagement in stormwater maintenance efforts, potentially through:

- Educational campaigns on best practices for managing stormwater on private properties.
- Volunteer programs for community-based clean-up efforts in public drainage areas.
- Workshops and training sessions for residents on erosion control, rainwater management, and stormwater-friendly landscaping.

By fostering a collaborative approach to stormwater maintenance, communities can enhance flood resilience, protect infrastructure, and improve overall water quality. Continued discussions on best practices and potential strategies for stormwater maintenance and public education may contribute to long-term improvements in Quitman's stormwater management efforts.

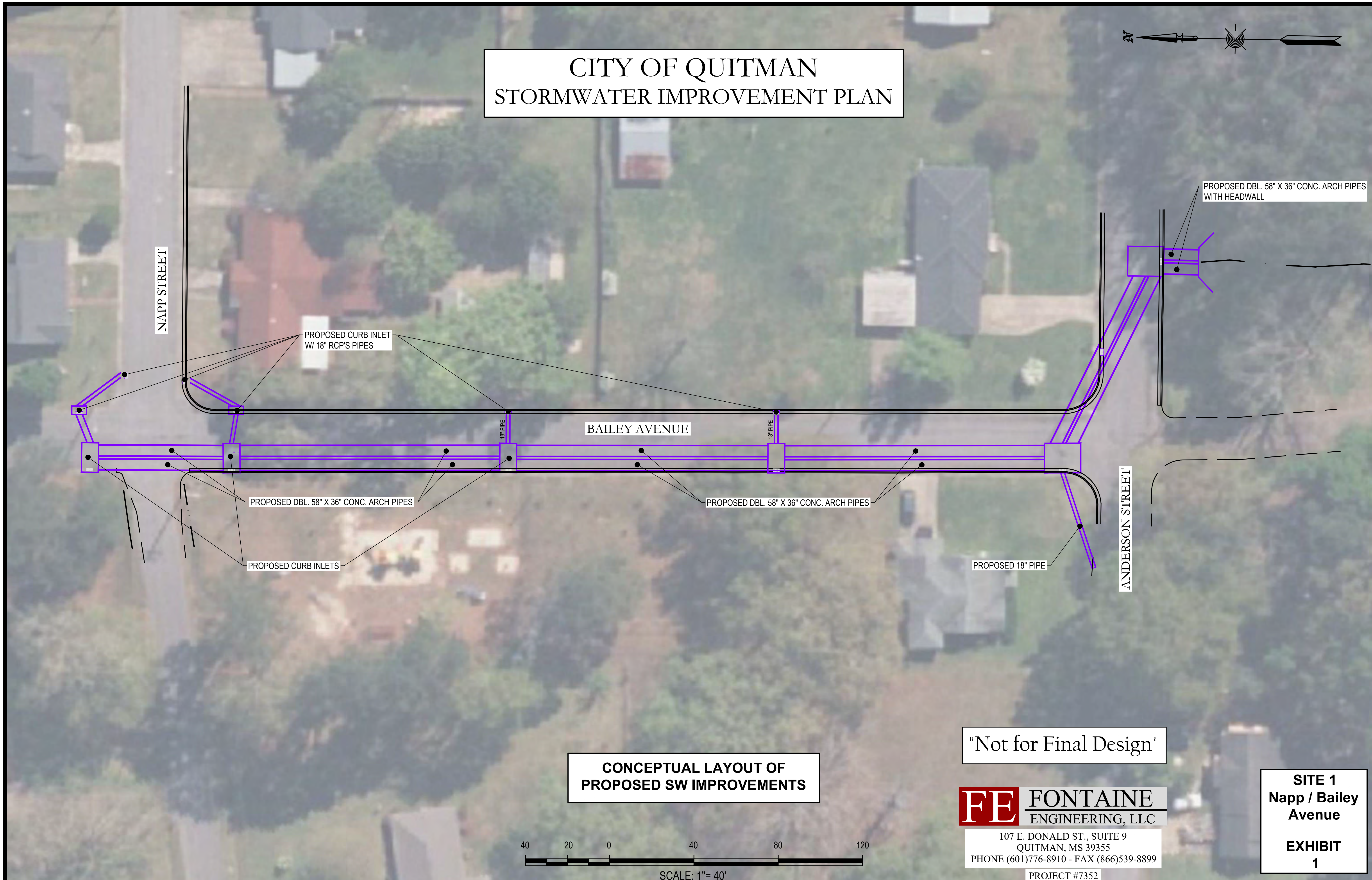
EXHIBITS



FE FONTAINE ENGINEERING, LLC
107 E. DONALD ST., SUITE 9
QUITMAN, MS 39355
PHONE (601)776-8910 FAX(866)539-8899

CITY OF QUITMAN
STORMWATER IMPROVEMENT PLAN

~ SITE INDEX ~



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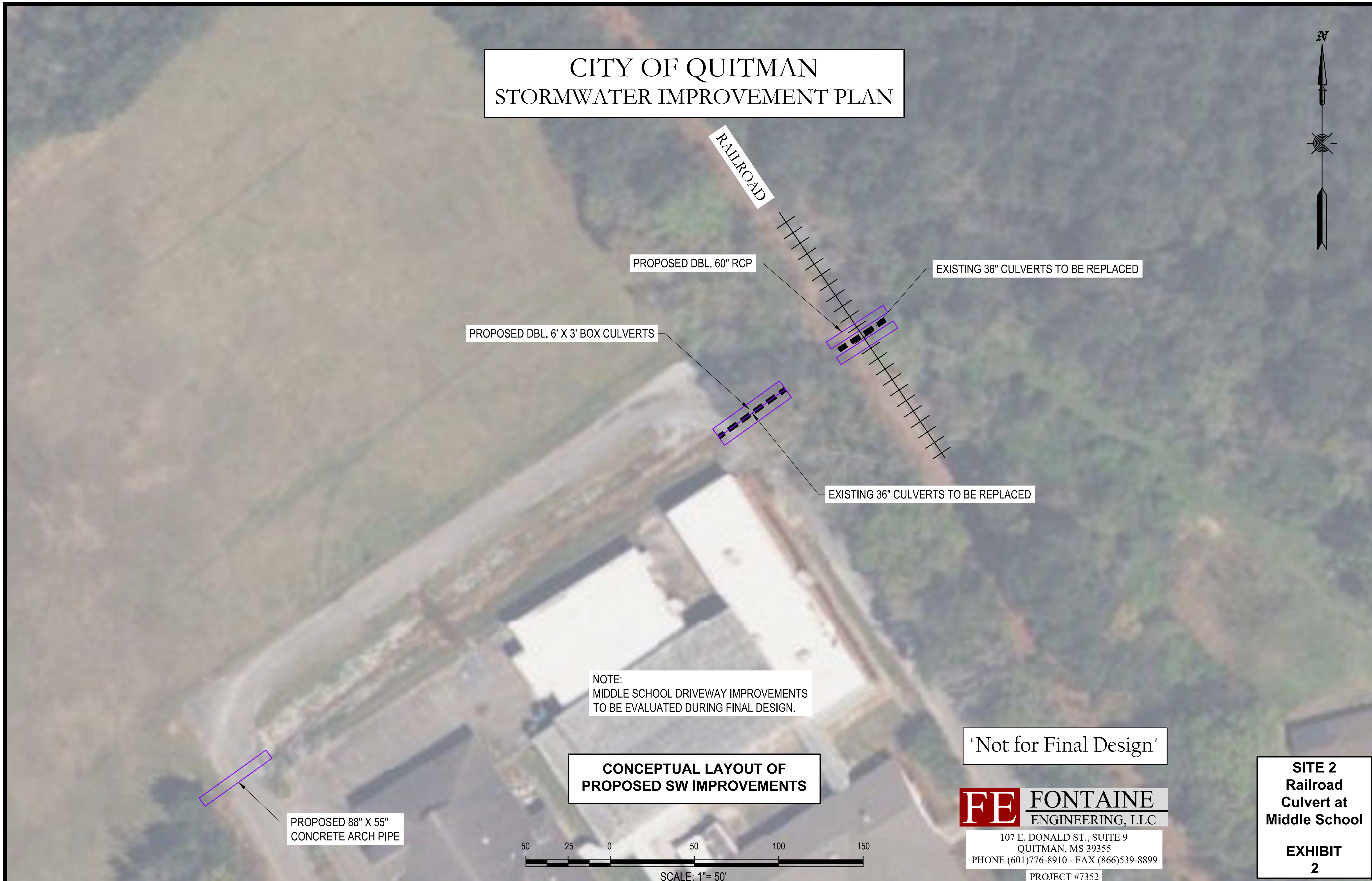

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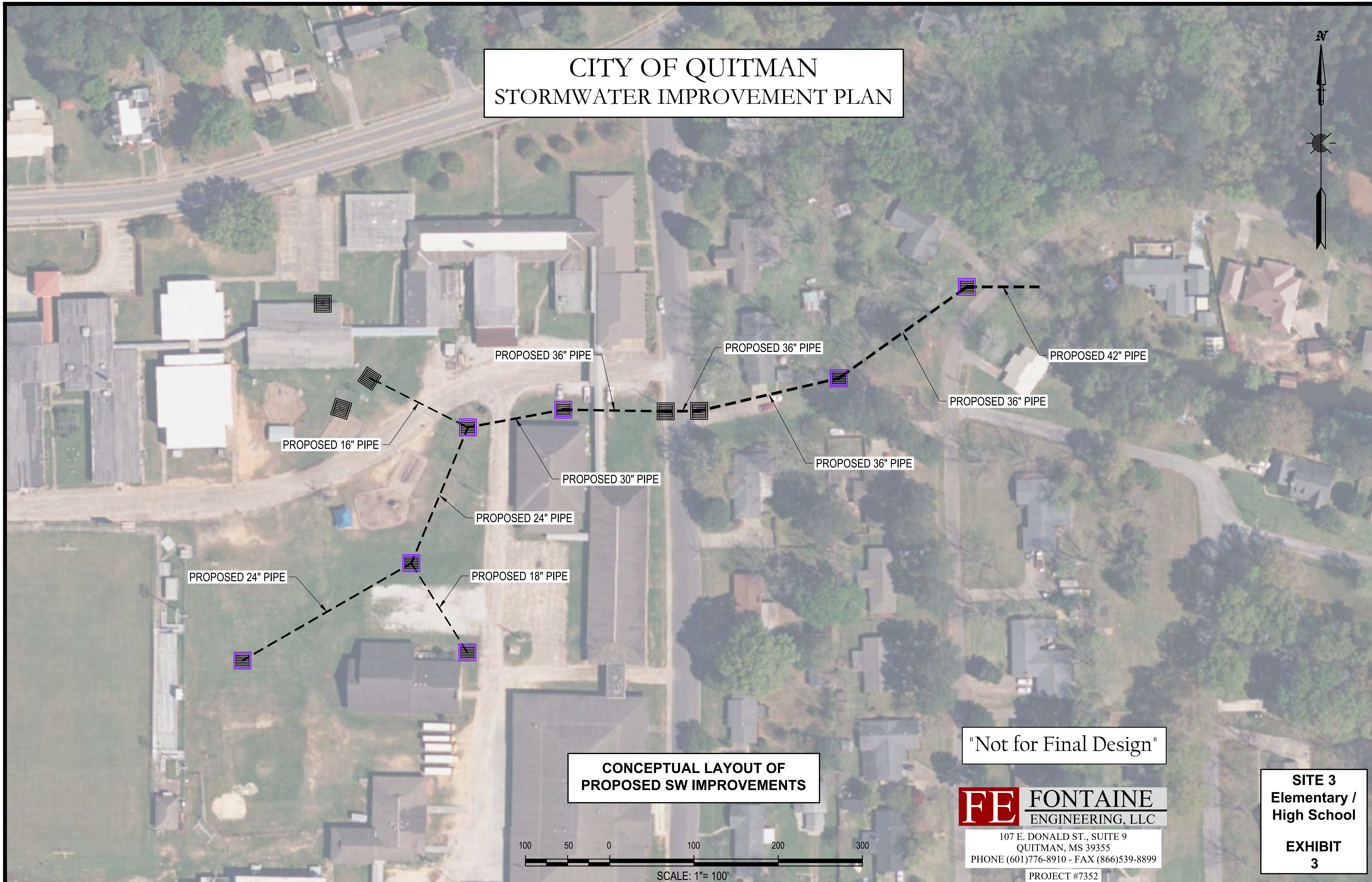

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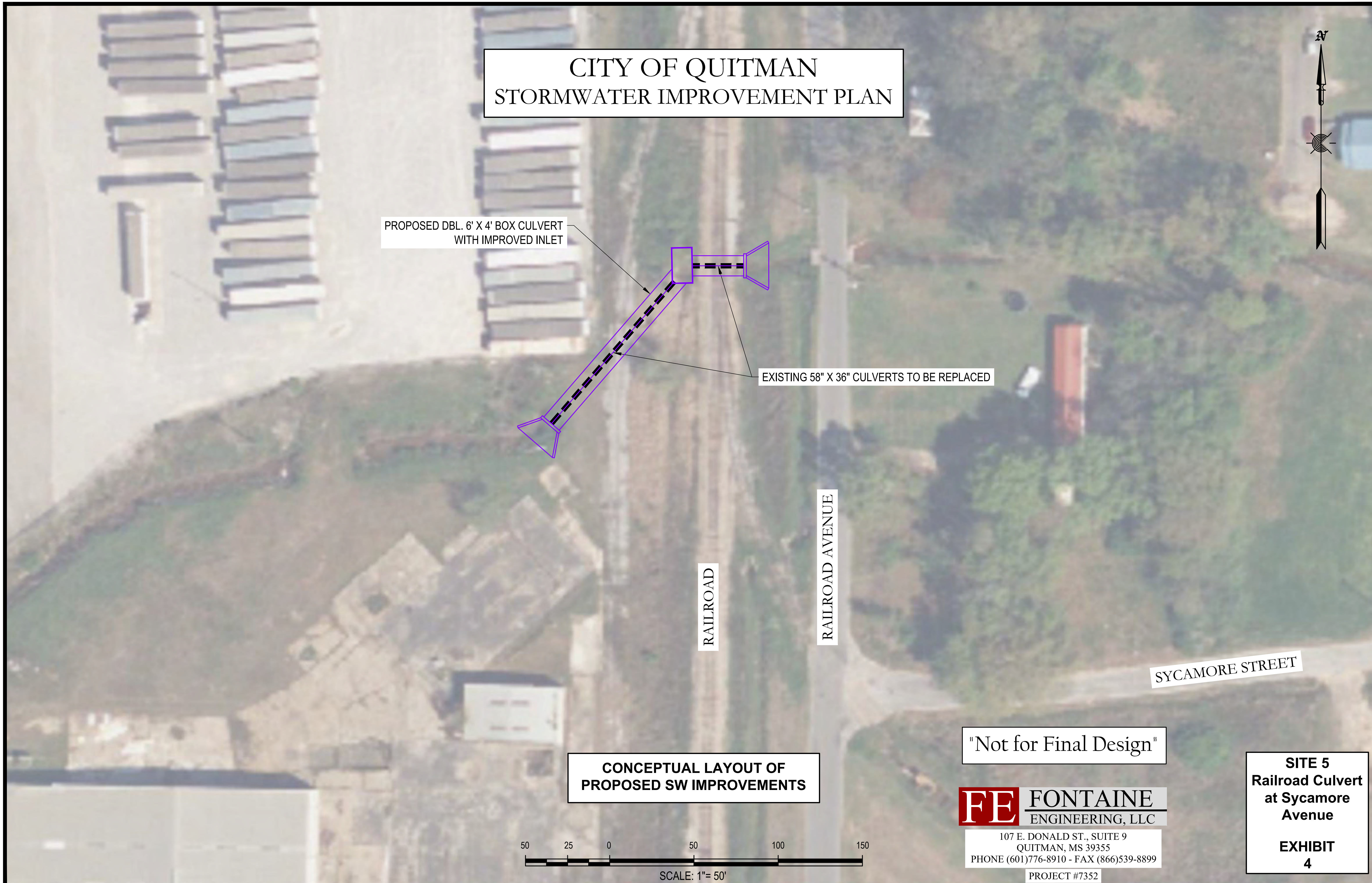

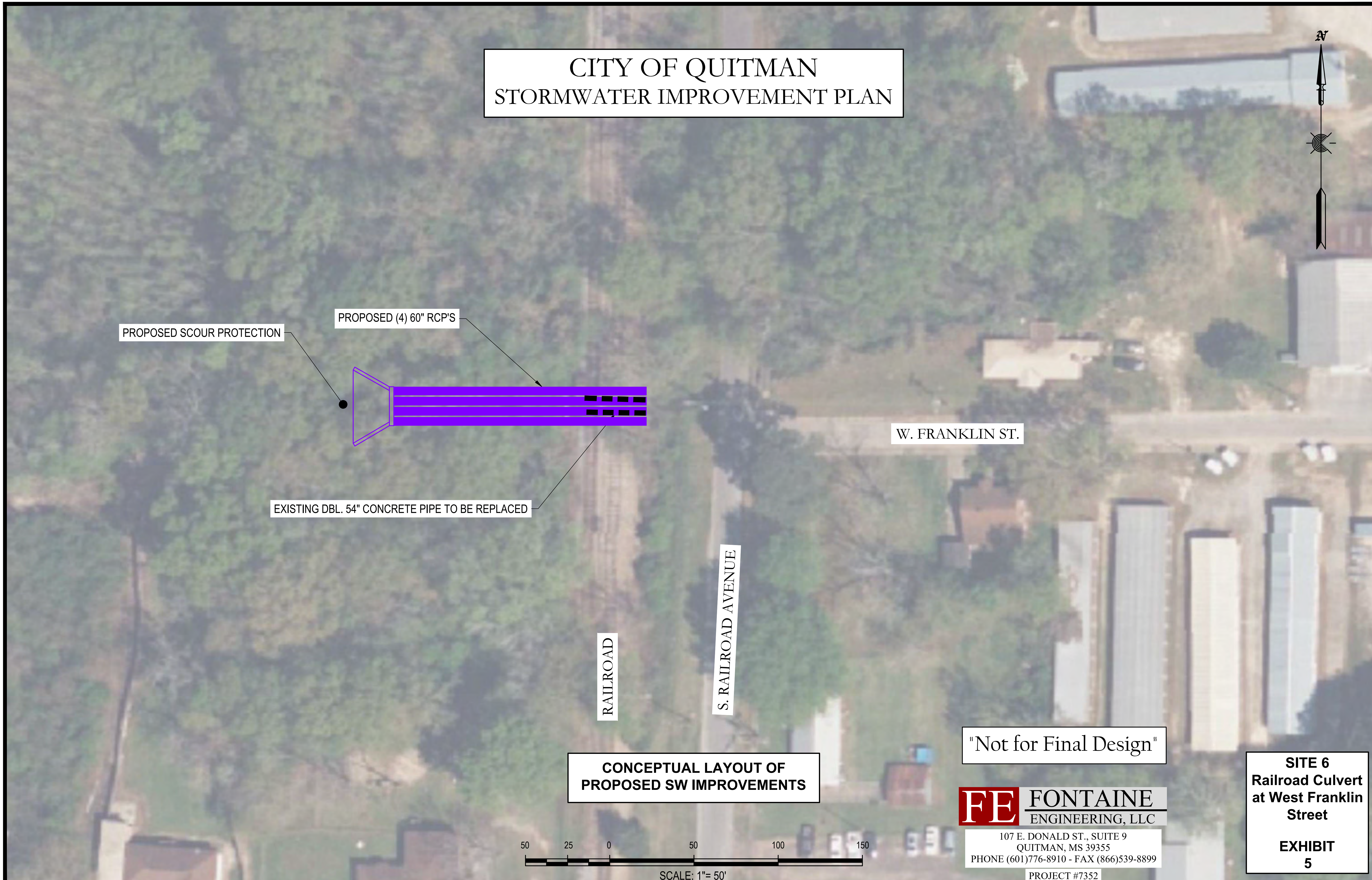

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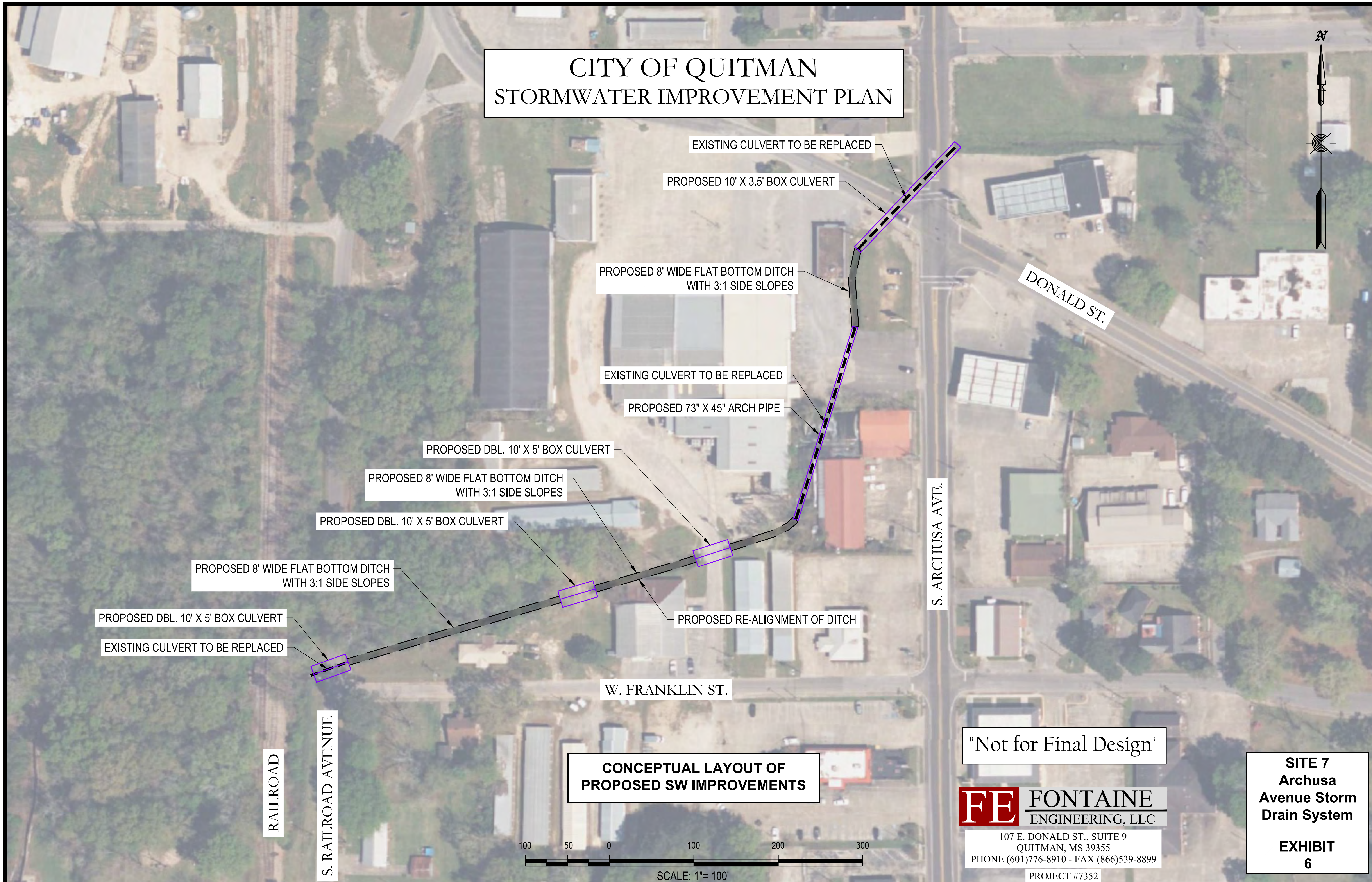
CITY OF QUITMAN
STORMWATER IMPROVEMENT PLAN
EXISTING CULVERT TO BE REPLACED
PROPOSED 10' X 3.5' BOX CULVERT
PROPOSED 8' WIDE FLAT BOTTOM DITCH WITH 3:1 SIDE SLOPES
EXISTING CULVERT TO BE REPLACED
PROPOSED 73" X 45" ARCH PIPE
PROPOSED DBL. 10' X 5' BOX CULVERT
PROPOSED 8' WIDE FLAT BOTTOM DITCH WITH 3:1 SIDE SLOPES
PROPOSED DBL. 10' X 5' BOX CULVERT
PROPOSED 8' WIDE FLAT BOTTOM DITCH WITH 3:1 SIDE SLOPES
PROPOSED DBL. 10' X 5' BOX CULVERT
EXISTING CULVERT TO BE REPLACED
PROPOSED RE-ALIGNMENT OF DITCH
DONALD ST.
S. ARCHUSA AVE.
W. FRANKLIN ST.
RAILROAD
S. RAILROAD AVENUE
N
CONCEPTUAL LAYOUT OF PROPOSED SW IMPROVEMENTS
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SCALE: 1"= 100'
"Not for Final Design"
FE FONTAINE ENGINEERING, LLC
107 E. DONALD ST., SUITE 9
QUITMAN, MS 39355
PHONE (601)776-8910 - FAX (866)539-8899
PROJECT #7352
SITE 7
Archusa Avenue Storm Drain System
EXHIBIT 6
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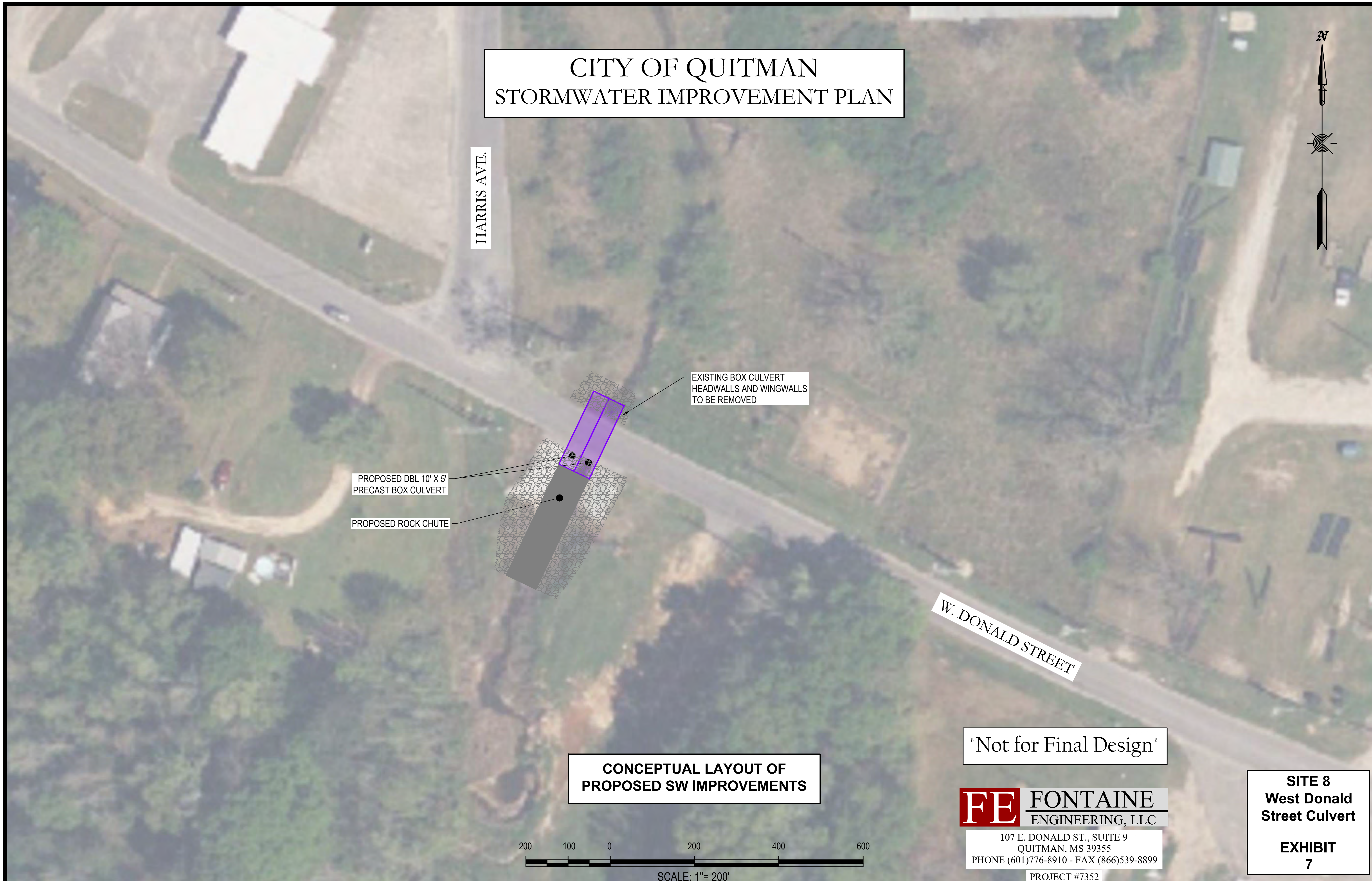

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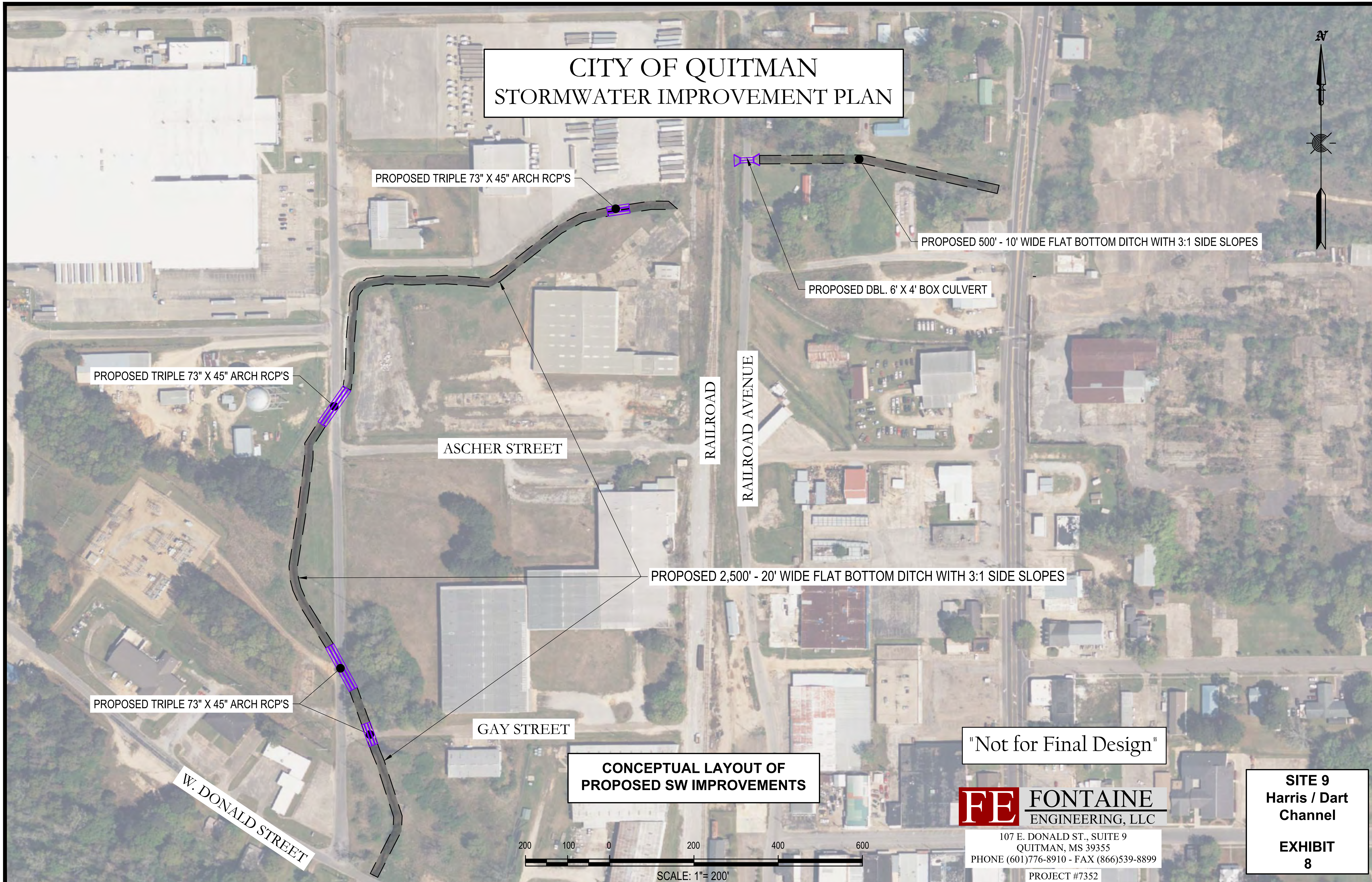

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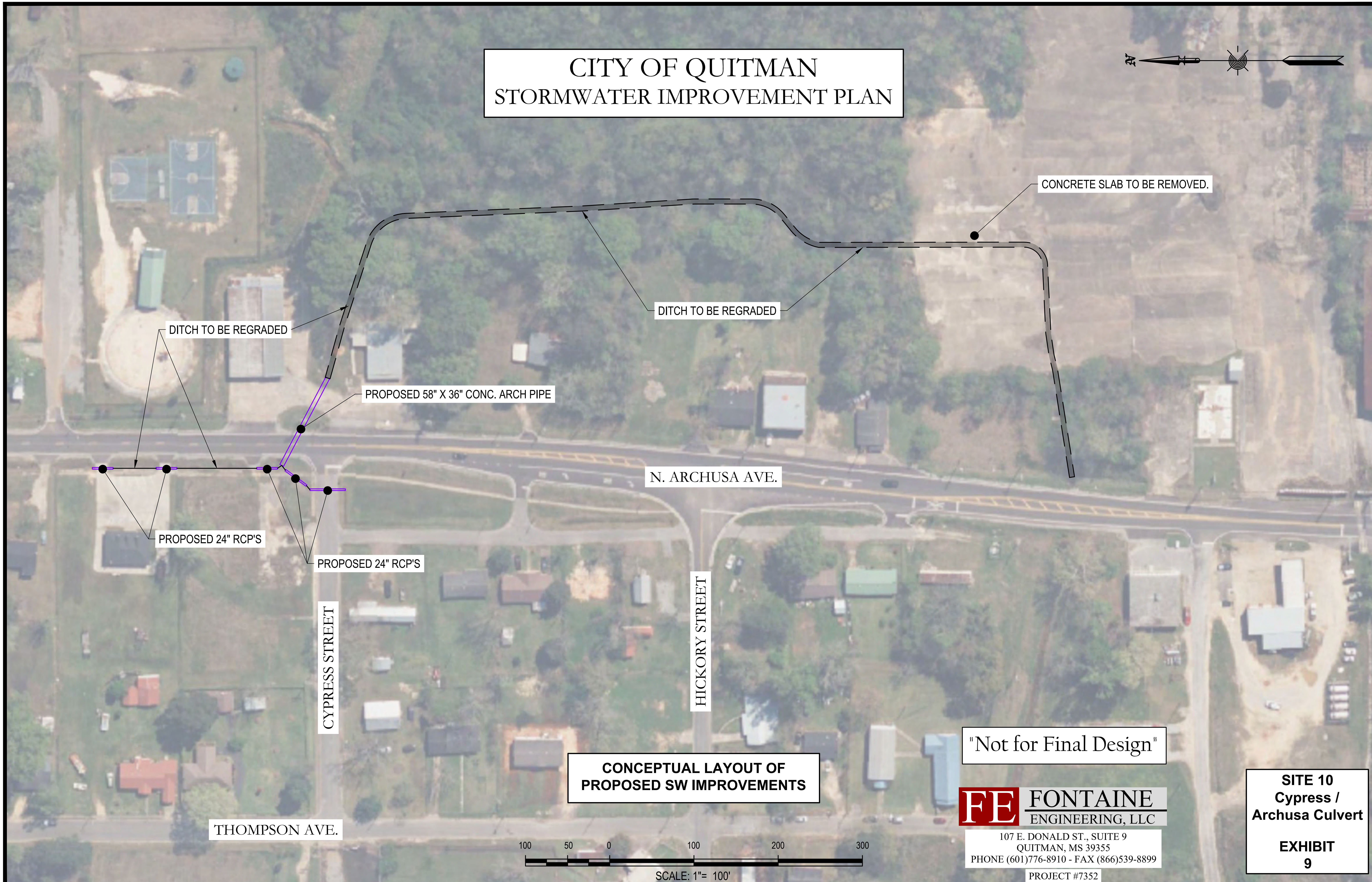

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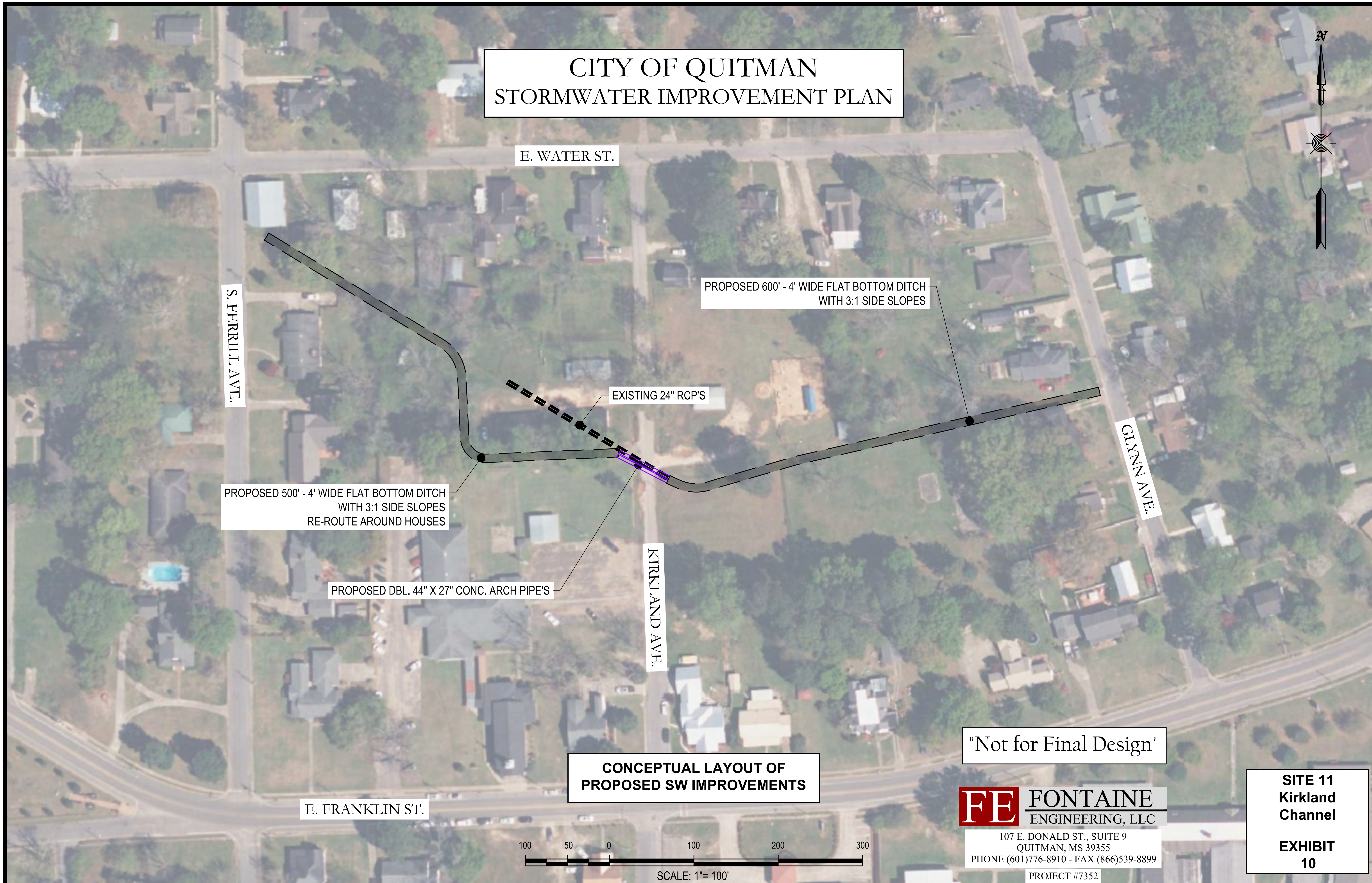

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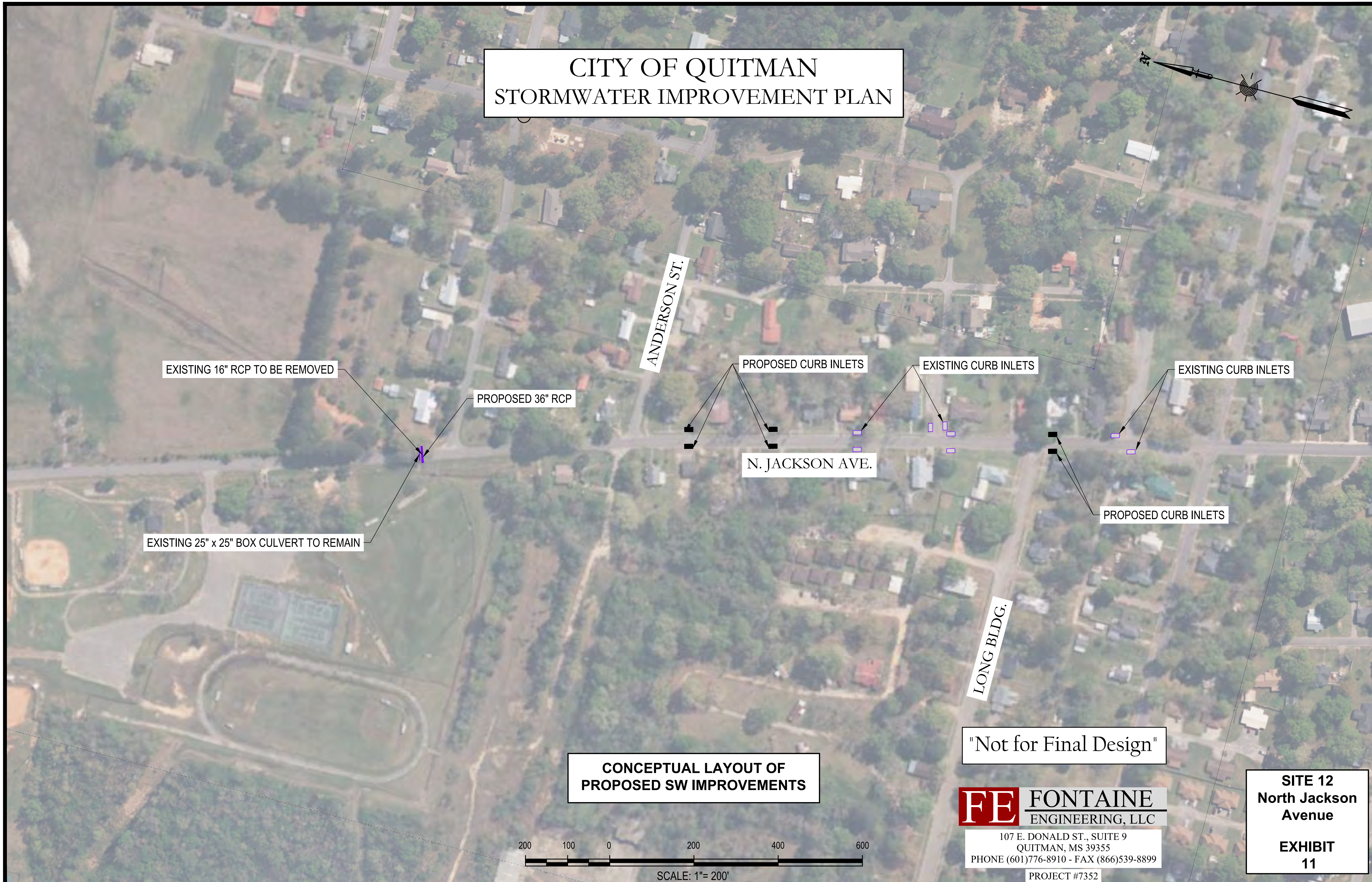

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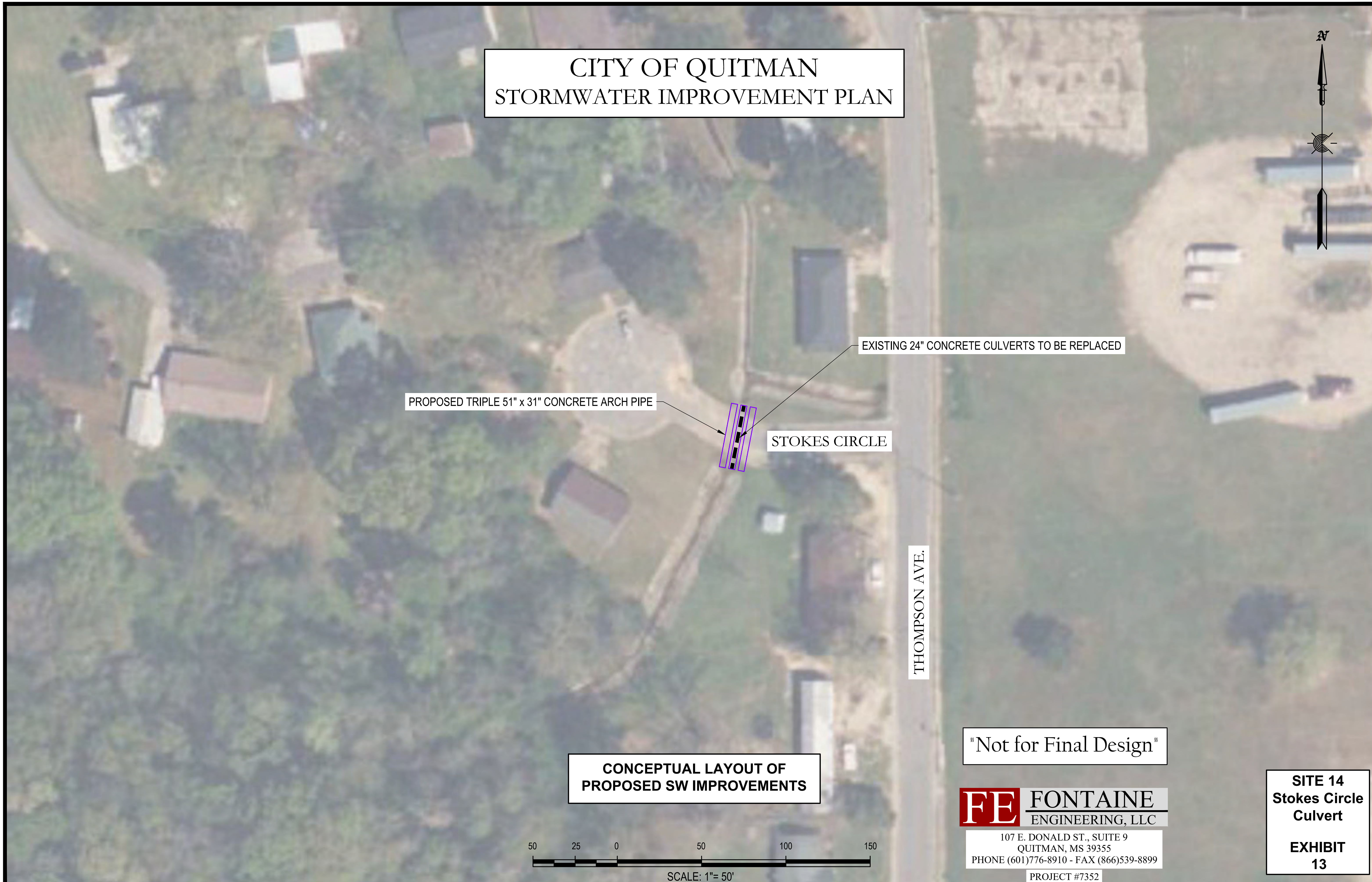

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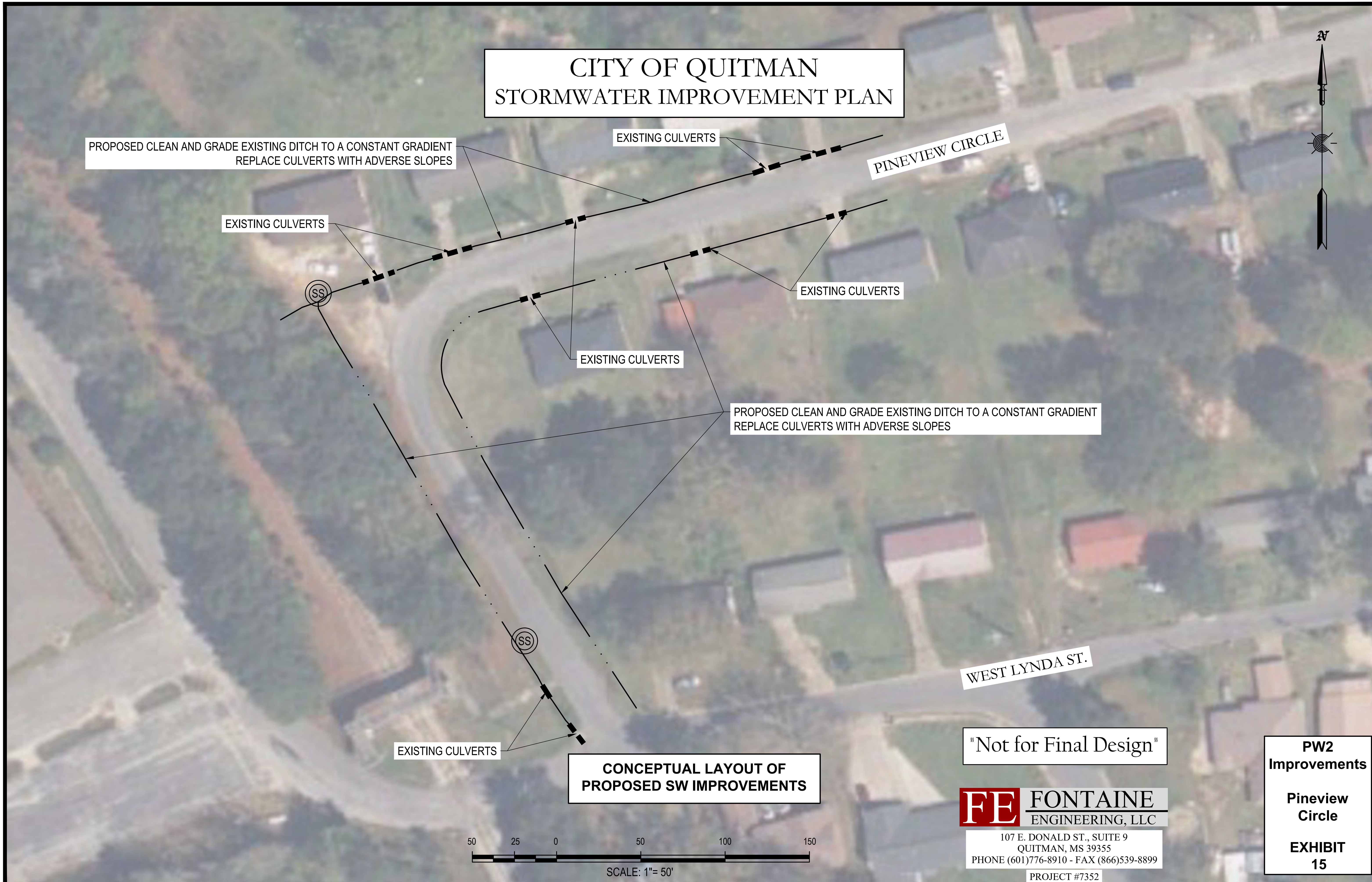

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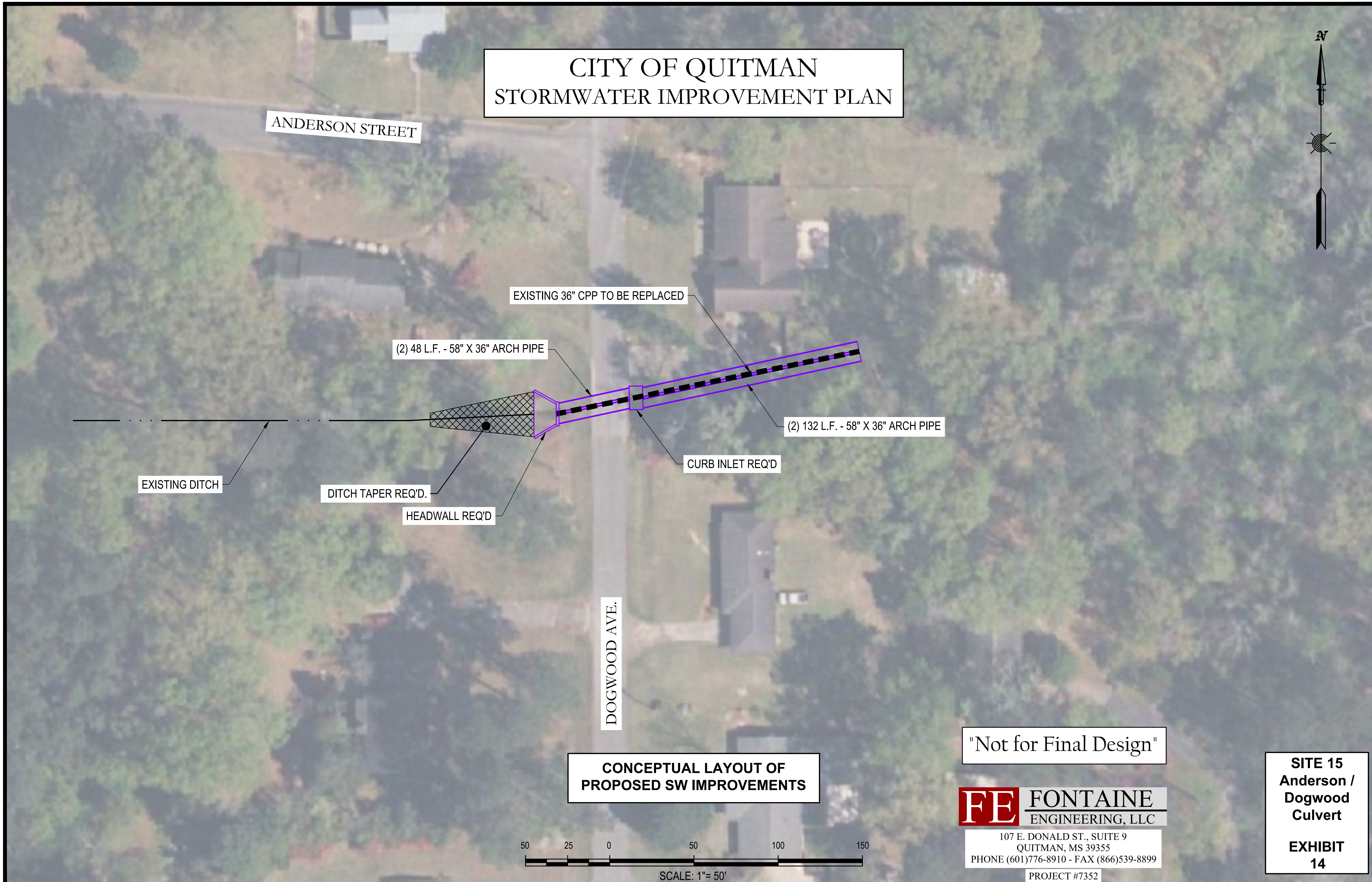

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OPINIONS OF COST

FONTAINE ENGINEERING, LLC

ESTIMATE OF PROBABLE COST

Storm Water System Improvements - Napp/Bailey Ave.
City of Quitman
Job Name Quitman, MS **Job No.** 75 **Date** 12-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$60,000.00	$60,000.00
2	Excavation	1,600	CY	$40.00	$64,000.00
3	Asphalt Demo. and Disposal	400	CY	$150.00	$60,000.00
4	Borrow Material	900	CY	$75.00	$67,500.00
5	6" Granular Material (Class 6 Limestone)	400	TN	$200.00	$80,000.00
6	58"x36" Conc. Arch Pipe	1,090	LF	$700.00	$763,000.00
7	Concrete Headwall	1	EA	$25,000.00	$25,000.00
8	18" WT Dual Wall Pipe	150	LF	$130.00	$19,500.00
9	30" WT Dual Wall Pipe	20	LF	$150.00	$3,000.00
10	Concrete Curb Inlets	12	EA	$15,000.00	$180,000.00
11	Curb and Gutter	1,200	LF	$40.00	$48,000.00
12	Hot Mix Asphalt	700	TN	$400.00	$280,000.00
13	Traffic Control	1	LS	$80,000.00	$80,000.00
14	Hydroseeding	1	AC	$10,000.00	$10,000.00
15	Erosion Control	1	LS	$6,000.00	$6,000.00
	Construction SubTotal				$1,746,000.00
	Contingency	18%			$314,280.00
	Preliminary Engineering	7.9%			$137,900.00
	Construction Engineering	3.4%			$59,400.00
	Total Project Cost				**$2,257,580.00**

The above represent preliminary cost estimates based on conceptual design of the proposed project.
All cost and design information should be verified during project design.

FONTAINE ENGINEERING, LLC

ESTIMATE OF PROBABLE COST

Storm Water System Improvements - Rail Road Culverts @ Middle School
City of Quitman

Job Name Quitman, MS **Job No.** 75 **Date** 12-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$60,000.00	$60,000.00
2	Remove and Replace Existing RR Track	100	LF	$500.00	$50,000.00
3	Remove and Replace Grade 3 Wood Ties	25	EA	$150.00	$3,750.00
4	Remove Exist. Culverts and Head Walls	1	LS	$30,000.00	$30,000.00
5	Asphalt Demo.	50	TN	$100.00	$5,000.00
6	Select Fill	450	CY	$60.00	$27,000.00
7	GeoTextile Fabric (non-woven)	560	SY	$15.00	$8,400.00
8	Limestone	120	TN	$200.00	$24,000.00
9	60" Reinf. Conc. Pipe	80	LF	$600.00	$48,000.00
10	72x36 Conc. Box Culvert (double)	96	LF	$700.00	$67,200.00
11	88x54 Reinf. Conc. Arch pipe	56	LF	$600.00	$33,600.00
12	Concrete Header Walls	1	LS	$72,000.00	$72,000.00
13	Hot Mix Asphalt	70	TN	$400.00	$28,000.00
14	Railroad Inspector	1	LS	$10,000.00	$10,000.00
15	Railroad Permit	1	LS	$15,000.00	$15,000.00
16	Hydroseeding	0.25	AC	$10,000.00	$2,500.00
17	Erosion Control	1	LS	$4,000.00	$4,000.00
	Construction SubTotal				$488,450.00
	Contingency	18%			$87,921.00
	Preliminary Engineering	9.2%			$44,900.00
	Construction Engineering	4.7%			$23,000.00
	Total Project Cost				**$644,271.00**

The above represent preliminary cost estimates based on conceptual design of the proposed project.
All cost and design information should be verified during project design.

FONTAINE ENGINEERING, LLC

ESTIMATE OF PROBABLE COST

Storm Water System Improvements - Elem./High School
City of Quitman
Job Name Quitman, MS **Job No.** 75 **Date** 12-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$60,000.00	$60,000.00
2	Excavation & Removal of Exist. Culverts	1	LS	$30,000.00	$30,000.00
3	Asphalt Demo. and Disposal	30	CY	$150.00	$4,500.00
4	Borrow Material	200	CY	$75.00	$15,000.00
5	6" Granular Material (Class 6 Limestone)	40	TN	$200.00	$8,000.00
6	18" Reinforced Conc. Pipe	140	LF	$150.00	$21,000.00
7	18" Water Tight Dual Wall HDPE Pipe	100	LF	$130.00	$13,000.00
8	24" Water Tight Dual Wall HDPE Pipe	260	LF	$145.00	$37,700.00
9	30" Reinforced Conc. Pipe	160	LF	$265.00	$42,400.00
10	36" Reinforced Conc. Pipe	40	LF	$315.00	$12,600.00
11	36" Water Tight Dual Wall HDPE Pipe	260	LF	$180.00	$46,800.00
12	42" Water Tight Dual Wall HDPE Pipe	140	LF	$220.00	$30,800.00
13	Drop Inlets w/Grates	10	EA	$8,000.00	$80,000.00
14	Concrete Curb Inlets	11	EA	$15,000.00	$165,000.00
15	Demo Conc. Walkway section and provide metal grate	1	LS	$15,000.00	$15,000.00
16	Hot Mix Asphalt	30	TN	$400.00	$12,000.00
17	Traffic Control	1	LS	$65,000.00	$65,000.00
18	Hydroseeding	1.50	AC	$10,000.00	$15,000.00
19	Erosion Control	1	LS	$12,000.00	$12,000.00
	Construction SubTotal				$685,800.00
	Contingency	18%			$123,444.00
	Preliminary Engineering	8.8%			$60,400.00
	Construction Engineering	4.5%			$30,900.00
	Total Project Cost				**$900,544.00**

The above represent preliminary cost estimates based on conceptual design of the proposed project. All cost and design information should be verified during project design.

FONTAINE ENGINEERING, LLC

ESTIMATE OF PROBABLE COST

Storm Water System Improvements - Railroad Culvert @ Sycamore Street
City of Quitman

Job Name Quitman, MS **Job No.** 75 **Date** 13-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$60,000.00	$60,000.00
2	Remove and Replace Existing Rail Road Track	140	LF	$500.00	$70,000.00
3	Remove and Replace Grade 3 Wood Ties	35	EA	$150.00	$5,250.00
4	Limestone	300	TN	$200.00	$60,000.00
5	GeoTextile	950	SY	$15.00	$14,250.00
6	Demo and Remove Existing Culverts	145	LF	$50.00	$7,250.00
7	Borrow Material	200	CY	$75.00	$15,000.00
8	Type C Filler Material (wash gravel)	180	TN	$120.00	$21,600.00
9	6x4 Box Culvert	290	LF	$900.00	$261,000.00
10	Concrete basin	1	LS	$8,000.00	$8,000.00
11	Cast In Place Head & Wing Walls	2	EA	$12,000.00	$24,000.00
12	Railroad Inspector	1	LS	$10,000.00	$10,000.00
13	Railroad Permit	1	LS	$15,000.00	$15,000.00
14	Hydroseeding	0.25	AC	$10,000.00	$2,500.00
15	Erosion Control	1	LS	$6,000.00	$6,000.00
	Construction SubTotal				$579,850.00
	Contingency	18%			$104,373.00
	Preliminary Engineering	9.0%			$52,200.00
	Construction Engineering	4.6%			$26,700.00
	Total Project Cost				**$763,123.00**

The above represent preliminary cost estimates based on conceptual design of the proposed project.
All cost and design information should be verified during project design.

FONTAINE ENGINEERING, LLC

ESTIMATE OF PROBABLE COST

Storm Water System Improvements - Railroad Culvert @ West Franklin
City of Quitman

Job Name Quitman, MS **Job No.** 75 **Date** 13-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$60,000.00	$60,000.00
2	Remove and Replace Existing Rail Road Track	200	LF	$500.00	$100,000.00
3	Remove and Replace Grade 3 Wood Ties	50	EA	$150.00	$7,500.00
4	Limestone	300	TN	$200.00	$60,000.00
5	GeoTextile	1,200	SY	$15.00	$18,000.00
6	Demo and Remove Existing Culverts	100	LF	$50.00	$5,000.00
7	Borrow Material	500	CY	$75.00	$37,500.00
8	Type C Filler Material (wash gravel)	300	TN	$120.00	$36,000.00
9	60" Reinforced Concrete Pipe	600	LF	$600.00	$360,000.00
10	Concrete wing wall and Scour protection	1	LS	$30,000.00	$30,000.00
11	Railroad Inspector	1	LS	$10,000.00	$10,000.00
12	Railroad Permit	1	LS	$15,000.00	$15,000.00
13	Hydroseeding	1.00	AC	$10,000.00	$10,000.00
14	Erosion Control	1	LS	$12,000.00	$12,000.00
	Construction SubTotal				$761,000.00
	Contingency	18%			$136,980.00
	Preliminary Engineering	8.7%			$66,200.00
	Construction Engineering	4.4%			$33,500.00
	Total Project Cost				**$997,680.00**

The above represent preliminary cost estimates based on conceptual design of the proposed project.
All cost and design information should be verified during project design.

ESTIMATE OF PROBABLE COST

Storm Water System Improvements - South Archusa Avenue Storm Drainage System
City of Quitman

Job Name Quitman, MS **Job No.** 75 **Date** 13-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$60,000.00	$60,000.00
2	10'x5' Box Culvert	300	LF	$2,500.00	$750,000.00
3	73"x45" Arch Pipe	260	LF	$600.00	$156,000.00
4	10'x3.5' Box Culvert (under hwy)	200	LF	$2,400.00	$480,000.00
5	Excavation and Removal of Asphalt &Exist. Culverts	1	LS	$150,000.00	$150,000.00
6	Clean and Restructure Existing Ditch	620	LF	$300.00	$186,000.00
7	Type C Filler Material (wash gravel)	450	TN	$120.00	$54,000.00
8	6" Granular Material (Class 6 Limestone)	150	TN	$200.00	$30,000.00
9	Cast In Place Head & Wing Walls	8	EA	$6,000.00	$48,000.00
10	Asphalt	220	TN	$400.00	$88,000.00
11	Concrete Drive Demo and Replace	12	CY	$1,000.00	$12,000.00
12	Traffic Control	1	LS	$75,000.00	$75,000.00
13	Grouted 200# Limestone Rip Rap	300	TN	$200.00	$60,000.00
14	Hydroseeding	3	AC	$10,000.00	$30,000.00
15	Erosion Control	1	LS	$50,000.00	$50,000.00
	Construction SubTotal				$2,229,000.00
	Contingency	18%			$401,220.00
	Preliminary Engineering	7.9%			$176,100.00
	Construction Engineering	3.4%			$75,800.00
	MDOT Permits	1	LS	$5,000.00	$5,000.00
	Total Project Cost				**$2,887,120.00**

The above represent preliminary cost estimates based on conceptual design of the proposed project.
All cost and design information should be verified during project design.

FONTAINE ENGINEERING, LLC

ESTIMATE OF PROBABLE COST

Storm Water System Improvements - Harris/Dart Channel
City of Quitman
Job Name Quitman, MS **Job No.** 75 **Date** 13-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$80,000.00	$80,000.00
2	73"x45" Arch Pipe	1,050	LF	$600.00	$630,000.00
3	6'x4' Reinforced Concrete box culvert	60	LF	$900.00	$54,000.00
4	Excavation and Removal of Asphalt &Exist. Culverts	1	LS	$75,000.00	$75,000.00
5	Clean and Restructure Existing Ditch	3,100	LF	$300.00	$930,000.00
6	Type C Filler Material (wash gravel)	400	TN	$120.00	$48,000.00
7	6" Granular Material (Class 6 Limestone)	250	TN	$200.00	$50,000.00
8	Cast In Place Head & Wing Walls	10	EA	$6,000.00	$60,000.00
9	Asphalt	280	TN	$400.00	$112,000.00
10	Traffic Control	1	LS	$60,000.00	$60,000.00
11	Hydroseeding	4	AC	$10,000.00	$40,000.00
12	Erosion Control	1	LS	$50,000.00	$50,000.00
	Construction SubTotal				$2,189,000.00
	Contingency	18%			$394,020.00
	Preliminary Engineering	7.9%			$172,900.00
	Construction Engineering	3.4%			$74,400.00
	Total Project Cost				**$2,830,320.00**

The above represent preliminary cost estimates based on conceptual design of the proposed project.
All cost and design information should be verified during project design.

FONTAINE ENGINEERING, LLC

ESTIMATE OF PROBABLE COST

Storm Water System Improvements- Cypress & Archusa Culverts
City of Quitman
Job Name Quitman, MS **Job No.** 75 **Date** 13-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$80,000.00	$80,000.00
2	58"x36" Arch Pipe	250	LF	$550.00	$137,500.00
3	24" Reinforced Concrete Pipe	145	LF	$145.00	$21,025.00
4	Excavation and Removal of Asphalt &Exist. Culverts	1	LS	$50,000.00	$50,000.00
5	Demolition and Removal of Concrete Slab	36,000	SF	$4.00	$144,000.00
6	Clean and Restructure Existing Ditch	1,600	LF	$300.00	$480,000.00
7	Type C Filler Material (wash gravel)	165	TN	$120.00	$19,800.00
8	6" Granular Material (Class 6 Limestone)	40	TN	$200.00	$8,000.00
9	Cast In Place Head & Wing Walls	2	EA	$6,000.00	$12,000.00
10	Asphalt	135	TN	$400.00	$54,000.00
11	Traffic Control	1	LS	$30,000.00	$30,000.00
12	Hydroseeding	3	AC	$10,000.00	$30,000.00
13	Erosion Control	1	LS	$50,000.00	$50,000.00
	Construction SubTotal				$1,116,325.00
	Contingency	18%			$200,938.50
	Preliminary Engineering	8.3%			$92,700.00
	Construction Engineering	4.0%			$44,700.00
	MDOT Permits	1	LS	$5,000.00	$5,000.00
	Total Project Cost				**$1,459,663.50**

The above represent preliminary cost estimates based on conceptual design of the proposed project.
All cost and design information should be verified during project design.

FE FONTAINE ENGINEERING, LLC

ESTIMATE OF PROBABLE COST

Storm Water System Improvements - Kirkland Channel
City of Quitman

Job Name Quitman, MS **Job No.** 75 **Date** 14-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$60,000.00	$60,000.00
2	Excavation and Removal of Exist. Asphalt & Culverts	1	LS	$20,000.00	$20,000.00
3	44x27 Reinforced Conc. Culvert	120	LF	$500.00	$60,000.00
4	Clean and Restructure Existing Ditch	830	LF	$300.00	$249,000.00
5	Cut New 4' Wide Flat Bottom Ditch	350	LF	$350.00	$122,500.00
6	Type C Filler Material (wash gravel)	50	TN	$120.00	$6,000.00
7	6" Granular Material (Class 6 Limestone)	25	TN	$200.00	$5,000.00
8	Cast In Place Head & Wing Walls	2	EA	$6,000.00	$12,000.00
9	Asphalt	100	TN	$250.00	$25,000.00
10	Traffic Control	1	LS	$20,000.00	$20,000.00
11	Erosion Control	1	LS	$3,000.00	$3,000.00
12	Hydroseeding	0.25	AC	$10,000.00	$2,500.00
	Construction SubTotal				$585,000.00
	Contingency	18%			$105,300.00
	Preliminary Engineering	9.0%			$52,700.00
	Construction Engineering	4.6%			$26,900.00
	Total Project Cost				**$769,900.00**

The above represent preliminary cost estimates based on conceptual design of the proposed project. All cost and design information should be verified during project design.

FONTAINE ENGINEERING, LLC

ESTIMATE OF PROBABLE COST

Storm Water System Improvements - North Jackson Avenue Drainage
City of Quitman

Job Name Quitman, MS **Job No.** 75 **Date** 1-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$50,000.00	$50,000.00
2	Excavation & Removal of Exist. Ashpalt & Culverts	1	LS	$20,000.00	$20,000.00
3	36" Reinforced Conc. Pipe	40	LF	$350.00	$14,000.00
4	Type C Filler Material (wash gravel)	15	TN	$120.00	$1,800.00
5	Borrow Material	25	CY	$75.00	$1,875.00
6	6" Granular Material (Class 6 Limestone)	10	TN	$200.00	$2,000.00
7	Cast In Place Head & Wing Walls	2	EA	$8,000.00	$16,000.00
8	New Curb Inlet	6		$12,000.00	$72,000.00
9	Asphalt	40	TN	$400.00	$16,000.00
10	Traffic Control	1	LS	$20,000.00	$20,000.00
11	Hydroseeding	0.10	AC	$3,000.00	$300.00
12	Erosion Control	1	LS	$3,000.00	$3,000.00
	Construction SubTotal				$216,975.00
	Contingency	18%			$39,055.50
	Preliminary Engineering	10.5%			$22,800.00
	Construction Engineering	5.3%			$11,500.00
	Total Project Cost				**$290,330.50**

The above represent preliminary cost estimates based on conceptual design of the proposed project.
All cost and design information should be verified during project design.

FONTAINE ENGINEERING, LLC

ESTIMATE OF PROBABLE COST

Storm Water System Improvements - Shirley Drive Culvert
City of Quitman

Job Name Quitman, MS **Job No.** 75 **Date** 14-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$20,000.00	$20,000.00
2	Excavation and Removal of Exist. Asphalt & Culverts	1	LS	$15,000.00	$15,000.00
3	44x27 Reinforced Conc. Culvert	160	LF	$500.00	$80,000.00
4	Type C Filler Material (wash gravel)	60	TN	$120.00	$7,200.00
5	6" Granular Material (Class 6 Limestone)	30	TN	$200.00	$6,000.00
6	Cast In Place Head & Wing Walls	2	EA	$8,000.00	$16,000.00
7	Asphalt	60	TN	$400.00	$24,000.00
8	Traffic Control	1	LS	$6,000.00	$6,000.00
9	Erosion Control	1	LS	$1,500.00	$1,500.00
10	Hydroseeding	0.05	AC	$10,000.00	$500.00
	Construction SubTotal				$176,200.00
	Contingency	18%			$31,716.00
	Preliminary Engineering	10.6%			$18,700.00
	Construction Engineering	5.6%			$9,900.00
	Total Project Cost				**$236,516.00**

The above represent preliminary cost estimates based on conceptual design of the proposed project. All cost and design information should be verified during project design.

ESTIMATE OF PROBABLE COST

Storm Water System Improvements - Stokes Circle Culvert
City of Quitman

Job Name Quitman, MS **Job No.** 75 **Date** 14-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$20,000.00	$20,000.00
2	Excavation and Removal of Exist. Asphalt & Culverts	1	LS	$15,000.00	$15,000.00
3	51x31 Reinforced Concrete Arch Pipe	120	LF	$700.00	$84,000.00
4	Type C Filler Material (wash gravel)	30	TN	$120.00	$3,600.00
5	6" Granular Material (Class 6 Limestone)	15	TN	$200.00	$3,000.00
6	Cast In Place Head & Wing Walls	2	EA	$8,000.00	$16,000.00
7	Asphalt	30	TN	$400.00	$12,000.00
8	Traffic Control	1	LS	$6,000.00	$6,000.00
9	Erosion Control	1	LS	$1,500.00	$1,500.00
10	Hydroseeding	0.05	AC	$10,000.00	$500.00
	Construction SubTotal				$161,600.00
	Contingency	18%			$29,088.00
	Preliminary Engineering	11.1%			$17,900.00
	Construction Engineering	6.3%			$10,200.00
	Total Project Cost				**$218,788.00**

The above represent preliminary cost estimates based on conceptual design of the proposed project. All cost and design information should be verified during project design.

ESTIMATE OF PROBABLE COST

Storm Water System Improvements - Pineview Culvert
City of Quitman
Job Name Quitman, MS **Job No.** 75 **Date** 14-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$60,000.00	$60,000.00
2	Excavation and Removal of Exist. Asphalt, Culv. & Conc.	1	LS	$50,000.00	$50,000.00
3	18" WT Dual Wall HDPE Culverts	420	LF	$130.00	$54,600.00
4	Type C Filler Material (wash gravel)	40	TN	$120.00	$4,800.00
5	6" Granular Material (Class 6 Limestone)	50	TN	$200.00	$10,000.00
6	Concrete (@ Driveways)	100	CY	$600.00	$60,000.00
7	Traffic Control	1	LS	$10,000.00	$10,000.00
8	Erosion Control	1	LS	$5,000.00	$5,000.00
9	Hydroseeding	2.00	AC	$10,000.00	$20,000.00
	Construction SubTotal				$274,400.00
	Contingency	18%			$49,392.00
	Preliminary Engineering	10.3%			$28,300.00
	Construction Engineering	5.1%			$14,000.00
	Total Project Cost				**$366,092.00**

The above represent preliminary cost estimates based on conceptual design of the proposed project. All cost and design information should be verified during project design.

FONTAINE ENGINEERING, LLC

ESTIMATE OF PROBABLE COST

Storm Water System Improvements- Anderson/Dogwood Culverts
City of Quitman
Job Name Quitman, MS **Job No.** 75 **Date** 19-Feb-25

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization	1	LS	$30,000.00	$30,000.00
2	58"x36" Arch Pipe	360	LF	$700.00	$252,000.00
3	Excavation and Removal of Asphalt &Exist. Culverts	1	LS	$30,000.00	$30,000.00
4	Type C Filler Material (wash gravel)	200	TN	$120.00	$24,000.00
5	6" Granular Material (Class 6 Limestone)	60	TN	$200.00	$12,000.00
6	Cast In Place Head & Wing Walls	4	EA	$6,000.00	$24,000.00
7	Asphalt	170	TN	$400.00	$68,000.00
8	Traffic Control	1	LS	$10,000.00	$10,000.00
9	Hydroseeding	0.25	AC	$10,000.00	$2,500.00
10	Erosion Control	1	LS	$5,000.00	$5,000.00
	Construction SubTotal				$457,500.00
	Contingency	18%			$82,350.00
	Preliminary Engineering	9.4%			$43,000.00
	Construction Engineering	4.8%			$22,000.00
	Total Project Cost				**$604,850.00**

The above represent preliminary cost estimates based on conceptual design of the proposed project.
All cost and design information should be verified during project design.

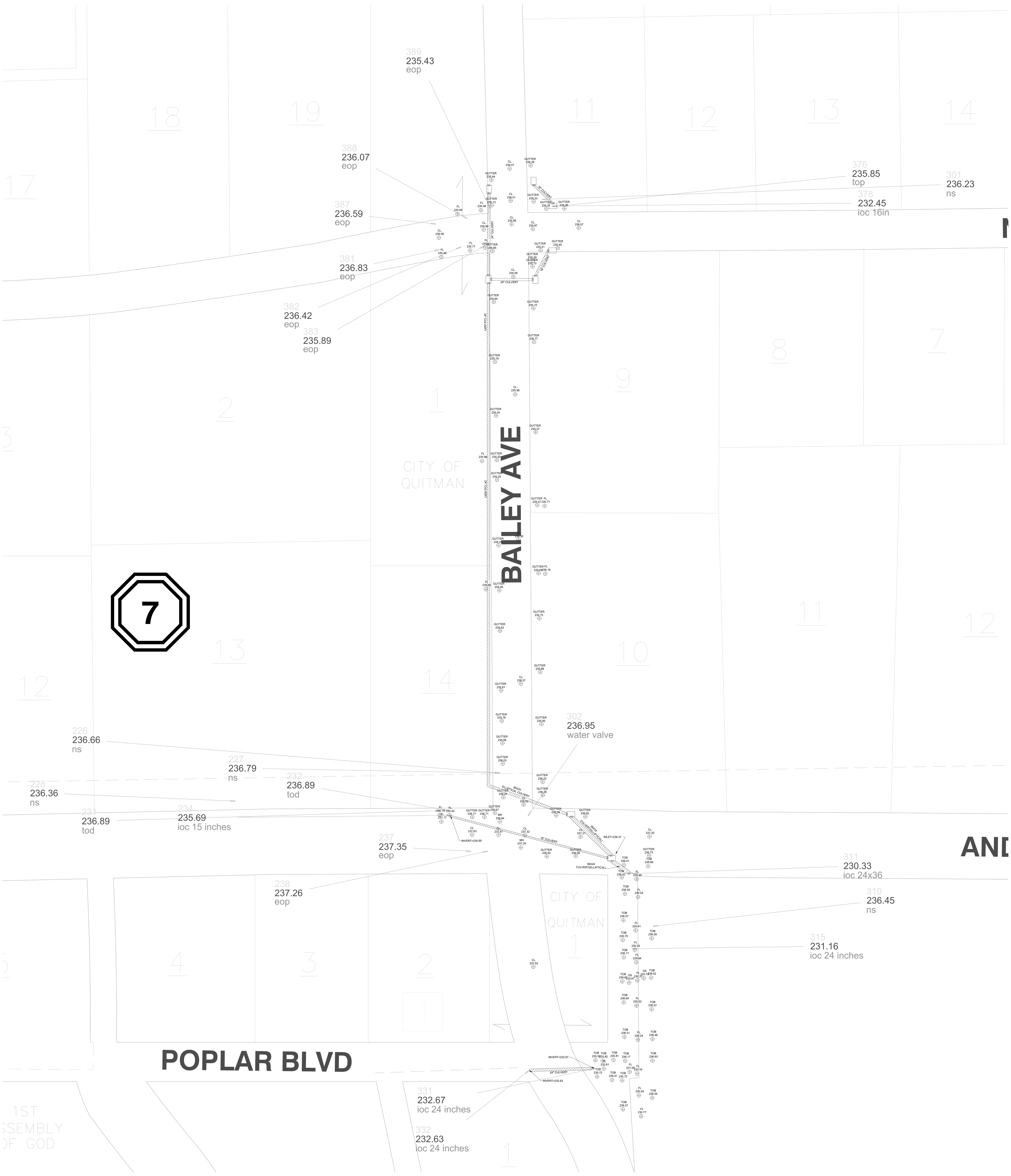
APPENDICES

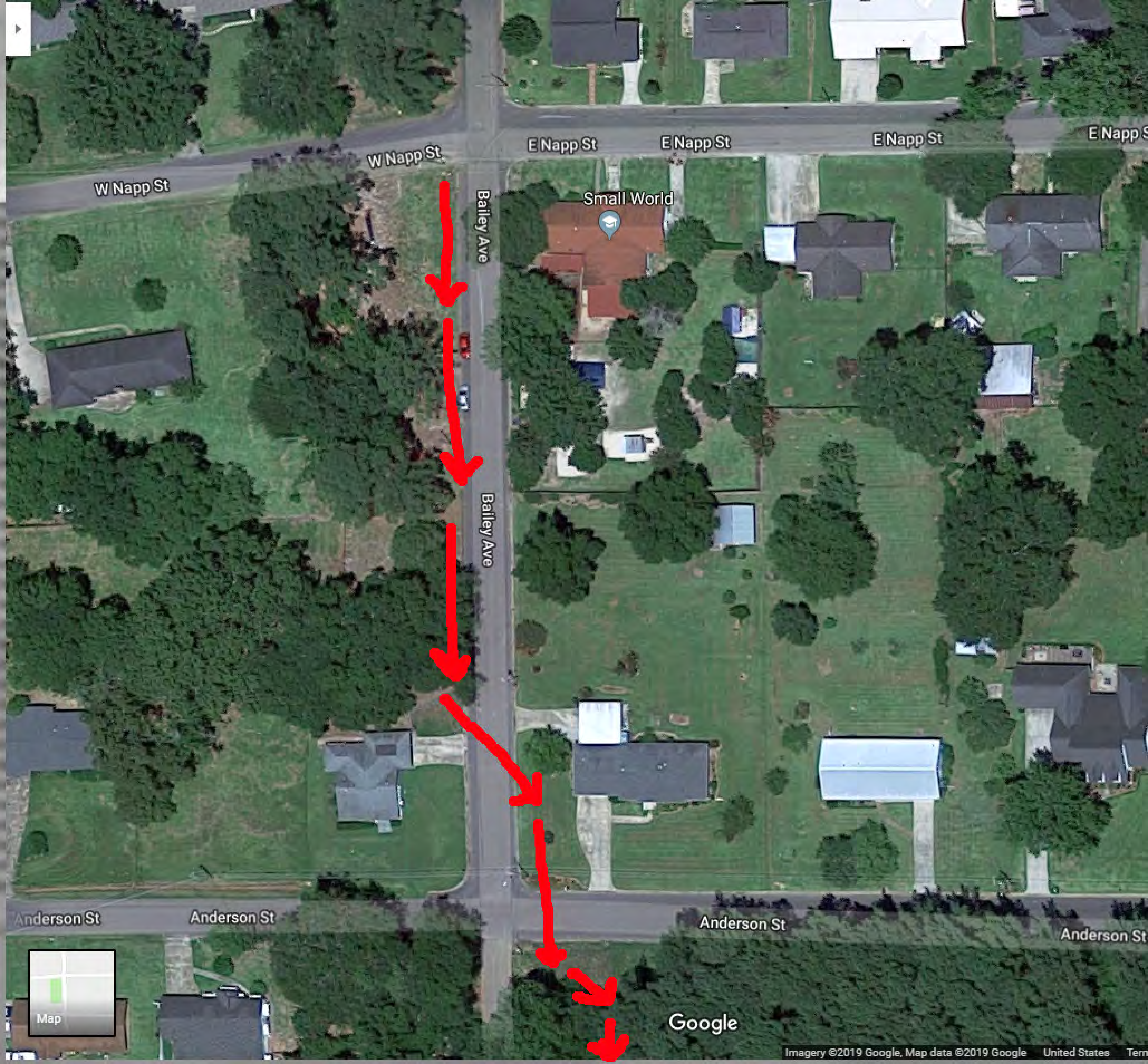
APPENDIX A

NAPP/BAILEY STORM DRAIN SYSTEM

- Existing Conditions Layout
- Flow Directions
- Plan View
- Storm Drain Tabulation
- Storm Drain Layout Page 1
- Storm Drain Layout Page 2
- Storm Drain Plots
- Culvert Inspection Reports

EXISTING CONDITIONS

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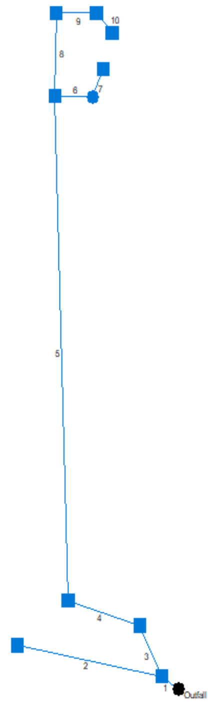


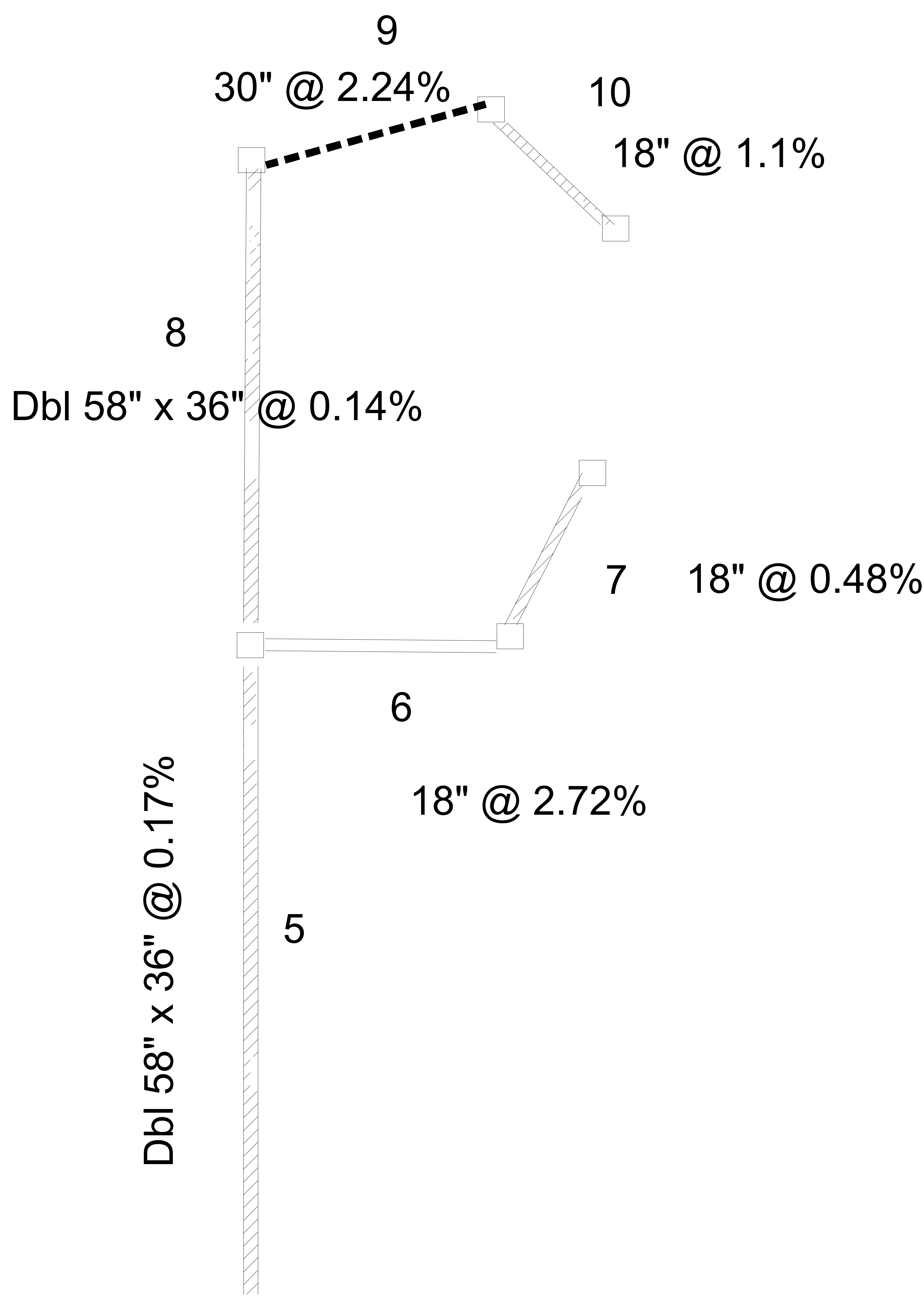
Project file: NappBaileyDesign.stm	No. Lines: 10	09-18-2023

Storm Sewer Tabulation

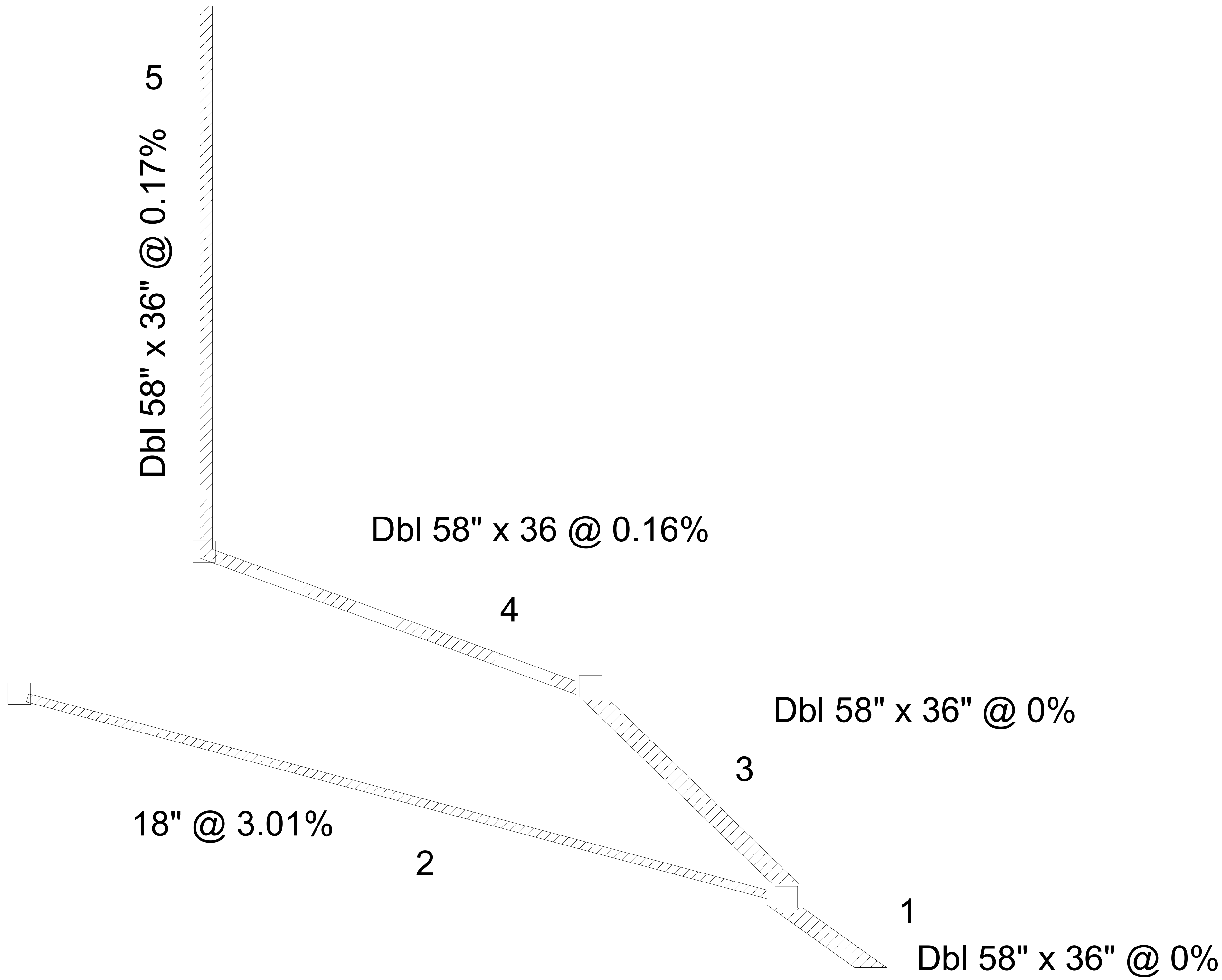
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	17.0	0.10	37.20	0.60	0.06	22.32	5.0	10.8	7.4	166.1	0.00	7.29	36 91 b	0.00	230.18	230.18	233.24	233.18	236.41	236.66	Dbl 58 x 36
2	1	124.0	1.70	1.70	0.60	1.02	1.02	6.0	6.0	8.5	8.64	18.21	5.73	18	3.01	235.69	231.96	236.81	233.24	236.77	236.41	
3	1	43.0	5.00	35.40	0.60	3.00	21.24	6.0	10.7	7.5	158.5	0.00	6.95	36 91 b	0.00	230.22	230.22	233.39	233.24	236.25	236.41	Dbl 58 x 36
4	3	63.0	4.40	30.40	0.60	2.64	18.24	9.0	10.5	7.5	136.8	109.0	6.29	36 91 b	0.16	230.74	230.64	233.60	233.50	234.94	236.25	Dbl 58 x 36
5	4	383.0	0.90	26.00	0.60	0.54	15.60	7.0	9.3	7.7	120.6	111.8	5.77	36 91 b	0.17	231.39	230.75	234.05	233.60	235.13	234.94	Dbl 58 x 36
6	5	32.0	0.00	1.00	0.60	0.00	0.60	0.0	5.1	8.7	5.21	17.32	2.95	18	2.72	232.30	231.43	234.13	234.05	235.45	235.13	
7	6	23.0	1.00	1.00	0.60	0.60	0.60	5.0	5.0	8.7	5.23	7.26	2.96	18	0.48	232.58	232.47	234.19	234.13	235.13	235.45	
8	5	63.0	12.40	24.10	0.60	7.44	14.46	8.0	9.1	7.8	112.4	103.4	5.59	36 91 b	0.14	231.49	231.40	234.13	234.05	234.95	235.13	Dbl 58 x 36
9	8	34.0	9.40	11.70	0.60	5.64	7.02	8.0	9.1	7.8	54.66	61.32	11.14	30	2.24	232.23	231.47	234.72	234.13	235.33	234.95	
10	9	20.0	2.30	2.30	0.60	1.38	1.38	9.0	9.0	7.8	10.76	11.01	6.09	18	1.10	232.45	232.23	234.93	234.72	235.31	235.33	

Project File: NappBaileyDesign.stm | Number of lines: 10 | Run Date: 09-18-2023

NOTES: Intensity = 154.35 / (Inlet time + 23.70) ^ 0.86; Return period = 25 Yrs.



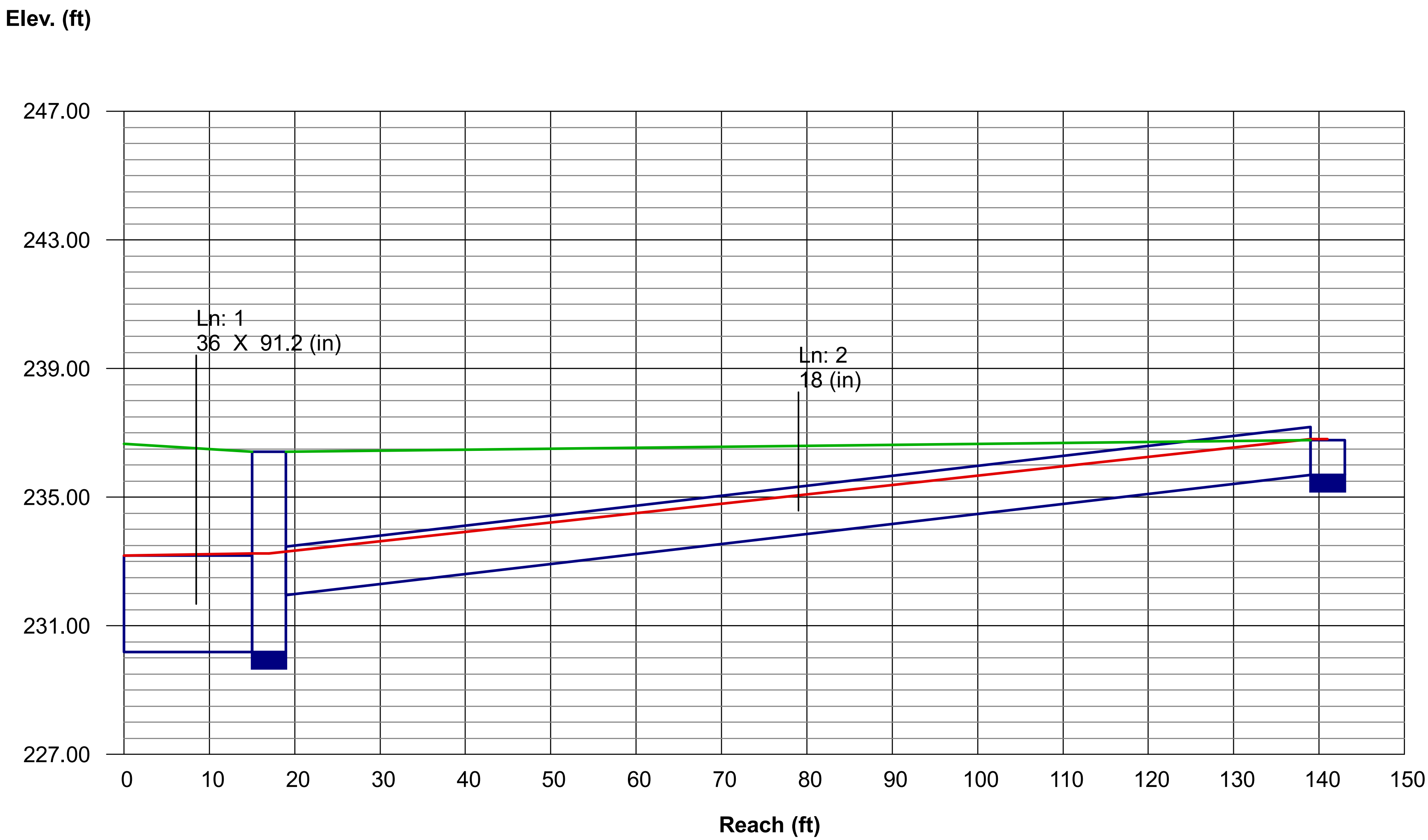
Napp-Bailey Layout page 1



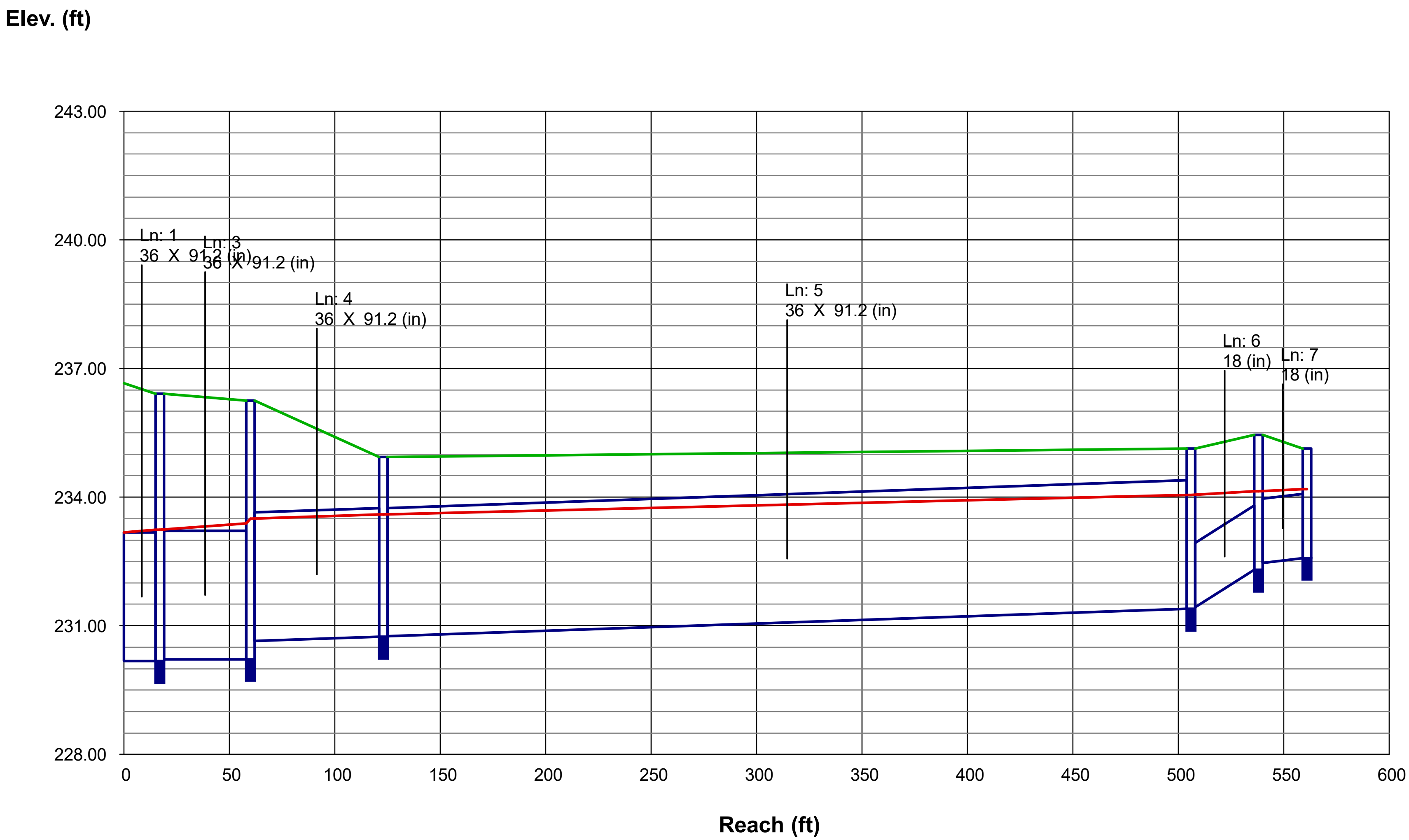
Napp-Bailey Layout Page 2

Storm Sewer Profile

Proj. file: NappBaileyDesign.stm

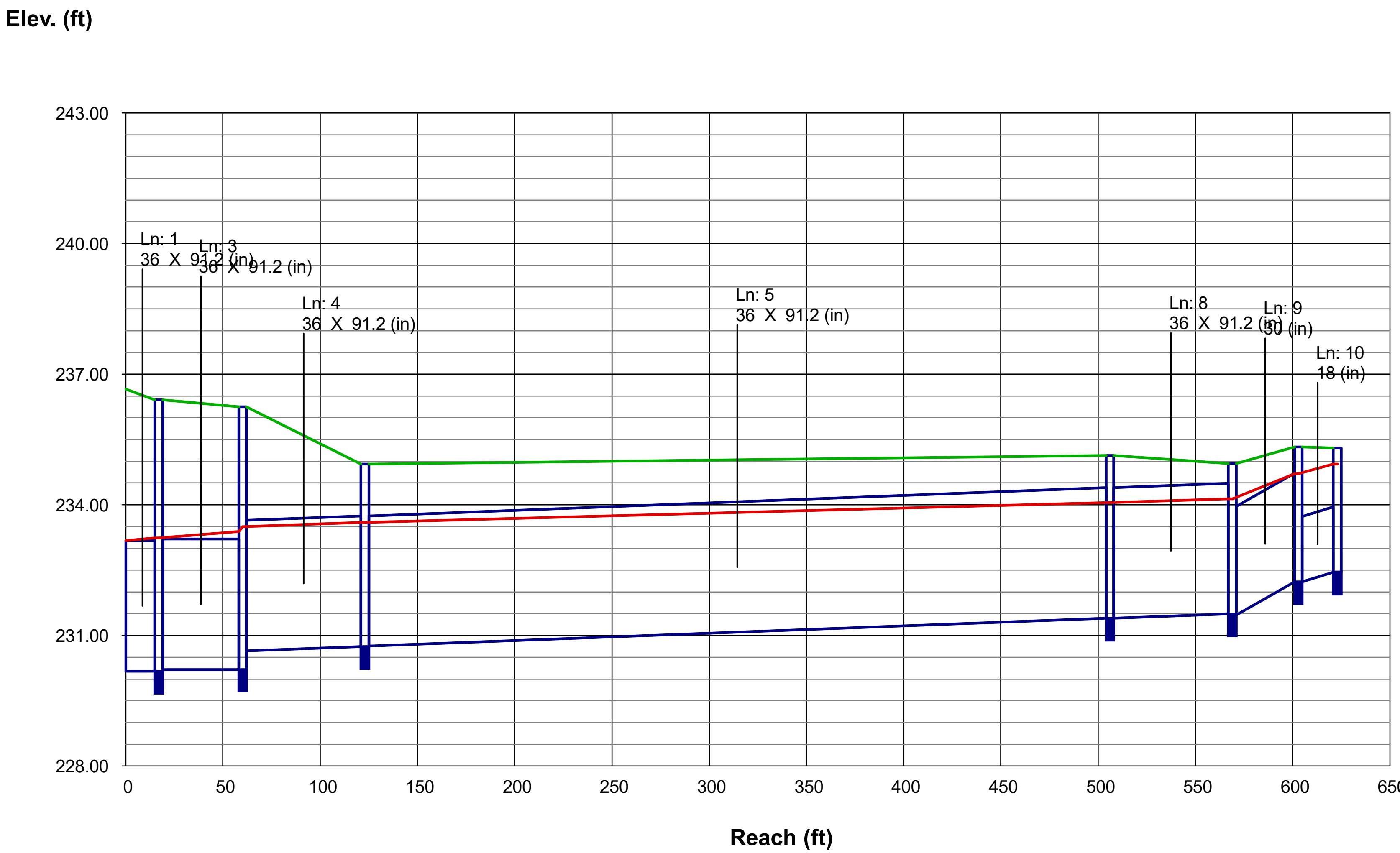


Storm Sewer Profile



2 of 3

Storm Sewer Profile



ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: ANDERSON ST.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #1617 CVI36	Size: 12" / Type: CORR. METAL
Condition: ☑ Poor ❑ Fair ❑ Good	High water elevation or height above inlet
OUTLET - Depth of silt ❑ < 0.5' ☑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: ANDERSON ST.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #1623 CVI40	Size: 36"	Type: CONC.
Condition: ❑ Poor ☑ Fair ☑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ❑ < 0.5' ❑ 0.5' - 1' ☑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

APPENDIX B

RAILROAD CULVERT AT MIDDLE SCHOOL

- Hydrology Summary
- HY-8 Report
- Watershed boundary
- Culvert Inspection Report
- Hydrographs
- Soil Data Report

Proposed Replacement Culvert near Middle School (at Railroad)

Hydrology Summary

Basin Parameters

Drainage Area (acres)	Runoff Curve Number	Basin Slope (percent)	Hydraulic Length (feet)	Storm Distribution	Time Interval (min)
84.4	68.7	4.4	2,776	Type III	2

Peak Discharges

2-yr Recurrence Peak Discharge (cfs)	5-yr Recurrence Peak Discharge (cfs)	10-yr Recurrence Peak Discharge (cfs)	25-yr Recurrence Peak Discharge (cfs)	50-yr Recurrence Peak Discharge (cfs)	100-yr Recurrence Peak Discharge (cfs)
65	98	129	177	218	261

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 261 cfs

Design Flow: 261 cfs

Maximum Flow: 443.07 cfs

Table 1 - Summary of Culvert Flows at Crossing: Railroad Str A Proposed

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
261.00	261.00	228.56	4.804	4.163	1-S2n	2.305	3.267	2.798	5.730	11.186	0.000
279.21	279.21	228.78	5.016	4.292	5-S2n	2.397	3.381	2.909	5.730	11.416	0.000
297.41	297.41	228.99	5.231	4.430	5-S2n	2.488	3.492	3.017	5.730	11.644	0.000
315.62	315.62	229.21	5.452	4.576	5-S2n	2.578	3.598	3.123	5.730	11.868	0.000
333.83	333.83	229.44	5.679	4.821	5-S2n	2.668	3.699	3.226	5.730	12.095	0.000
352.03	352.03	229.67	5.913	5.683	5-S2n	2.758	3.797	3.326	5.730	12.324	0.000
370.24	370.24	229.92	6.156	5.904	5-S2n	2.847	3.893	3.425	5.730	12.553	0.000
388.45	388.45	230.17	6.407	6.130	5-S2n	2.937	3.982	3.521	5.730	12.785	0.000
406.66	406.66	230.43	6.667	6.361	5-S2n	3.028	4.066	3.614	5.730	13.018	0.000
424.86	424.86	230.70	6.938	6.599	5-S2n	3.120	4.143	3.706	5.730	13.254	0.000
443.07	443.07	230.98	7.217	6.844	5-S2n	3.213	4.218	3.797	5.730	13.496	0.000

Straight Culvert

Inlet Elevation (invert): 223.76 ft, Outlet Elevation (invert): 223.42 ft
Culvert Length: 33.00 ft, Culvert Slope: 0.0103
Culvert Length: 33.00 ft, Culvert Slope: 0.0103

Site Data - Culvert 1

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 223.76 ft
Outlet Station: 33.00 ft
Outlet Elevation: 223.42 ft
Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular
Barrel Diameter: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Beveled Edge (1.5:1)
Inlet Depression: None

Table 2 - Culvert Summary Table: Culvert 1

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
228.56	261.00	261.00	0.00	1
228.78	279.21	279.21	0.00	1
228.99	297.41	297.41	0.00	1
229.21	315.62	315.62	0.00	1
229.44	333.83	333.83	0.00	1
229.67	352.03	352.03	0.00	1
229.92	370.24	370.24	0.00	1
230.17	388.45	388.45	0.00	1
230.43	406.66	406.66	0.00	1
230.70	424.86	424.86	0.00	1
230.98	443.07	443.07	0.00	1
231.00	444.47	444.47	0.00	Overtopping

Water Surface Profile Plot for Culvert: Culvert 1

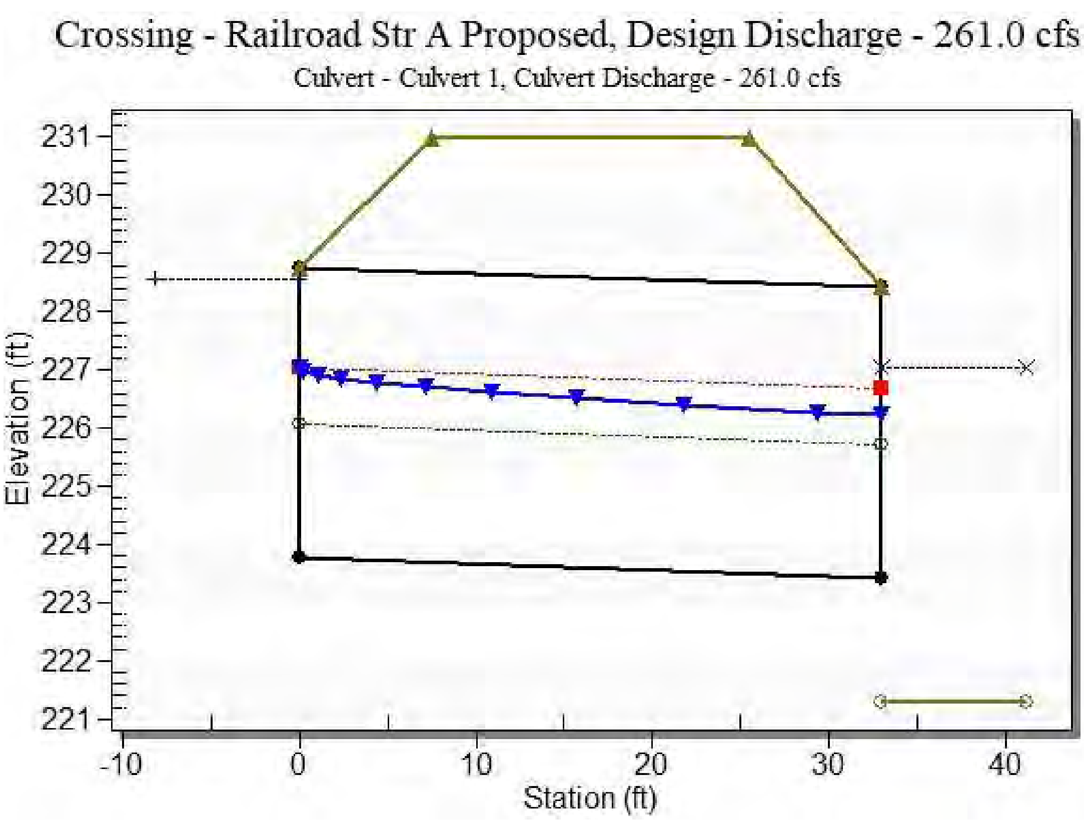


Table 3 - Downstream Channel Rating Curve (Crossing: Railroad Str A Proposed)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
129.00	224.77	224.77	0.00
142.20	225.00	225.00	0.00
155.40	225.23	225.23	0.00
168.60	225.46	225.46	0.00
181.80	225.70	225.70	0.00
195.00	225.94	225.94	0.00
208.20	226.14	226.14	0.00
221.40	226.30	226.30	0.00
234.60	226.50	226.50	0.00
247.80	226.76	226.76	0.00
261.00	227.03	227.03	0.00

Tailwater Channel Data - Railroad Str A Proposed

Tailwater Channel Option: Enter Rating Curve

Channel Invert Elevation: 221.30 ft

Roadway Data for Crossing: Railroad Str A Proposed

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 1000.00 ft

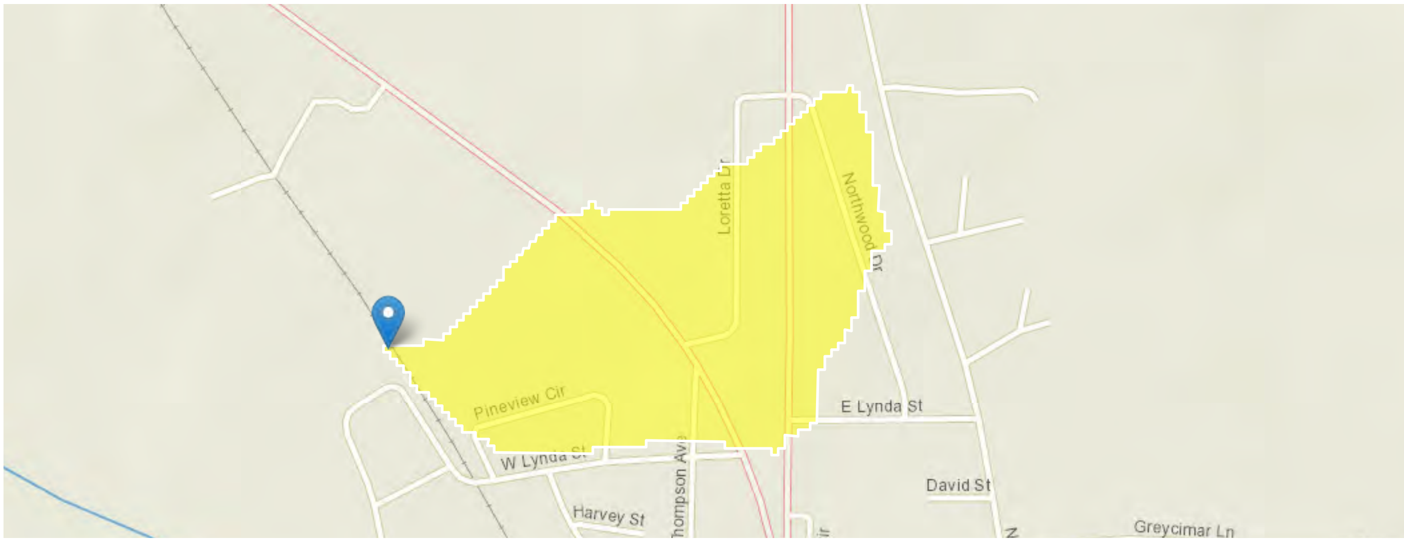
Crest Elevation: 231.00 ft

Roadway Surface: Paved

Roadway Top Width: 18.00 ft

StreamStats Report

Region ID: MS
Workspace ID: MS20240427174953859000
Clicked Point (Latitude, Longitude): 32.05537, -88.73422
Time: 2024-04-27 12:50:16 -0500



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CSL10_85fm	Change in elevation between points 10 and 85 percent of length along main channel to basin divide divided by length between points ft per mi	118	feet per mi
DRNAREA	Area that drains to a point on a stream	0.0916	square miles
ELEVMAX	Maximum basin elevation	306	feet
LAT_CENT	Latitude of Basin Centroid	32.0559	decimal degrees
LC11ADEV	Area of developed land-use from NLCD 2011 classes 21-24	0.05	square miles
LC11ADEVHI	Area of developed land, high intensity, NLCD 2011 class 24	0	square miles
LC11ADEVLO	Area of developed land, low intensity, from NLCD 2011 class 22	0.02	square miles
LC11ADEVMD	Area of developed land, medium intensity, NLCD 2011 class 23	0	square miles
LC11ADVOPN	Area of developed open land from NLCD 2011 class 21	0.03	square miles
LC11AWATER	Area of water from NLCD 2011 class 11	0	square miles
LC11AWETL	Area of wetlands from NLCD 2011 classes 90 and 95	0	square miles
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	54.7	percent
LC11DEVLMH	Percentage drainage area that is in low to high developed land-use classes 22-24 from NLCD 2011	23.8	percent
LC11DINT	Impervious percentage computed as ((.10*A21+.25*A22+.65*A23+.90*A24)/DA)*100 from NLCD 2011	10.81	percent
LC11FOREST	Percentage of forest from NLCD 2011 classes 41-43	24.3	percent
LC11STOR	Percentage of water bodies and wetlands determined from the NLCD 2011	2.57	percent
LC11WATER	Percent of open water, class 11, from NLCD 2011	0	percent
LC11WETLND	Percentage of wetlands, classes 90 and 95, from NLCD 2011	2.57	percent
LFPLENGTH	Length of longest flow path	0.6	miles
LONG_CENT	Longitude Basin Centroid	88.7296	decimal degrees

NOTE The location of Shirley Drive shown on this form is incorrect. This is the RR culvert near the middle school..

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: SHIRLEY DRIVE		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #1630-1631 CVI45	Size: 36"	Type: CONC.
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ☑ < 0.5' ❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

Hydrograph Report

Hyd. No. 3

Middle School Culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 65.31 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 84.40 ac	Curve number	= 68.7
Basin Slope	= 4.4 %	Hydraulic length	= 2776 ft
Tc method	= LAG	Time of conc. (Tc)	= 47.6 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 465,617 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.60	65.31 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

Middle School Culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 98.36 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Drainage area	= 84.40 ac	Curve number	= 68.7
Basin Slope	= 4.4 %	Hydraulic length	= 2776 ft
Tc method	= LAG	Time of conc. (Tc)	= 47.6 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 682,507 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.60	98.36 <<

...End

Hydrograph Report

Hyd. No. 3

Middle School Culvert

Hydrograph type	=	SCS Runoff	Peak discharge	=	129.46 cfs
Storm frequency	=	10 yrs	Time interval	=	2 min
Drainage area	=	84.40 ac	Curve number	=	68.7
Basin Slope	=	4.4 %	Hydraulic length	=	2776 ft
Tc method	=	LAG	Time of conc. (Tc)	=	47.6 min
Total precip.	=	6.27 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

Hydrograph Volume = 887,355 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.57	129.46 <<

...End

Hydrograph Report

Hyd. No. 3

Middle School Culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 177.46 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 84.40 ac	Curve number	= 68.7
Basin Slope	= 4.4 %	Hydraulic length	= 2776 ft
Tc method	= LAG	Time of conc. (Tc)	= 47.6 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,206,173 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.57	177.46 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

Middle School Culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 217.71 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 84.40 ac	Curve number	= 68.7
Basin Slope	= 4.4 %	Hydraulic length	= 2776 ft
Tc method	= LAG	Time of conc. (Tc)	= 47.6 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,476,512 cuft

Hydrograph Discharge Table

Time -- (hrs	**Outflow cfs)**
12.57	217.71 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

Middle School Culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 260.67 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 84.40 ac	Curve number	= 68.7
Basin Slope	= 4.4 %	Hydraulic length	= 2776 ft
Tc method	= LAG	Time of conc. (Tc)	= 47.6 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,767,938 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.57	260.67 <<

...End

Map Scale: 1:6,390 if printed on A landscape (11" x 8.5") sheet.

N

0 50 100 200 300 Meters

0 300 600 1200 1800 Feet

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 Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:15,800.

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: http://websoilsurvey.nrcs.usda.gov
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: Clarke County, Mississippi
Survey Area Data: Version 13, Sep 28, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 27, 2010—Feb 14, 2011

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.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Clarke County, Mississippi (MS023)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	17.5	14.8%
BtF	Boswell, Shubuta, and Cuthbert fine sandy loams, 12 to 45 percent slopes (sweatman)	C	2.2	1.8%
OfB2	Ora fine sandy loam, 2 to 5 percent slopes, moderately eroded	C/D	37.0	31.3%
OfC	Ora fine sandy loam, 5 to 8 percent slopes	C	7.6	6.4%
OfC2	Ora fine sandy loam, 5 to 8 percent slopes, eroded	C/D	20.6	17.4%
PrA	Prentiss fine sandy loam, 0 to 2 percent slopes	C	9.0	7.6%
RuB2	Ruston fine sandy loam, 2 to 5 percent slopes, moderately eroded	B	17.5	14.8%
SfA	Savannah fine sandy loam, 0 to 2 percent slopes	C/D	2.7	2.2%
SmC	Smithdale fine sandy loam, 5 to 8 percent slopes	A	0.6	0.5%
SmD	Smithdale fine sandy loam, 8 to 12 percent slopes	B	3.5	3.0%
Totals for Area of Interest			**118.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

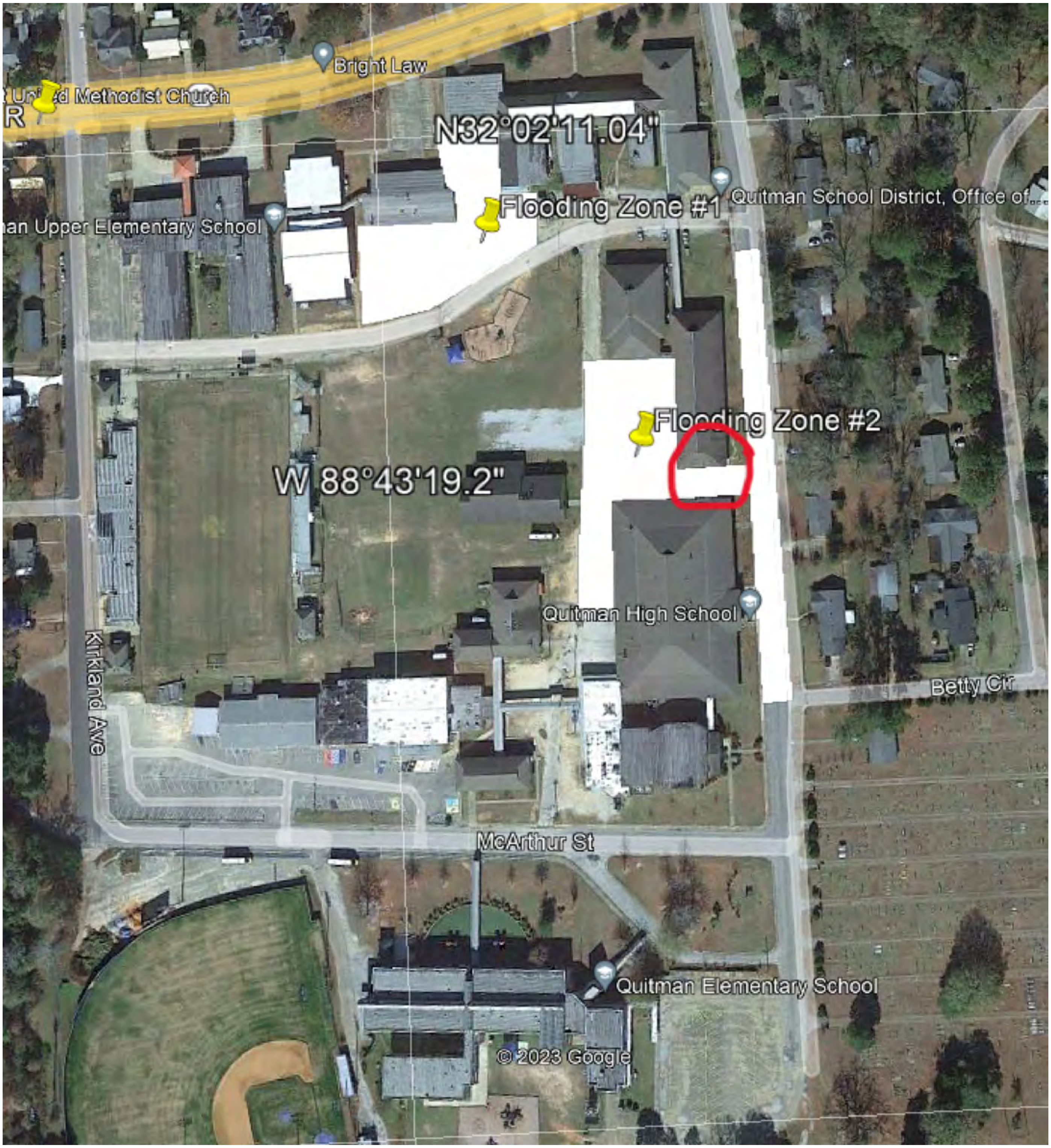
Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

APPENDIX C

ELEMENTARY/HIGH SCHOOL STORM DRAIN SYSTEM

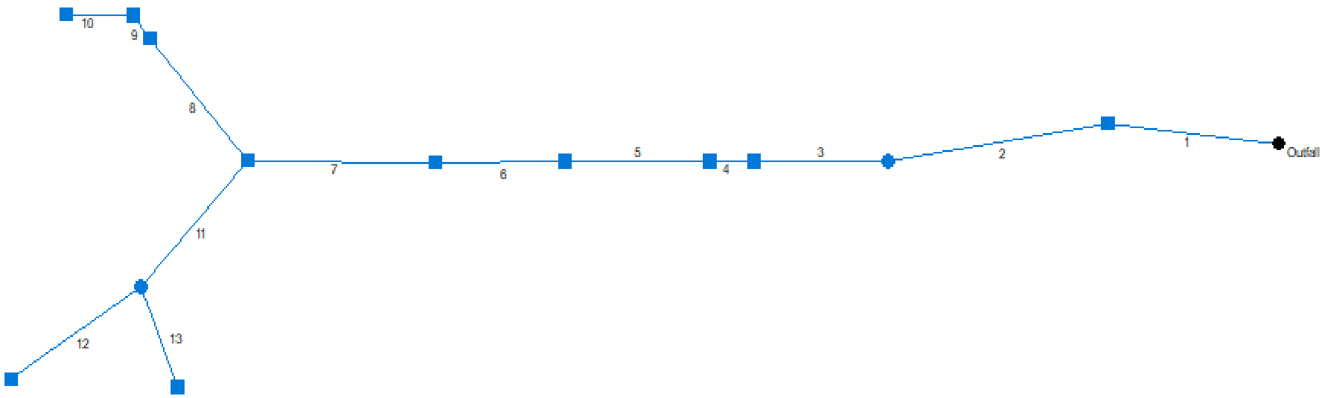
- Flooding Zones Layout
- Drainage Areas and Layout
- Plan View
- Storm Drain Tabulation
- Storm Drain Plots
- Culvert Inspection Report



LOCATION OF FLOODING AREAS AT ELEMENTARY SCHOOL

DRAINAGE AREAS AND STORM DRAIN LAYOUT, ELEMENTARY SCHOOL

Hydraflow Plan View



Project file: StormDrains.stm	No. Lines: 13	08-04-2024

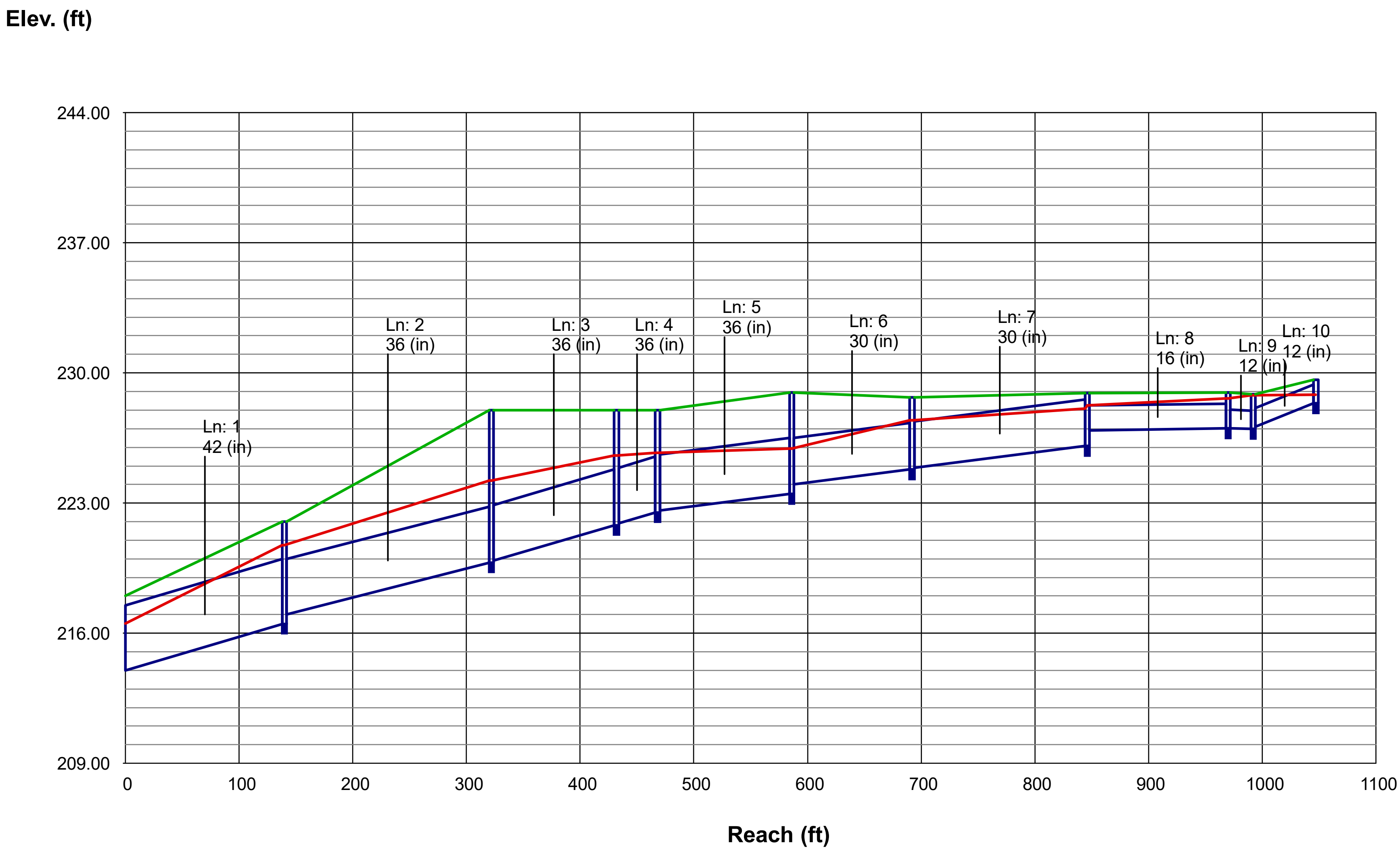
Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	140.0	1.90	12.50	0.65	1.24	8.13	5.0	11.2	7.5	60.67	134.4	8.45	42	1.79	216.50	214.00	220.74	216.51	222.00	218.00	
2	1	182.0	0.00	10.60	0.65	0.00	6.89	5.0	10.8	7.6	52.23	82.72	8.18	36	1.54	219.80	217.00	224.20	220.74	228.00	222.00	
3	2	110.0	2.00	10.60	0.65	1.30	6.89	5.0	10.6	7.6	52.70	87.65	7.46	36	1.73	221.80	219.90	225.55	224.20	228.00	228.00	
4	3	36.0	2.00	8.60	0.65	1.30	5.59	5.0	10.5	7.7	42.91	86.10	6.07	36	1.67	222.50	221.90	225.70	225.55	228.00	228.00	
5	4	118.0	2.30	6.60	0.65	1.50	4.29	5.0	10.1	7.8	33.44	57.92	5.15	36	0.75	223.49	222.60	225.93	225.70	228.93	228.00	
6	5	106.0	0.90	4.30	0.65	0.59	2.80	5.0	9.8	7.9	22.11	35.63	6.12	30	0.75	224.80	224.00	227.46	225.93	228.68	228.93	
7	6	154.0	0.30	3.40	0.65	0.20	2.21	5.0	9.2	8.1	17.96	35.59	4.61	30	0.75	226.06	224.90	228.09	227.46	228.91	228.68	
8	7	124.0	0.20	0.70	0.65	0.13	0.46	5.0	6.2	9.5	4.32	2.18	3.09	16	0.08	227.01	226.91	228.64	228.24	228.93	228.91	
9	8	22.0	0.40	0.50	0.65	0.26	0.33	5.0	6.1	9.5	3.10	0.00	3.95	12	-0.23	226.98	227.03	228.80	228.64	228.87	228.93	
10	9	55.0	0.10	0.10	0.65	0.07	0.07	5.0	5.0	10.2	0.66	5.37	1.36	12	2.27	228.36	227.11	228.82	228.80	229.64	228.87	
11	7	131.0	0.00	2.40	0.65	0.00	1.56	5.0	8.7	8.3	12.94	16.05	5.24	24	0.50	227.14	226.48	229.14	228.09	230.00	228.91	
12	11	128.0	2.30	2.30	0.65	1.50	1.50	5.0	5.0	10.2	15.23	15.99	5.24	24	0.50	227.94	227.30	229.97	229.14	230.00	230.00	
13	11	84.2	0.10	0.10	0.65	0.07	0.07	5.0	5.0	10.2	0.66	7.42	0.38	18	0.50	227.72	227.30	229.14	229.14	230.00	230.00	

Project File: StormDrains.stm | Number of lines: 13 | Run Date: 08-04-2024

NOTES: Intensity = 50.49 / (Inlet time + 5.60) ^ 0.68; Return period = 25 Yrs.

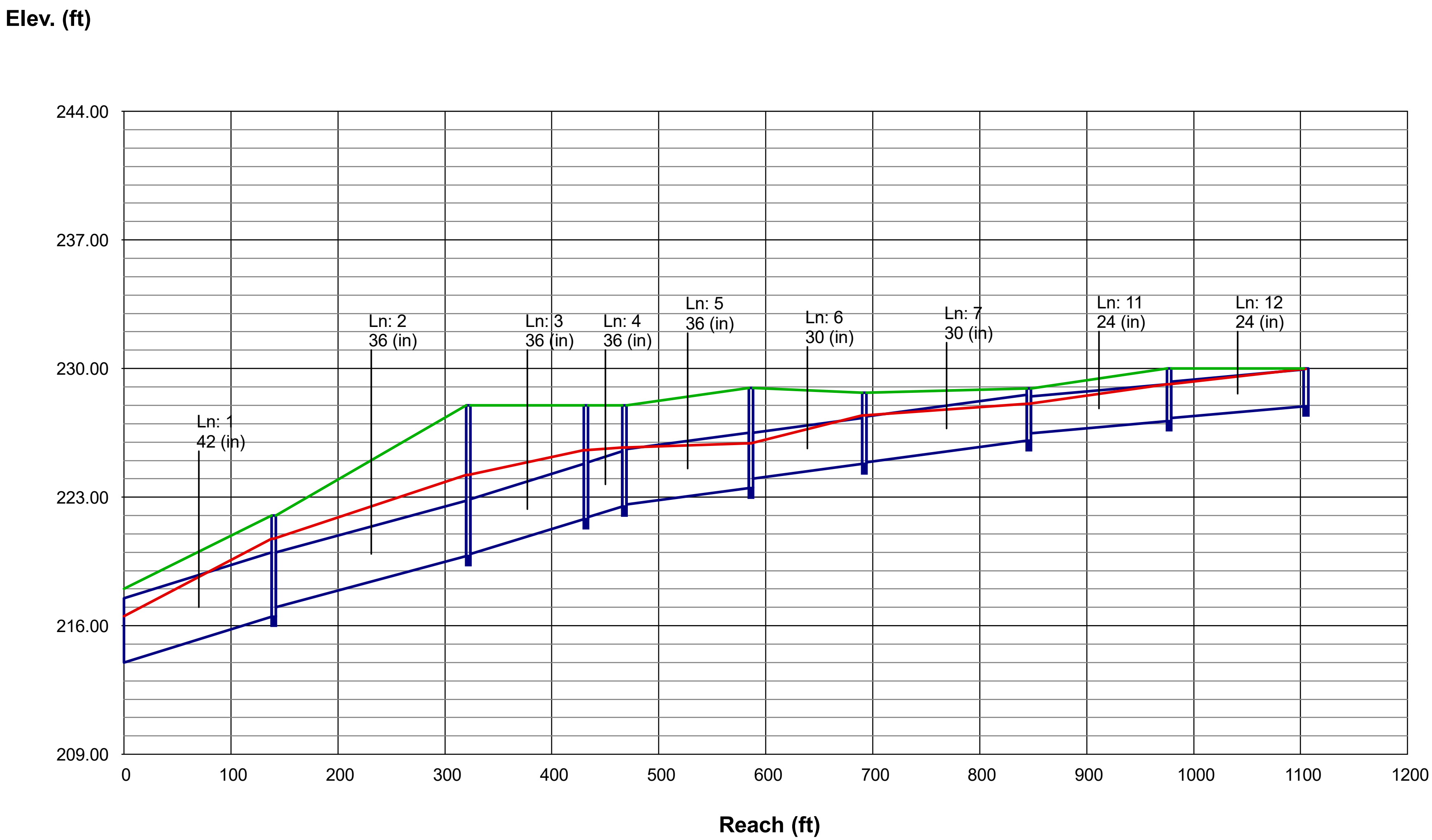
Storm Sewer Profile



Storm Sewer Profile

Hydraflow Storm Sewers

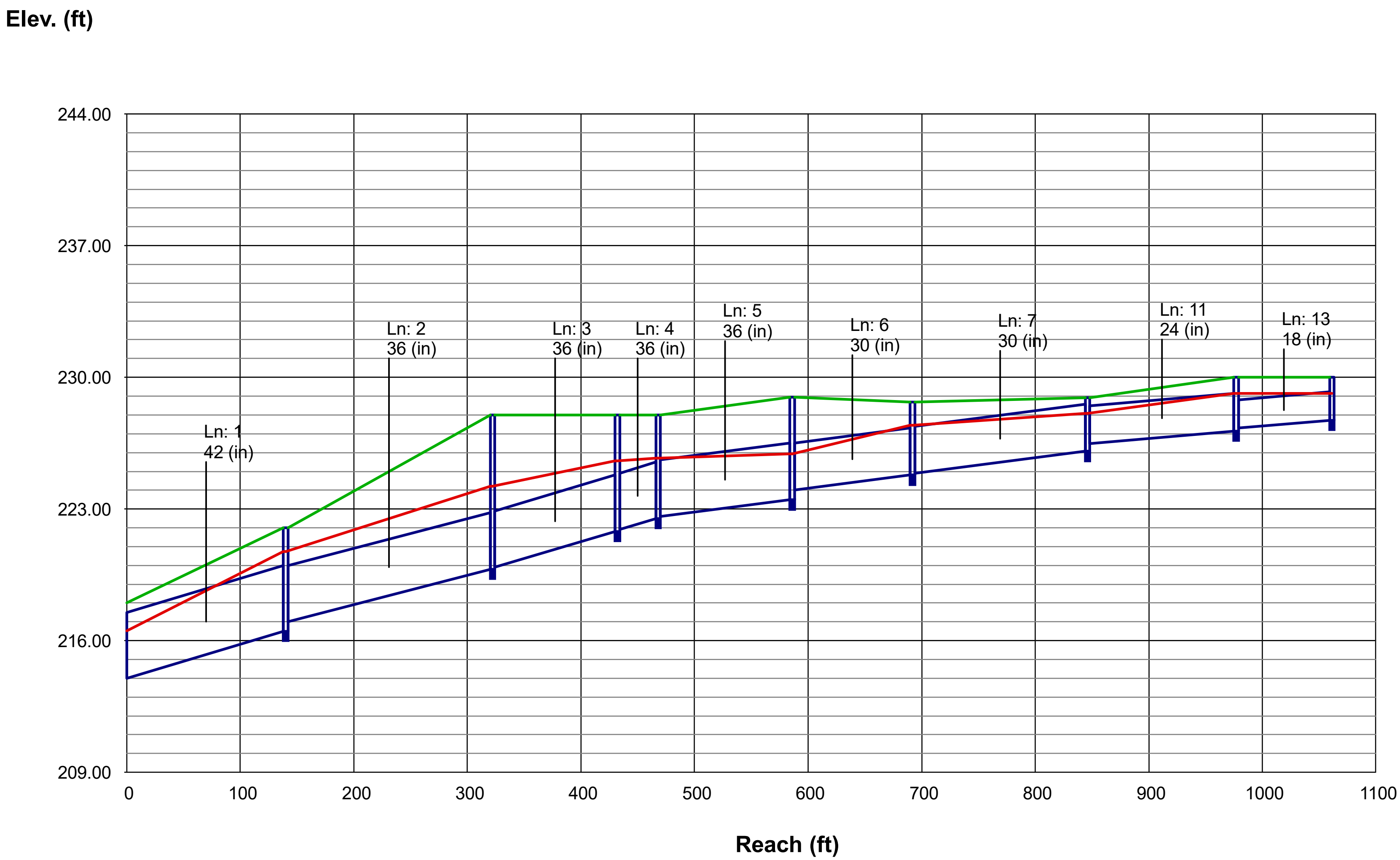
Proj. file: StormDrains.stm



Storm Sewer Profile

Hydraflow Storm Sewers

Proj. file: StormDrains.stm



ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:
Location: S JACKSON AVE.	Date:
Inspector:	

EXISTING STRUCTURE:

Reference no.: #2793-2796 CVI66-67	Size: 10" / Type: METAL.
Condition: ☐ Poor ☐ Fair ☑ Good	High water elevation or height above inlet
OUTLET - Depth of silt ☑ < 0.5' ☐ 0.5' - 1' ☐ 1' - 2' ☐ > 2'	OUTLET - Erosion ☐ None ☐ Major ☐ Minor ☐ Severe w/undermining

FLOW:

☐ Continous ☐ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ☐ Stock pass Does irrigation ditch carry runoff: ☐ yes ☐ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

APPENDIX D

HOWARD INDUSTRIES PARKING LOT

- Survey from Saul Surveying and Mapping
- Flow Direction Arrows from Quitman Study

IMAGE #1679

IMAGE #2036

IMAGE #2256

IMAGE #2277

IMAGE #2278

IMAGE #2287

FOR EXHIBITS "A–I" SEE SHEET 2

APR–CURVE DATA
RADIUS: 5,600.00'
ARC LENGTH: 792.23'
CHORD LENGTH: 791.57'
CHORD BEARING: S 03°07'28" E

APS–CURVE DATA
RADIUS: 5600.00'
ARC LENGTH: 792.23'
CHORD BEARING: S 03°10'44" E
CHORD DISTANCE: 791.57'

= SIGN
TP = TELEPHONE POLE
MP = METER POLE
PP = POWER POLE
= LAMP POLE
= GUY WIRE
W = WATER METER
G = GAS METER
DG = DRAIN GRATE
DI = DRAIN INLET
CI = CURB INLET
CO = CLEAN OUT
WV = WATER VALVE
= TELEPHONE BOX
FO = FIBER OPTIC MARKER
= BOLLARD
= FIRE HYDRANT
S = SEWER MANHOLE
TOB = TOP OF BANK
TOE = TOE OF DITCH
EOC = EDGE OF CONCRETE
EOP = EDGE OF PAVEMENT
EOG = EDGE OF GRAVEL
EOR = EDGE OF ROCK
BOC = BACK OF CURB
CSF = COTTON SPINDLE FD
RBF = 1/2" REBAR FD
RBS = 1/2" REBAR SET
MNF = MAGNETIC NAIL FD
MNS = MAGNETIC NAIL SET
MFP = METAL FENCE POST
FEB = FIRE EQUIPMENT BOX
TRL = TREE LINE
APR = AS PER RECORD (CCBS–104–22)
APS = AS PER SURVEY
= MILLED ASPHALT
= CHAIN LINK FENCE
P = POWER POLE
S = SEWER LINE
V = WATER LINE
GAS = GAS LINE
= RAILROAD TRACKS

NOTE: NOT ALL EASEMENTS AND ROW'S LOCATED – OBSERVED OR RECORDED
NOT ALL SUBSURFACE FEATURES LOCATED
NOT ALL STRUCTURES AND FEATURES LOCATED

SAUL SURVEYING AND MAPPING, LLC.
454 SHORT 7th AVENUE - LAUREL, MS 39440
PHONE:(601) 428-0600 - FAX: (601) 649-2372
EMAIL: hsaul@saulsurveying.com
PROFESSIONAL SURVEYOR
ALABAMA LICENSE #28446 / MISSISSIPPI LICENSE #02829

SURVEY DATE:	08/01/23
DRAWING DATE:	09/05/23
SCALE:	1" = 60'
SURVEY CLASS:	B
DWG. NO.:	072423A1 (SHEET 1)
BEARING DETERMINED BY GPS	
PREPARED BY: CW	CHECKED BY: PC
PARTY CHIEF: BV	APPROVED BY: HJS
SURVEY PARTY:	
NO TITLE RESEARCH DONE BY THIS SURVEYOR	

MS 02829 AL 28446
PROFESSIONAL SURVEYOR

0 60' 120'

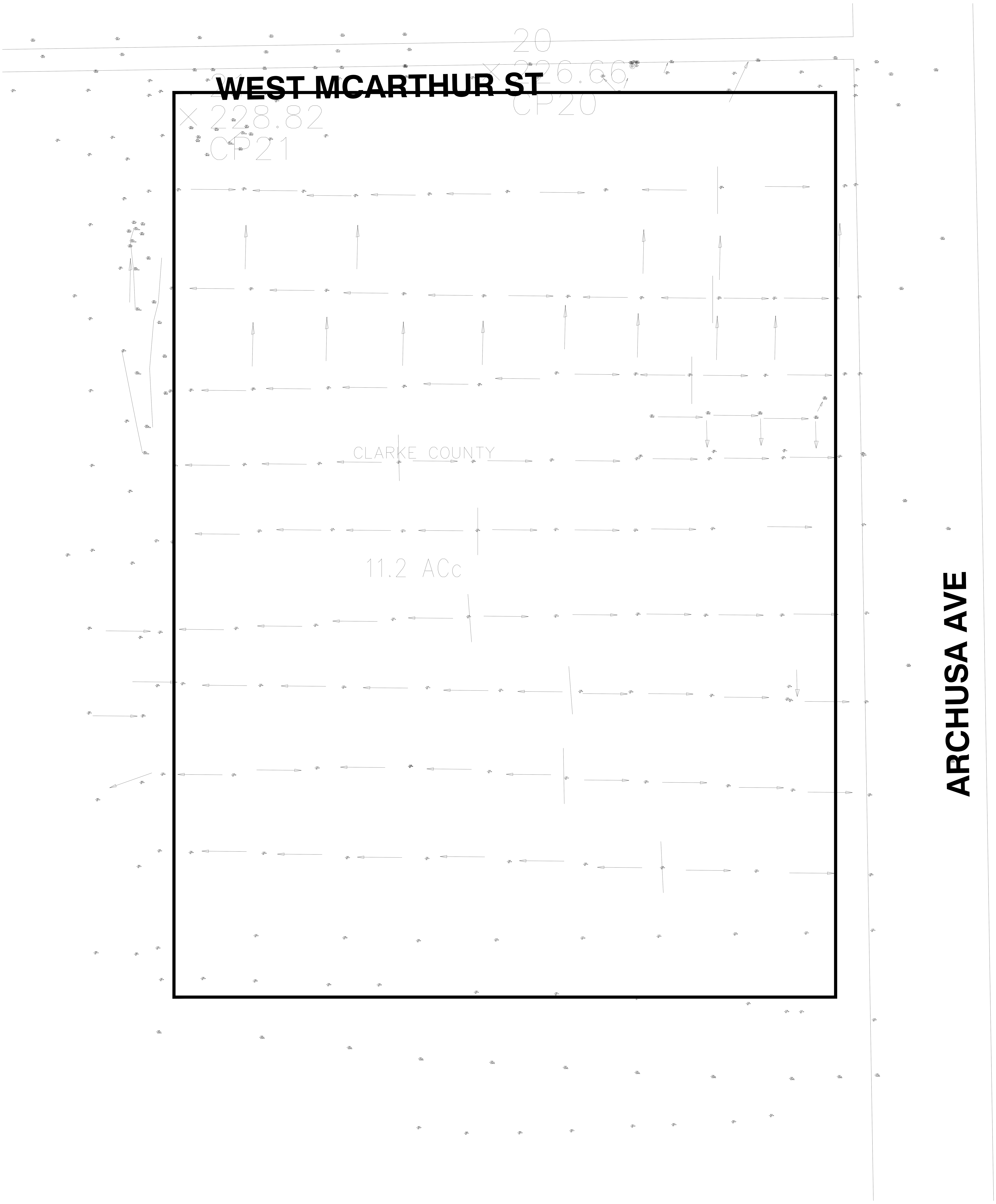
PURPOSE OF SURVEY: TOPO & BOUNDARY

LOCATION: EAST 1/2 OF SEC.11–T2N–R15E, CLARKE COUNTY, MISSISSIPPI

NAME: HOWARD INDUSTRIES 500 S. ARCHUSA AVE

REFERENCE MATERIALS: GLO NOTES; CLARK BOUNDARY PLAT CCBS–104–22; CLIENT'S INSTRUCTIONS.

HARVEY J. SAUL
REGISTERED PROFESSIONAL LAND SURVEYOR
PLS-02829
STATE OF MISSISSIPPI


WEST MCARTHUR ST
20
× 226.66
CP20
× 228.82
CP21
CLARKE COUNTY
11.2 ACc
ARCHUSA AVE

APPENDIX E

RAILROAD CULVERT AT SYCAMORE

- Hydrology Summary
- HY-8 Report
- Watershed boundary
- Culvert Inspection Report
- Hydrographs
- Soil Data Report

Proposed Replacement Culvert near Sycamore Street (at Railroad)

Hydrology Summary

Basin Parameters

Drainage Area (acres)	Runoff Curve Number	Basin Slope (percent)	Hydraulic Length (feet)	Storm Distribution	Time Interval (min)
170	71	4.0	6,080	Type III	5

Peak Discharges

2-yr Recurrence Peak Discharge (cfs)	5-yr Recurrence Peak Discharge (cfs)	10-yr Recurrence Peak Discharge (cfs)	25-yr Recurrence Peak Discharge (cfs)	50-yr Recurrence Peak Discharge (cfs)	100-yr Recurrence Peak Discharge (cfs)
100	148	193	261	317	377

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 100 cfs

Design Flow: 261 cfs

Maximum Flow: 377 cfs

Table 1 - Summary of Culvert Flows at Crossing: Proposed Main line and Spur at Dart

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
222.56	100.00	100.00	0.00	1
223.17	127.70	127.70	0.00	1
223.78	155.40	155.40	0.00	1
224.41	183.10	183.10	0.00	1
225.08	210.80	210.80	0.00	1
225.81	238.50	238.50	0.00	1
226.44	261.00	261.00	0.00	1
227.31	293.90	289.36	3.65	30
227.35	321.60	290.59	30.26	6
227.38	349.30	291.42	56.54	4
227.40	377.00	292.16	84.15	4
227.30	288.96	288.96	0.00	Overtopping

Rating Curve Plot for Crossing: Proposed Main line and Spur at Dart

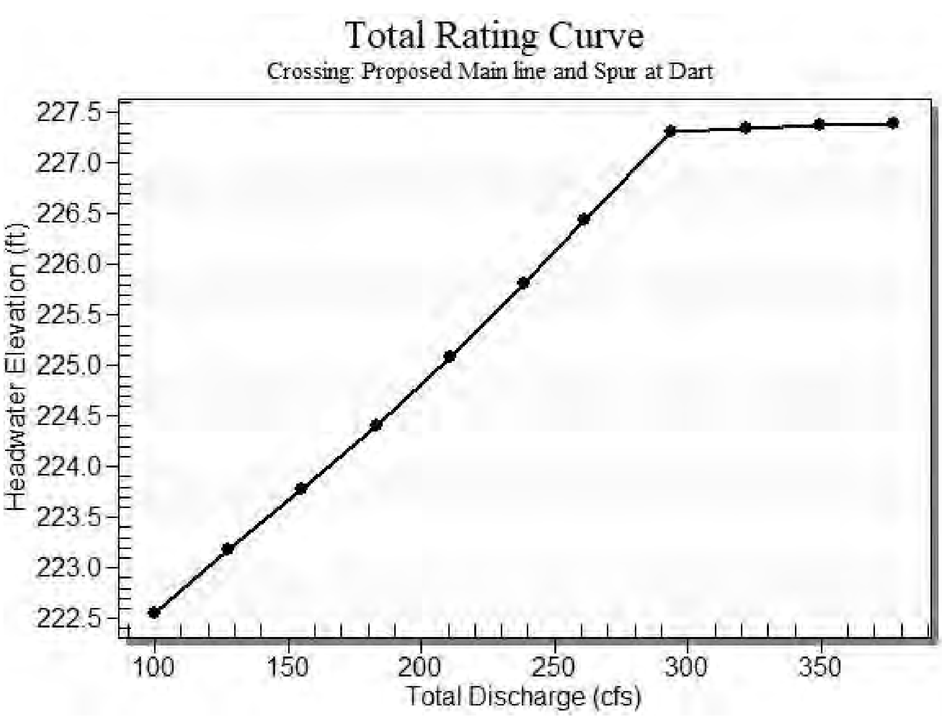


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
100.00	100.00	222.56	3.170	3.071	1-JS1f	1.330	2.051	4.000	4.210	4.167	3.490
127.70	127.70	223.17	3.784	3.356	1-JS1f	1.574	2.414	4.000	4.210	5.321	3.490
155.40	155.40	223.78	4.394	3.860	5-JS1f	1.807	2.752	4.000	4.360	6.475	3.609
183.10	183.10	224.41	5.024	4.537	5-JS1f	2.032	3.070	4.000	4.613	7.629	3.809
210.80	210.80	225.08	5.693	5.266	5-JS1f	2.249	3.372	4.000	4.849	8.783	3.983
238.50	238.50	225.81	6.417	6.047	5-JS1f	2.462	3.661	4.000	5.069	9.938	4.129
261.00	261.00	226.44	7.053	6.722	5-JS1f	2.631	3.888	4.000	5.237	10.875	4.233
293.90	289.36	227.31	7.923	7.656	4-FFf	2.841	4.000	223.390	5.466	12.057	4.362
321.60	290.59	227.35	7.962	7.881	4-FFf	2.850	4.000	4.000	5.658	12.108	4.471
349.30	291.42	227.38	7.989	8.081	4-FFf	2.856	4.000	4.000	5.836	12.143	4.558
377.00	292.16	227.40	8.013	7.717	4-FFf	2.861	4.000	223.390	6.008	12.173	4.638

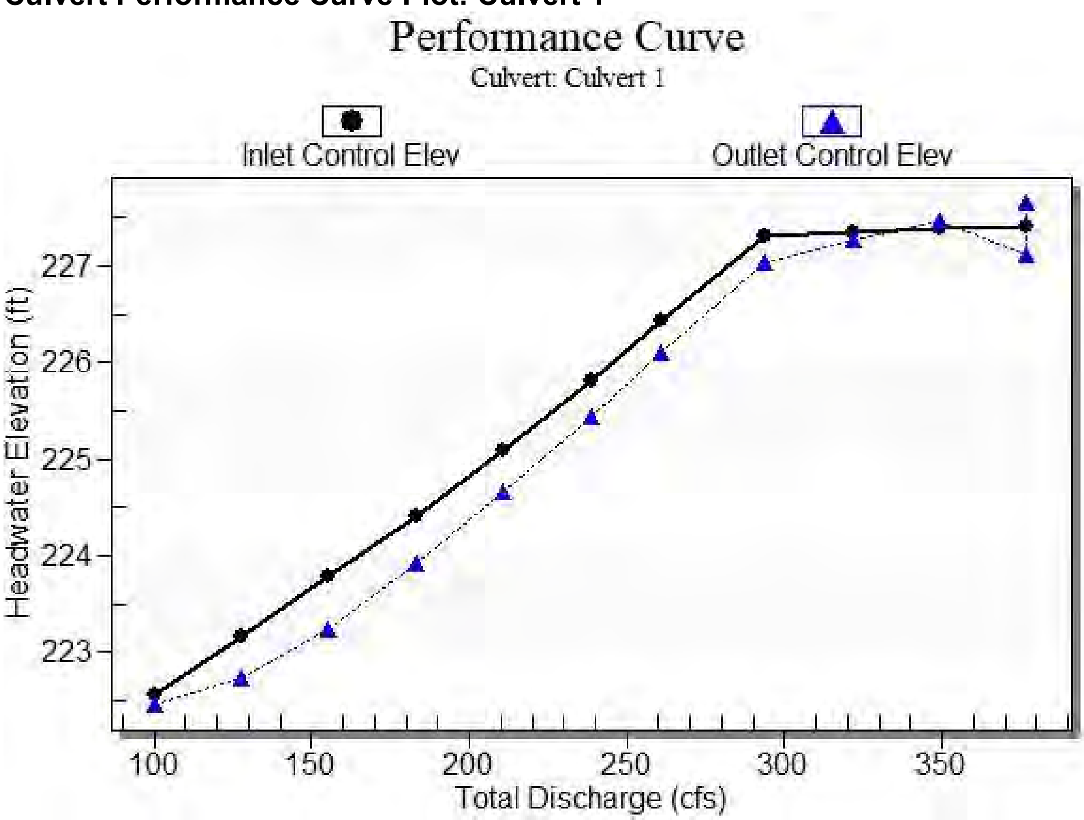
****

Straight Culvert

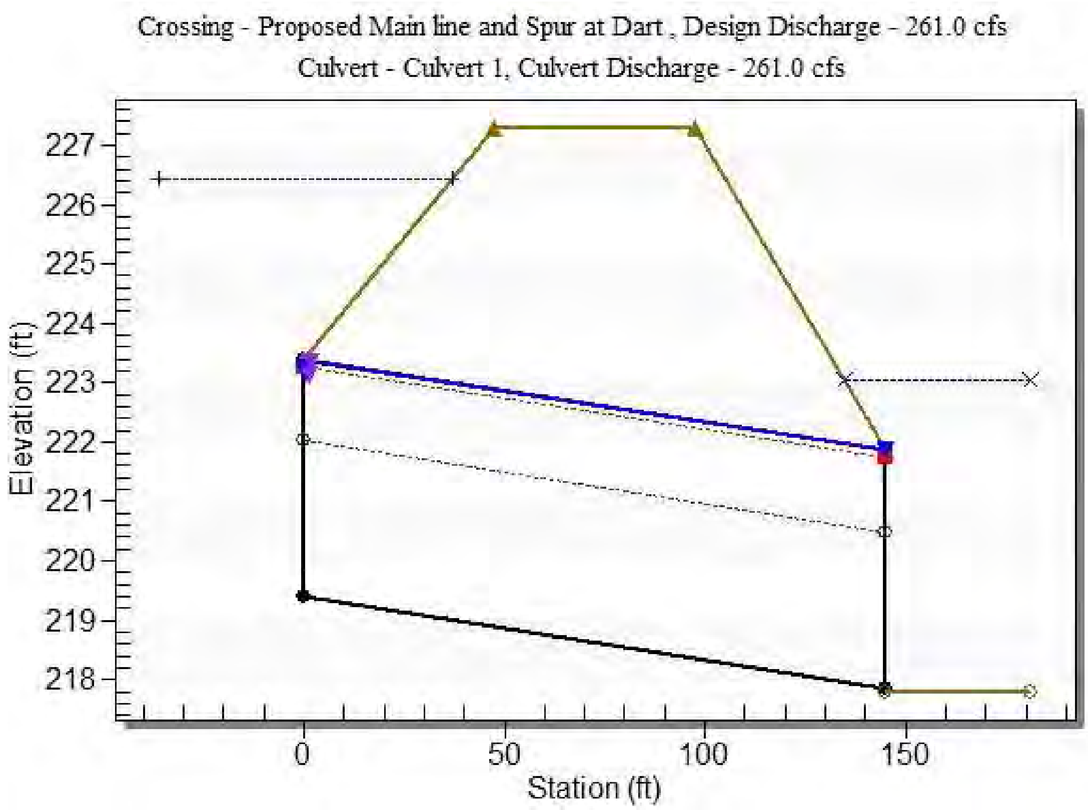
Inlet Elevation (invert): 219.39 ft, Outlet Elevation (invert): 217.86 ft

Culvert Length: 145.01 ft, Culvert Slope: 0.0106

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 219.39 ft

Outlet Station: 145.00 ft

Outlet Elevation: 217.86 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 6.00 ft

Barrel Rise: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: 1:1 Bevel (45º flare) Wingwall

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Proposed Main line and Spur at Dart)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
139.00	222.01	222.01	3.49
197.00	222.54	222.54	3.91
250.00	222.96	222.96	4.19
329.00	223.51	223.51	4.50
395.00	223.92	223.92	4.69
466.00	224.30	224.30	4.84

Tailwater Channel Data - Proposed Main line and Spur at Dart

Tailwater Channel Option: Enter Rating Curve

Channel Invert Elevation: 217.80 ft

Roadway Data for Crossing: Proposed Main line and Spur at Dart

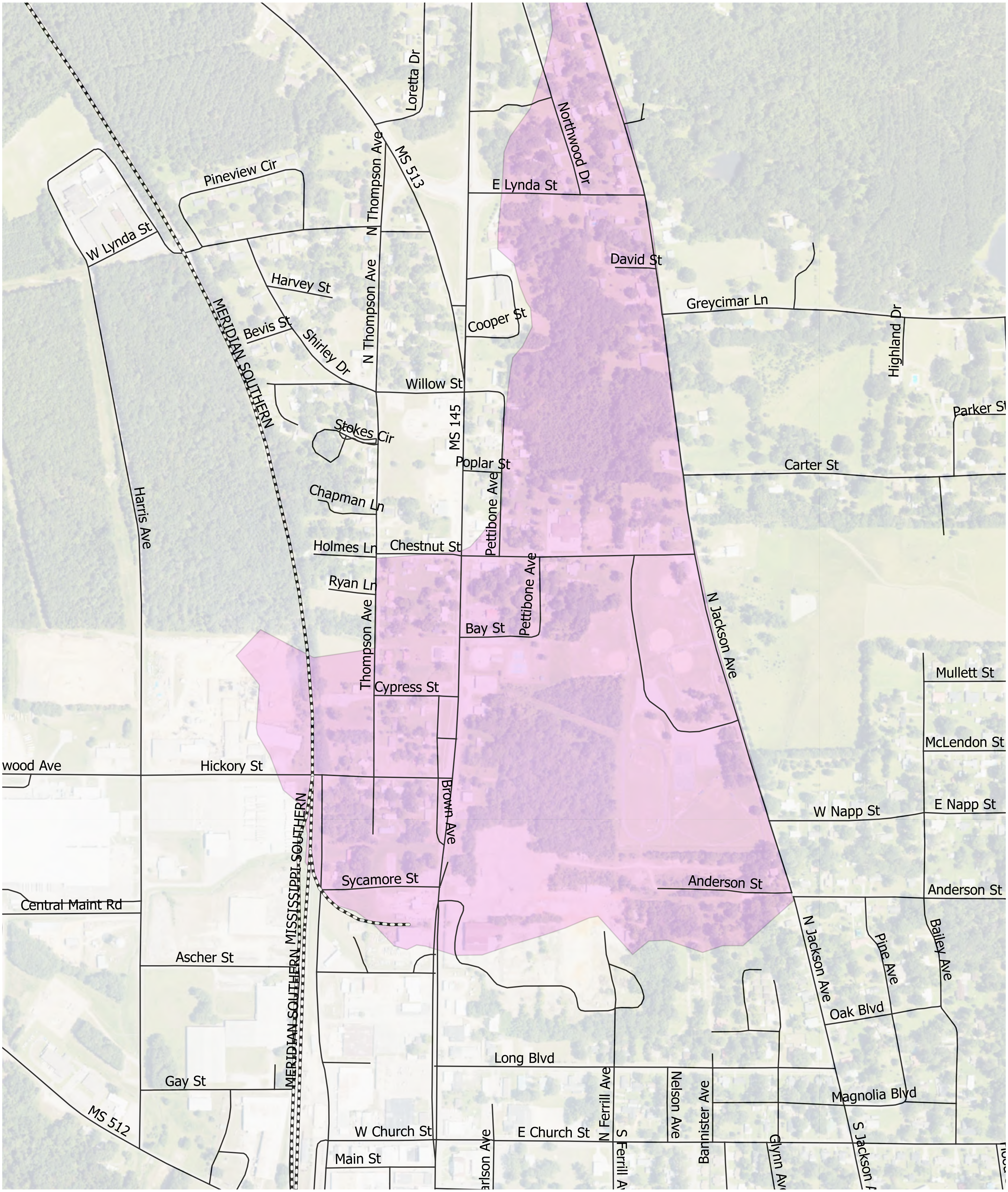
Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 1000.00 ft

Crest Elevation: 227.30 ft

Roadway Surface: Gravel

Roadway Top Width: 50.00 ft



Watershed Boundary
Railroad Culvert at Sycamore

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: N RAILROAD AVE.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2994-2995 CVI81	Size: 48"	Type: CONC.
Condition: ❑ Poor ❑ Fair ☑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ☑ < 0.5' ❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC. **CULVERT FIELD INSPECTION REPORT** For culverts 50 sq. ft. or smaller	Project no.: 23117	Subaccount:
	Location: N. RAILROAD AVE.	Date:
	Inspector:	

EXISTING STRUCTURE:

Reference no.: #2411 AN 2416 CVI82	Size: 30"	Type: CONC.
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ❑ < 0.5' ☑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs
☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

Hydrograph Report

Hyd. No. 5

2024 Dart

Hydrograph type	= SCS Runoff	Peak discharge	= 100.47 cfs
Storm frequency	= 2 yrs	Time interval	= 5 min
Drainage area	= 170.00 ac	Curve number	= 71
Basin Slope	= 4.0 %	Hydraulic length	= 6080 ft
Tc method	= LAG	Time of conc. (Tc)	= 87.6 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,025,899 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.08	100.47 <<

...End

Hydrograph Report

Hyd. No. 5

2024 Dart

Hydrograph type	= SCS Runoff	Peak discharge	= 148.25 cfs
Storm frequency	= 5 yrs	Time interval	= 5 min
Drainage area	= 170.00 ac	Curve number	= 71
Basin Slope	= 4.0 %	Hydraulic length	= 6080 ft
Tc method	= LAG	Time of conc. (Tc)	= 87.6 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,478,466 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.00	148.25 <<

...End

Hydrograph Report

Hyd. No. 5

2024 Dart

Hydrograph type	= SCS Runoff	Peak discharge	= 192.64 cfs
Storm frequency	= 10 yrs	Time interval	= 5 min
Drainage area	= 170.00 ac	Curve number	= 71
Basin Slope	= 4.0 %	Hydraulic length	= 6080 ft
Tc method	= LAG	Time of conc. (Tc)	= 87.6 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,902,127 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.00	192.64 <<

...End

Hydrograph Report

Hyd. No. 5

2024 Dart

Hydrograph type	= SCS Runoff	Peak discharge	= 260.53 cfs
Storm frequency	= 25 yrs	Time interval	= 5 min
Drainage area	= 170.00 ac	Curve number	= 71
Basin Slope	= 4.0 %	Hydraulic length	= 6080 ft
Tc method	= LAG	Time of conc. (Tc)	= 87.6 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,556,766 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.00	260.53 <<

...End

Hyd. No. 5

2024 Dart

Hydrograph type	= SCS Runoff	Peak discharge	= 317.16 cfs
Storm frequency	= 50 yrs	Time interval	= 5 min
Drainage area	= 170.00 ac	Curve number	= 71
Basin Slope	= 4.0 %	Hydraulic length	= 6080 ft
Tc method	= LAG	Time of conc. (Tc)	= 87.6 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,108,735 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.00	317.16 <<

...End

Hydrograph Report

Hyd. No. 5

2024 Dart

Hydrograph type	= SCS Runoff	Peak discharge	= 377.39 cfs
Storm frequency	= 100 yrs	Time interval	= 5 min
Drainage area	= 170.00 ac	Curve number	= 71
Basin Slope	= 4.0 %	Hydraulic length	= 6080 ft
Tc method	= LAG	Time of conc. (Tc)	= 87.6 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

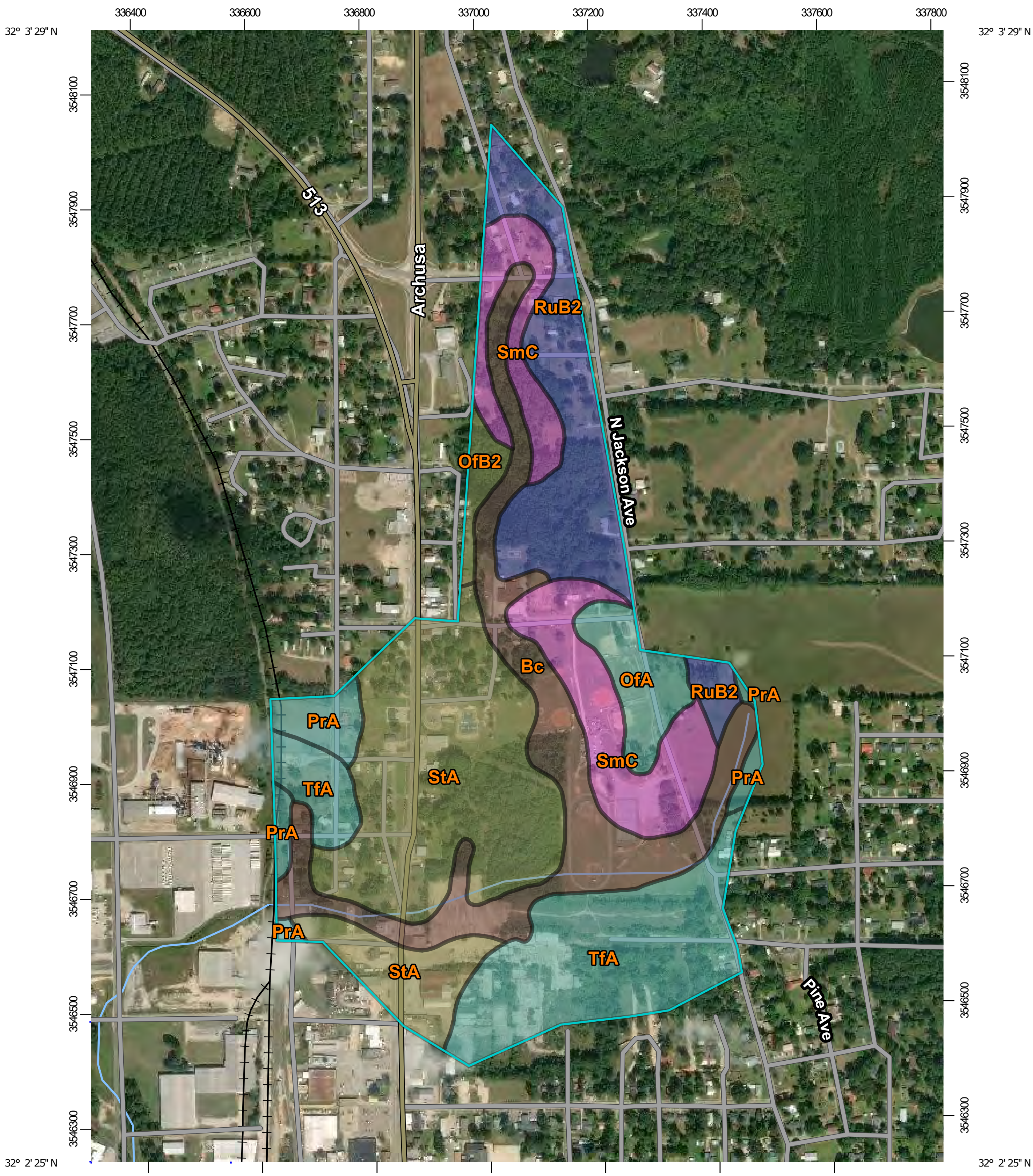
Hydrograph Volume = 3,701,465 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.00	377.39 <<

...End

Hydrologic Soil Group—Clarke County, Mississippi
(Dart Revised)



Map Scale: 1:9,610 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 450, 900, 1800, 2700

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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 15, Sep 17, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 26, 2014—Oct 28, 2017

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	30.5	17.8%
OfA	Ora fine sandy loam, 0 to 2 percent slopes	C	7.2	4.2%
OfB2	Ora fine sandy loam, 2 to 5 percent slopes, moderately eroded	C/D	2.7	1.6%
PrA	Prentiss fine sandy loam, 0 to 2 percent slopes	C	6.1	3.6%
RuB2	Ruston fine sandy loam, 2 to 5 percent slopes, moderately eroded	B	22.7	13.3%
SmC	Smithdale fine sandy loam, 5 to 8 percent slopes	A	23.6	13.8%
StA	Stough fine sandy loam, 0 to 2 percent slopes	C/D	47.6	27.8%
TfA	Tilden fine sandy loam, 0 to 2 percent slopes (savannah)	C	30.7	17.9%
Totals for Area of Interest			**171.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX F

RAILROAD CULVERT AT FRANKLIN

- Hydrology Summary
- HY-8 Report
- Watershed boundary
- Culvert Inspection Report
- Hydrographs
- Soil Data Report

Proposed Replacement Culvert near Franklin Street (at Railroad)

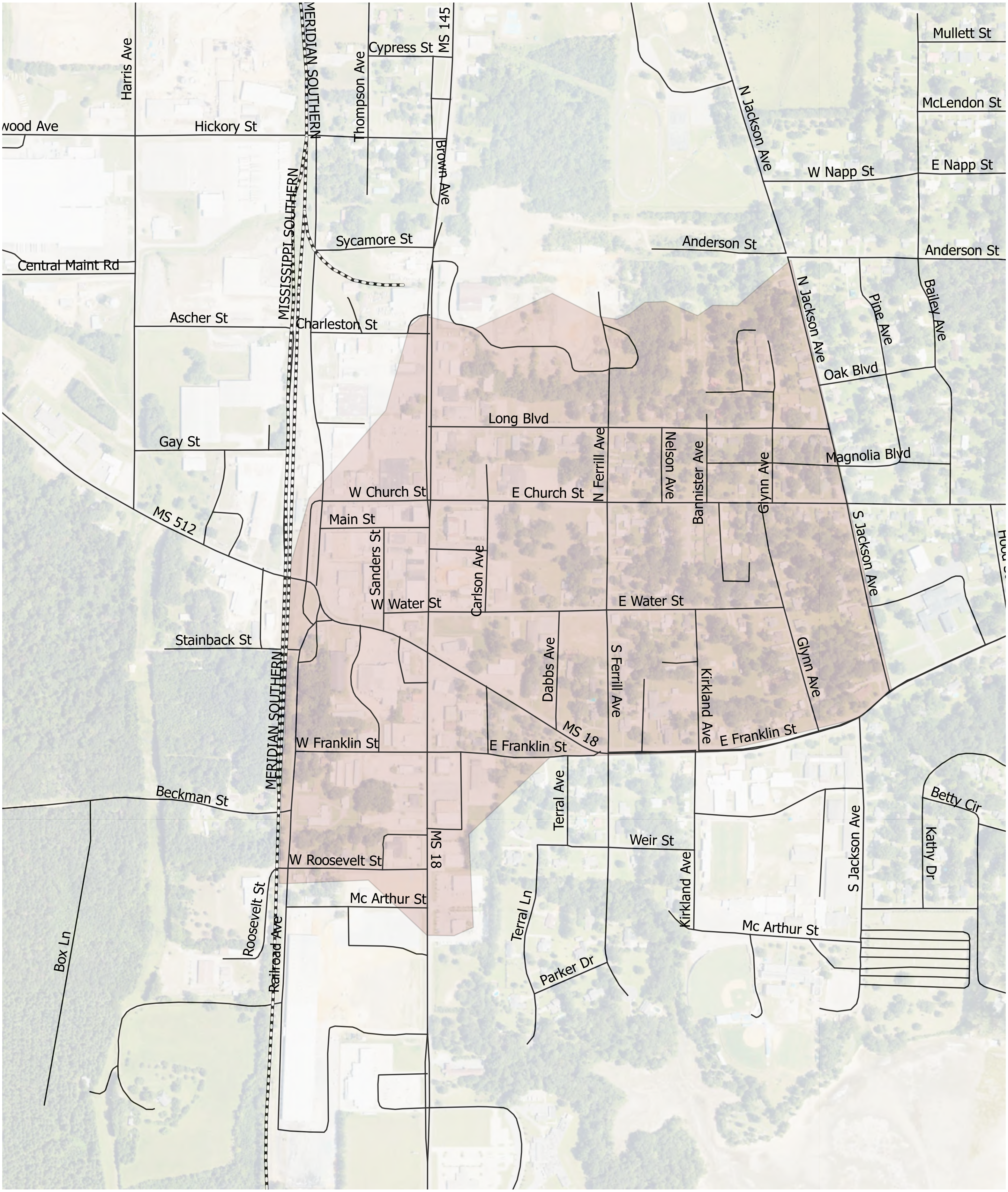
Hydrology Summary

Basin Parameters

Drainage Area (acres)	Runoff Curve Number	Basin Slope (percent)	Hydraulic Length (feet)	Storm Distribution	Time Interval (min)
215	86	1.0	4,160	Type III	5

Peak Discharges

2-yr Recurrence Peak Discharge (cfs)	5-yr Recurrence Peak Discharge (cfs)	10-yr Recurrence Peak Discharge (cfs)	25-yr Recurrence Peak Discharge (cfs)	50-yr Recurrence Peak Discharge (cfs)	100-yr Recurrence Peak Discharge (cfs)
246	322	389	488	567	651



Watershed Boundary
Railroad Culvert at Franklin

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 246 cfs

Design Flow: 567 cfs

Maximum Flow: 651 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
221.52	246.00	246.00	0.00	1
221.82	286.50	286.50	0.00	1
222.09	327.00	327.00	0.00	1
222.35	367.50	367.50	0.00	1
222.59	408.00	408.00	0.00	1
222.83	448.50	448.50	0.00	1
223.06	489.00	489.00	0.00	1
223.30	529.50	529.50	0.00	1
223.52	567.00	567.00	0.00	1
223.78	610.50	610.50	0.00	1
224.03	651.00	651.00	0.00	1
225.00	796.94	796.94	0.00	Overtopping

Table 1 - Summary of Culvert Flows at Crossing: Franklin

Rating Curve Plot for Crossing: Franklin

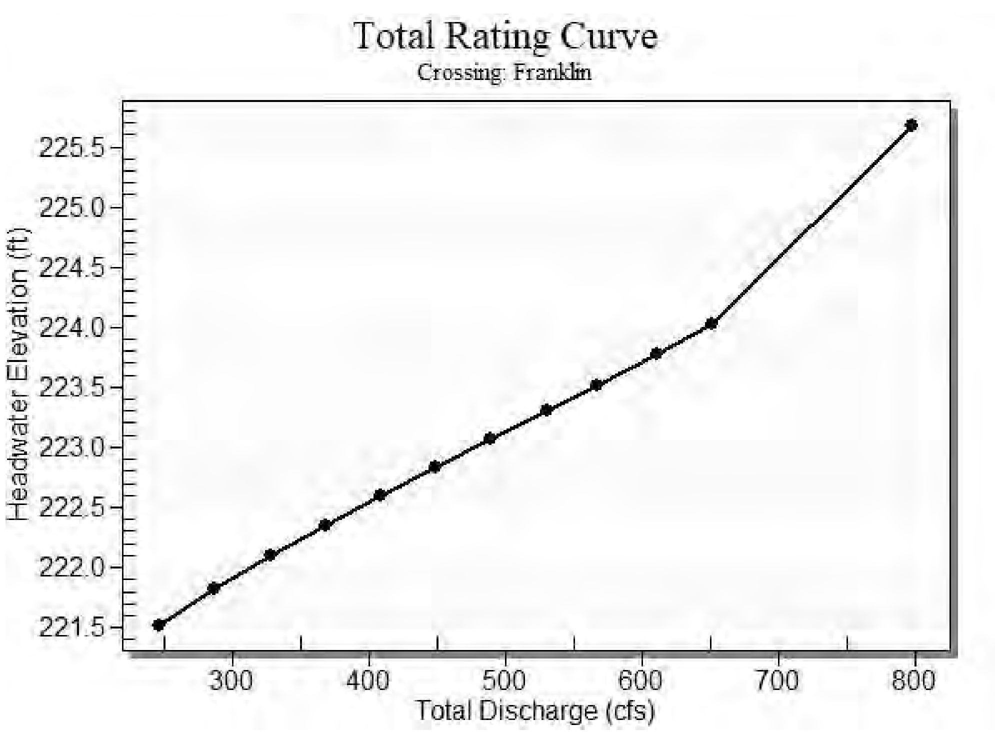


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
246.00	246.00	221.52	3.023	1.112	1-JS1f	1.165	2.206	5.000	5.380	3.132	2.120
286.50	286.50	221.82	3.319	1.415	1-JS1f	1.258	2.391	5.000	5.593	3.648	2.285
327.00	327.00	222.09	3.592	1.726	1-JS1f	1.345	2.560	5.000	5.800	4.163	2.447
367.50	367.50	222.35	3.848	2.008	1-JS1f	1.429	2.720	5.000	5.963	4.679	2.586
408.00	408.00	222.59	4.093	2.289	1-JS1f	1.508	2.874	5.000	6.113	5.195	2.716
448.50	448.50	222.83	4.330	2.570	1-JS1f	1.584	3.018	5.000	6.248	5.710	2.834
489.00	489.00	223.06	4.564	2.864	1-JS1f	1.659	3.155	5.000	6.383	6.226	2.952
529.50	529.50	223.30	4.798	3.165	1-JS1f	1.730	3.291	5.000	6.511	6.742	3.024
567.00	567.00	223.52	5.017	3.456	5-JS1f	1.795	3.408	5.000	6.630	7.219	3.090
610.50	610.50	223.78	5.276	3.779	5-JS1f	1.867	3.538	5.000	6.739	7.773	3.173
651.00	651.00	224.03	5.525	4.095	5-JS1f	1.934	3.653	5.000	6.840	8.289	3.250

****

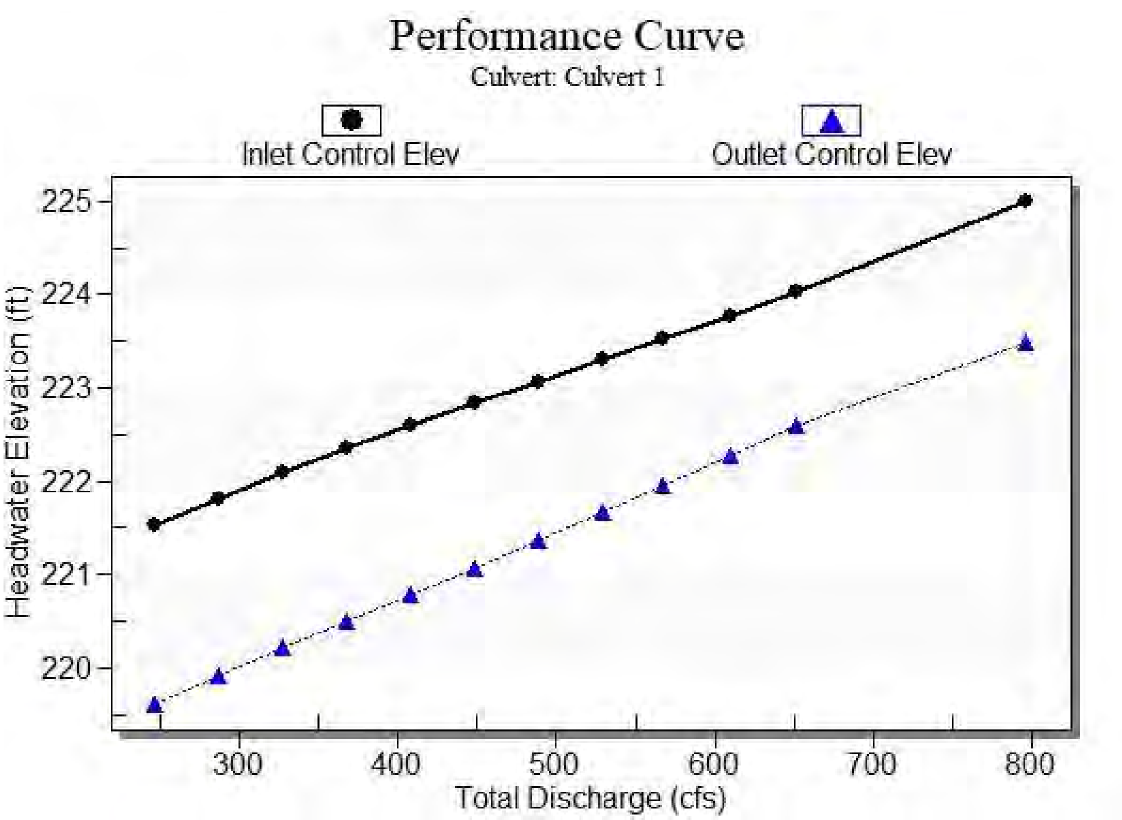
Straight Culvert

Inlet Elevation (invert): 218.50 ft,   Outlet Elevation (invert): 214.00 ft

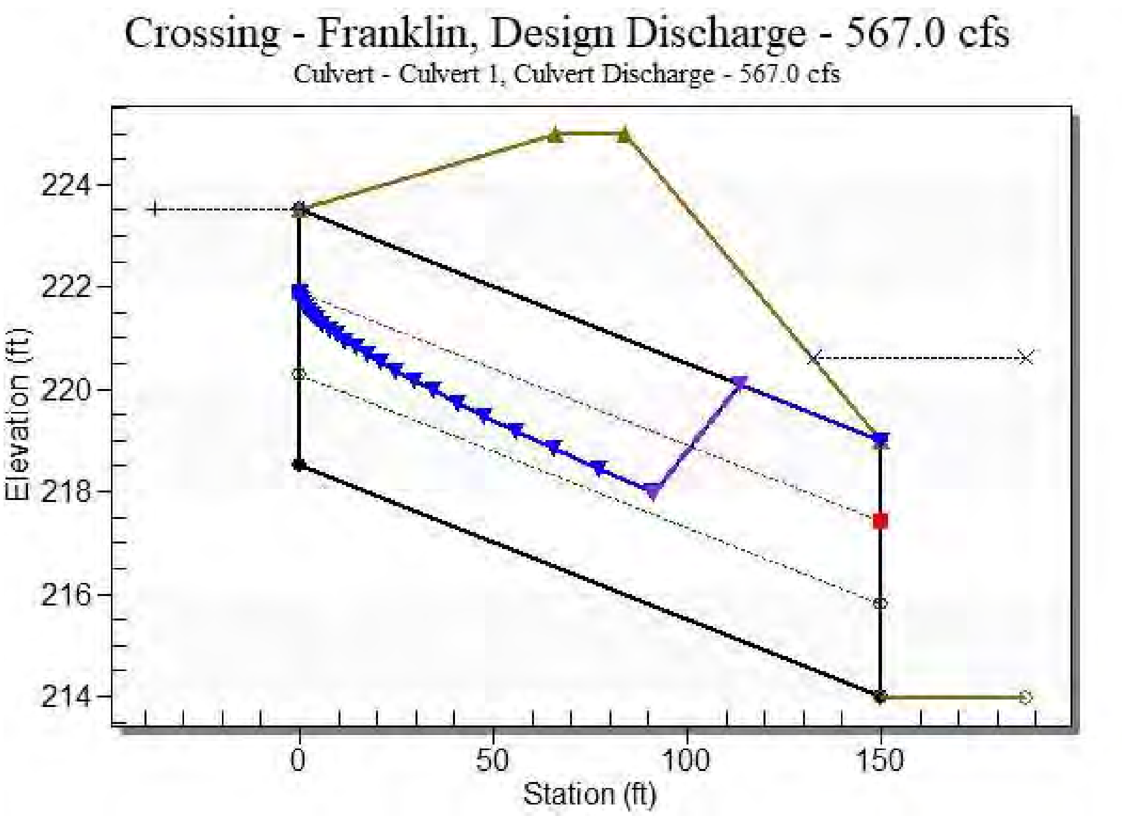
Culvert Length: 150.07 ft,   Culvert Slope: 0.0300

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
246.00	219.36	219.36	2.12
322.00	219.76	219.76	2.43
389.00	220.03	220.03	2.66
488.00	220.36	220.36	2.95
567.00	220.61	220.61	3.09
651.00	220.82	220.82	3.25

Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 218.50 ft

Outlet Station: 150.00 ft

Outlet Elevation: 214.00 ft

Number of Barrels: 4

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 5.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1.5:1)

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Franklin)

Tailwater Channel Data - Franklin

Tailwater Channel Option: Enter Rating Curve

Channel Invert Elevation: 213.98 ft

Roadway Data for Crossing: Franklin

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 1000.00 ft

Crest Elevation: 225.00 ft

Roadway Surface: Gravel

Roadway Top Width: 18.00 ft

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: S. RAILROAD AVE.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2015-2018 CVI52-53	Size: 54" / Type: CONC.
Condition: ☑ Poor ❑ Fair ❑ Good	High water elevation or height above inlet
OUTLET - Depth of silt ❑ < 0.5' ✓❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

Hydrograph Report

Hyd. No. 7

Franklin

Hydrograph type	= SCS Runoff	Peak discharge	= 245.62 cfs
Storm frequency	= 2 yrs	Time interval	= 5 min
Drainage area	= 215.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4160 ft
Tc method	= LAG	Time of conc. (Tc)	= 81.4 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,307,745 cuft

Hydrograph Discharge Table

Time -- (hrs	**Outflow cfs)**
12.83	245.62 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

Franklin

Hydrograph type	= SCS Runoff	Peak discharge	= 321.74 cfs
Storm frequency	= 5 yrs	Time interval	= 5 min
Drainage area	= 215.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4160 ft
Tc method	= LAG	Time of conc. (Tc)	= 81.4 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,035,900 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	321.74 <<

...End

Hydrograph Report

Hyd. No. 7

Franklin

Hydrograph type	= SCS Runoff	Peak discharge	= 388.86 cfs
Storm frequency	= 10 yrs	Time interval	= 5 min
Drainage area	= 215.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4160 ft
Tc method	= LAG	Time of conc. (Tc)	= 81.4 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,687,480 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	388.86 <<

...End

Hydrograph Report

Hyd. No. 7

Franklin

Hydrograph type	= SCS Runoff	Peak discharge	= 487.52 cfs
Storm frequency	= 25 yrs	Time interval	= 5 min
Drainage area	= 215.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4160 ft
Tc method	= LAG	Time of conc. (Tc)	= 81.4 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 4,658,954 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	487.52 <<

...End

Hydrograph Report

Hyd. No. 7

Franklin

Hydrograph type	= SCS Runoff	Peak discharge	= 567.43 cfs
Storm frequency	= 50 yrs	Time interval	= 5 min
Drainage area	= 215.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4160 ft
Tc method	= LAG	Time of conc. (Tc)	= 81.4 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 5,455,902 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	567.43 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

Franklin

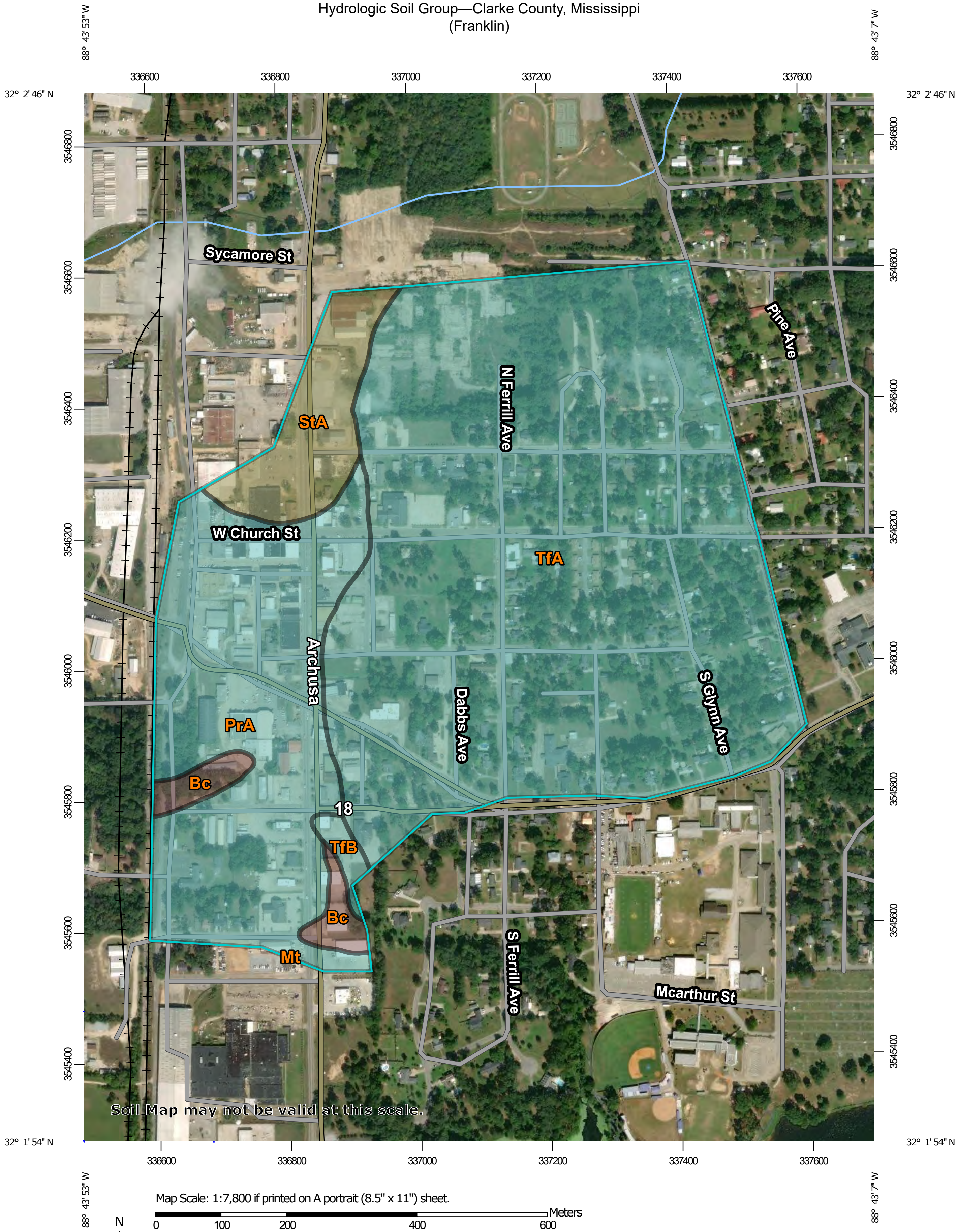
Hydrograph type	= SCS Runoff	Peak discharge	= 650.89 cfs
Storm frequency	= 100 yrs	Time interval	= 5 min
Drainage area	= 215.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4160 ft
Tc method	= LAG	Time of conc. (Tc)	= 81.4 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 6,296,215 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	650.89 <<

...End



Map Scale: 1:7,800 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 350, 700, 1400, 2100

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 Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 15, Sep 17, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 26, 2014—Oct 28, 2017

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	3.7	2.0%
Mt	Mashulaville fine sandy loam, terrace	C/D	0.0	0.0%
PrA	Prentiss fine sandy loam, 0 to 2 percent slopes	C	44.3	24.2%
StA	Stough fine sandy loam, 0 to 2 percent slopes	C/D	10.7	5.8%
TfA	Tilden fine sandy loam, 0 to 2 percent slopes (savannah)	C	123.3	67.3%
TfB	Tilden fine sandy loam, 2 to 5 percent slopes (savannah)	C	1.3	0.7%
Totals for Area of Interest			**183.3**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX G

CHANNEL AND CULVERTS BETWEEN RAILROAD AND ARCHUSA AVENUES

- Hydrology Summary
- Watershed Boundaries
- HY-8 Reports
- Culvert Inspection Reports
- Hydrographs
- HECRAS Output
- Soil Data Report

Channel and Culverts Between Railroad Avenue and Archusa Avenue

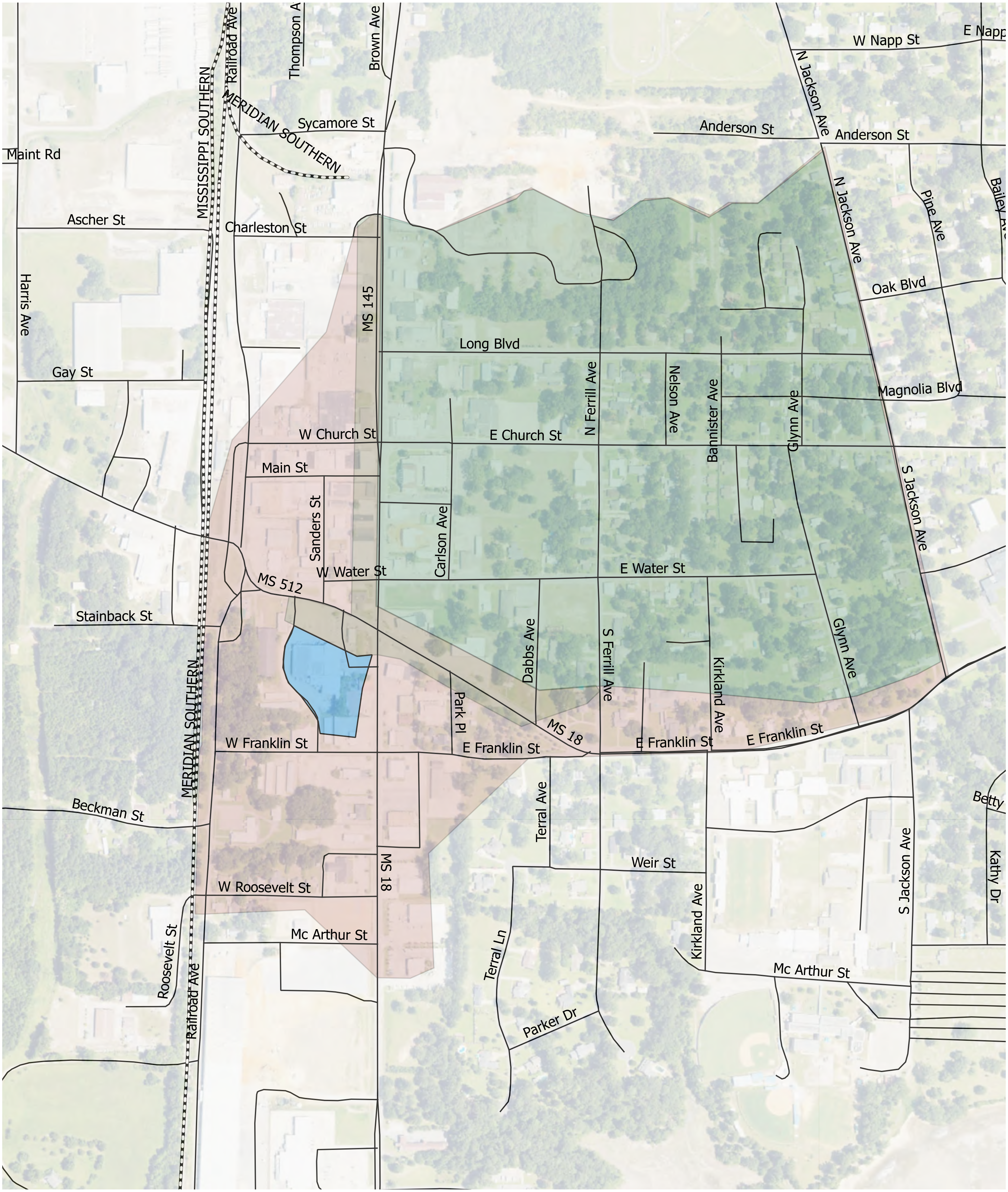
Hydrology Summary

Basin Parameters

Location	Drainage Area (acres)	Runoff Curve Number	Basin Slope (percent)	Hydraulic Length (feet)	Storm Distribution	Time Interval (min)
At Railroad Culverts	215	86	1	4,160	Type III	5
At Railroad Avenue	180	86	1	4,000	Type III	5
Behind Credit Union	121	86	1	2,960	Type III	5
At Archusa Avenue	109	86	1	2,800	Type III	5

Peak Discharges

Location	2-yr Recurrence Peak Discharge (cfs)	5-yr Recurrence Peak Discharge (cfs)	10-yr Recurrence Peak Discharge (cfs)	25-yr Recurrence Peak Discharge (cfs)	50-yr Recurrence Peak Discharge (cfs)	100-yr Recurrence Peak Discharge (cfs)
At Railroad Culverts	246	322	389	488	567	651
At Railroad Avenue	206	269	326	408	475	545
Behind Credit Union	158	207	250	313	364	417
At Archusa Avenue	142	186	225	282	328	376



Watershed Boundaries
Franklin to Archusa Avenue
Culverts and Channel

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

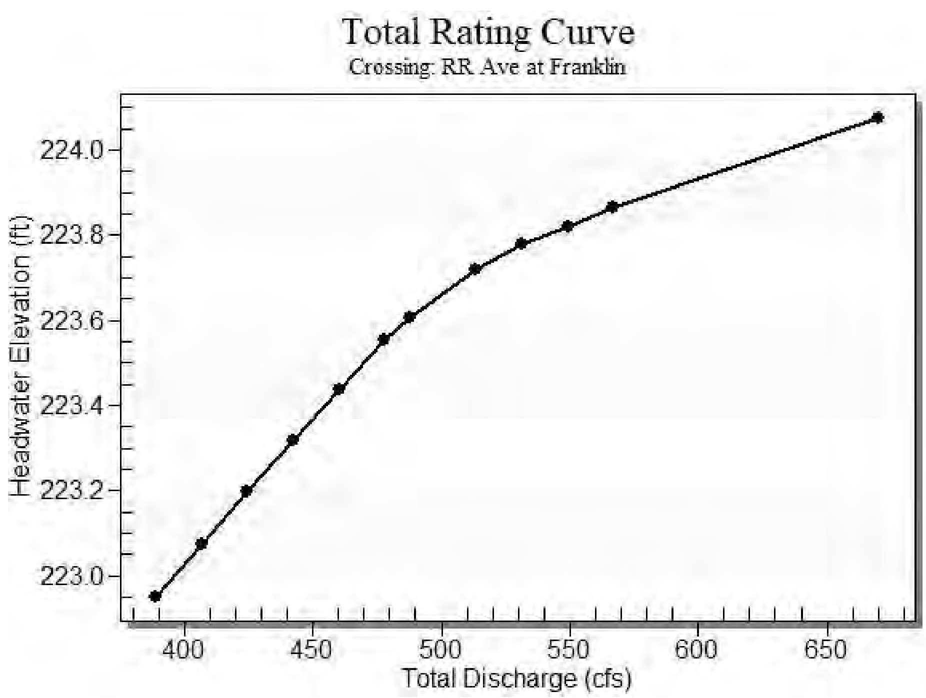
Minimum Flow: 389 cfs

Design Flow: 488 cfs

Maximum Flow: 567 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
222.95	389.00	389.00	0.00	1
223.07	406.80	406.80	0.00	1
223.20	424.60	424.60	0.00	1
223.32	442.40	442.40	0.00	1
223.44	460.20	460.20	0.00	1
223.55	478.00	477.56	0.01	13
223.61	488.00	486.62	0.79	12
223.72	513.60	503.62	9.43	10
223.78	531.40	511.66	19.04	7
223.82	549.20	521.06	27.42	6
223.86	567.00	524.25	38.67	7
223.54	475.75	475.75	0.00	Overtopping

Table 1 - Summary of Culvert Flows at Crossing: RR Ave at Franklin



Rating Curve Plot for Crossing: RR Ave at Franklin

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
389.00	389.00	222.95	3.507	4.352	3-M1t	2.344	2.273	3.977	3.977	4.890	2.659
406.80	406.80	223.07	3.619	4.475	3-M1t	2.418	2.342	4.083	4.083	4.982	2.716
424.60	424.60	223.20	3.730	4.597	3-M1t	2.491	2.410	4.188	4.188	5.069	2.765
442.40	442.40	223.32	3.840	4.719	3-M1t	2.563	2.477	4.294	4.294	5.152	2.813
460.20	460.20	223.44	3.948	4.838	3-M1t	2.634	2.543	4.396	4.396	5.234	2.865
478.00	477.56	223.55	4.054	4.954	3-M1t	2.703	2.606	4.498	4.498	5.309	2.917
488.00	486.62	223.61	4.108	5.017	7-M1t	2.739	2.639	4.554	4.546	5.342	2.943
513.60	503.62	223.72	4.210	5.170	7-M1t	2.806	2.700	4.706	4.706	5.351	2.993
531.40	511.66	223.78	4.258	5.268	7-M1t	2.838	2.729	4.811	4.811	5.317	3.024
549.20	521.06	223.82	4.314	5.368	7-M1t	2.874	2.762	4.916	4.916	5.300	3.057
567.00	524.25	223.86	4.333	5.418	7-M1t	2.886	2.774	4.972	5.020	5.272	3.090

Table 2 - Culvert Summary Table: Culvert 1

****

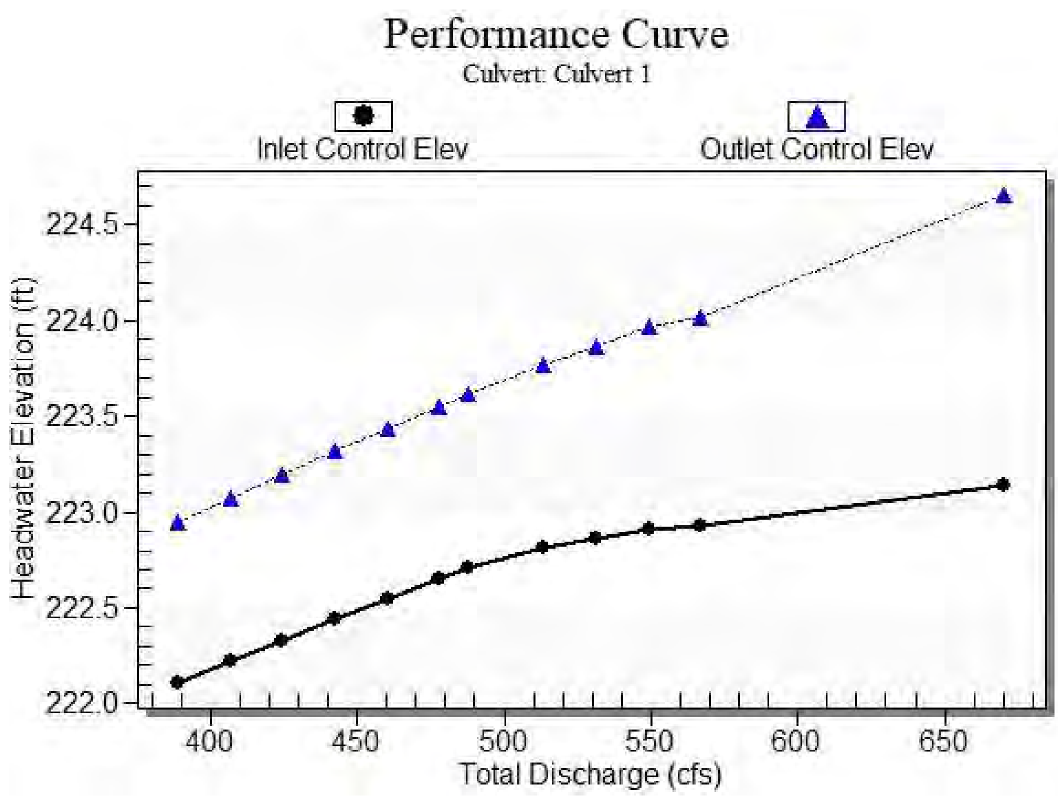
Straight Culvert

Inlet Elevation (invert): 218.60 ft, Outlet Elevation (invert): 218.50 ft

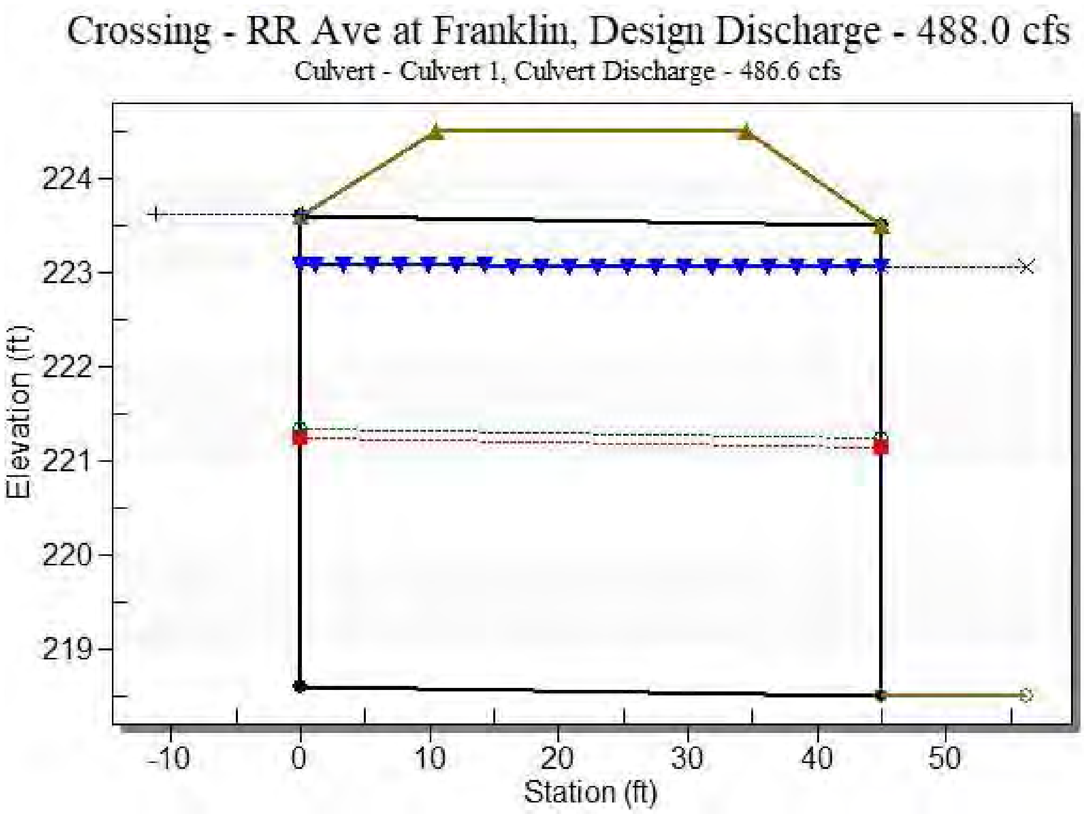
Culvert Length: 45.00 ft, Culvert Slope: 0.0022

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 218.60 ft

Outlet Station: 45.00 ft

Outlet Elevation: 218.50 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 10.00 ft

Barrel Rise: 5.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: 1:1 Bevel (45º flare) Wingwall

Inlet Depression: None

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
0.00	218.60	218.60	0.00
286.50	221.82	221.82	2.29
327.00	222.09	222.09	2.45
367.50	222.35	222.35	2.59
408.00	222.59	222.59	2.72
448.50	222.83	222.83	2.83
489.00	223.06	223.06	2.95
529.50	223.30	223.30	3.02
567.00	223.52	223.52	3.09
610.50	223.78	223.78	3.17
651.00	224.03	224.03	3.25

Table 3 - Downstream Channel Rating Curve (Crossing: RR Ave at Franklin)

Tailwater Channel Data - RR Ave at Franklin

Tailwater Channel Option: Enter Rating Curve

Channel Invert Elevation: 218.50 ft

Roadway Data for Crossing: RR Ave at Franklin

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	0.00	224.50
1	86.00	223.98
2	142.00	223.80
3	197.00	223.54
4	263.40	223.69

Roadway Surface: Paved

Roadway Top Width: 24.00 ft

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 207 cfs

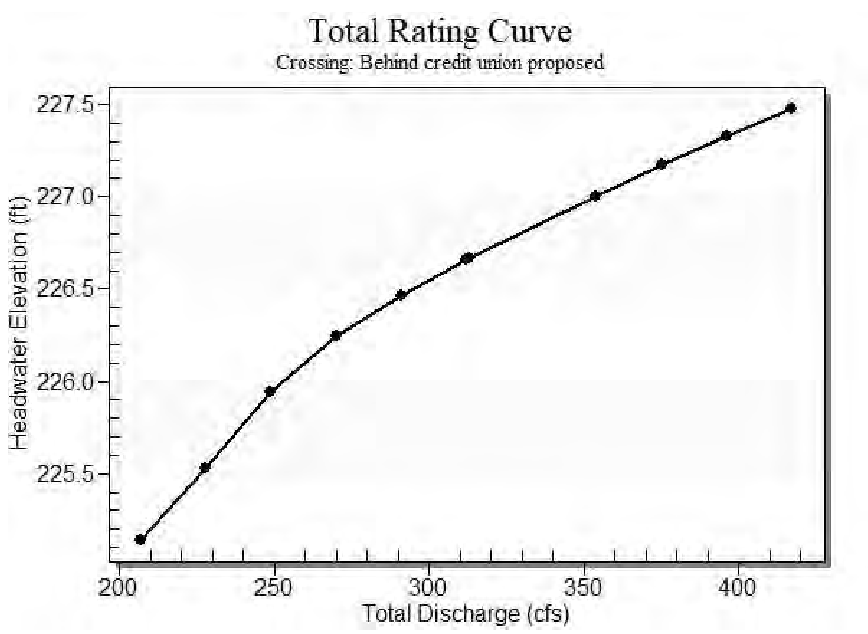
Design Flow: 313 cfs

Maximum Flow: 417 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
225.14	207.00	207.00	0.00	1
225.53	228.00	228.00	0.00	1
225.94	249.00	249.00	0.00	1
226.24	270.00	263.64	6.29	5
226.46	291.00	273.97	16.98	5
226.66	312.00	282.77	29.21	4
226.67	313.00	283.16	29.82	3
227.00	354.00	297.67	56.28	3
227.17	375.00	302.78	72.16	4
227.33	396.00	307.47	88.47	4
227.48	417.00	311.77	104.71	5
226.00	251.84	251.84	0.00	Overtopping

Table 4 - Summary of Culvert Flows at Crossing: Behind credit union proposed

Rating Curve Plot for Crossing: Behind credit union proposed



Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
207.00	207.00	225.14	4.744	4.723	3-M2t	3.146	2.750	2.841	2.841	9.106	2.469
228.00	228.00	225.53	5.132	5.037	3-M2t	3.378	2.933	3.130	3.130	9.106	2.719
249.00	249.00	225.94	5.543	5.343	3-M2t	3.605	3.110	3.418	3.418	9.106	2.969
270.00	263.64	226.24	5.844	5.551	3-M2t	3.762	3.231	3.706	3.619	8.892	3.144
291.00	273.97	226.46	6.064	6.044	6-FFt	3.872	3.315	3.994	3.761	8.574	3.267
312.00	282.77	226.66	6.258	6.499	4-FFf	4.000	3.385	4.000	3.881	8.836	3.372
313.00	283.16	226.67	6.267	6.520	4-FFf	4.000	3.389	4.000	3.887	8.849	3.377
354.00	297.67	227.00	6.599	7.044	4-FFf	4.000	3.503	4.000	4.086	9.302	3.550
375.00	302.78	227.17	6.719	7.224	4-FFf	4.000	3.543	4.000	4.156	9.462	3.611
396.00	307.47	227.33	6.832	7.393	4-FFf	4.000	3.580	4.000	4.221	9.609	3.667
417.00	311.77	227.48	6.937	7.081	4-FFf	4.000	3.613	4.000	4.280	9.743	3.718

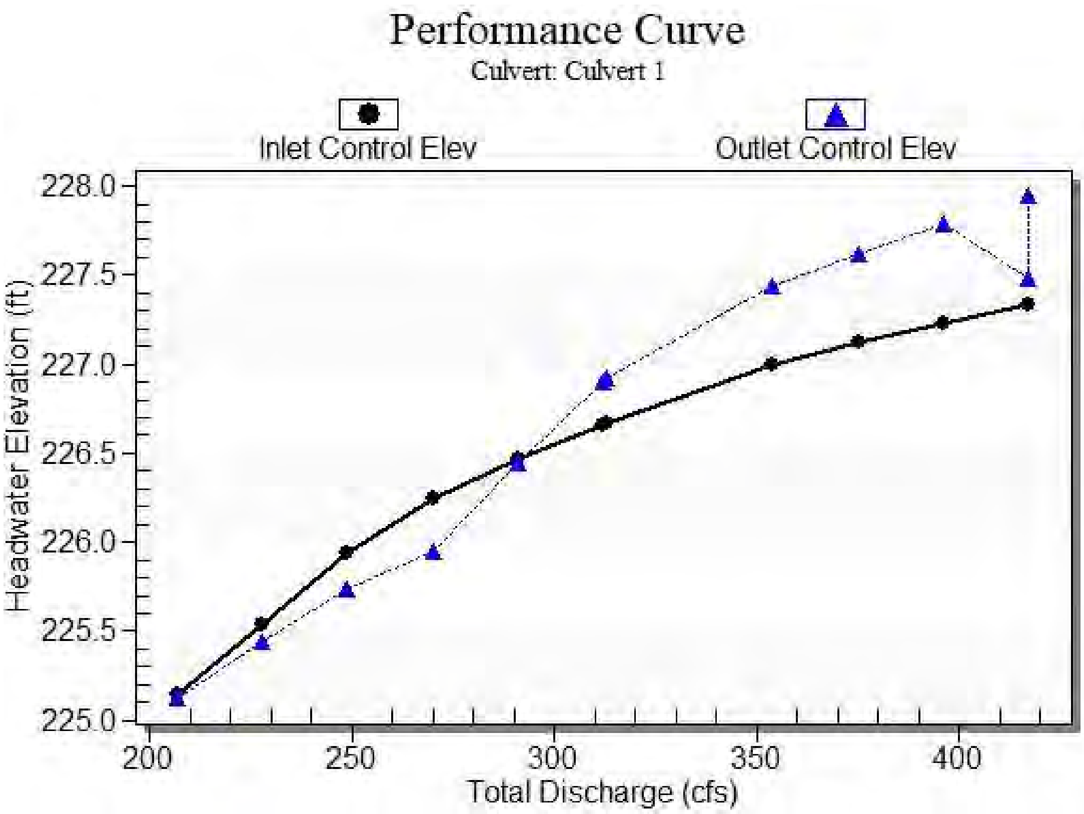
Table 5 - Culvert Summary Table: Culvert 1

****

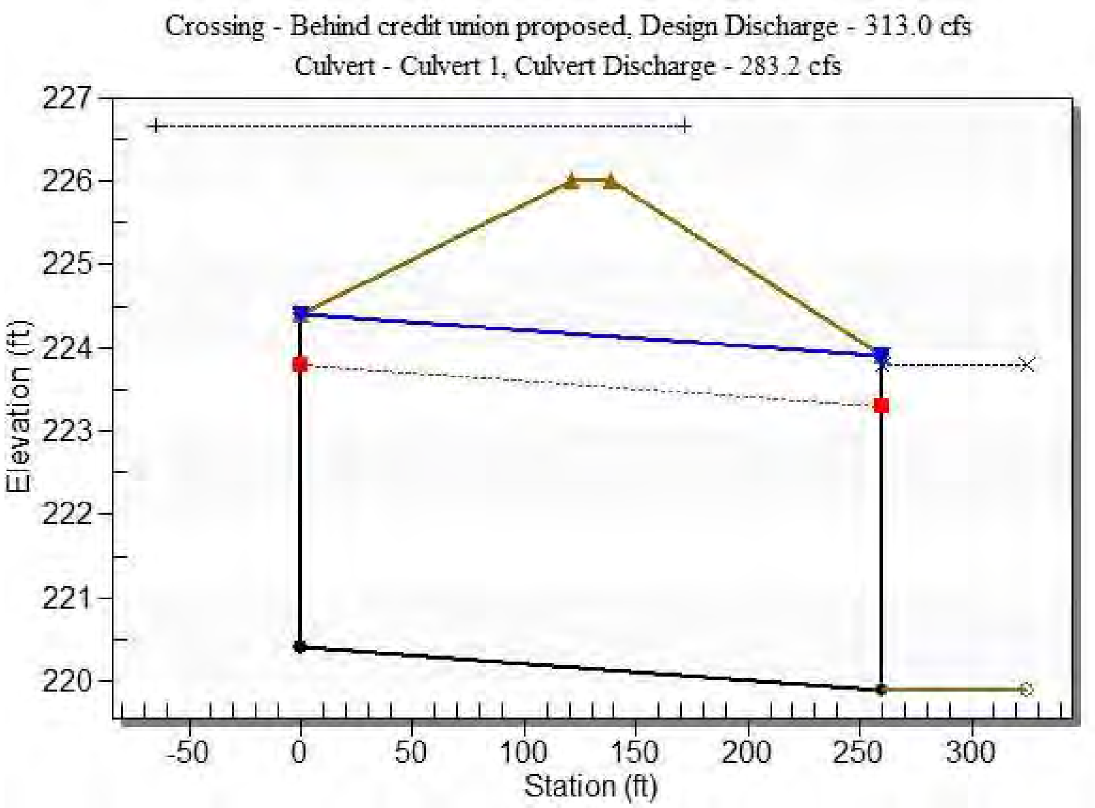
Straight Culvert

Inlet Elevation (invert): 220.40 ft,   Outlet Elevation (invert): 219.90 ft
Culvert Length: 260.00 ft,   Culvert Slope: 0.0019

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 220.40 ft

Outlet Station: 260.00 ft

Outlet Elevation: 219.90 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 8.00 ft

Barrel Rise: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90º) Headwall

Inlet Depression: None

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
0.00	219.90	219.90	0.00
322.00	224.32	224.32	3.84
389.00	224.56	224.56	4.04
488.00	224.87	224.87	3.83
567.00	225.08	225.08	3.75

Table 6 - Downstream Channel Rating Curve (Crossing: Behind credit union proposed)

Tailwater Channel Data - Behind credit union proposed

Tailwater Channel Option: Enter Rating Curve

Channel Invert Elevation: 219.90 ft

Roadway Data for Crossing: Behind credit union proposed

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 20.00 ft

Crest Elevation: 226.00 ft

Roadway Surface: Gravel

Roadway Top Width: 18.00 ft

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

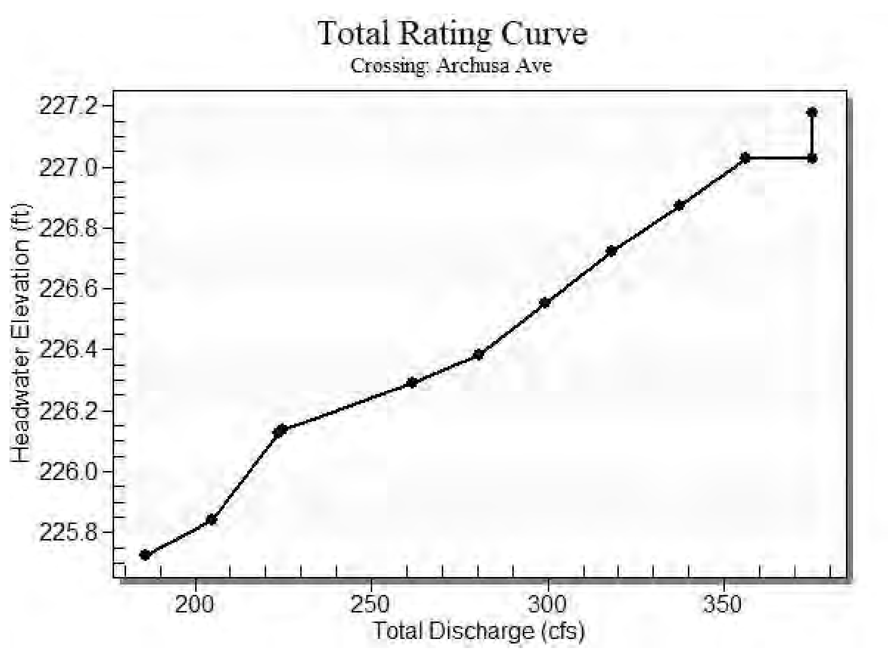
Minimum Flow: 186 cfs

Design Flow: 225 cfs

Maximum Flow: 375 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
225.73	186.00	186.00	0.00	1
225.84	204.90	204.90	0.00	1
226.13	223.80	210.23	13.38	12
226.13	225.00	210.23	14.45	4
226.29	261.60	214.75	46.65	6
226.38	280.50	218.01	63.33	9
226.55	299.40	224.60	77.51	7
226.72	318.30	230.12	85.21	6
226.87	337.20	235.06	102.14	7
227.03	356.10	240.16	115.89	7
227.03	375.00	240.12	315.04	5
226.00	210.23	210.23	0.00	Overtopping

Table 7 - Summary of Culvert Flows at Crossing: Archusa Ave



Rating Curve Plot for Crossing: Archusa Ave

Table 8 - Culvert Summary Table: Culvert 1

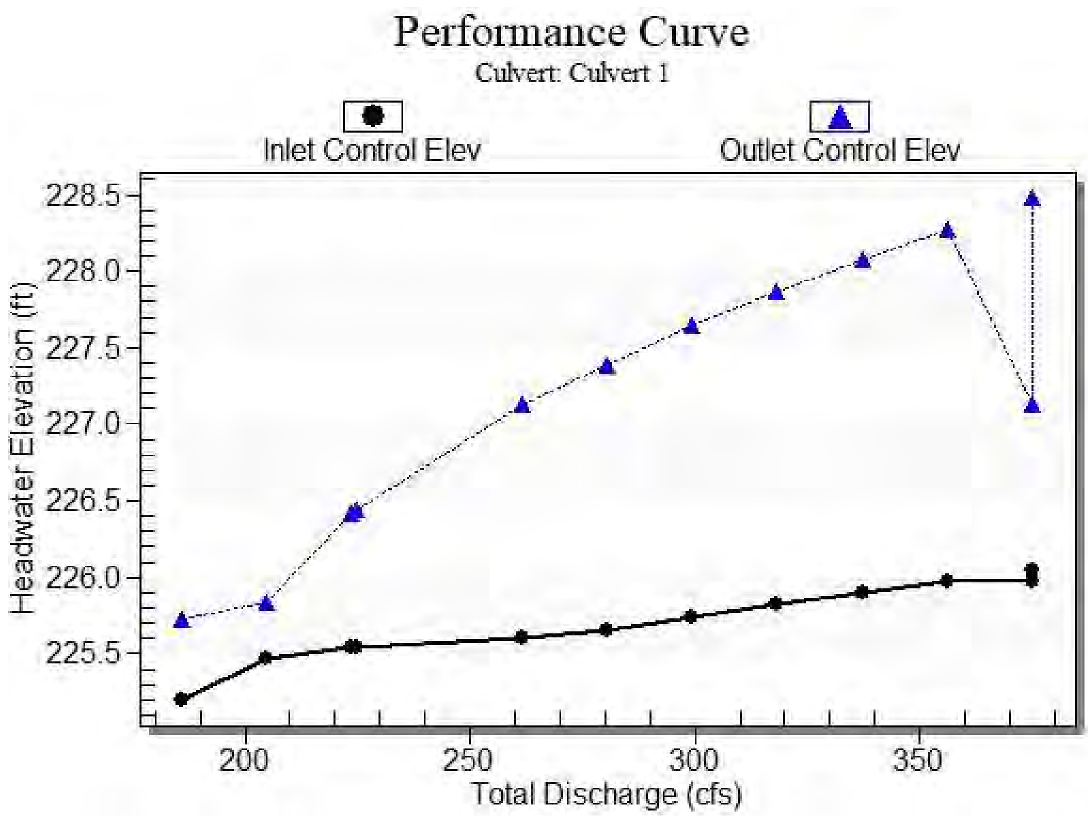
****

Straight Culvert

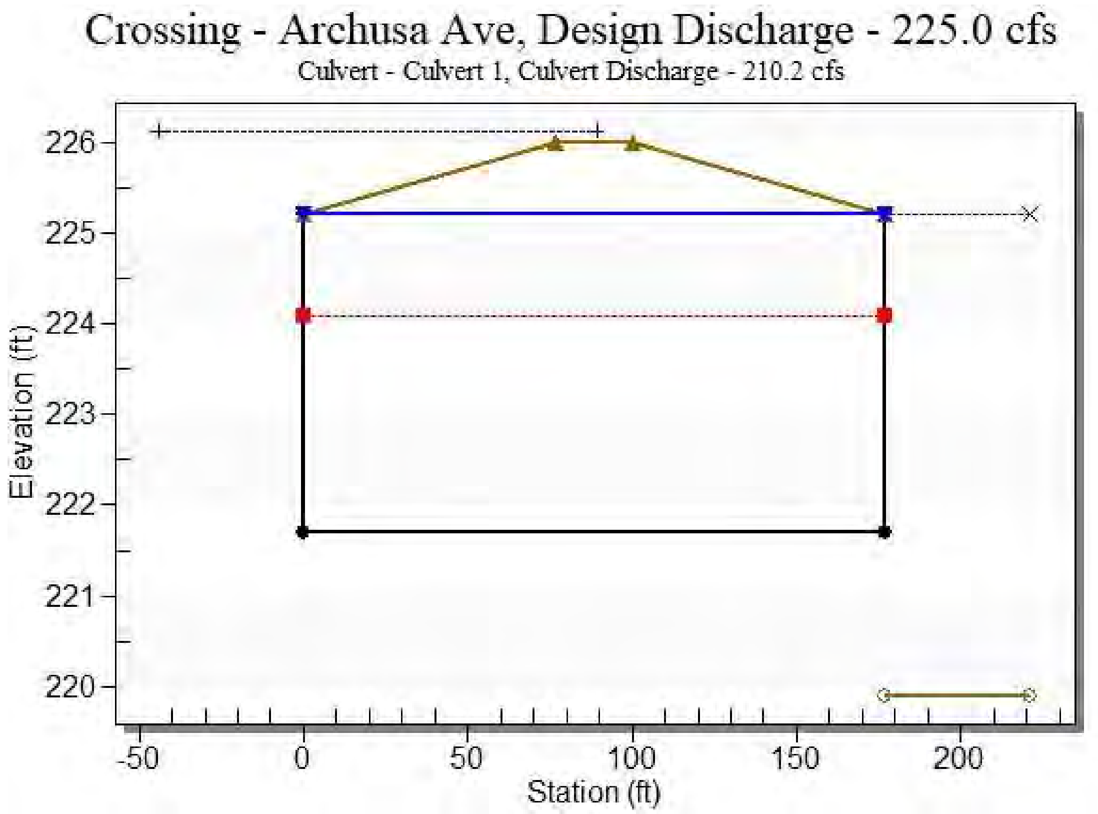
Inlet Elevation (invert): 221.70 ft,   Outlet Elevation (invert): 221.70 ft

Culvert Length: 177.00 ft,   Culvert Slope: 0.0000

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 221.70 ft

Outlet Station: 177.00 ft

Outlet Elevation: 221.70 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 10.00 ft

Barrel Rise: 3.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: 1:1 Bevel (45º flare) Wingwall

Inlet Depression: None

Table 9 - Downstream Channel Rating Curve (Crossing: Archusa Ave)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
207.00	225.14	225.14	9.11
228.00	225.53	225.53	9.11
249.00	225.94	225.94	9.11
270.00	226.24	226.24	8.89
291.00	226.46	226.46	8.57
312.00	226.66	226.66	8.84
313.00	226.67	226.67	8.85
354.00	227.00	227.00	9.30
375.00	227.17	227.17	9.46
396.00	227.33	227.33	9.61
417.00	227.48	227.48	9.74

Tailwater Channel Data - Archusa Ave

Tailwater Channel Option: Enter Rating Curve

Channel Invert Elevation: 219.90 ft

Roadway Data for Crossing: Archusa Ave

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 226.00 ft

Roadway Surface: Paved

Roadway Top Width: 24.00 ft

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: W.FRANKLIN ST.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2030 CVI54	Size: 12"	Type: PLASTIC
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ☑ < 0.5' ❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Minor ❑ Major ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: W.FRANKLIN ST.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2032-2033 CVI55	Size: 36"	Type: CORR. METAL
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ❑ < 0.5' ☑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs
☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: W.FRANKLIN ST.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2042-2043 CVI56	Size: 36"	Type: PLASTIC
Condition: ☐ Poor ☑ Fair ☐ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ☑ < 0.5' ☐ 0.5' - 1' ☐ 1' - 2' ☐ > 2'	OUTLET - Erosion ☐ None ☐ Major ☐ Minor ☐ Severe w/undermining	

FLOW:

☐ Continous ☐ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs ☒ Intermittent ☐ Stock pass Does irrigation ditch carry runoff: ☐ yes ☐ no	
Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: W.FRANKLIN ST.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2045-2046 CVI57	Size: 36"	Type: METAL
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ❑ < 0.5' ☑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Minor ❑ Major ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: W.FRANKLIN ST.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2048 CVI58	Size: 42" / Type: METAL
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet
OUTLET - Depth of silt: ❑ < 0.5' ☑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion: ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

Hydrograph Report

Hyd. No. 7

Franklin

Hydrograph type	= SCS Runoff	Peak discharge	= 245.62 cfs
Storm frequency	= 2 yrs	Time interval	= 5 min
Drainage area	= 215.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4160 ft
Tc method	= LAG	Time of conc. (Tc)	= 81.4 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,307,745 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	245.62 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

Franklin

Hydrograph type	= SCS Runoff	Peak discharge	= 321.74 cfs
Storm frequency	= 5 yrs	Time interval	= 5 min
Drainage area	= 215.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4160 ft
Tc method	= LAG	Time of conc. (Tc)	= 81.4 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,035,900 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	321.74 <<

...End

Hydrograph Report

Hyd. No. 7

Franklin

Hydrograph type	= SCS Runoff	Peak discharge	= 388.86 cfs
Storm frequency	= 10 yrs	Time interval	= 5 min
Drainage area	= 215.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4160 ft
Tc method	= LAG	Time of conc. (Tc)	= 81.4 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,687,480 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	388.86 <<

...End

Hydrograph Report

Hyd. No. 7

Franklin

Hydrograph type	= SCS Runoff	Peak discharge	= 487.52 cfs
Storm frequency	= 25 yrs	Time interval	= 5 min
Drainage area	= 215.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4160 ft
Tc method	= LAG	Time of conc. (Tc)	= 81.4 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 4,658,954 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	487.52 <<

...End

Hydrograph Report

Hyd. No. 7

Franklin

Hydrograph type	= SCS Runoff	Peak discharge	= 567.43 cfs
Storm frequency	= 50 yrs	Time interval	= 5 min
Drainage area	= 215.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4160 ft
Tc method	= LAG	Time of conc. (Tc)	= 81.4 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 5,455,902 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	567.43 <<

...End

Hydrograph Report

Hyd. No. 7

Franklin

Hydrograph type	= SCS Runoff	Peak discharge	= 650.89 cfs
Storm frequency	= 100 yrs	Time interval	= 5 min
Drainage area	= 215.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4160 ft
Tc method	= LAG	Time of conc. (Tc)	= 81.4 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 6,296,215 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	650.89 <<

...End

Hyd. No. 10

FranklinToDrivewayChannel

Hydrograph type	= SCS Runoff	Peak discharge	= 205.63 cfs
Storm frequency	= 2 yrs	Time interval	= 5 min
Drainage area	= 180.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4000 ft
Tc method	= LAG	Time of conc. (Tc)	= 78.9 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,932,065 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	205.63 <<

...End

Hyd. No. 10

FranklinToDrivewayChannel

Hydrograph type	= SCS Runoff	Peak discharge	= 269.36 cfs
Storm frequency	= 5 yrs	Time interval	= 5 min
Drainage area	= 180.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4000 ft
Tc method	= LAG	Time of conc. (Tc)	= 78.9 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,541,680 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	269.36 <<

...End

Hydrograph Report

At Railroad Avenue

Hydraflow Hydrographs by Intelisolve

Hyd. No. 10

FranklinToDrivewayChannel

Hydrograph type	= SCS Runoff	Peak discharge	= 325.56 cfs
Storm frequency	= 10 yrs	Time interval	= 5 min
Drainage area	= 180.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4000 ft
Tc method	= LAG	Time of conc. (Tc)	= 78.9 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,087,191 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	325.56 <<

...End

Hyd. No. 10

FranklinToDrivewayChannel

Hydrograph type	= SCS Runoff	Peak discharge	= 408.15 cfs
Storm frequency	= 25 yrs	Time interval	= 5 min
Drainage area	= 180.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4000 ft
Tc method	= LAG	Time of conc. (Tc)	= 78.9 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,900,521 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	408.15 <<

...End

Hyd. No. 10

FranklinToDrivewayChannel

Hydrograph type	= SCS Runoff	Peak discharge	= 475.06 cfs
Storm frequency	= 50 yrs	Time interval	= 5 min
Drainage area	= 180.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4000 ft
Tc method	= LAG	Time of conc. (Tc)	= 78.9 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 4,567,727 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	475.06 <<

...End

Hyd. No. 10

FranklinToDrivewayChannel

Hydrograph type	= SCS Runoff	Peak discharge	= 544.93 cfs
Storm frequency	= 100 yrs	Time interval	= 5 min
Drainage area	= 180.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 4000 ft
Tc method	= LAG	Time of conc. (Tc)	= 78.9 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 5,271,248 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.83	544.93 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 11

FranklinArchusaBehindCreditUnion

Hydrograph type	= SCS Runoff	Peak discharge	= 158.07 cfs
Storm frequency	= 2 yrs	Time interval	= 5 min
Drainage area	= 121.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 2960 ft
Tc method	= LAG	Time of conc. (Tc)	= 62 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,262,699 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.67	158.07 <<

...End

Hydrograph Report

Hyd. No. 11

FranklinArchusaBehindCreditUnion

Hydrograph type	= SCS Runoff	Peak discharge	= 206.82 cfs
Storm frequency	= 5 yrs	Time interval	= 5 min
Drainage area	= 121.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 2960 ft
Tc method	= LAG	Time of conc. (Tc)	= 62 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,661,115 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.67	206.82 <<

...End

Hydrograph Report

Hyd. No. 11

FranklinArchusaBehindCreditUnion

Hydrograph type	= SCS Runoff	Peak discharge	= 249.78 cfs
Storm frequency	= 10 yrs	Time interval	= 5 min
Drainage area	= 121.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 2960 ft
Tc method	= LAG	Time of conc. (Tc)	= 62 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,017,632 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.67	249.78 <<

...End

Hydrograph Report

Hyd. No. 11

FranklinArchusaBehindCreditUnion

Hydrograph type	= SCS Runoff	Peak discharge	= 312.89 cfs
Storm frequency	= 25 yrs	Time interval	= 5 min
Drainage area	= 121.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 2960 ft
Tc method	= LAG	Time of conc. (Tc)	= 62 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,549,183 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.67	312.89 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 11

FranklinArchusaBehindCreditUnion

Hydrograph type	=	SCS Runoff	Peak discharge	=	363.98 cfs
Storm frequency	=	50 yrs	Time interval	=	5 min
Drainage area	=	121.00 ac	Curve number	=	86
Basin Slope	=	1.0 %	Hydraulic length	=	2960 ft
Tc method	=	LAG	Time of conc. (Tc)	=	62 min
Total precip.	=	8.59 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

Hydrograph Volume = 2,985,238 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.67	363.98 <<

...End

Hydrograph Report

Hyd. No. 11

FranklinArchusaBehindCreditUnion

Hydrograph type	= SCS Runoff	Peak discharge	= 417.33 cfs
Storm frequency	= 100 yrs	Time interval	= 5 min
Drainage area	= 121.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 2960 ft
Tc method	= LAG	Time of conc. (Tc)	= 62 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,445,021 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.67	417.33 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 12

AtArchusaAve

Hydrograph type	= SCS Runoff	Peak discharge	= 142.39 cfs
Storm frequency	= 2 yrs	Time interval	= 5 min
Drainage area	= 109.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 2800 ft
Tc method	= LAG	Time of conc. (Tc)	= 59.3 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,137,473 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.67	142.39 <<

...End

Hydrograph Report

Hyd. No. 12

AtArchusaAve

Hydrograph type	= SCS Runoff	Peak discharge	= 186.31 cfs
Storm frequency	= 5 yrs	Time interval	= 5 min
Drainage area	= 109.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 2800 ft
Tc method	= LAG	Time of conc. (Tc)	= 59.3 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,496,376 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.67	186.31 <<

...End

Hydrograph Report

Hyd. No. 12

AtArchusaAve

Hydrograph type	= SCS Runoff	Peak discharge	= 225.01 cfs
Storm frequency	= 10 yrs	Time interval	= 5 min
Drainage area	= 109.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 2800 ft
Tc method	= LAG	Time of conc. (Tc)	= 59.3 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,817,537 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.67	225.01 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 12

AtArchusaAve

Hydrograph type	= SCS Runoff	Peak discharge	= 281.86 cfs
Storm frequency	= 25 yrs	Time interval	= 5 min
Drainage area	= 109.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 2800 ft
Tc method	= LAG	Time of conc. (Tc)	= 59.3 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,296,371 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.67	281.86 <<

...End

Hydrograph Report

Hyd. No. 12

AtArchusaAve

Hydrograph type	= SCS Runoff	Peak discharge	= 327.89 cfs
Storm frequency	= 50 yrs	Time interval	= 5 min
Drainage area	= 109.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 2800 ft
Tc method	= LAG	Time of conc. (Tc)	= 59.3 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,689,179 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.67	327.89 <<

...End

Hydrograph Report

Hyd. No. 12

AtArchusaAve

Hydrograph type	= SCS Runoff	Peak discharge	= 375.95 cfs
Storm frequency	= 100 yrs	Time interval	= 5 min
Drainage area	= 109.00 ac	Curve number	= 86
Basin Slope	= 1.0 %	Hydraulic length	= 2800 ft
Tc method	= LAG	Time of conc. (Tc)	= 59.3 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

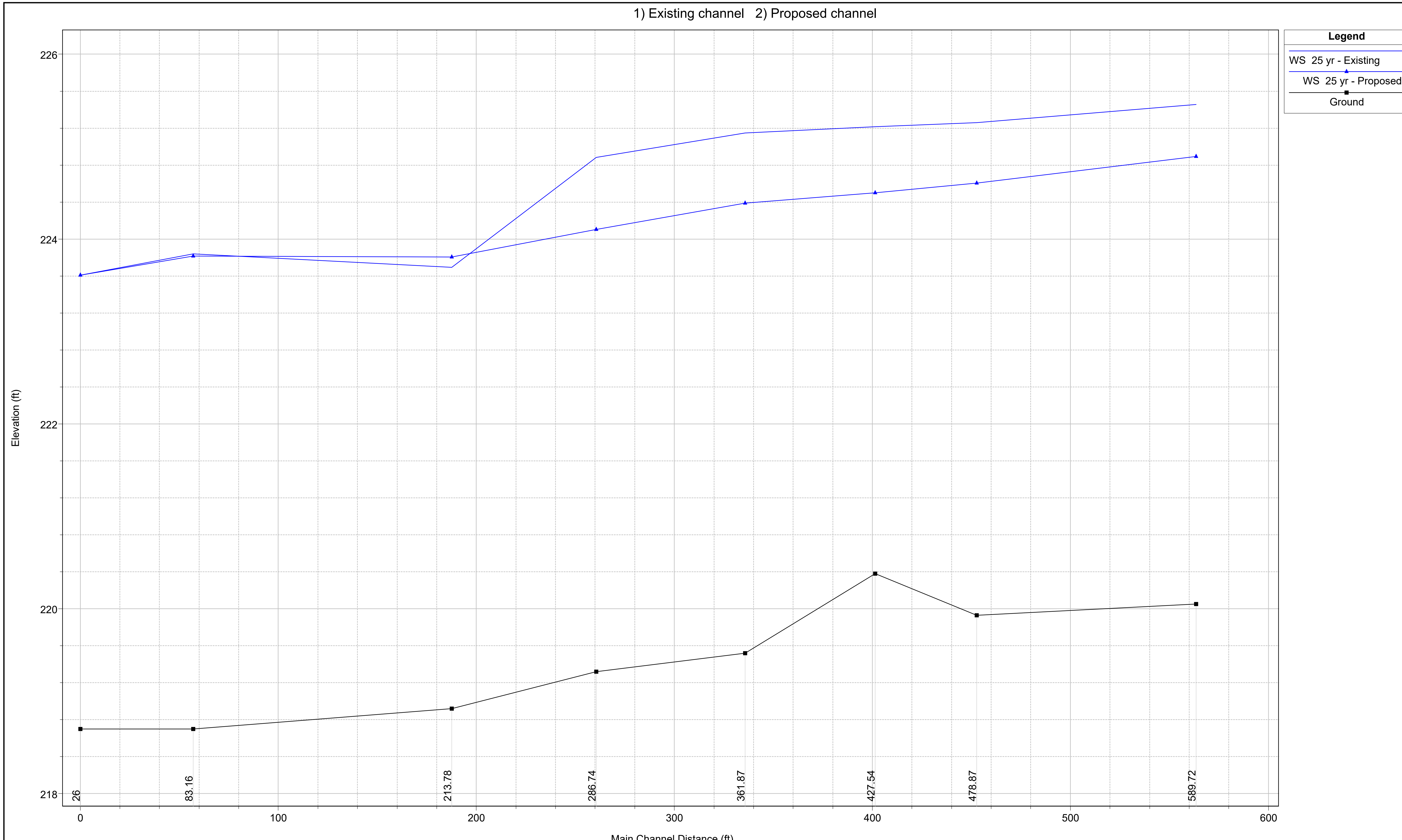
Hydrograph Volume = 3,103,365 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.67	375.95 <<

...End

Channel upstream of RR Avenue at Franklin Ave
Water-surfave Profiles
Propsed vs Existing



Channel Between Railroad Avenue and Credit Union
Water-surface Elevations

HEC-RAS River: FranklinArchusaC Reach: FranklinArchusaC

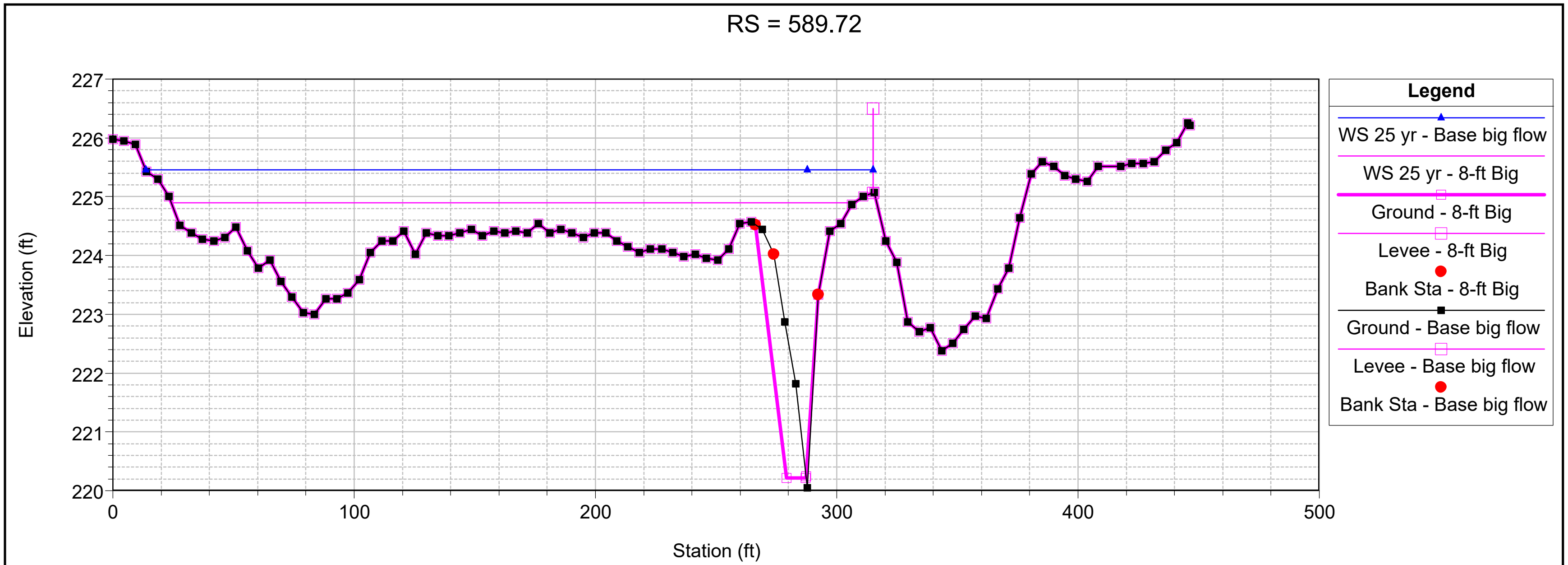
Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
FranklinArchusaC	589.72	5 yr	Base big flow	322.00	220.05	224.999	224.20	225.06	0.001977	2.82	282.31	287.69	0.29
FranklinArchusaC	589.72	5 yr	8-ft Big	322.00	220.22	224.419	223.03	224.60	0.003265	3.66	153.10	243.18	0.38
FranklinArchusaC	589.72	10 yr	Base big flow	389.00	220.05	225.193	224.29	225.25	0.001809	2.82	339.14	294.78	0.28
FranklinArchusaC	589.72	10 yr	8-ft Big	389.00	220.22	224.633	223.50	224.81	0.003197	3.77	209.78	276.29	0.38
FranklinArchusaC	589.72	25 yr	Base big flow	488.00	220.05	225.455	224.73	225.51	0.001642	2.83	417.00	301.33	0.27
FranklinArchusaC	589.72	25 yr	8-ft Big	488.00	220.22	224.893	223.90	225.04	0.002847	3.76	282.47	282.91	0.36
FranklinArchusaC	589.72	50 yr	Base big flow	567.00	220.05	225.624	224.81	225.68	0.001599	2.89	468.24	303.04	0.27
FranklinArchusaC	589.72	50 yr	8-ft Big	567.00	220.22	225.095	224.25	225.23	0.002569	3.72	340.65	293.26	0.35
FranklinArchusaC	478.87	5 yr	Base big flow	322.00	219.93	224.704		224.81	0.002576	3.53	254.86	308.36	0.34
FranklinArchusaC	478.87	5 yr	8-ft Big	322.00	219.89	224.165		224.28	0.002289	2.94	175.52	158.96	0.32
FranklinArchusaC	478.87	10 yr	Base big flow	389.00	219.93	224.953		225.03	0.002086	3.33	336.37	361.43	0.31
FranklinArchusaC	478.87	10 yr	8-ft Big	389.00	219.89	224.361		224.48	0.002427	3.16	210.93	197.76	0.33
FranklinArchusaC	478.87	25 yr	Base big flow	488.00	219.93	225.259		225.32	0.001699	3.17	461.45	450.85	0.28
FranklinArchusaC	478.87	25 yr	8-ft Big	488.00	219.89	224.606		224.74	0.002537	3.41	267.98	261.16	0.34
FranklinArchusaC	478.87	50 yr	Base big flow	567.00	219.93	225.450		225.50	0.001516	3.09	548.40	461.38	0.27
FranklinArchusaC	478.87	50 yr	8-ft Big	567.00	219.89	224.804		224.94	0.002548	3.57	327.42	320.12	0.35
FranklinArchusaC	427.54	5 yr	Base big flow	322.00	220.38	224.647		224.70	0.001401	2.55	334.29	344.46	0.26
FranklinArchusaC	427.54	5 yr	8-ft Big	322.00	219.73	224.051		224.16	0.002035	2.98	191.51	225.48	0.31
FranklinArchusaC	427.54	10 yr	Base big flow	389.00	220.38	224.902		224.94	0.001161	2.45	426.82	389.79	0.24
FranklinArchusaC	427.54	10 yr	8-ft Big	389.00	219.73	224.236		224.36	0.002212	3.24	239.34	294.45	0.32
FranklinArchusaC	427.54	25 yr	Base big flow	488.00	220.38	225.216		225.25	0.000956	2.36	555.24	418.05	0.22
FranklinArchusaC	427.54	25 yr	8-ft Big	488.00	219.73	224.501		224.62	0.002051	3.29	320.23	320.32	0.31
FranklinArchusaC	427.54	50 yr	Base big flow	567.00	220.38	225.407		225.44	0.000889	2.35	635.86	430.81	0.21
FranklinArchusaC	427.54	50 yr	8-ft Big	567.00	219.73	224.719		224.82	0.001835	3.24	394.30	351.80	0.30
FranklinArchusaC	361.87	5 yr	Base big flow	322.00	219.52	224.562		224.60	0.001336	2.41	318.81	285.50	0.24
FranklinArchusaC	361.87	5 yr	8-ft Big	322.00	219.54	223.947		224.03	0.001721	2.67	215.49	211.46	0.28
FranklinArchusaC	361.87	10 yr	Base big flow	389.00	219.52	224.821		224.86	0.001260	2.47	399.87	342.79	0.24
FranklinArchusaC	361.87	10 yr	8-ft Big	389.00	219.54	224.129		224.22	0.001822	2.84	254.71	223.10	0.29
FranklinArchusaC	361.87	25 yr	Base big flow	488.00	219.52	225.149		225.18	0.001033	2.38	515.82	359.67	0.22
FranklinArchusaC	361.87	25 yr	8-ft Big	488.00	219.54	224.389		224.48	0.001858	2.98	316.10	256.38	0.30
FranklinArchusaC	361.87	50 yr	Base big flow	567.00	219.52	225.344		225.38	0.000975	2.39	586.50	365.65	0.22
FranklinArchusaC	361.87	50 yr	8-ft Big	567.00	219.54	224.610		224.70	0.001756	3.03	376.58	288.95	0.29
FranklinArchusaC	286.74	5 yr	Base big flow	322.00	219.32	224.257		224.42	0.004709	3.98	142.18	106.22	0.43
FranklinArchusaC	286.74	5 yr	8-ft Big	322.00	219.31	223.763		223.88	0.002223	2.97	148.39	102.03	0.32
FranklinArchusaC	286.74	10 yr	Base big flow	389.00	219.32	224.534		224.69	0.004606	3.98	175.46	142.08	0.43
FranklinArchusaC	286.74	10 yr	8-ft Big	389.00	219.31	223.899		224.05	0.002730	3.34	162.64	108.31	0.35
FranklinArchusaC	286.74	25 yr	Base big flow	488.00	219.32	224.884		225.03	0.004456	4.02	231.37	171.16	0.43
FranklinArchusaC	286.74	25 yr	8-ft Big	488.00	219.31	224.103		224.29	0.003332	3.79	185.79	118.36	0.39
FranklinArchusaC	286.74	50 yr	Base big flow	567.00	219.32	225.083		225.23	0.004341	4.13	269.11	212.28	0.42
FranklinArchusaC	286.74	50 yr	8-ft Big	567.00	219.31	224.311		224.51	0.003478	3.96	211.29	127.41	0.40
FranklinArchusaC	213.78	5 yr	Base big flow	322.00	218.92	223.508		223.90	0.010879	5.64	84.75	63.05	0.65

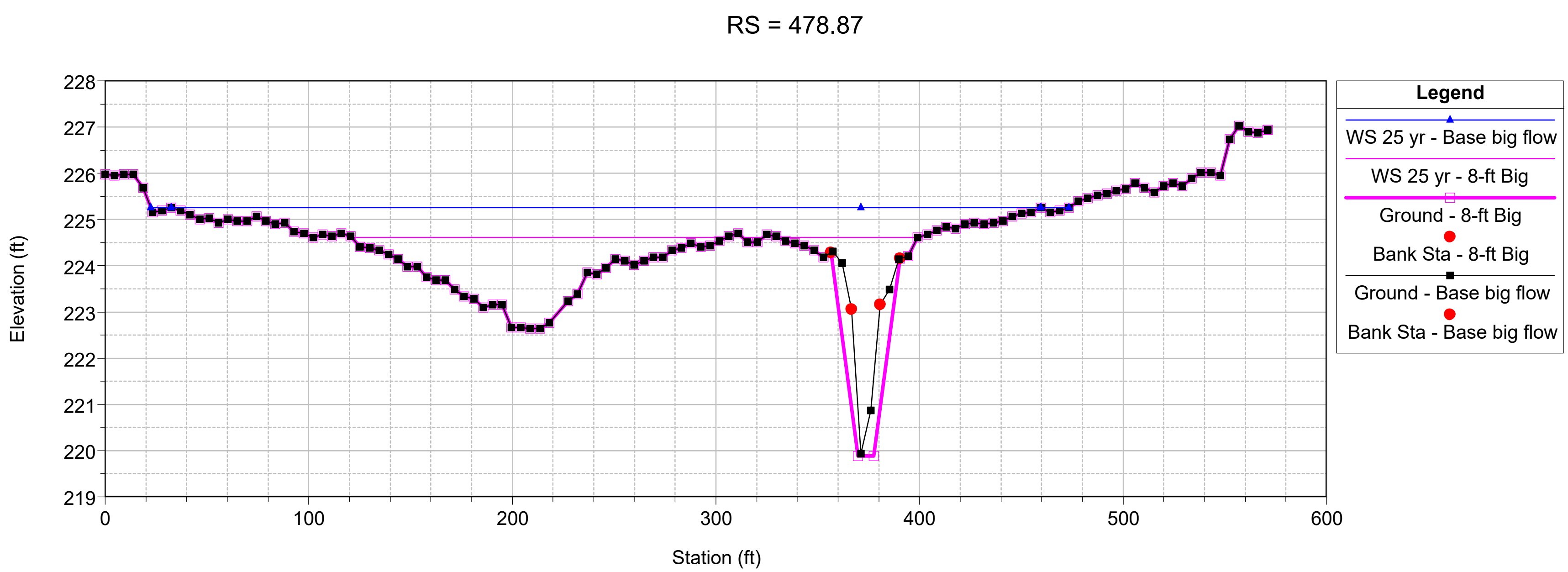
Channel Between Railroad Avenue and Credit Union
Water-surface Elevations

HEC-RAS River: FranklinArchusaC Reach: FranklinArchusaC (Continued)

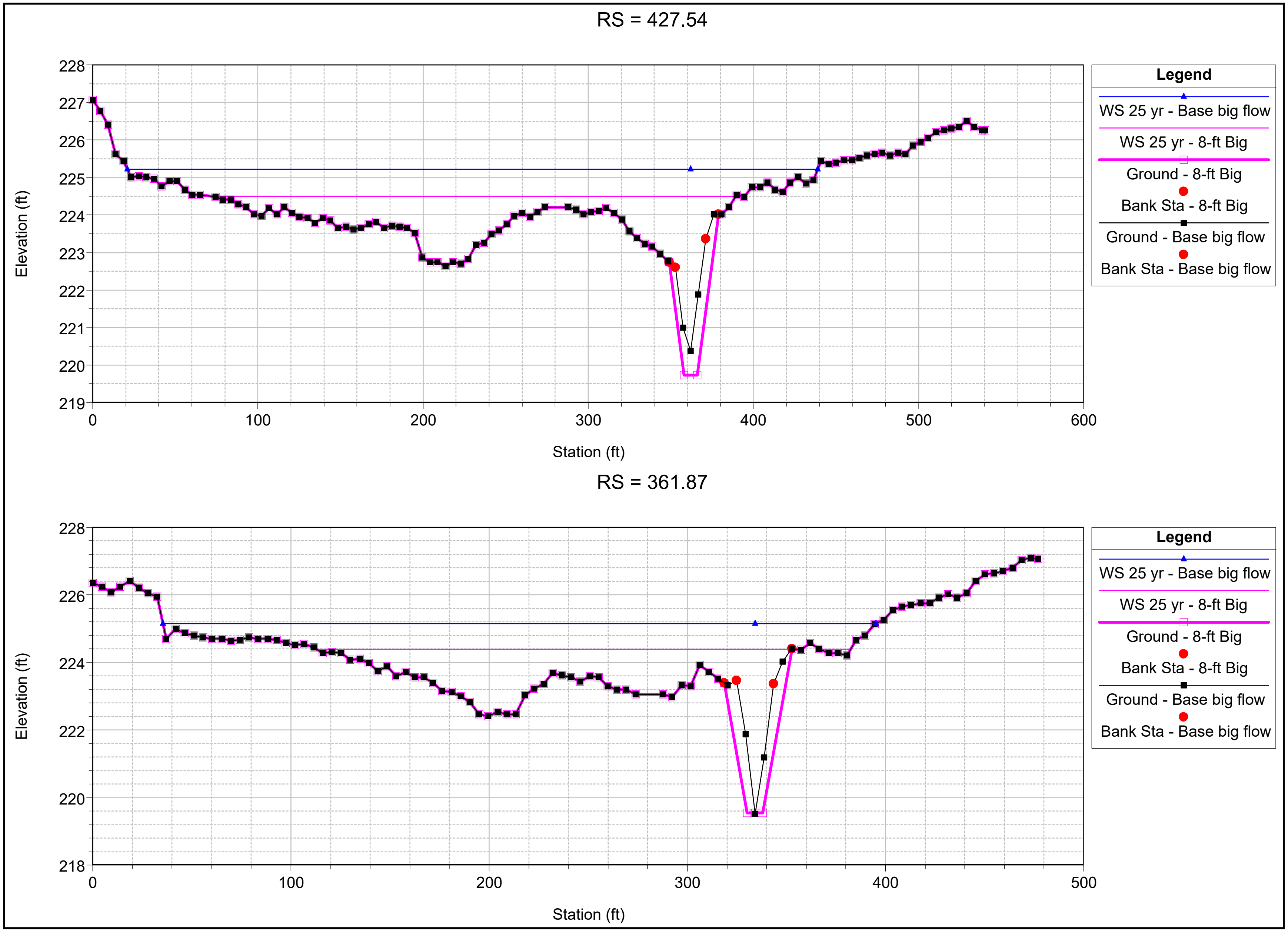
Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
FranklinArchusaC	213.78	5 yr	8-ft Big	322.00	219.09	223.606		223.72	0.002131	2.93	142.82	83.90	0.31
FranklinArchusaC	213.78	10 yr	Base big flow	389.00	218.92	223.511	223.33	224.08	0.015809	6.80	84.95	63.23	0.78
FranklinArchusaC	213.78	10 yr	8-ft Big	389.00	219.09	223.687		223.85	0.002817	3.40	149.68	85.39	0.36
FranklinArchusaC	213.78	25 yr	Base big flow	488.00	218.92	223.695	223.70	224.39	0.018981	7.61	97.34	69.56	0.86
FranklinArchusaC	213.78	25 yr	8-ft Big	488.00	219.09	223.807		224.03	0.003837	4.03	160.10	87.60	0.42
FranklinArchusaC	213.78	50 yr	Base big flow	567.00	218.92	223.877	223.88	224.59	0.019414	7.85	110.27	72.72	0.88
FranklinArchusaC	213.78	50 yr	8-ft Big	567.00	219.09	223.976		224.23	0.004254	4.33	175.16	90.71	0.44
FranklinArchusaC	83.16	5 yr	Base big flow	322.00	218.70	223.623		223.63	0.000406	1.46	578.96	418.55	0.14
FranklinArchusaC	83.16	5 yr	8-ft Big	322.00	218.70	223.603		223.61	0.000278	1.22	607.01	415.96	0.12
FranklinArchusaC	83.16	10 yr	Base big flow	389.00	218.70	223.712		223.72	0.000502	1.65	616.59	431.98	0.15
FranklinArchusaC	83.16	10 yr	8-ft Big	389.00	218.70	223.688		223.70	0.000351	1.39	642.89	428.42	0.13
FranklinArchusaC	83.16	25 yr	Base big flow	488.00	218.70	223.841		223.86	0.000644	1.91	673.42	445.88	0.17
FranklinArchusaC	83.16	25 yr	8-ft Big	488.00	218.70	223.816		223.83	0.000459	1.63	698.68	443.67	0.15
FranklinArchusaC	83.16	50 yr	Base big flow	567.00	218.70	224.020		224.04	0.000649	1.98	754.14	455.44	0.18
FranklinArchusaC	83.16	50 yr	8-ft Big	567.00	218.70	223.998		224.02	0.000472	1.71	780.75	454.78	0.15
FranklinArchusaC	26	5 yr	Base big flow	322.00	218.70	223.331	223.33	223.54	0.025351	5.47	138.99	314.13	0.86
FranklinArchusaC	26	5 yr	8-ft Big	322.00	218.70	223.331	223.33	223.54	0.025351	5.47	138.99	314.13	0.86
FranklinArchusaC	26	10 yr	Base big flow	389.00	218.70	223.388	223.39	223.62	0.027311	5.84	157.01	324.75	0.90
FranklinArchusaC	26	10 yr	8-ft Big	389.00	218.70	223.388	223.39	223.62	0.027311	5.84	157.01	324.75	0.90
FranklinArchusaC	26	25 yr	Base big flow	488.00	218.70	223.610	223.45	223.75	0.015519	4.89	235.78	382.02	0.69
FranklinArchusaC	26	25 yr	8-ft Big	488.00	218.70	223.610	223.45	223.75	0.015519	4.89	235.78	382.02	0.69
FranklinArchusaC	26	50 yr	Base big flow	567.00	218.70	223.860	223.54	223.94	0.008578	4.01	341.36	455.78	0.53
FranklinArchusaC	26	50 yr	8-ft Big	567.00	218.70	223.860	223.54	223.94	0.008578	4.01	341.36	455.78	0.53

Channel Upstream of RR Avenue at Franklin Avenue
Cross-section Plots

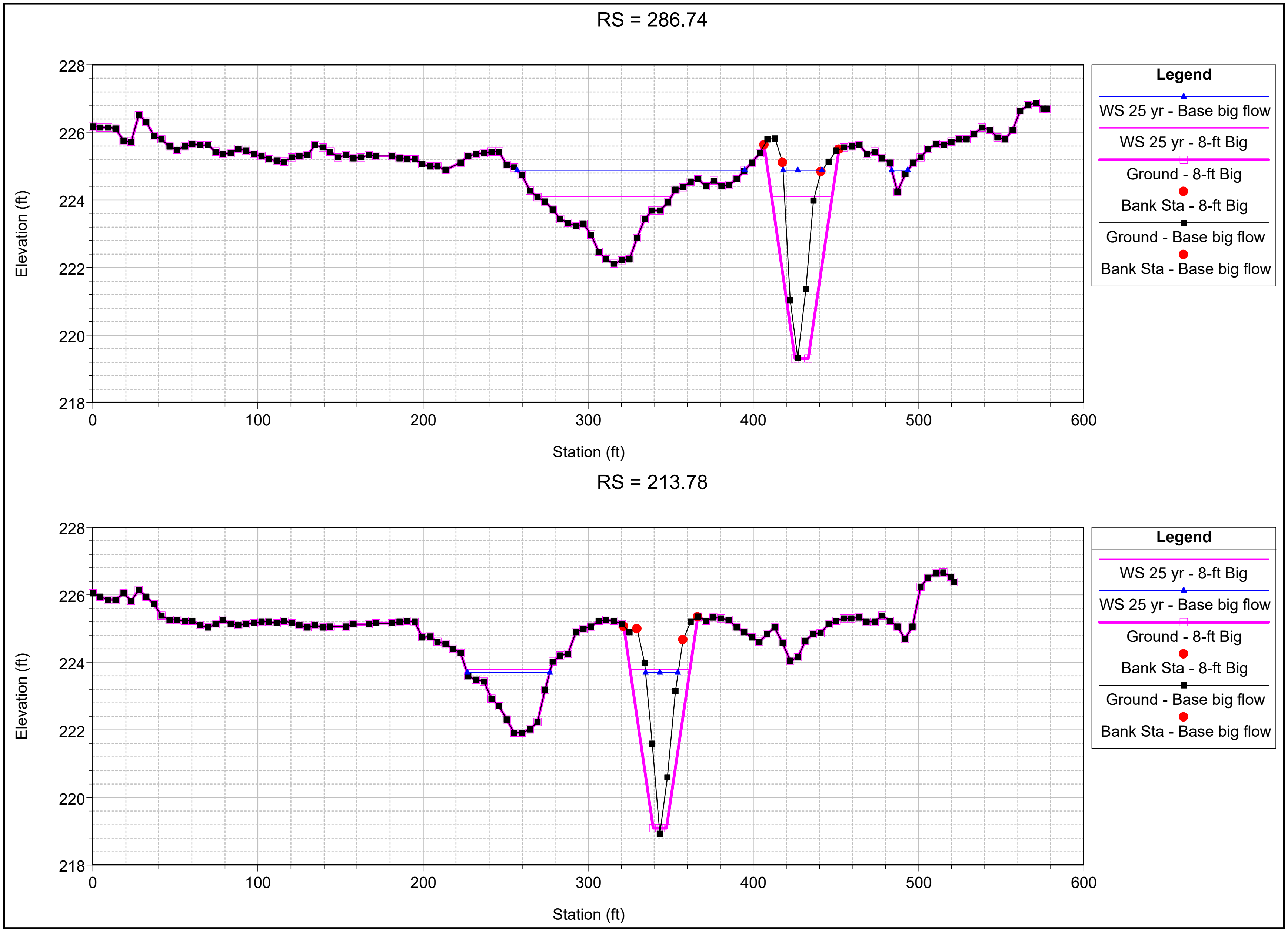




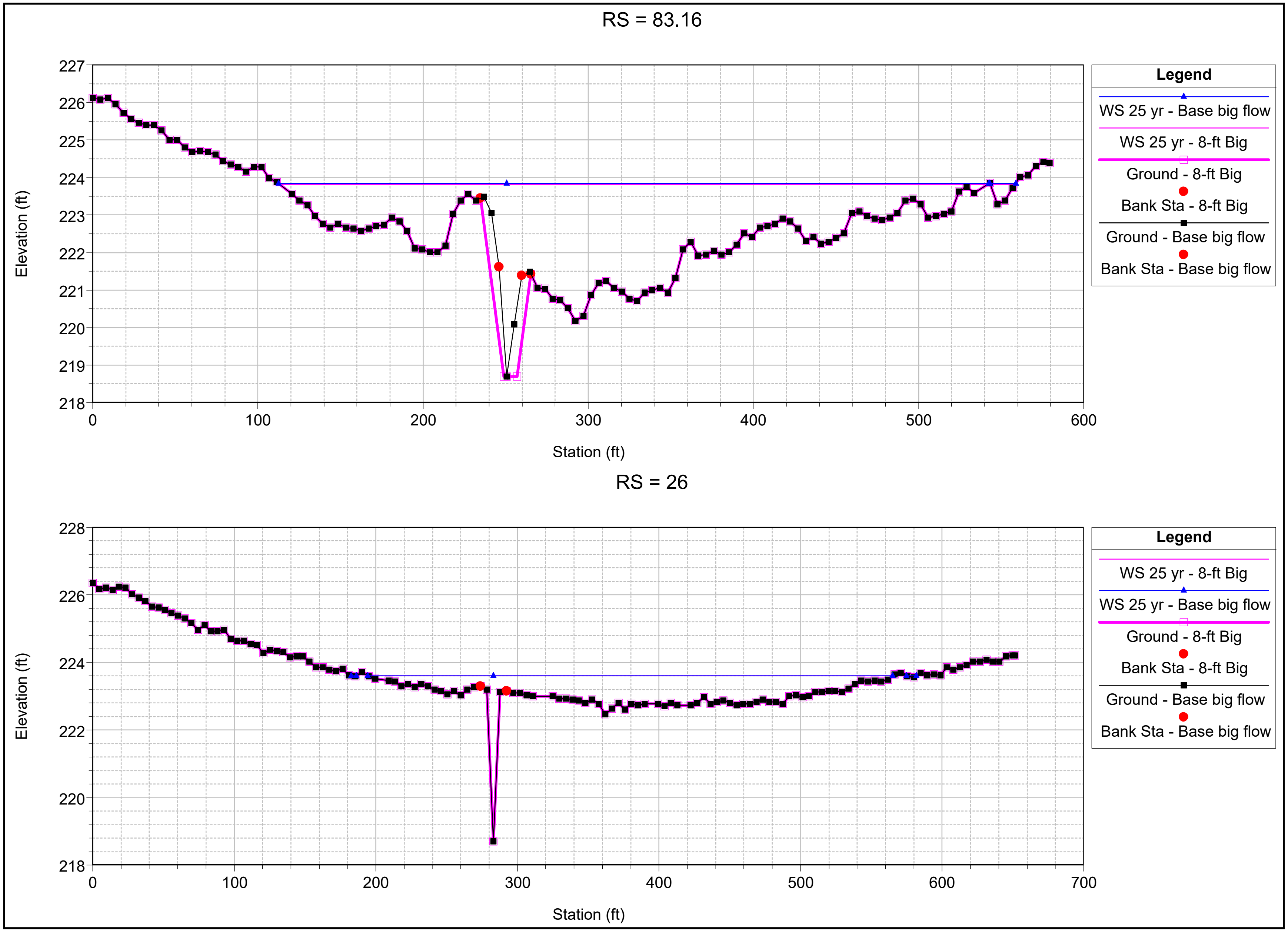
Channel Upstream of RR Avenue at Franklin Avenue
Cross-section Plots



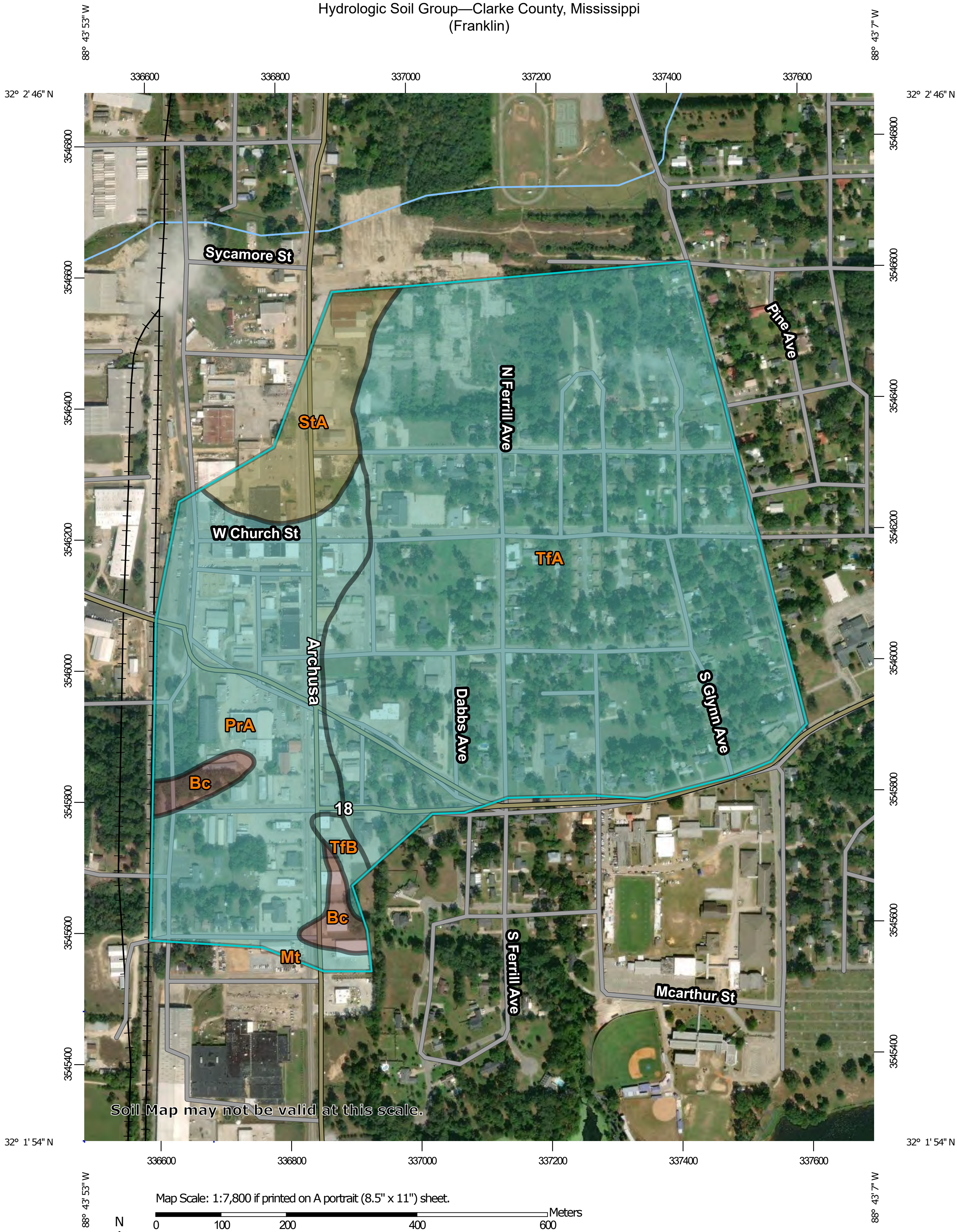
Channel Upstream of RR Avenue at Franklin Avenue
Cross-section Plots



Channel Upstream of RR Avenue at Franklin Avenue
Cross-section Plots



Hydrologic Soil Group—Clarke County, Mississippi
(Franklin)



Map Scale: 1:7,800 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 100, 200, 400, 600

Feet: 0, 350, 700, 1400, 2100

N

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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 15, Sep 17, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 26, 2014—Oct 28, 2017

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	3.7	2.0%
Mt	Mashulaville fine sandy loam, terrace	C/D	0.0	0.0%
PrA	Prentiss fine sandy loam, 0 to 2 percent slopes	C	44.3	24.2%
StA	Stough fine sandy loam, 0 to 2 percent slopes	C/D	10.7	5.8%
TfA	Tilden fine sandy loam, 0 to 2 percent slopes (savannah)	C	123.3	67.3%
TfB	Tilden fine sandy loam, 2 to 5 percent slopes (savannah)	C	1.3	0.7%
Totals for Area of Interest			**183.3**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX H

PROPOSED CULVERT AT WEST DONALD STREET

- Hydrology Summary
- HY-8 Report
- Watershed boundary
- Culvert Inspection Report
- Hydrographs
- Soil Data Report

Proposed Replacement Culvert at West Donald Street

Hydrology Summary

Basin Parameters

Drainage Area (acres)	Runoff Curve Number	Basin Slope (percent)	Hydraulic Length (feet)	Storm Distribution	Time Interval (min)
275	82	2	8450	Type III	2

Peak Discharges

2-yr Recurrence Peak Discharge (cfs)	5-yr Recurrence Peak Discharge (cfs)	10-yr Recurrence Peak Discharge (cfs)	25-yr Recurrence Peak Discharge (cfs)	50-yr Recurrence Peak Discharge (cfs)	100-yr Recurrence Peak Discharge (cfs)
219	295	363	463	545	631

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

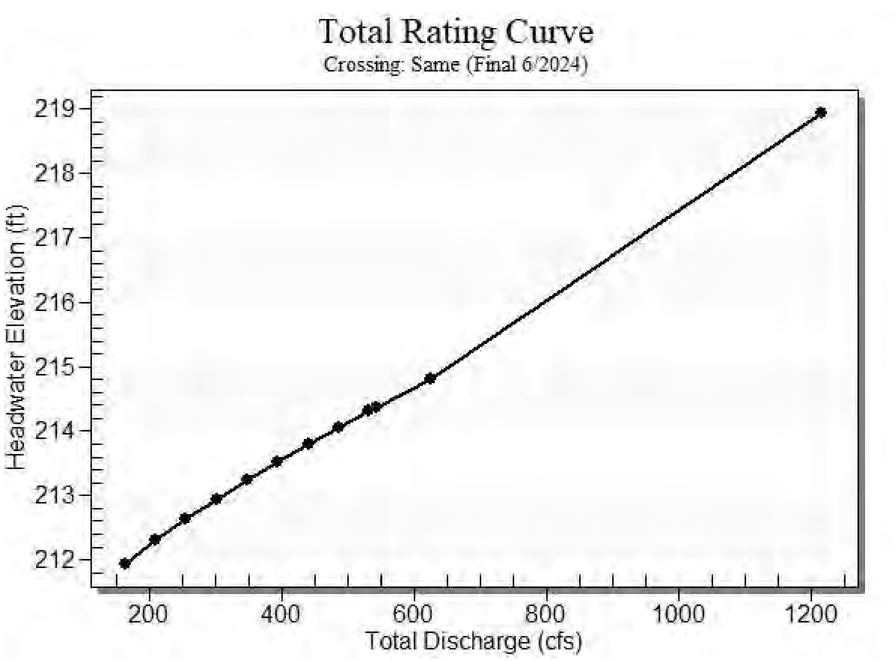
Minimum Flow: 162 cfs

Design Flow: 542 cfs

Maximum Flow: 624 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
211.94	162.00	162.00	0.00	1
212.30	208.20	208.20	0.00	1
212.63	254.40	254.40	0.00	1
212.94	300.60	300.60	0.00	1
213.24	346.80	346.80	0.00	1
213.52	393.00	393.00	0.00	1
213.80	439.20	439.20	0.00	1
214.06	485.40	485.40	0.00	1
214.31	531.60	531.60	0.00	1
214.36	542.00	542.00	0.00	1
214.80	624.00	624.00	0.00	1
218.00	1215.98	1215.98	0.00	Overtopping

Table 1 - Summary of Culvert Flows at Crossing: Same (Final 6/2024)



Rating Curve Plot for Crossing: Same (Final 6/2024)

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
162.00	162.00	211.94	1.944	0.321	1-S2n	0.635	1.268	0.770	4.120	10.521	4.440
208.20	208.20	212.30	2.297	0.818	1-S2n	0.744	1.499	0.934	4.730	11.150	5.240
254.40	254.40	212.63	2.629	1.251	1-S2n	0.845	1.713	1.088	5.120	11.693	5.690
300.60	300.60	212.94	2.943	1.743	1-S2n	0.940	1.914	1.236	5.560	12.161	6.170
346.80	346.80	213.24	3.241	2.103	1-S2n	1.032	2.106	1.379	5.860	12.573	6.480
393.00	393.00	213.52	3.525	2.442	1-S2n	1.118	2.289	1.518	6.130	12.943	6.780
439.20	439.20	213.80	3.796	2.520	1-S2n	1.202	2.465	1.653	6.130	13.283	6.780
485.40	485.40	214.06	4.057	2.606	1-S2n	1.284	2.635	1.785	6.130	13.600	6.780
531.60	531.60	214.31	4.309	2.701	1-S2n	1.362	2.800	1.915	6.130	13.883	6.780
542.00	542.00	214.36	4.365	2.724	1-S2n	1.380	2.836	1.943	6.130	13.948	6.780
624.00	624.00	214.80	4.795	2.917	1-S2n	1.515	3.115	2.164	6.130	14.415	6.780

Table 2 - Culvert Summary Table: Culvert 1

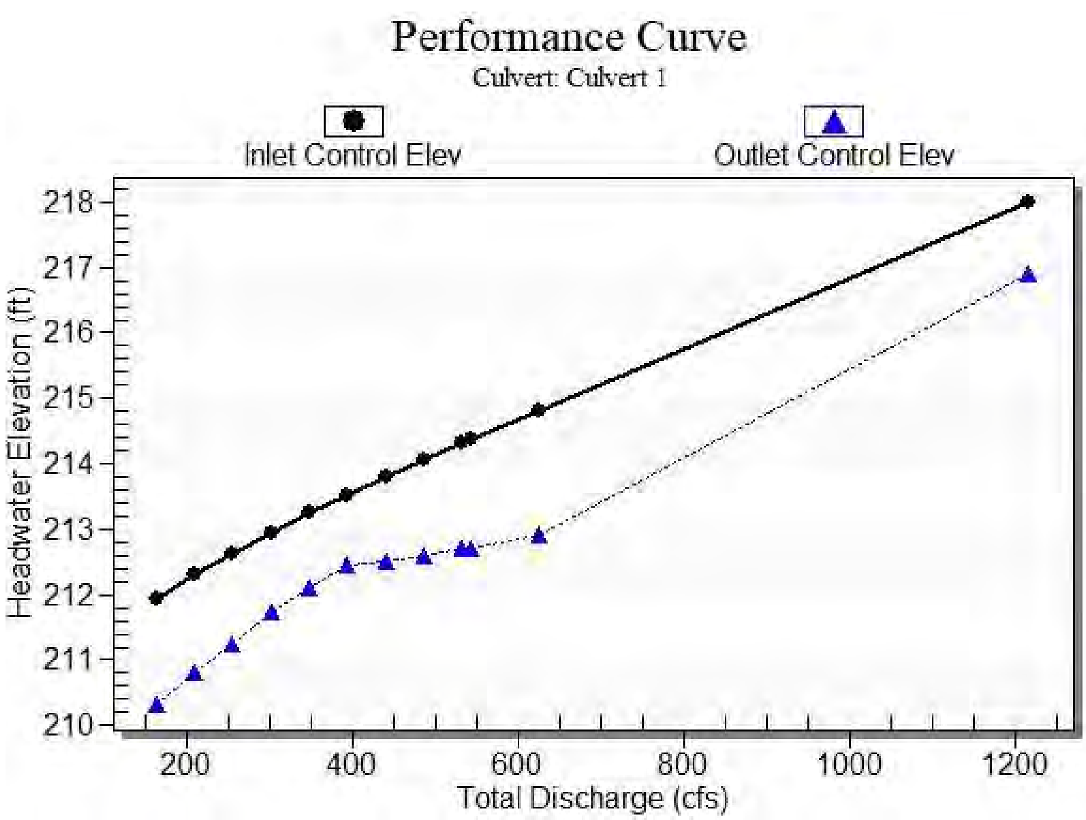
****

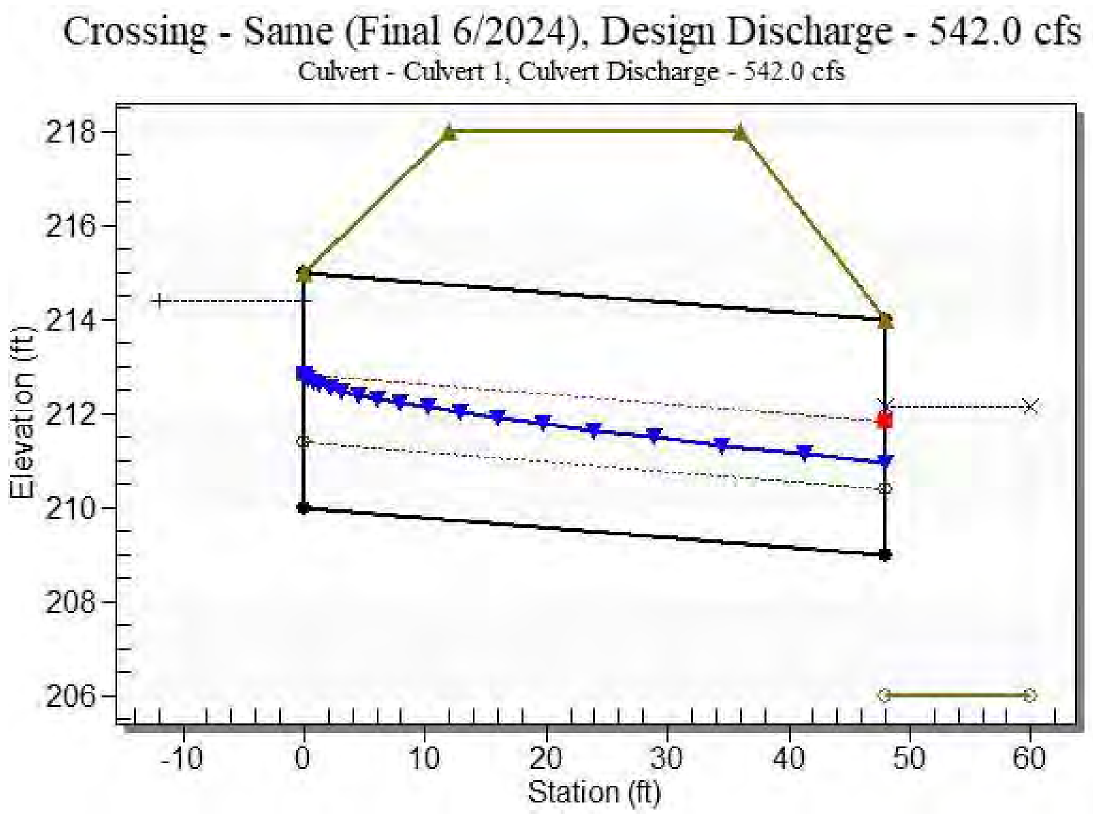
Straight Culvert

Inlet Elevation (invert): 210.00 ft, Outlet Elevation (invert): 209.00 ft

Culvert Length: 48.01 ft, Culvert Slope: 0.0208

Culvert Performance Curve Plot: Culvert 1





Water Surface Profile Plot for Culvert: Culvert 1

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
162.00	210.12	210.12	4.44
208.20	210.73	210.73	5.24
254.40	211.12	211.12	5.69
300.60	211.56	211.56	6.17
346.80	211.86	211.86	6.48
393.00	212.13	212.13	6.78

Table 3 - Downstream Channel Rating Curve (Crossing: Same (Final 6/2024))

Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 210.00 ft

Outlet Station: 48.00 ft

Outlet Elevation: 209.00 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 10.00 ft

Barrel Rise: 5.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: 1.5:1 Bevel (90º) Headwall

Inlet Depression: None

Tailwater Channel Data - Same (Final 6/2024)

Tailwater Channel Option: Enter Rating Curve

Channel Invert Elevation: 206.00 ft

Roadway Data for Crossing: Same (Final 6/2024)

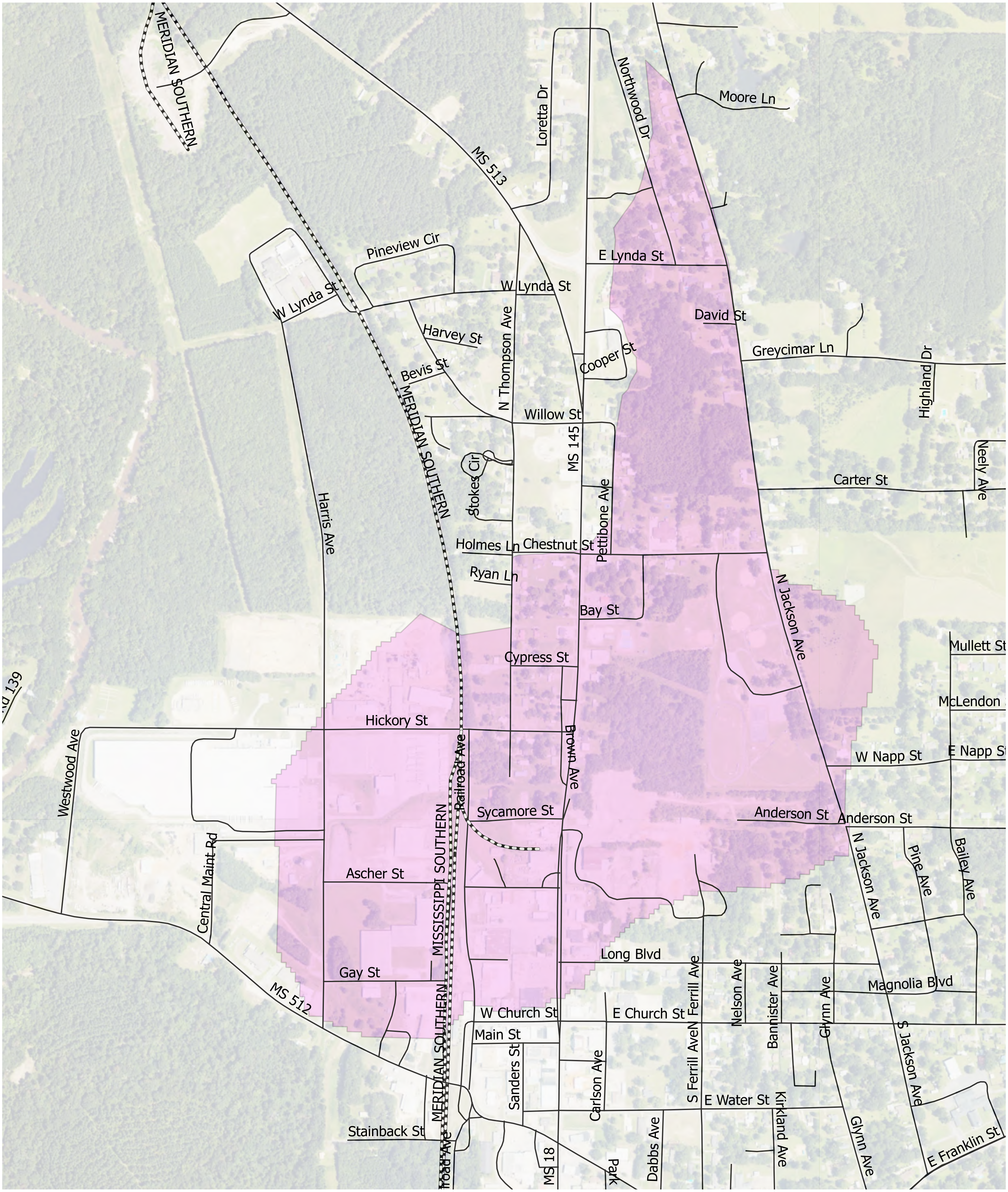
Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 300.00 ft

Crest Elevation: 218.00 ft

Roadway Surface: Paved

Roadway Top Width: 24.00 ft



Watershed Boundary
Culvert at West Donald Street

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:
Location: W. DONALD ST.	Date:
Inspector:	

EXISTING STRUCTURE:

Reference no.: #2078-2079 CVI65	Size: 60" Type: CONC.
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet
OUTLET - Depth of silt ☑ < 0.5' ❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

Hydrograph Report

Hyd. No. 16

Donald Street

Hydrograph type	= SCS Runoff	Peak discharge	= 219.26 cfs
Storm frequency	= 2 yrs	Time interval	= 5 min
Drainage area	= 275.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 8450 ft
Tc method	= LAG	Time of conc. (Tc)	= 116.4 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,530,045 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.25	219.26 <<

...End

Hydrograph Report

Hyd. No. 16

Donald Street

Hydrograph type	= SCS Runoff	Peak discharge	= 295.05 cfs
Storm frequency	= 5 yrs	Time interval	= 5 min
Drainage area	= 275.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 8450 ft
Tc method	= LAG	Time of conc. (Tc)	= 116.4 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,402,534 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.25	295.05 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 16

Donald Street

Hydrograph type	= SCS Runoff	Peak discharge	= 362.63 cfs
Storm frequency	= 10 yrs	Time interval	= 5 min
Drainage area	= 275.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 8450 ft
Tc method	= LAG	Time of conc. (Tc)	= 116.4 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 4,191,046 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.25	362.63 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 16

Donald Street

Hydrograph type	= SCS Runoff	Peak discharge	= 462.94 cfs
Storm frequency	= 25 yrs	Time interval	= 5 min
Drainage area	= 275.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 8450 ft
Tc method	= LAG	Time of conc. (Tc)	= 116.4 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 5,375,706 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.17	462.94 <<

...End

Hydrograph Report

Hyd. No. 16

Donald Street

Hydrograph type	= SCS Runoff	Peak discharge	= 545.02 cfs
Storm frequency	= 50 yrs	Time interval	= 5 min
Drainage area	= 275.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 8450 ft
Tc method	= LAG	Time of conc. (Tc)	= 116.4 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 6,353,117 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.17	545.02 <<

...End

Hydrograph Report

Hyd. No. 16

Donald Street

Hydrograph type	= SCS Runoff	Peak discharge	= 631.02 cfs
Storm frequency	= 100 yrs	Time interval	= 5 min
Drainage area	= 275.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 8450 ft
Tc method	= LAG	Time of conc. (Tc)	= 116.4 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

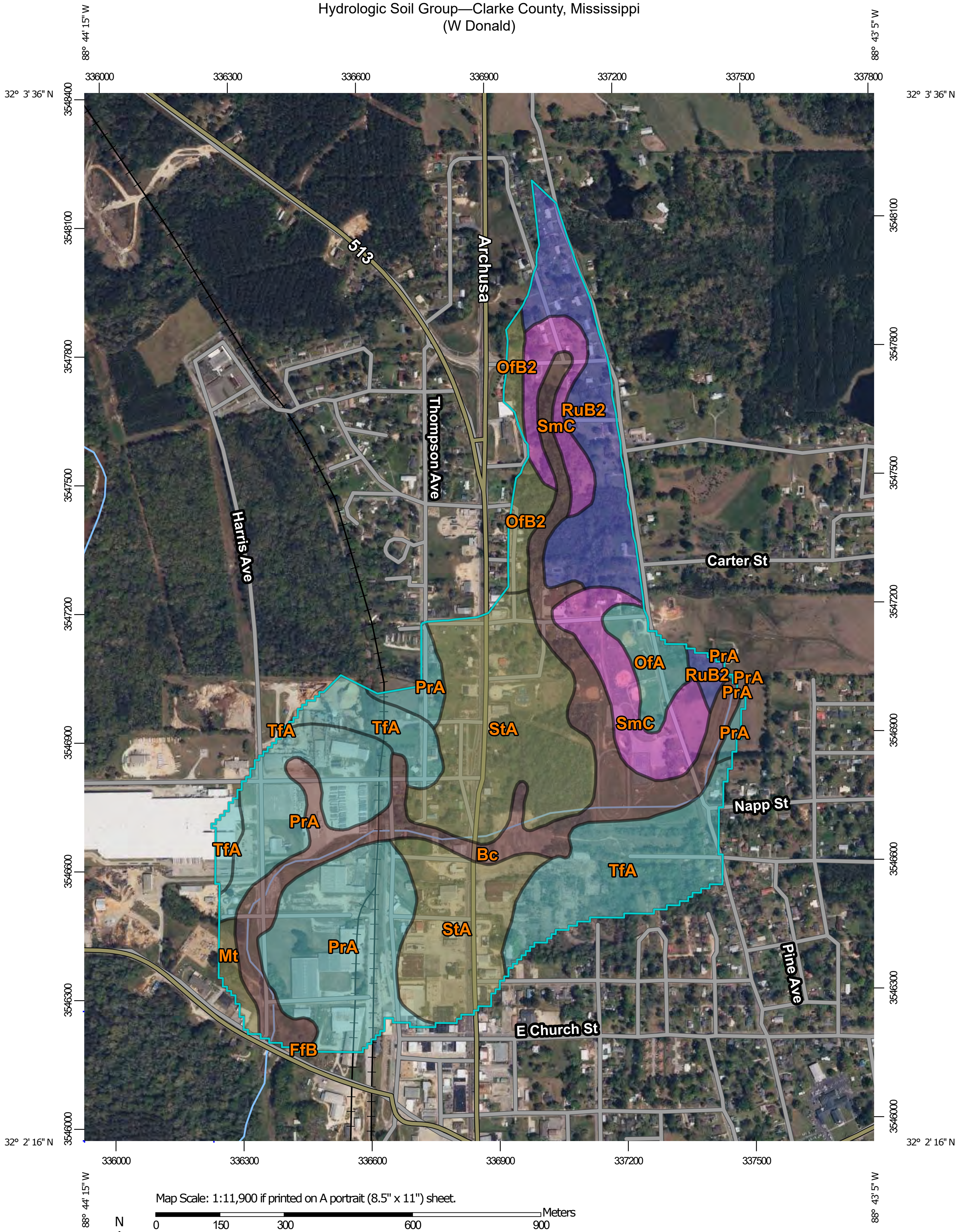
Hydrograph Volume = 7,387,581 cuft

Hydrograph Discharge Table

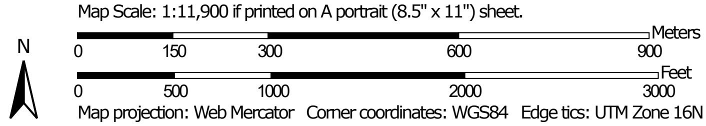
Time -- (hrs	Outflow cfs)
13.17	631.02 <<

...End

Hydrologic Soil Group—Clarke County, Mississippi
(W Donald)



Map Scale: 1:11,900 if printed on A portrait (8.5" x 11") sheet.



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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 21, Sep 6, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 3, 2021—May 8, 2021

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	43.6	16.0%
FfB	Flint fine sandy loam, loamy substratum, 2 to 5 percent slopes (annemaine)	D	0.1	0.0%
Mt	Mashulaville fine sandy loam, terrace	C/D	2.8	1.0%
OfA	Ora fine sandy loam, 0 to 2 percent slopes	C	7.3	2.7%
OfB2	Ora fine sandy loam, 2 to 5 percent slopes, moderately eroded	C/D	7.0	2.6%
PrA	Prentiss fine sandy loam, 0 to 2 percent slopes	C	57.8	21.2%
RuB2	Ruston fine sandy loam, 2 to 5 percent slopes, moderately eroded	B	26.8	9.8%
SmC	Smithdale fine sandy loam, 5 to 8 percent slopes	A	24.8	9.1%
StA	Stough fine sandy loam, 0 to 2 percent slopes	C/D	65.0	23.9%
TfA	Tilden fine sandy loam, 0 to 2 percent slopes (savannah)	C	37.5	13.8%
Totals for Area of Interest			**272.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX I

HARRIS/DART CHANNEL
HICKORY/CYPRESS AREA

- Hydrology Summary
- Inundation Boundary for 25-yr
- Culvert Inspection Reports
- Hydrographs
- HECRAS Output
- Soil Data Reports

Proposed Harris/Dart Channel Improvments

Hydrology Summary

Basin Parameters

Location	Drainage Area (acres)	Runoff Curve Number	Basin Slope	Hydraulic Length	Storm Distribution	Time Interval
W Donald St	275	82	2%	8450 ft	Type III	2 min.
Harris Ave	250	82	2%	7192 ft	Type III	5 min
Railroad	170	71	4%	6080 ft	Type III	5 min

Peak Discharges

Location	2-yr Recurrence Peak Discharge (cfs)	5-yr Recurrence Peak Discharge (cfs)	10-yr Recurrence Peak Discharge (cfs)	25-yr Recurrence Peak Discharge (cfs)	50-yr Recurrence Peak Discharge (cfs)	100-yr Recurrence Peak Discharge (cfs)
W Donald St	219	295	363	463	545	631
Harris Ave	211	243	348	444	523	606
Railroad	100	148	193	261	317	377

Harris/Dart Channel
Inundation Boundary for 25-yr Flow
Orange = Existing, Red = Proposed

Harris/Dart Channel - Hickory/Cypress Area
Inundation Boundary for 25-yr Flow: Red = Existing, Blue = Proposed

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: HARRIS AVE.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2125-2126 CVI59	Size: 30"	Type: PLASTIC
Condition: ☐ Poor ☑ Fair ☐ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ☐ < 0.5' ☐ 0.5' - 1' ☑ 1' - 2' ☐ > 2'	OUTLET - Erosion ☐ None ☐ Minor ☐ Major ☐ Severe w/undermining	

FLOW:

☐ Continous ☐ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ☐ Stock pass Does irrigation ditch carry runoff: ☐ yes ☐ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC.		
CULVERT FIELD INSPECTION REPORT For culverts 50 sq. ft. or smaller	Project no.: 23117	Subaccount:
	Location: HARRIS AVE.	Date:
	Inspector:	

EXISTING STRUCTURE:

Reference no.: #2104-2106 CVI60-61	Size: 26"	Type: PLASTIC
Condition: ☐ Poor ☑ Fair ☐ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ☐ < 0.5' ☐ 0.5' - 1' ☑ 1' - 2' ☐ > 2'	OUTLET - Erosion ☐ None ☐ Major ☐ Minor ☐ Severe w/undermining	

FLOW:

☐ Continous ☐ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs ☒ Intermittent ☐ Stock pass Does irrigation ditch carry runoff: ☐ yes ☐ no	
Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: HARRIS AVE.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2090-2093 CVI62-63	Size: 36"	Type: PLASTIC
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ☑ < 0.5' ❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs
☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC. **CULVERT FIELD INSPECTION REPORT** For culverts 50 sq. ft. or smaller	Project no.: 23117	Subaccount:
	Location: GAY ST.	Date:
	Inspector:	

EXISTING STRUCTURE:

Reference no.: #2085-2086 CVI64	Size: 36"	Type: CORR. METAL
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ☑ < 0.5' ❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: W. DONALD ST.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2078-2079 CVI65	Size: 60"	Type: CONC.
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ☑ < 0.5' ❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Minor ❑ Major ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: N RAILROAD AVE.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2999-3000 CVI80	Size: 68"	Type: CONC.
Condition: ❑ Poor ❑ Fair ☑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ☑ < 0.5' ❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs
☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: N RAILROAD AVE.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2994-2995 CVI81	Size: 48"	Type: CONC.
Condition: ❑ Poor ❑ Fair ☑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ☑ < 0.5' ❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: N. RAILROAD AVE.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2411 AN 2416 CVI82	Size: 30" / Type: CONC.
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet
OUTLET - Depth of silt: ❑ < 0.5' ☑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion: ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 16

Donald Street

Hydrograph type	= SCS Runoff	Peak discharge	= 219.26 cfs
Storm frequency	= 2 yrs	Time interval	= 5 min
Drainage area	= 275.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 8450 ft
Tc method	= LAG	Time of conc. (Tc)	= 116.4 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,530,045 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.25	219.26 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 16

Donald Street

Hydrograph type	= SCS Runoff	Peak discharge	= 295.05 cfs
Storm frequency	= 5 yrs	Time interval	= 5 min
Drainage area	= 275.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 8450 ft
Tc method	= LAG	Time of conc. (Tc)	= 116.4 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,402,534 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.25	295.05 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 16

Donald Street

Hydrograph type	= SCS Runoff	Peak discharge	= 362.63 cfs
Storm frequency	= 10 yrs	Time interval	= 5 min
Drainage area	= 275.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 8450 ft
Tc method	= LAG	Time of conc. (Tc)	= 116.4 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 4,191,046 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.25	362.63 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 16

Donald Street

Hydrograph type	= SCS Runoff	Peak discharge	= 462.94 cfs
Storm frequency	= 25 yrs	Time interval	= 5 min
Drainage area	= 275.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 8450 ft
Tc method	= LAG	Time of conc. (Tc)	= 116.4 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 5,375,706 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.17	462.94 <<

...End

Hydrograph Report

Hyd. No. 16

Donald Street

Hydrograph type	= SCS Runoff	Peak discharge	= 545.02 cfs
Storm frequency	= 50 yrs	Time interval	= 5 min
Drainage area	= 275.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 8450 ft
Tc method	= LAG	Time of conc. (Tc)	= 116.4 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 6,353,117 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.17	545.02 <<

...End

Hydrograph Report

Hyd. No. 16

Donald Street

Hydrograph type	= SCS Runoff	Peak discharge	= 631.02 cfs
Storm frequency	= 100 yrs	Time interval	= 5 min
Drainage area	= 275.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 8450 ft
Tc method	= LAG	Time of conc. (Tc)	= 116.4 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 7,387,581 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.17	631.02 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 17

2024 Harris Ave shop culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 210.60 cfs
Storm frequency	= 2 yrs	Time interval	= 5 min
Drainage area	= 250.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 7192 ft
Tc method	= LAG	Time of conc. (Tc)	= 102.3 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,343,077 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.17	210.60 <<

...End

Hyd. No. 17

2024 Harris Ave shop culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 283.36 cfs
Storm frequency	= 5 yrs	Time interval	= 5 min
Drainage area	= 250.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 7192 ft
Tc method	= LAG	Time of conc. (Tc)	= 102.3 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,151,088 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.17	283.36 <<

...End

Hydrograph Report

Hyd. No. 17

2024 Harris Ave shop culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 348.24 cfs
Storm frequency	= 10 yrs	Time interval	= 5 min
Drainage area	= 250.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 7192 ft
Tc method	= LAG	Time of conc. (Tc)	= 102.3 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,881,330 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.17	348.24 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 17

2024 Harris Ave shop culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 444.40 cfs
Storm frequency	= 25 yrs	Time interval	= 5 min
Drainage area	= 250.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 7192 ft
Tc method	= LAG	Time of conc. (Tc)	= 102.3 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 4,978,439 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.08	444.40 <<

...End

Hydrograph Report

Hyd. No. 17

2024 Harris Ave shop culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 523.17 cfs
Storm frequency	= 50 yrs	Time interval	= 5 min
Drainage area	= 250.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 7192 ft
Tc method	= LAG	Time of conc. (Tc)	= 102.3 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 5,883,630 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.08	523.17 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 17

2024 Harris Ave shop culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 605.70 cfs
Storm frequency	= 100 yrs	Time interval	= 5 min
Drainage area	= 250.00 ac	Curve number	= 82
Basin Slope	= 2.0 %	Hydraulic length	= 7192 ft
Tc method	= LAG	Time of conc. (Tc)	= 102.3 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

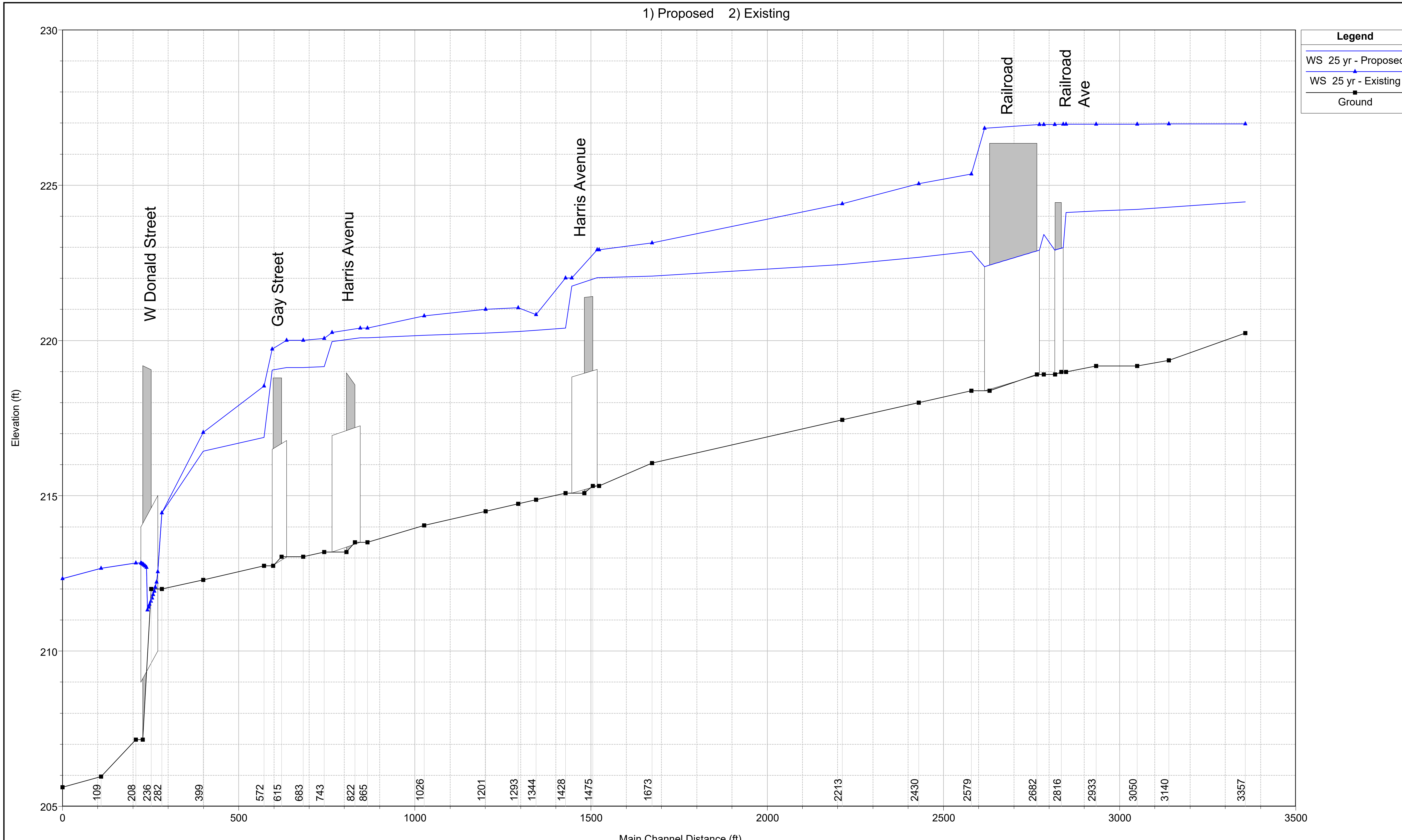
Hydrograph Volume = 6,841,647 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.08	605.70 <<

...End

Harris/Dart Channel Water-surface Profiles
Proposed vs Existing, 25-yr Flow



HEC-RAS River: LongHarrisDartCe Reach: LongHarrisDartCe

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
LongHarrisDartCe	1	10 yr	Proposed	363.00	205.62	211.812	209.96	212.02	0.003001	3.65	99.53	32.12	0.36
LongHarrisDartCe	1	10 yr	Existing	363.00	205.62	211.812	209.96	212.02	0.003001	3.65	99.53	32.12	0.36
LongHarrisDartCe	1	25 yr	Proposed	463.00	205.62	212.332	210.33	212.58	0.003003	3.98	116.63	33.93	0.37
LongHarrisDartCe	1	25 yr	Existing	463.00	205.62	212.332	210.33	212.58	0.003003	3.98	116.63	33.93	0.37
LongHarrisDartCe	1	50 yr	Proposed	545.00	205.62	212.698	210.61	212.98	0.003001	4.25	129.61	36.96	0.38
LongHarrisDartCe	1	50 yr	Existing	545.00	205.62	212.698	210.61	212.98	0.003001	4.25	129.61	36.96	0.38
LongHarrisDartCe	1	100 yr	Proposed	631.00	205.62	213.053	210.87	213.37	0.003005	4.50	143.26	39.91	0.38
LongHarrisDartCe	1	100 yr	Existing	631.00	205.62	213.053	210.87	213.37	0.003005	4.50	143.26	39.91	0.38
LongHarrisDartCe	109	10 yr	Proposed	363.00	205.96	212.131		212.26	0.001664	2.93	125.37	40.28	0.28
LongHarrisDartCe	109	10 yr	Existing	363.00	205.96	212.131		212.26	0.001664	2.93	125.37	40.28	0.28
LongHarrisDartCe	109	25 yr	Proposed	463.00	205.96	212.667		212.83	0.001675	3.21	147.88	43.42	0.29
LongHarrisDartCe	109	25 yr	Existing	463.00	205.96	212.667		212.83	0.001675	3.21	147.88	43.42	0.29
LongHarrisDartCe	109	50 yr	Proposed	545.00	205.96	213.047		213.23	0.001684	3.43	164.76	45.35	0.29
LongHarrisDartCe	109	50 yr	Existing	545.00	205.96	213.047		213.23	0.001684	3.43	164.76	45.35	0.29
LongHarrisDartCe	109	100 yr	Proposed	631.00	205.96	213.417		213.62	0.001695	3.64	181.85	47.22	0.30
LongHarrisDartCe	109	100 yr	Existing	631.00	205.96	213.417		213.62	0.001695	3.64	181.85	47.22	0.30
LongHarrisDartCe	208	10 yr	Proposed	363.00	209.00	212.312	211.07	212.61	0.004854	4.35	83.36	29.72	0.46
LongHarrisDartCe	208	10 yr	Existing	363.00	209.00	212.312	211.07	212.61	0.004854	4.35	83.36	29.72	0.46
LongHarrisDartCe	208	25 yr	Proposed	463.00	209.00	212.838	211.39	213.18	0.004699	4.66	99.28	30.88	0.46
LongHarrisDartCe	208	25 yr	Existing	463.00	209.00	212.838	211.39	213.18	0.004699	4.66	99.28	30.88	0.46
LongHarrisDartCe	208	50 yr	Proposed	545.00	209.00	213.212	211.64	213.59	0.004725	4.91	111.02	31.97	0.46
LongHarrisDartCe	208	50 yr	Existing	545.00	209.00	213.212	211.64	213.59	0.004725	4.91	111.02	31.97	0.46
LongHarrisDartCe	208	100 yr	Proposed	631.00	209.00	213.577	211.89	213.99	0.004767	5.13	122.90	33.21	0.47
LongHarrisDartCe	208	100 yr	Existing	631.00	209.00	213.577	211.89	213.99	0.004767	5.13	122.90	33.21	0.47
LongHarrisDartCe	236			Culvert									
LongHarrisDartCe	282	10 yr	Proposed	363.00	212.00	214.077	214.08	215.09	0.027960	8.08	44.94	22.28	1.00
LongHarrisDartCe	282	10 yr	Existing	363.00	212.00	214.077	214.08	215.09	0.027960	8.08	44.94	22.28	1.00
LongHarrisDartCe	282	25 yr	Proposed	463.00	212.00	214.445	214.45	215.62	0.027022	8.71	53.18	22.50	1.00
LongHarrisDartCe	282	25 yr	Existing	463.00	212.00	214.445	214.45	215.62	0.027022	8.71	53.18	22.50	1.00
LongHarrisDartCe	282	50 yr	Proposed	545.00	212.00	214.722	214.72	216.03	0.026611	9.17	59.44	22.67	1.00
LongHarrisDartCe	282	50 yr	Existing	545.00	212.00	214.722	214.72	216.03	0.026611	9.17	59.44	22.67	1.00
LongHarrisDartCe	282	100 yr	Proposed	631.00	212.00	214.995	214.99	216.43	0.026363	9.61	65.64	22.84	1.00
LongHarrisDartCe	282	100 yr	Existing	631.00	212.00	214.995	214.99	216.43	0.026363	9.61	65.64	22.84	1.00
LongHarrisDartCe	399	10 yr	Proposed	363.00	212.29	215.919	214.25	216.08	0.002707	3.25	111.66	41.72	0.35
LongHarrisDartCe	399	10 yr	Existing	363.00	212.29	216.643	216.64	217.40	0.013254	7.49	75.99	74.67	0.76
LongHarrisDartCe	399	25 yr	Proposed	463.00	212.29	216.436	214.57	216.62	0.002557	3.46	133.84	64.64	0.35
LongHarrisDartCe	399	25 yr	Existing	463.00	212.29	217.039	217.00	217.74	0.011496	7.58	111.71	101.74	0.73
LongHarrisDartCe	399	50 yr	Proposed	545.00	212.29	216.823	214.79	217.03	0.002405	3.61	150.83	90.85	0.34

HEC-RAS River: LongHarrisDartCe Reach: LongHarrisDartCe (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
LongHarrisDartCe	399	50 yr	Existing	545.00	212.29	217.383	217.37	217.98	0.009482	7.34	154.05	137.03	0.67
LongHarrisDartCe	399	100 yr	Proposed	631.00	212.29	217.209	215.02	217.43	0.002259	3.76	167.83	125.30	0.34
LongHarrisDartCe	399	100 yr	Existing	631.00	212.29	217.725	217.56	218.18	0.007201	6.79	202.62	146.11	0.59
LongHarrisDartCe	572	10 yr	Proposed	363.00	212.75	216.385	214.71	216.55	0.002660	3.23	112.35	41.81	0.35
LongHarrisDartCe	572	10 yr	Existing	363.00	211.16	218.232	216.45	218.40	0.002420	3.90	184.75	130.32	0.32
LongHarrisDartCe	572	25 yr	Proposed	463.00	212.75	216.883	215.01	217.07	0.002603	3.46	133.82	59.87	0.35
LongHarrisDartCe	572	25 yr	Existing	463.00	211.16	218.538	217.33	218.71	0.002584	4.21	225.66	136.22	0.34
LongHarrisDartCe	572	50 yr	Proposed	545.00	212.75	217.251	215.24	217.45	0.002479	3.59	159.88	72.94	0.35
LongHarrisDartCe	572	50 yr	Existing	545.00	211.16	218.725	217.79	218.92	0.002803	4.50	251.43	139.09	0.35
LongHarrisDartCe	572	100 yr	Proposed	631.00	212.75	217.618	215.47	217.83	0.002274	3.69	193.62	105.25	0.34
LongHarrisDartCe	572	100 yr	Existing	631.00	211.16	218.832	217.99	219.06	0.003283	4.93	266.46	140.73	0.38
LongHarrisDartCe	615			Culvert									
LongHarrisDartCe	683	10 yr	Proposed	363.00	213.04	217.952	214.99	218.02	0.000830	2.13	170.61	64.33	0.20
LongHarrisDartCe	683	10 yr	Existing	363.00	213.20	219.855	217.09	219.92	0.000778	2.56	283.38	158.21	0.20
LongHarrisDartCe	683	25 yr	Proposed	463.00	213.04	219.132	215.31	219.19	0.000475	1.95	278.67	119.86	0.16
LongHarrisDartCe	683	25 yr	Existing	463.00	213.20	220.005	217.51	220.10	0.001064	3.06	307.30	161.85	0.24
LongHarrisDartCe	683	50 yr	Proposed	545.00	213.04	219.465	215.54	219.53	0.000500	2.09	324.66	147.90	0.17
LongHarrisDartCe	683	50 yr	Existing	545.00	213.20	220.116	217.82	220.23	0.001305	3.44	325.55	165.90	0.26
LongHarrisDartCe	683	100 yr	Proposed	631.00	213.04	219.716	215.76	219.79	0.000545	2.26	362.65	154.75	0.17
LongHarrisDartCe	683	100 yr	Existing	631.00	213.20	220.252	218.12	220.39	0.001517	3.77	348.56	171.60	0.29
LongHarrisDartCe	743	10 yr	Proposed	363.00	213.19	218.000	215.15	218.08	0.000850	2.22	163.56	55.93	0.21
LongHarrisDartCe	743	10 yr	Existing	363.00	212.54	219.902	217.55	219.99	0.001222	3.07	268.79	185.04	0.24
LongHarrisDartCe	743	25 yr	Proposed	463.00	213.19	219.157	215.45	219.22	0.000525	2.09	248.82	97.41	0.17
LongHarrisDartCe	743	25 yr	Existing	463.00	212.54	220.071	218.04	220.19	0.001590	3.58	300.75	194.37	0.27
LongHarrisDartCe	743	50 yr	Proposed	545.00	213.19	219.490	215.68	219.57	0.000569	2.27	289.33	146.18	0.18
LongHarrisDartCe	743	50 yr	Existing	545.00	212.54	220.199	218.50	220.34	0.001855	3.93	326.26	200.86	0.30
LongHarrisDartCe	743	100 yr	Proposed	631.00	213.19	219.743	215.91	219.83	0.000626	2.46	329.19	174.45	0.19
LongHarrisDartCe	743	100 yr	Existing	631.00	212.54	220.352	218.58	220.50	0.002019	4.18	357.19	203.34	0.31
LongHarrisDartCe	822			Culvert									
LongHarrisDartCe	865	10 yr	Proposed	363.00	213.50	219.440	215.60	219.49	0.000480	1.87	194.42	80.38	0.16
LongHarrisDartCe	865	10 yr	Existing	363.00	214.15	220.242	218.25	220.37	0.001706	3.23	191.43	140.00	0.29
LongHarrisDartCe	865	25 yr	Proposed	463.00	213.50	220.084	215.94	220.14	0.000457	2.00	279.82	133.04	0.16
LongHarrisDartCe	865	25 yr	Existing	463.00	214.15	220.399	218.64	220.58	0.002246	3.81	213.79	144.75	0.33
LongHarrisDartCe	865	50 yr	Proposed	545.00	213.50	220.282	216.18	220.35	0.000539	2.23	306.93	141.20	0.17
LongHarrisDartCe	865	50 yr	Existing	545.00	214.15	220.507	218.92	220.72	0.002700	4.25	229.61	147.81	0.37
LongHarrisDartCe	865	100 yr	Proposed	631.00	213.50	220.455	216.42	220.54	0.000628	2.46	331.87	146.40	0.19
LongHarrisDartCe	865	100 yr	Existing	631.00	214.15	220.564	219.19	220.83	0.003361	4.79	238.09	149.36	0.41

HEC-RAS River: LongHarrisDartCe Reach: LongHarrisDartCe (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
LongHarrisDartCe	1026	10 yr	Proposed	363.00	214.05	219.525		219.57	0.000448	1.76	244.79	113.03	0.15
LongHarrisDartCe	1026	10 yr	Existing	363.00	214.31	220.547		220.61	0.001124	2.68	273.54	156.40	0.23
LongHarrisDartCe	1026	25 yr	Proposed	463.00	214.05	220.167		220.22	0.000412	1.86	325.70	140.02	0.15
LongHarrisDartCe	1026	25 yr	Existing	463.00	214.31	220.796		220.88	0.001320	3.02	313.49	170.18	0.26
LongHarrisDartCe	1026	50 yr	Proposed	545.00	214.05	220.381		220.44	0.000478	2.06	356.66	151.65	0.16
LongHarrisDartCe	1026	50 yr	Existing	545.00	214.31	220.981		221.08	0.001506	3.32	345.98	180.47	0.27
LongHarrisDartCe	1026	100 yr	Proposed	631.00	214.05	220.572		220.64	0.000546	2.26	386.16	156.95	0.18
LongHarrisDartCe	1026	100 yr	Existing	631.00	214.31	221.144		221.25	0.001652	3.56	375.76	183.87	0.29
LongHarrisDartCe	1201	10 yr	Proposed	363.00	214.50	219.609		219.67	0.000665	2.00	197.07	116.05	0.18
LongHarrisDartCe	1201	10 yr	Existing	363.00	215.25	220.722		220.80	0.000940	2.58	264.82	163.68	0.22
LongHarrisDartCe	1201	25 yr	Proposed	463.00	214.50	220.243		220.31	0.000584	2.08	281.09	140.94	0.18
LongHarrisDartCe	1201	25 yr	Existing	463.00	215.25	221.001		221.09	0.001090	2.90	313.14	182.57	0.24
LongHarrisDartCe	1201	50 yr	Proposed	545.00	214.50	220.468		220.54	0.000655	2.27	313.40	146.56	0.19
LongHarrisDartCe	1201	50 yr	Existing	545.00	215.25	221.212		221.31	0.001216	3.16	353.14	196.31	0.26
LongHarrisDartCe	1201	100 yr	Proposed	631.00	214.50	220.670		220.76	0.000733	2.48	344.50	159.88	0.20
LongHarrisDartCe	1201	100 yr	Existing	631.00	215.25	221.397		221.51	0.001314	3.37	390.23	204.26	0.27
LongHarrisDartCe	1293	10 yr	Proposed	363.00	214.74	219.671		219.74	0.000819	2.12	171.52	49.57	0.20
LongHarrisDartCe	1293	10 yr	Existing	363.00	215.12	220.778		220.93	0.001553	3.29	150.47	75.03	0.28
LongHarrisDartCe	1293	25 yr	Proposed	463.00	214.74	220.293		220.37	0.000795	2.27	211.00	69.07	0.20
LongHarrisDartCe	1293	25 yr	Existing	463.00	215.12	221.055		221.25	0.001924	3.81	172.11	82.38	0.32
LongHarrisDartCe	1293	50 yr	Proposed	545.00	214.74	220.523		220.62	0.000918	2.51	227.06	71.15	0.22
LongHarrisDartCe	1293	50 yr	Existing	545.00	215.12	221.266		221.50	0.002202	4.20	190.87	98.56	0.34
LongHarrisDartCe	1293	100 yr	Proposed	631.00	214.74	220.729		220.85	0.001037	2.76	242.05	74.24	0.23
LongHarrisDartCe	1293	100 yr	Existing	631.00	215.12	221.446		221.72	0.002488	4.58	209.50	110.52	0.36
LongHarrisDartCe	1344	10 yr	Proposed	363.00	214.87	219.712		219.79	0.000880	2.17	167.16	49.05	0.21
LongHarrisDartCe	1344	10 yr	Existing	363.00	214.87	220.652		221.21	0.009793	6.02	60.38	20.58	0.61
LongHarrisDartCe	1344	25 yr	Proposed	463.00	214.87	220.333		220.42	0.000887	2.33	198.78	52.78	0.21
LongHarrisDartCe	1344	25 yr	Existing	463.00	214.87	220.830		221.64	0.013144	7.24	64.09	21.11	0.72
LongHarrisDartCe	1344	50 yr	Proposed	545.00	214.87	220.568		220.67	0.001039	2.58	211.36	54.19	0.23
LongHarrisDartCe	1344	50 yr	Existing	545.00	214.87	220.929		221.99	0.016424	8.26	66.21	21.43	0.81
LongHarrisDartCe	1344	100 yr	Proposed	631.00	214.87	220.781		220.90	0.001202	2.83	223.01	55.46	0.25
LongHarrisDartCe	1344	100 yr	Existing	631.00	214.87	220.929	220.78	222.35	0.022034	9.57	66.19	21.43	0.93
LongHarrisDartCe	1428	10 yr	Proposed	363.00	215.08	219.782	217.04	219.86	0.000874	2.28	160.66	47.35	0.21
LongHarrisDartCe	1428	10 yr	Existing	363.00	213.96	221.474	219.42	221.71	0.002815	4.28	138.29	100.03	0.35
LongHarrisDartCe	1428	25 yr	Proposed	463.00	215.08	220.400	217.34	220.50	0.000841	2.48	191.18	54.67	0.21
LongHarrisDartCe	1428	25 yr	Existing	463.00	213.96	222.009	219.93	222.24	0.002598	4.41	205.61	147.88	0.34
LongHarrisDartCe	1428	50 yr	Proposed	545.00	215.08	220.645	217.57	220.76	0.000964	2.76	205.66	63.51	0.23
LongHarrisDartCe	1428	50 yr	Existing	545.00	213.96	222.453	220.41	222.64	0.002110	4.19	275.58	169.36	0.31

HEC-RAS River: LongHarrisDartCe Reach: LongHarrisDartCe (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
LongHarrisDartCe	1428	100 yr	Proposed	631.00	215.08	220.868	217.80	221.01	0.001093	3.03	220.76	71.08	0.25
LongHarrisDartCe	1428	100 yr	Existing	631.00	213.96	222.934	220.87	223.06	0.001490	3.72	429.65	288.92	0.26
LongHarrisDartCe	1475			Culvert									
LongHarrisDartCe	1523	10 yr	Proposed	342.00	215.32	221.388	217.21	221.42	0.000274	1.54	222.73	58.36	0.12
LongHarrisDartCe	1523	10 yr	Existing	342.00	214.04	222.719	218.99	222.82	0.000890	2.79	187.33	98.84	0.20
LongHarrisDartCe	1523	25 yr	Proposed	444.00	215.32	222.021	217.53	222.07	0.000298	1.74	283.34	114.83	0.13
LongHarrisDartCe	1523	25 yr	Existing	444.00	214.04	222.923	219.50	223.08	0.001283	3.42	208.92	116.38	0.25
LongHarrisDartCe	1523	50 yr	Proposed	523.00	215.32	222.253	217.75	222.31	0.000353	1.95	310.38	118.70	0.14
LongHarrisDartCe	1523	50 yr	Existing	523.00	214.04	223.040	219.84	223.24	0.001599	3.87	222.83	125.81	0.28
LongHarrisDartCe	1523	100 yr	Proposed	606.00	215.32	222.440	217.98	222.51	0.000418	2.16	332.89	121.49	0.16
LongHarrisDartCe	1523	100 yr	Existing	606.00	214.04	223.165	220.17	223.41	0.001965	4.35	239.74	143.99	0.31
LongHarrisDartCe	1673	10 yr	Proposed	342.00	216.05	221.437		221.49	0.000512	1.76	194.81	52.32	0.16
LongHarrisDartCe	1673	10 yr	Existing	342.00	216.08	222.878		223.01	0.001491	2.88	120.69	36.56	0.27
LongHarrisDartCe	1673	25 yr	Proposed	444.00	216.05	222.074		222.13	0.000543	1.94	229.36	56.15	0.17
LongHarrisDartCe	1673	25 yr	Existing	444.00	216.08	223.143		223.33	0.001981	3.48	130.55	37.64	0.31
LongHarrisDartCe	1673	50 yr	Proposed	523.00	216.05	222.315		222.39	0.000634	2.15	243.04	57.59	0.18
LongHarrisDartCe	1673	50 yr	Existing	523.00	216.08	223.309		223.55	0.002387	3.92	136.85	38.31	0.34
LongHarrisDartCe	1673	100 yr	Proposed	606.00	216.05	222.513		222.60	0.000737	2.39	254.55	58.77	0.20
LongHarrisDartCe	1673	100 yr	Existing	606.00	216.08	223.489		223.78	0.002769	4.35	143.78	39.04	0.37
LongHarrisDartCe	2213	10 yr	Proposed	342.00	217.44	221.806		221.89	0.001119	2.32	147.16	46.81	0.23
LongHarrisDartCe	2213	10 yr	Existing	342.00	216.88	223.896		224.11	0.002799	3.69	93.54	29.58	0.35
LongHarrisDartCe	2213	25 yr	Proposed	444.00	217.44	222.442		222.54	0.001035	2.50	178.15	50.63	0.23
LongHarrisDartCe	2213	25 yr	Existing	444.00	216.88	224.402		224.67	0.003062	4.15	109.27	32.91	0.37
LongHarrisDartCe	2213	50 yr	Proposed	523.00	217.44	222.730		222.85	0.001118	2.73	193.00	52.36	0.24
LongHarrisDartCe	2213	50 yr	Existing	523.00	216.88	224.741		225.05	0.003186	4.48	121.89	44.42	0.39
LongHarrisDartCe	2213	100 yr	Proposed	606.00	217.44	222.983		223.12	0.001222	2.98	206.44	53.88	0.25
LongHarrisDartCe	2213	100 yr	Existing	606.00	216.88	225.070		225.42	0.003265	4.77	138.91	62.84	0.40
LongHarrisDartCe	2430	10 yr	Proposed	342.00	218.00	222.064		222.16	0.001373	2.51	136.33	45.74	0.25
LongHarrisDartCe	2430	10 yr	Existing	342.00	217.27	224.494		224.64	0.002155	3.14	121.12	67.65	0.30
LongHarrisDartCe	2430	25 yr	Proposed	444.00	218.00	222.677		222.79	0.001256	2.70	165.50	49.42	0.25
LongHarrisDartCe	2430	25 yr	Existing	444.00	217.27	225.045		225.21	0.002009	3.36	167.12	106.03	0.30
LongHarrisDartCe	2430	50 yr	Proposed	523.00	218.00	222.982		223.12	0.001327	2.93	180.83	51.25	0.26
LongHarrisDartCe	2430	50 yr	Existing	523.00	217.27	225.418		225.59	0.001886	3.46	219.84	180.79	0.30
LongHarrisDartCe	2430	100 yr	Proposed	606.00	218.00	223.256		223.41	0.001418	3.17	195.09	52.89	0.27
LongHarrisDartCe	2430	100 yr	Existing	606.00	217.27	225.774		225.93	0.001672	3.44	296.37	240.87	0.28
LongHarrisDartCe	2579	10 yr	Proposed	342.00	218.38	222.281	220.25	222.40	0.001696	2.75	124.21	43.63	0.28
LongHarrisDartCe	2579	10 yr	Existing	342.00	217.77	224.842	222.64	225.03	0.002827	3.47	99.13	35.27	0.35

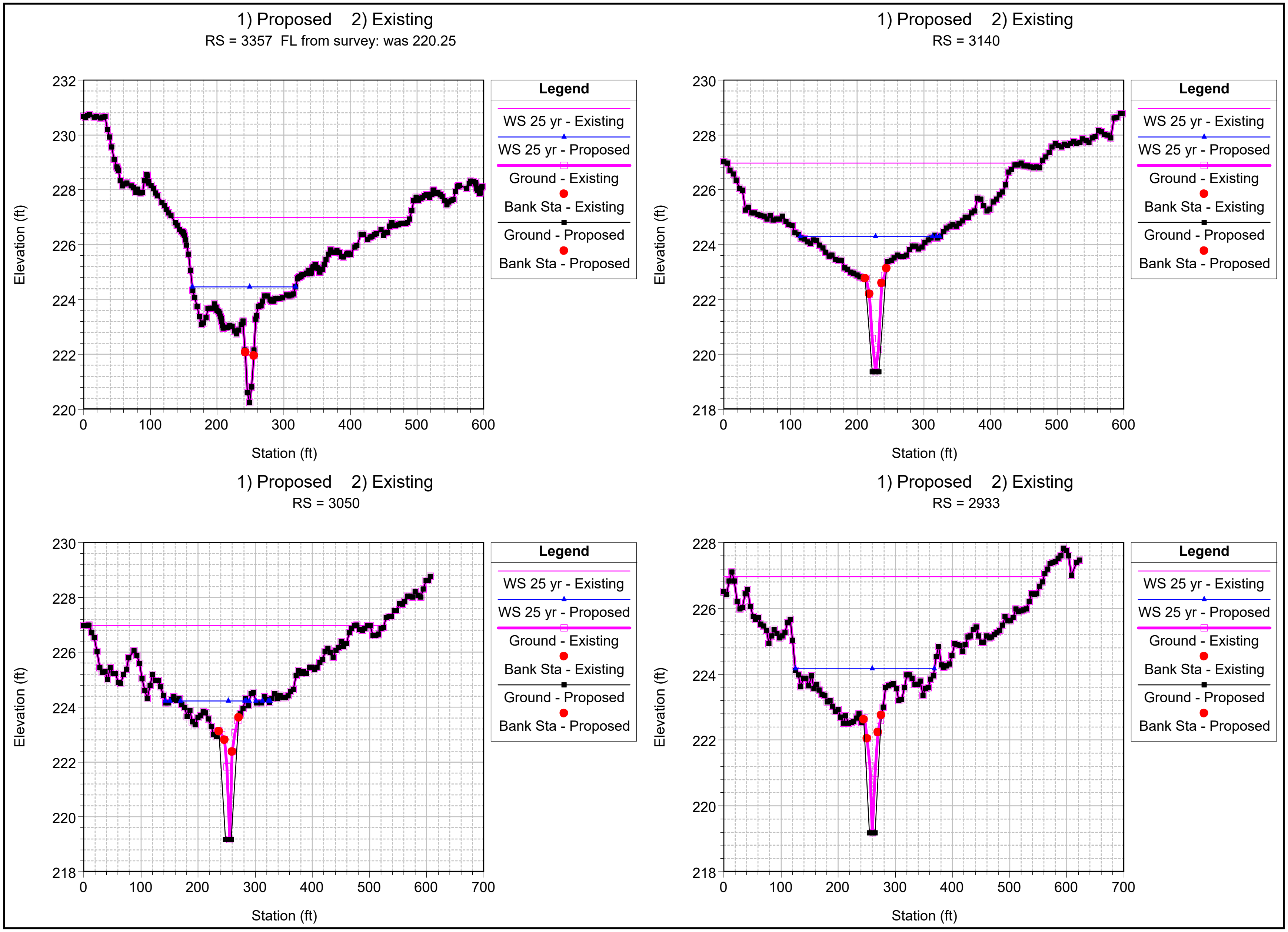
HEC-RAS River: LongHarrisDartCe Reach: LongHarrisDartCe (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
LongHarrisDartCe	2579	25 yr	Proposed	444.00	218.38	222.873	220.58	223.01	0.001558	2.98	149.03	47.18	0.28
LongHarrisDartCe	2579	25 yr	Existing	444.00	217.77	225.365	223.14	225.59	0.002786	3.83	119.06	42.00	0.36
LongHarrisDartCe	2579	50 yr	Proposed	523.00	218.38	223.186	220.80	223.35	0.001631	3.22	162.17	49.06	0.29
LongHarrisDartCe	2579	50 yr	Existing	523.00	217.77	225.714	223.47	225.97	0.002796	4.08	143.94	134.15	0.36
LongHarrisDartCe	2579	100 yr	Proposed	606.00	218.38	223.472	221.02	223.66	0.001726	3.48	174.15	50.77	0.30
LongHarrisDartCe	2579	100 yr	Existing	606.00	217.77	226.033	223.77	226.29	0.002669	4.20	198.83	234.54	0.36
LongHarrisDartCe	2682			Culvert									
LongHarrisDartCe	2785	10 yr	Proposed	193.00	218.91	222.562	220.24	222.61	0.000652	1.76	109.62	41.91	0.18
LongHarrisDartCe	2785	10 yr	Existing	193.00	218.91	226.848	221.83	226.85	0.000010	0.35	1474.32	576.13	0.02
LongHarrisDartCe	2785	25 yr	Proposed	261.00	218.91	223.410	220.52	223.46	0.000531	1.87	139.72	171.75	0.17
LongHarrisDartCe	2785	25 yr	Existing	261.00	218.91	226.959	222.17	226.96	0.000016	0.45	1538.64	584.17	0.03
LongHarrisDartCe	2785	50 yr	Proposed	317.00	218.91	223.998	220.72	224.06	0.000493	1.97	160.60	270.43	0.16
LongHarrisDartCe	2785	50 yr	Existing	317.00	218.91	227.046	222.42	227.05	0.000022	0.53	1589.87	584.17	0.04
LongHarrisDartCe	2785	100 yr	Proposed	377.00	218.91	224.640	220.91	224.71	0.000448	2.06	183.39	392.08	0.16
LongHarrisDartCe	2785	100 yr	Existing	377.00	218.91	227.116	222.66	227.12	0.000029	0.61	1630.48	584.17	0.04
LongHarrisDartCe	2816			Culvert									
LongHarrisDartCe	2848	10 yr	Proposed	193.00	218.99	223.000	220.55	223.05	0.000685	1.74	110.62	44.18	0.18
LongHarrisDartCe	2848	10 yr	Existing	193.00	219.55	226.850	221.06	226.85	0.000010	0.36	1403.25	593.43	0.02
LongHarrisDartCe	2848	25 yr	Proposed	261.00	218.99	224.118	220.85	224.16	0.000430	1.71	152.49	182.56	0.15
LongHarrisDartCe	2848	25 yr	Existing	261.00	219.55	226.962	221.35	226.96	0.000016	0.46	1470.34	605.34	0.03
LongHarrisDartCe	2848	50 yr	Proposed	317.00	218.99	224.997	221.07	225.04	0.000330	1.71	185.43	337.73	0.14
LongHarrisDartCe	2848	50 yr	Existing	317.00	219.55	227.052	221.55	227.05	0.000021	0.54	1525.49	610.61	0.04
LongHarrisDartCe	2848	100 yr	Proposed	377.00	218.99	225.608	221.28	225.66	0.000317	1.81	208.30	503.20	0.14
LongHarrisDartCe	2848	100 yr	Existing	377.00	219.55	227.159	221.75	227.16	0.000027	0.61	1591.18	613.61	0.04
LongHarrisDartCe	2933	10 yr	Proposed	193.00	219.18	223.064		223.14	0.001269	2.22	104.67	89.61	0.24
LongHarrisDartCe	2933	10 yr	Existing	193.00	219.18	226.851		226.85	0.000014	0.39	1326.07	548.93	0.03
LongHarrisDartCe	2933	25 yr	Proposed	261.00	219.18	224.170		224.20	0.000469	1.70	286.41	243.38	0.15
LongHarrisDartCe	2933	25 yr	Existing	261.00	219.18	226.963		226.96	0.000023	0.51	1388.16	554.88	0.04
LongHarrisDartCe	2933	50 yr	Proposed	317.00	219.18	225.058		225.07	0.000199	1.27	531.09	318.03	0.10
LongHarrisDartCe	2933	50 yr	Existing	317.00	219.18	227.055		227.06	0.000030	0.59	1439.12	561.41	0.04
LongHarrisDartCe	2933	100 yr	Proposed	377.00	219.18	225.676		225.69	0.000146	1.18	771.26	440.68	0.09
LongHarrisDartCe	2933	100 yr	Existing	377.00	219.18	227.163		227.16	0.000039	0.68	1500.19	569.95	0.05
LongHarrisDartCe	3050	10 yr	Proposed	193.00	219.18	223.213		223.28	0.001240	2.16	91.39	46.04	0.23
LongHarrisDartCe	3050	10 yr	Existing	193.00	219.18	226.853		226.85	0.000029	0.52	1008.88	481.54	0.04
LongHarrisDartCe	3050	25 yr	Proposed	261.00	219.18	224.221		224.28	0.000691	1.97	172.83	140.78	0.18
LongHarrisDartCe	3050	25 yr	Existing	261.00	219.18	226.967		226.97	0.000046	0.66	1065.07	504.82	0.05
LongHarrisDartCe	3050	50 yr	Proposed	317.00	219.18	225.077		225.11	0.000340	1.59	367.80	276.97	0.13

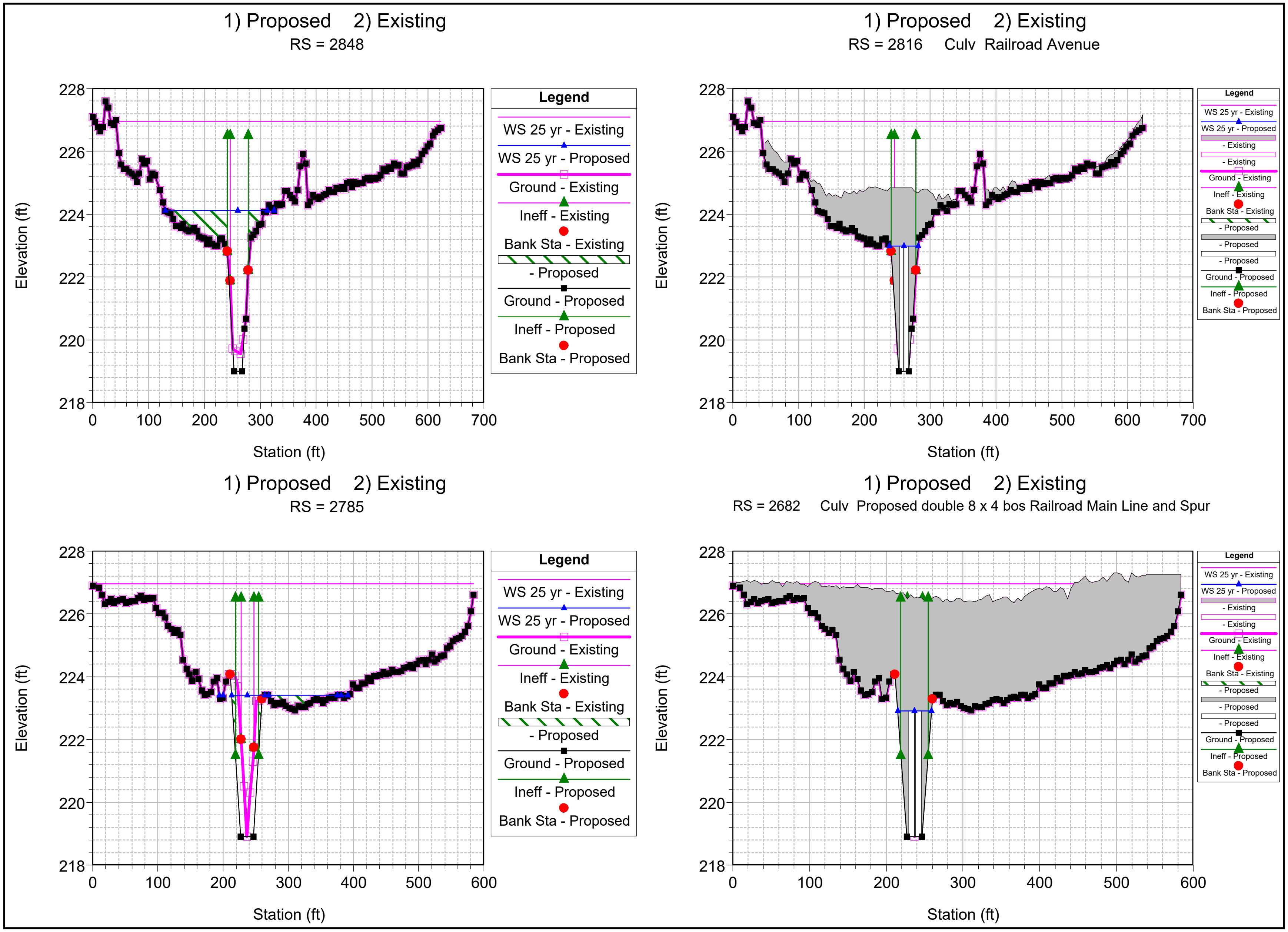
HEC-RAS River: LongHarrisDartCe Reach: LongHarrisDartCe (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
LongHarrisDartCe	3050	50 yr	Existing	317.00	219.18	227.059		227.06	0.000066	0.80	1113.42	526.51	0.06
LongHarrisDartCe	3050	100 yr	Proposed	377.00	219.18	225.691		225.71	0.000223	1.41	571.64	371.66	0.11
LongHarrisDartCe	3050	100 yr	Existing	377.00	219.18	227.168		227.17	0.000080	0.90	1170.92	527.91	0.06
LongHarrisDartCe	3140	10 yr	Proposed	193.00	219.36	223.322		223.40	0.001212	2.19	98.52	67.16	0.23
LongHarrisDartCe	3140	10 yr	Existing	193.00	219.36	226.855		226.86	0.000019	0.47	1077.00	445.46	0.03
LongHarrisDartCe	3140	25 yr	Proposed	261.00	219.36	224.288		224.34	0.000616	1.91	224.52	203.05	0.18
LongHarrisDartCe	3140	25 yr	Existing	261.00	219.36	226.970		226.97	0.000033	0.63	1129.99	471.69	0.04
LongHarrisDartCe	3140	50 yr	Proposed	317.00	219.36	225.110		225.14	0.000313	1.56	430.77	319.62	0.13
LongHarrisDartCe	3140	50 yr	Existing	317.00	219.36	227.064		227.07	0.000044	0.73	1174.62	477.94	0.05
LongHarrisDartCe	3140	100 yr	Proposed	377.00	219.36	225.714		225.73	0.000200	1.35	644.19	380.43	0.11
LongHarrisDartCe	3140	100 yr	Existing	377.00	219.36	227.174		227.18	0.000056	0.83	1227.47	481.76	0.06
LongHarrisDartCe	3357	10 yr	Proposed	193.00	220.24	223.665		223.93	0.005192	4.54	71.38	78.72	0.48
LongHarrisDartCe	3357	10 yr	Existing	193.00	220.24	226.860		226.86	0.000049	0.73	725.11	350.53	0.05
LongHarrisDartCe	3357	25 yr	Proposed	261.00	220.24	224.467		224.58	0.002119	3.44	169.89	154.95	0.32
LongHarrisDartCe	3357	25 yr	Existing	261.00	220.24	226.979		226.98	0.000078	0.94	767.03	356.12	0.07
LongHarrisDartCe	3357	50 yr	Proposed	317.00	220.24	225.202		225.25	0.000925	2.57	293.87	194.69	0.22
LongHarrisDartCe	3357	50 yr	Existing	317.00	220.24	227.075		227.08	0.000103	1.09	801.67	359.79	0.08
LongHarrisDartCe	3357	100 yr	Proposed	377.00	220.24	225.772		225.81	0.000591	2.23	414.30	243.71	0.18
LongHarrisDartCe	3357	100 yr	Existing	377.00	220.24	227.189		227.20	0.000129	1.24	842.63	364.55	0.09

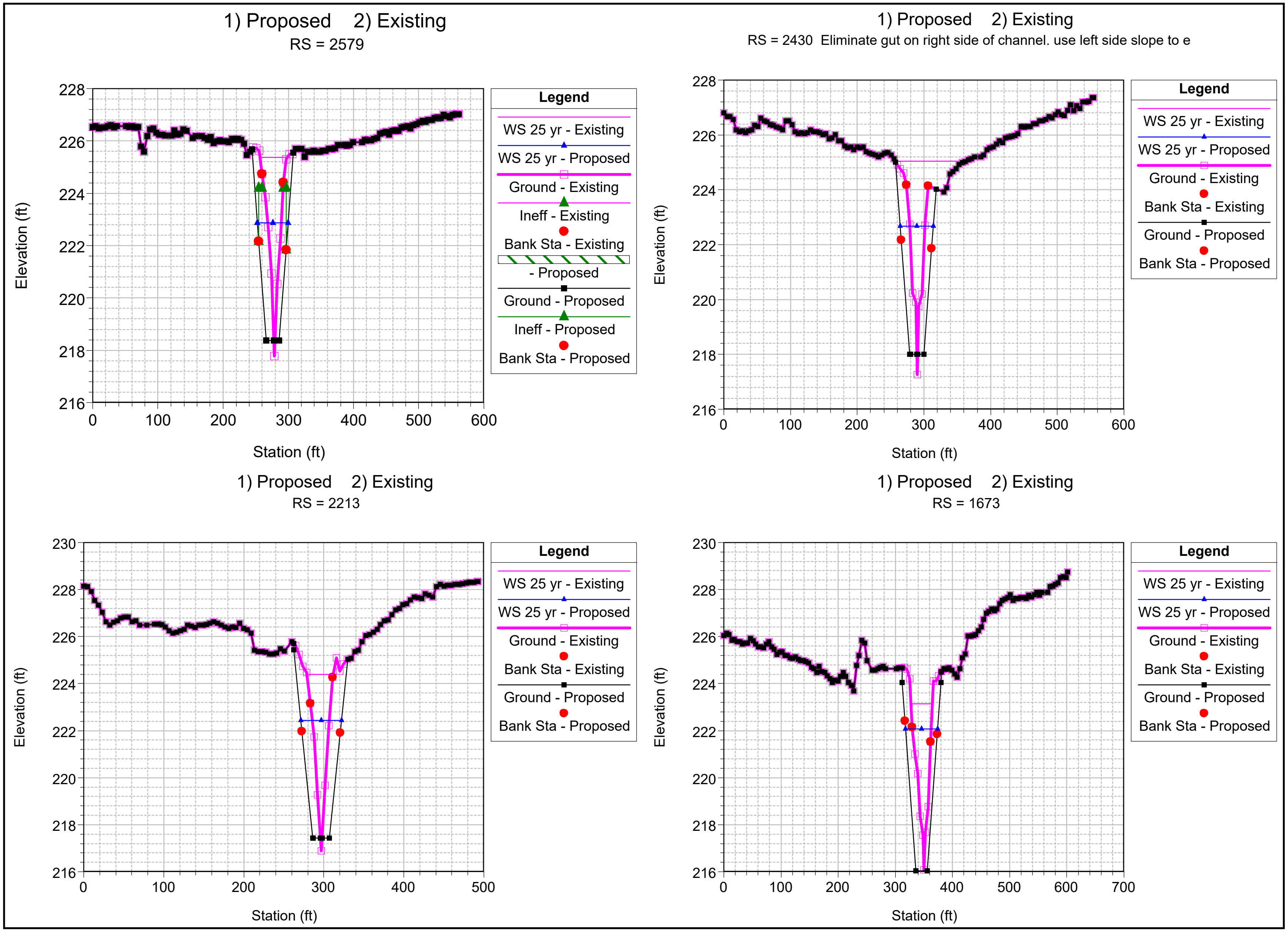
Harris/Dart Channel Cross-section Plots
Proposed vs Existing



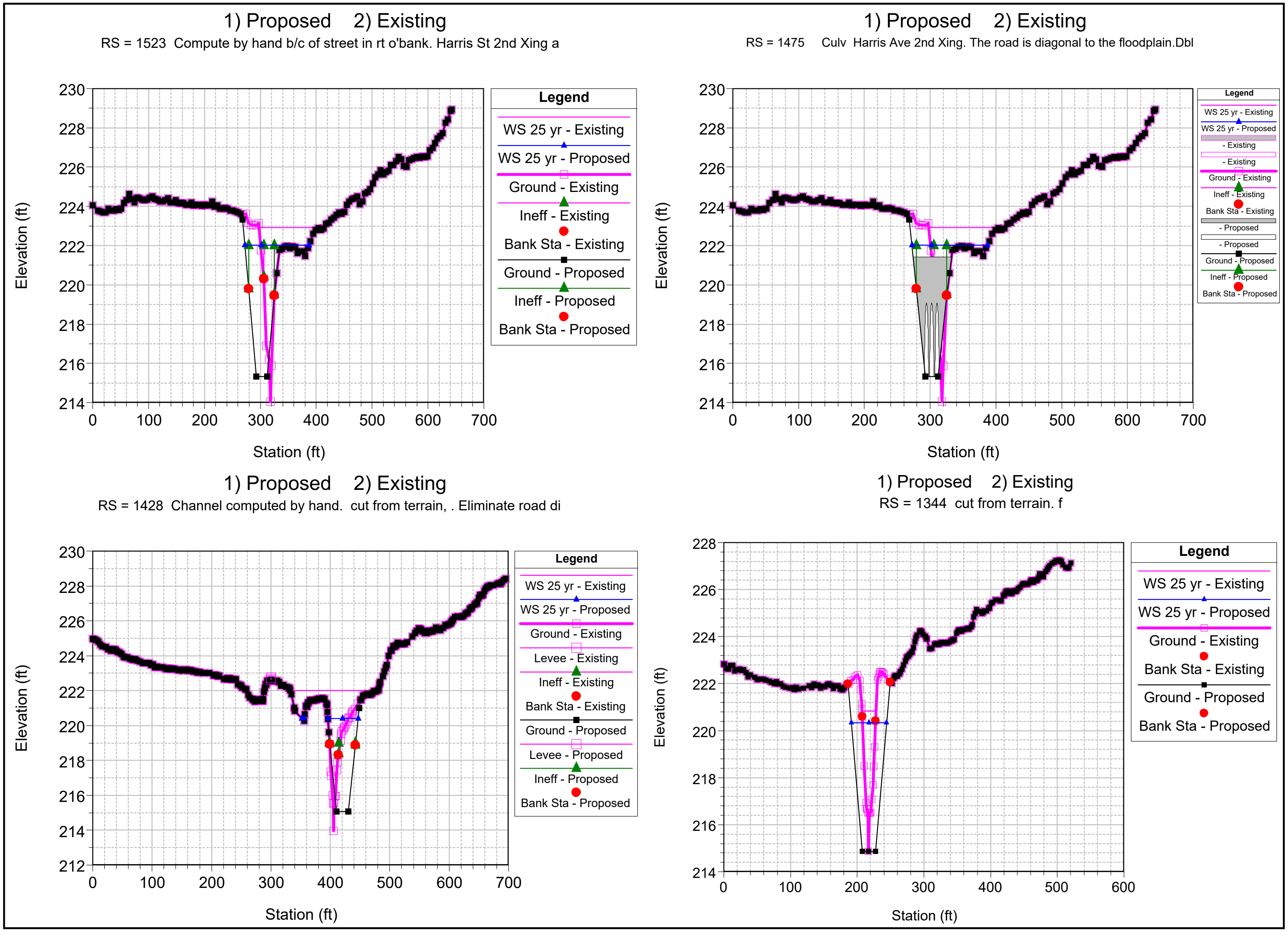
Harris/Dart Channel Cross-section Plots
Proposed vs Existing



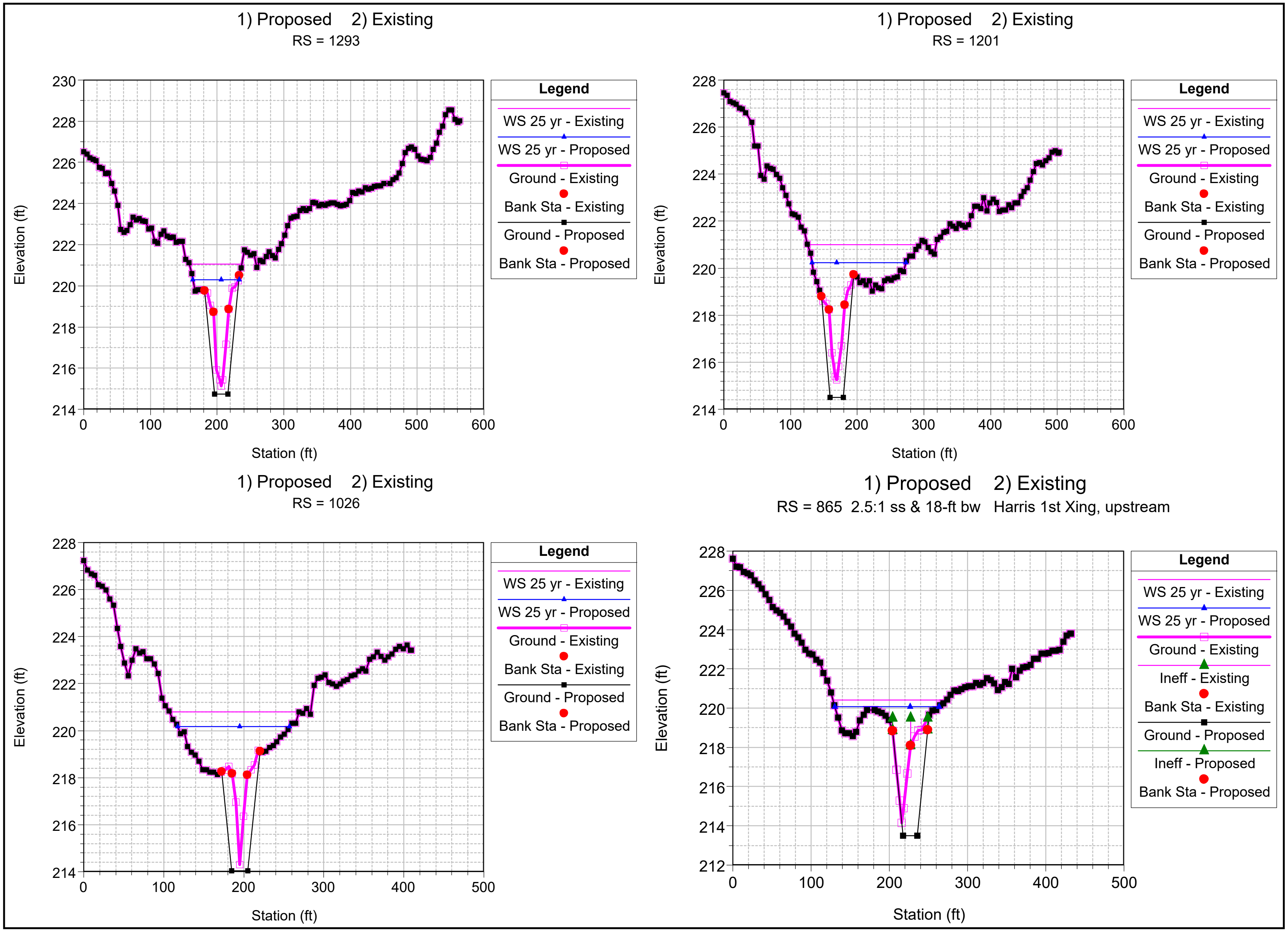
Harris/Dart Channel Cross-section Plots
Proposed vs Existing



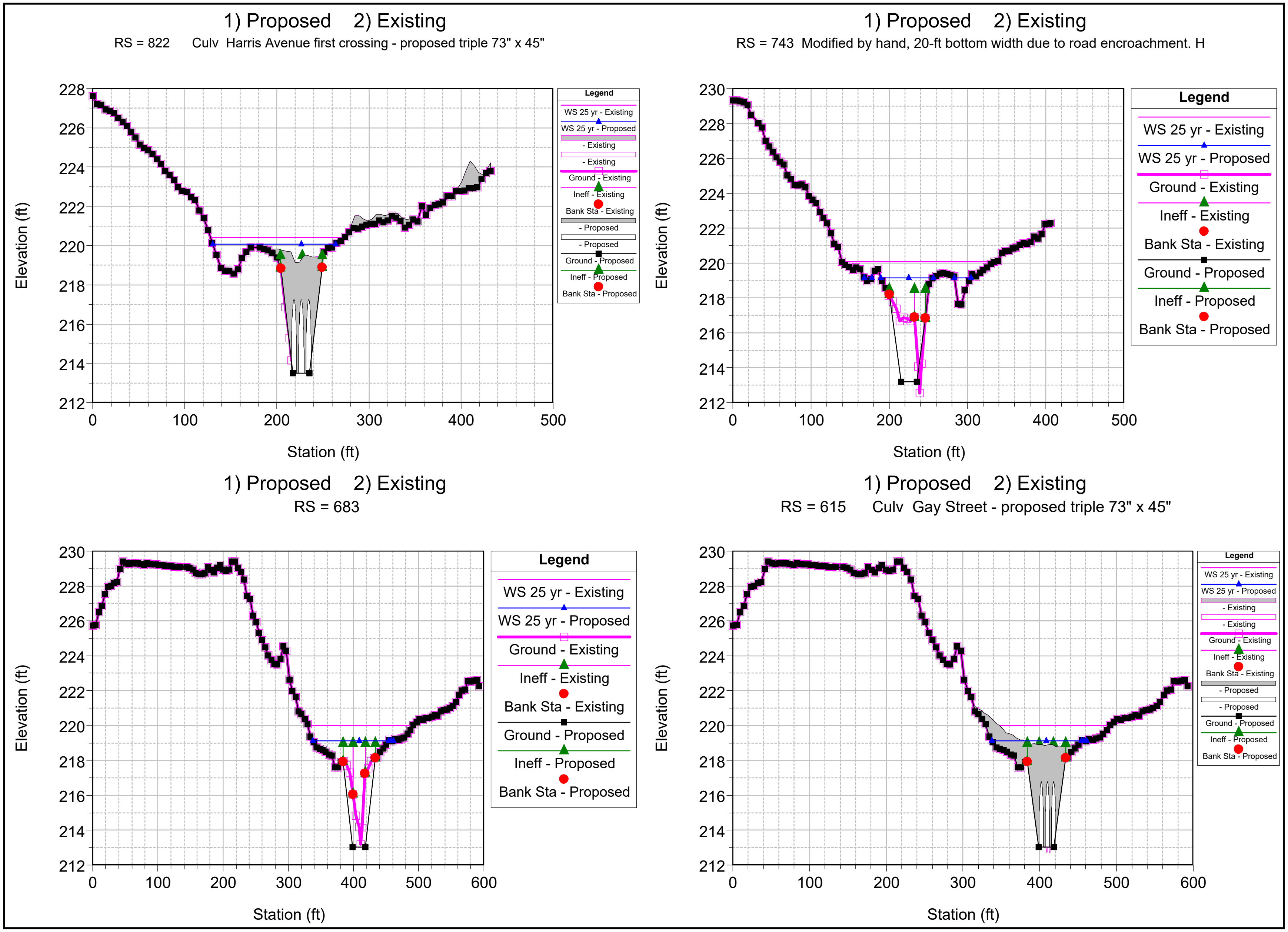
Harris/Dart Channel Cross-section Plots
Proposed vs Existing



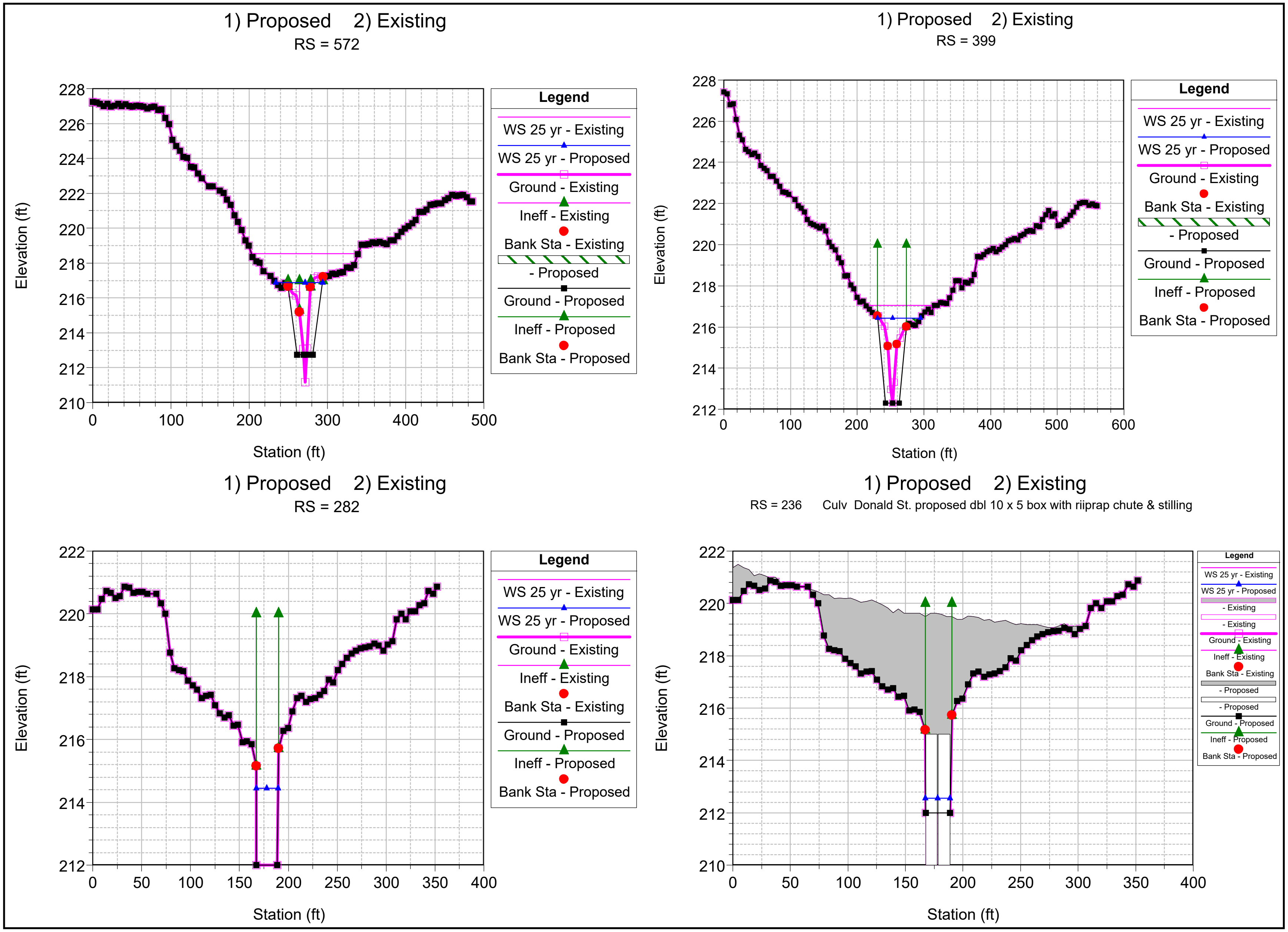
Harris/Dart Channel Cross-section Plots
Proposed vs Existing



Harris/Dart Channel Cross-section Plots
Proposed vs Existing

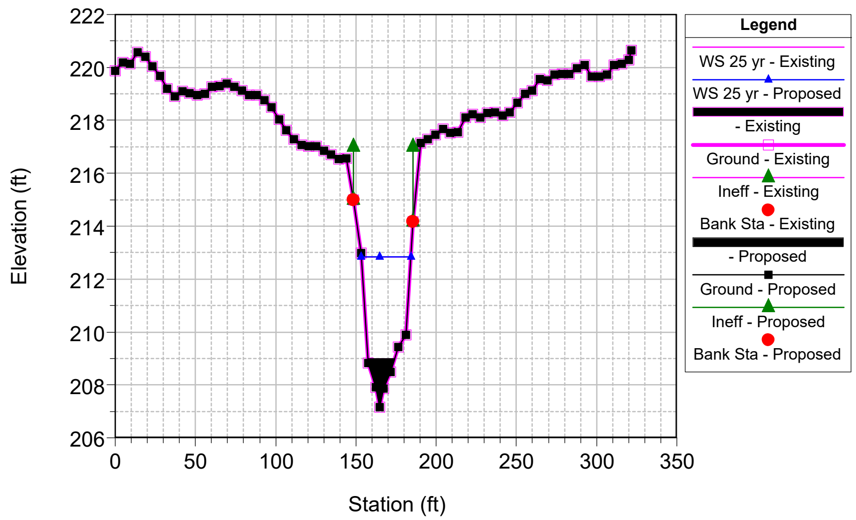


Harris/Dart Channel Cross-section Plots
Proposed vs Existing

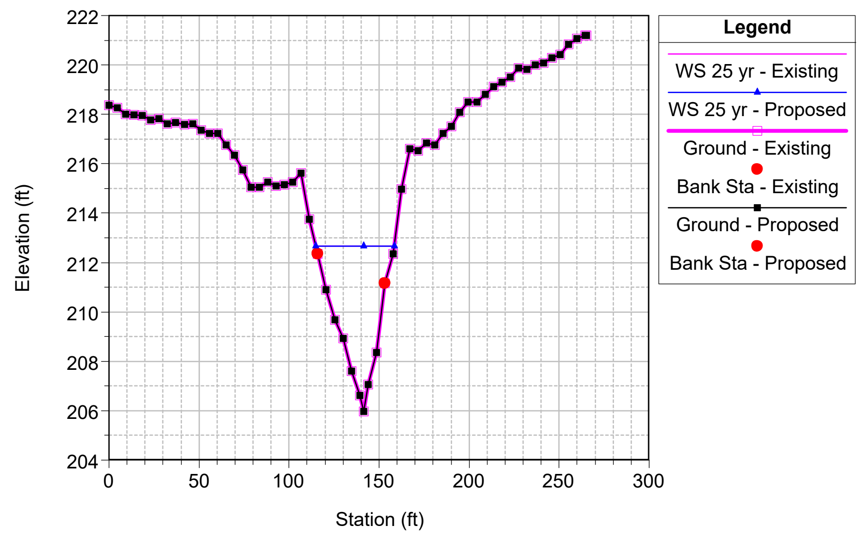


Harris/Dart Channel Cross-section Plots
Proposed vs Existing

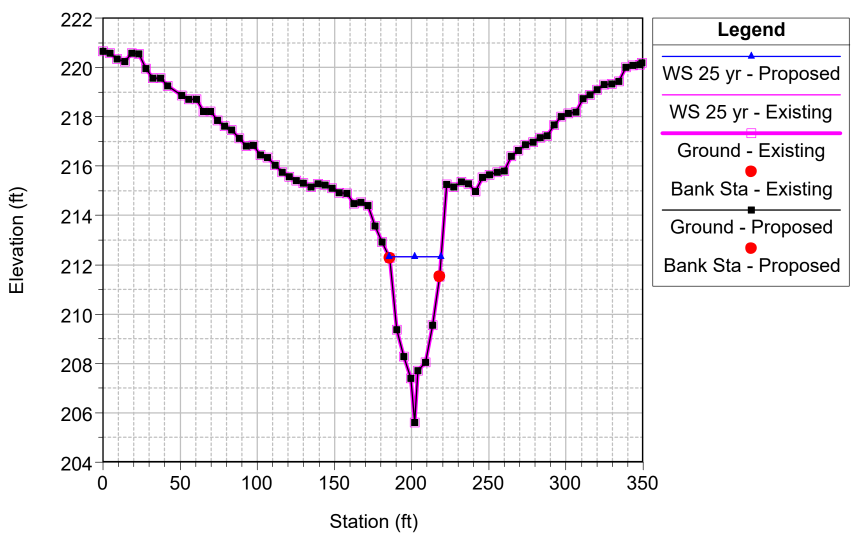
1) Proposed 2) Existing
RS = 208 flowine from survey

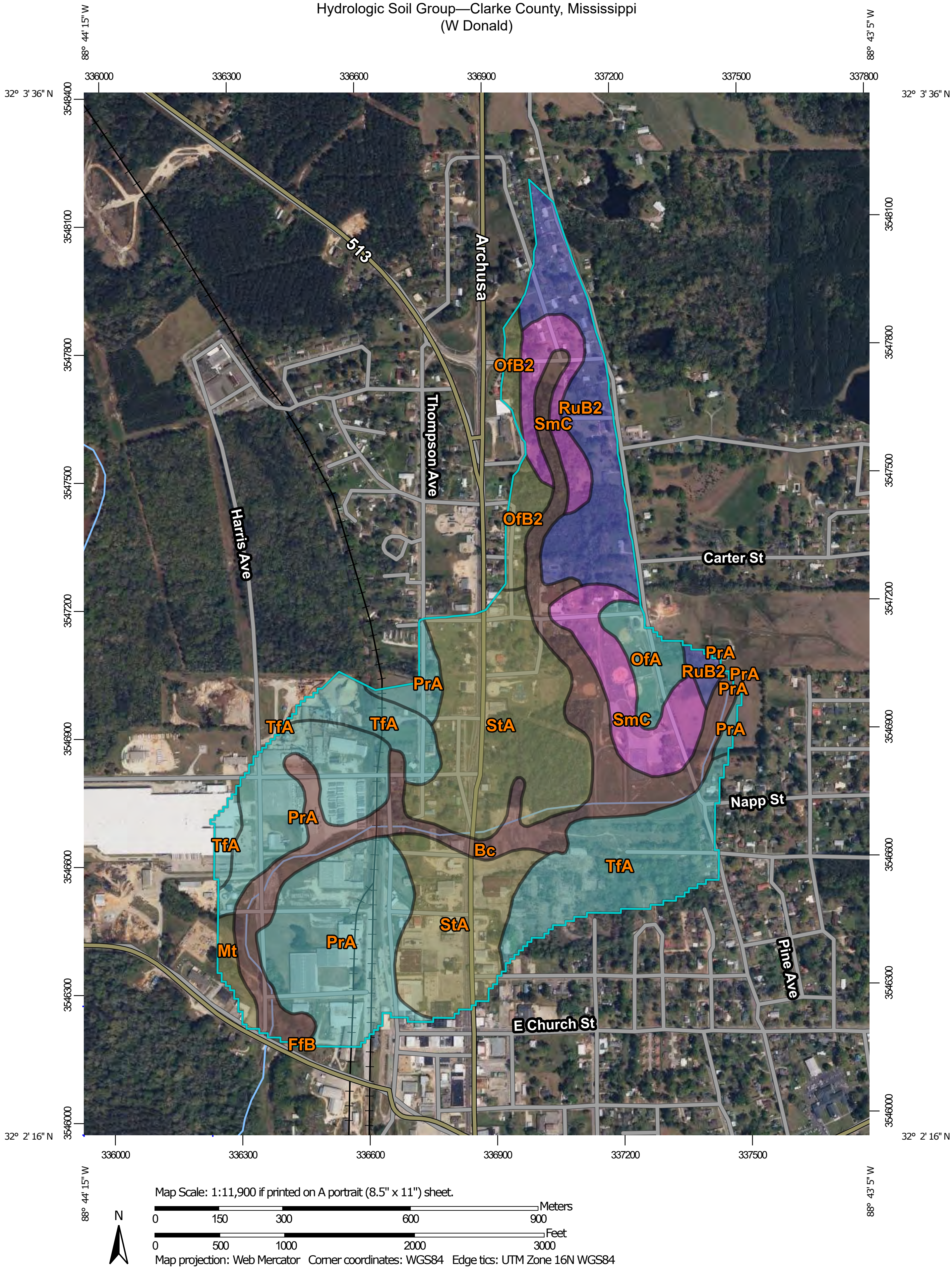


1) Proposed 2) Existing
RS = 109 flowine from survey



1) Proposed 2) Existing
RS = 1 flowine from survey

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88° 43' 5" W
32° 3' 36" N
32° 2' 16" N
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336600
336900
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337800
3548400
3548100
3547800
3547500
3547200
3546900
3546600
3546300
3546000
513
Archusa
Thompson Ave
Harris Ave
Carter St
Napp St
Pine Ave
E Church St
OfB2
RuB2
SmC
OfA
PrA
TfA
StA
Bc
Mt
FfB
Map Scale: 1:11,900 if printed on A portrait (8.5" x 11") sheet.
Meters
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Feet
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N
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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 21, Sep 6, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 3, 2021—May 8, 2021

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	43.6	16.0%
FfB	Flint fine sandy loam, loamy substratum, 2 to 5 percent slopes (annemaine)	D	0.1	0.0%
Mt	Mashulaville fine sandy loam, terrace	C/D	2.8	1.0%
OfA	Ora fine sandy loam, 0 to 2 percent slopes	C	7.3	2.7%
OfB2	Ora fine sandy loam, 2 to 5 percent slopes, moderately eroded	C/D	7.0	2.6%
PrA	Prentiss fine sandy loam, 0 to 2 percent slopes	C	57.8	21.2%
RuB2	Ruston fine sandy loam, 2 to 5 percent slopes, moderately eroded	B	26.8	9.8%
SmC	Smithdale fine sandy loam, 5 to 8 percent slopes	A	24.8	9.1%
StA	Stough fine sandy loam, 0 to 2 percent slopes	C/D	65.0	23.9%
TfA	Tilden fine sandy loam, 0 to 2 percent slopes (savannah)	C	37.5	13.8%
Totals for Area of Interest			**272.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

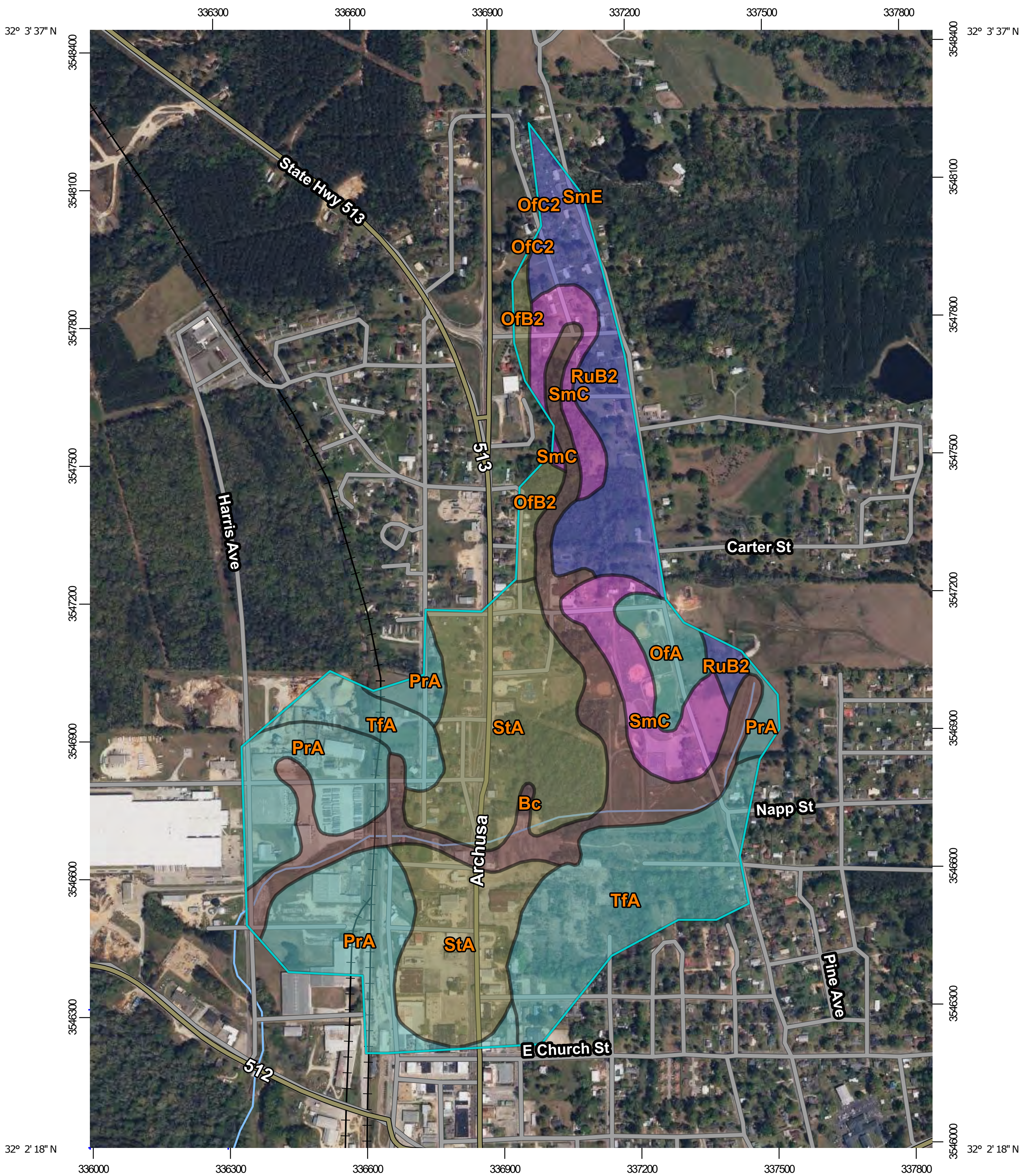
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group—Clarke County, Mississippi
(Harris)



Map Scale: 1:11,900 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

N

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 Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 21, Sep 6, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 3, 2021—May 8, 2021

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	37.4	14.3%
OfA	Ora fine sandy loam, 0 to 2 percent slopes	C	7.9	3.0%
OfB2	Ora fine sandy loam, 2 to 5 percent slopes, moderately eroded	C/D	5.3	2.0%
OfC2	Ora fine sandy loam, 5 to 8 percent slopes, eroded	C/D	0.1	0.1%
PrA	Prentiss fine sandy loam, 0 to 2 percent slopes	C	46.0	17.6%
RuB2	Ruston fine sandy loam, 2 to 5 percent slopes, moderately eroded	B	29.5	11.3%
SmC	Smithdale fine sandy loam, 5 to 8 percent slopes	A	23.8	9.1%
SmE	Smithdale fine sandy loam, 12 to 17 percent slopes	B	0.0	0.0%
StA	Stough fine sandy loam, 0 to 2 percent slopes	C/D	65.8	25.2%
TfA	Tilden fine sandy loam, 0 to 2 percent slopes (savannah)	C	45.2	17.3%
Totals for Area of Interest			**261.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

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If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

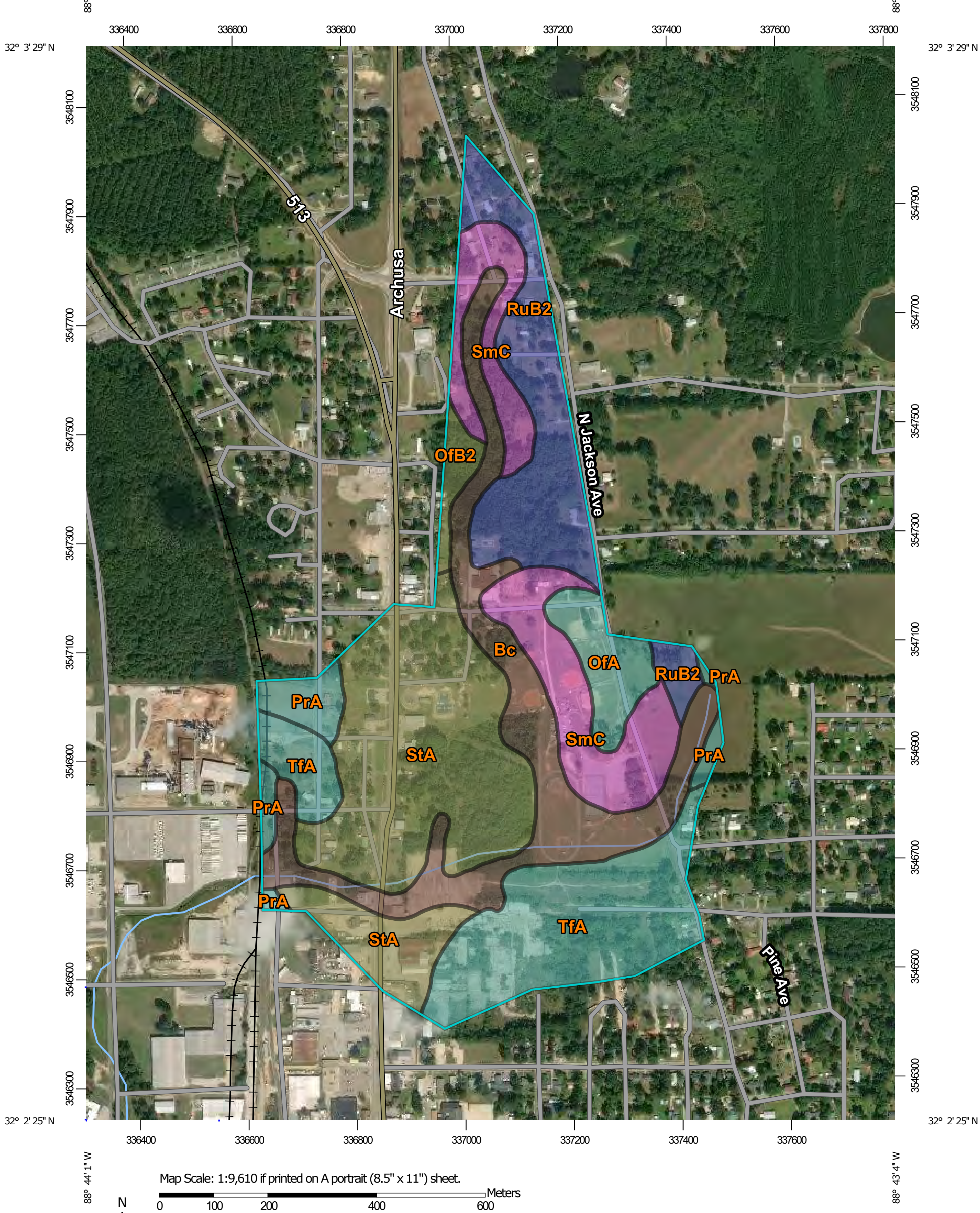
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group—Clarke County, Mississippi
(Dart Revised)



Map Scale: 1:9,610 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 100, 200, 400, 600

Feet: 0, 450, 900, 1800, 2700

N

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 Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 15, Sep 17, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 26, 2014—Oct 28, 2017

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	30.5	17.8%
OfA	Ora fine sandy loam, 0 to 2 percent slopes	C	7.2	4.2%
OfB2	Ora fine sandy loam, 2 to 5 percent slopes, moderately eroded	C/D	2.7	1.6%
PrA	Prentiss fine sandy loam, 0 to 2 percent slopes	C	6.1	3.6%
RuB2	Ruston fine sandy loam, 2 to 5 percent slopes, moderately eroded	B	22.7	13.3%
SmC	Smithdale fine sandy loam, 5 to 8 percent slopes	A	23.6	13.8%
StA	Stough fine sandy loam, 0 to 2 percent slopes	C/D	47.6	27.8%
TfA	Tilden fine sandy loam, 0 to 2 percent slopes (savannah)	C	30.7	17.9%
Totals for Area of Interest			**171.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX J

CYPRESS STREET AND ARCHUSA AVENUE CULVERTS

- Hydrology Summary
- Watershed Boundaries
- Cypress Street Culverts Report
- Archusa Avenue Culvert HY-8 Report
- Culvert Inspection Reports
- MDOT Plan -Archusa Ave Culvert
- Hydrographs
- HECRAS Output (Downstream Channel)
- Soil Data Report

Archusa Avenue Culverts and Downstream Channel

Hydrology Summary

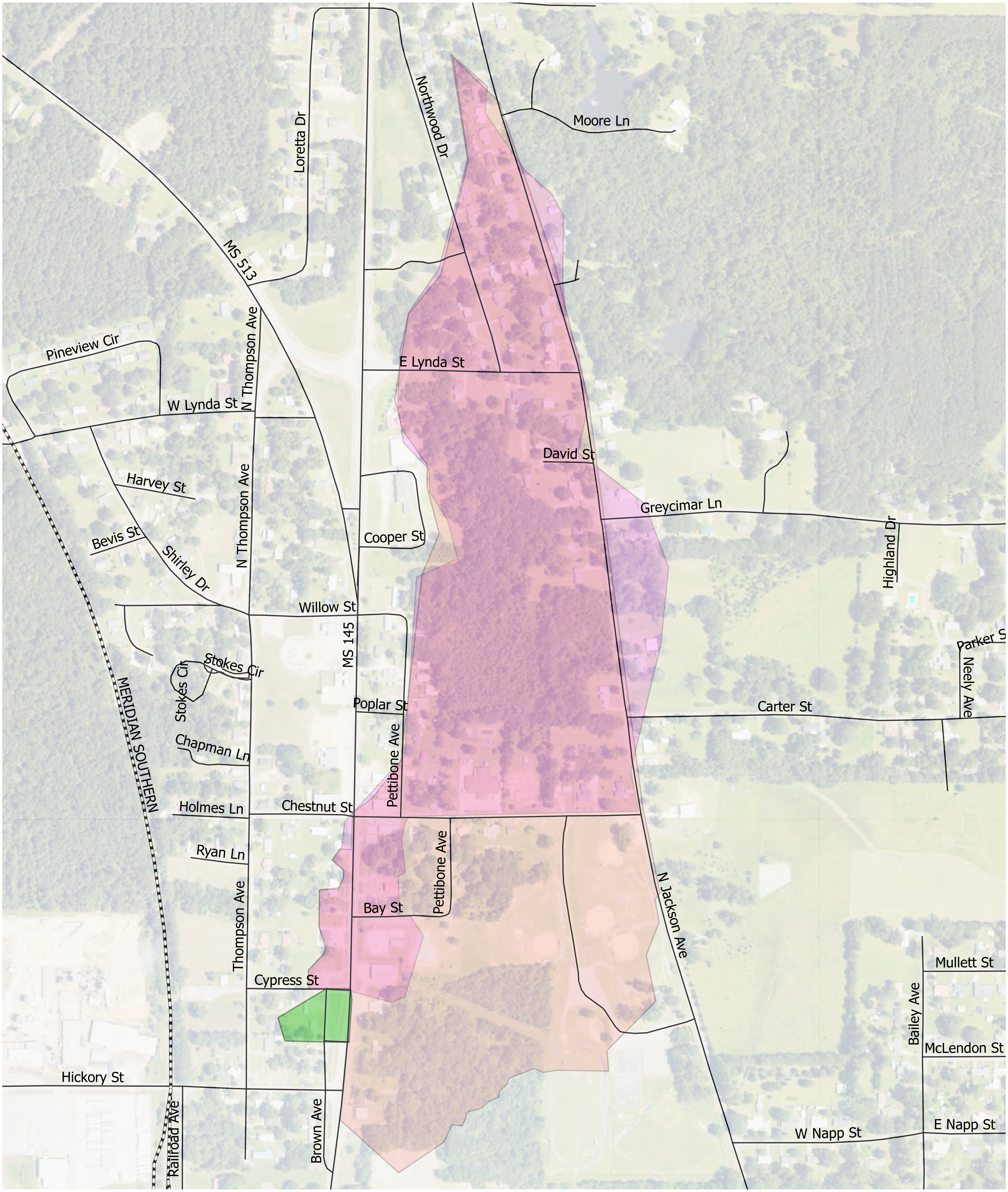
Basin Parameters

Location	Drainage Area (acres)	Runoff Curve Number	Basin Slope (percent)	Hydraulic Length (feet)	Storm Distribution	Time Interval (min)
Downstream of Archusa Ave	64	67	3	5065	Type III	2
1,000 ft downstream of Archusa Ave	94	67	3	5065	Type III	2

Peak Discharges

Location	2-yr Recurrence Peak Discharge (cfs)	5-yr Recurrence Peak Discharge (cfs)	10-yr Recurrence Peak Discharge (cfs)	25-yr Recurrence Peak Discharge (cfs)	50-yr Recurrence Peak Discharge (cfs)	100-yr Recurrence Peak Discharge (cfs)
Downstream of Archusa Ave	31	48	64	89	110	132
1,000 ft downstream of Archusa Ave	43	67	89	123	153	184

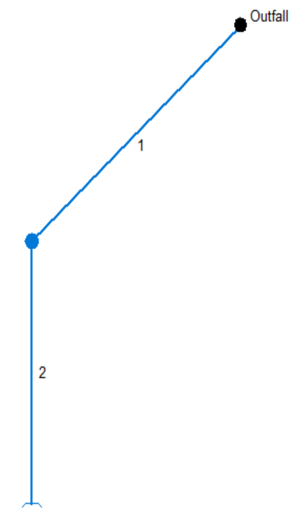
- The hydrology of the two culverts at Cypress Street is presented in the Storm Drain Analysis section of this Appendix



Watershed Boundaries
Cypress at Archusa Avenue
Culvert and Downstream Channel

Hydraflow Plan View

Proposed culverts at Cypress Street
Storm drain analysis



Project file: CypressStormDrains.stm	No. Lines: 2	10-31-2024

Hydraflow Storm Sewers 2003

Storm Sewer Tabulation

Proposed culverts at Cypress Street
Storm drain analysis

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	40.0	0.00	1.30	0.00	0.00	0.84	0.0	5.2	10.0	8.48	13.38	2.72	24	0.35	225.44	225.30	227.35	227.30	229.00	0.00	
2	1	40.0	1.30	1.30	0.65	0.84	0.84	5.0	5.0	10.2	8.61	13.38	2.83	24	0.35	225.58	225.44	227.39	227.35	229.00	229.00	

Project File: CypressStormDrains.stm | Number of lines: 2 | Run Date: 10-31-2024

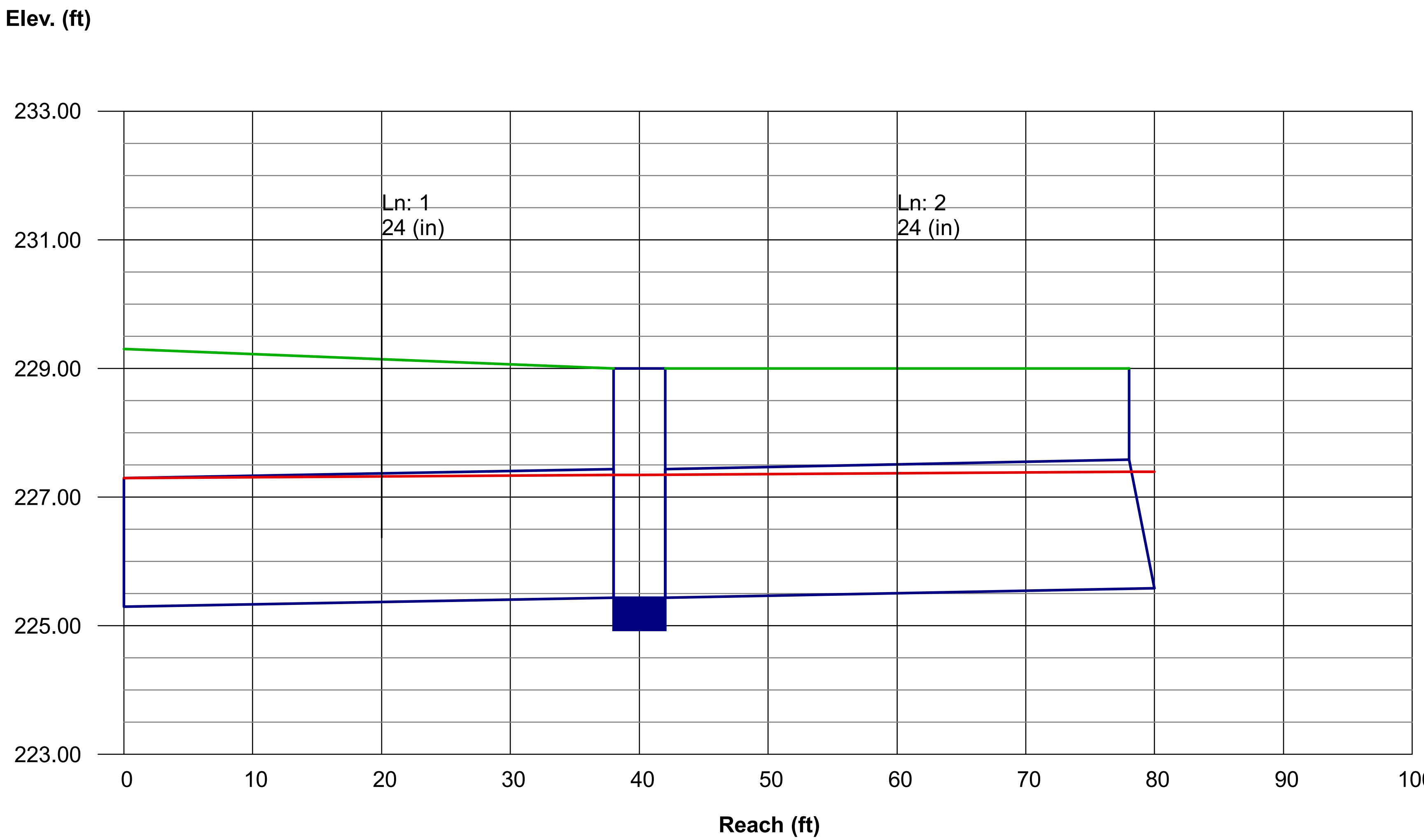
NOTES: Intensity = 50.49 / (Inlet time + 5.60) ^ 0.68; Return period = 25 Yrs.

Hydraflow Storm Sewers 2003

Storm Sewer Profile

Proposed culverts at Cypress Street
Storm drain analysis

Proj. file: CypressStormDrains.stm



HY-8 Culvert Analysis Report

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
226.97	31.00	31.00	0.00	1
227.04	41.10	41.10	0.00	1
227.15	51.20	51.20	0.00	1
227.31	61.30	61.30	0.00	1
227.52	71.40	71.40	0.00	1
227.72	81.50	81.50	0.00	1
227.88	89.00	89.00	0.00	1
228.17	101.70	101.70	0.00	1
228.42	111.80	111.80	0.00	1
228.70	121.90	121.90	0.00	1
229.00	132.00	132.00	0.00	1
230.50	203.08	203.08	0.00	Overtopping

****

Straight Culvert
Inlet Elevation (invert): 225.30 ft, Outlet Elevation (invert): 224.20 ft
Culvert Length: 113.01 ft, Culvert Slope: 0.0097

Table 1 - Summary of Culvert Flows at Crossing: CypressAtArchusaProposed

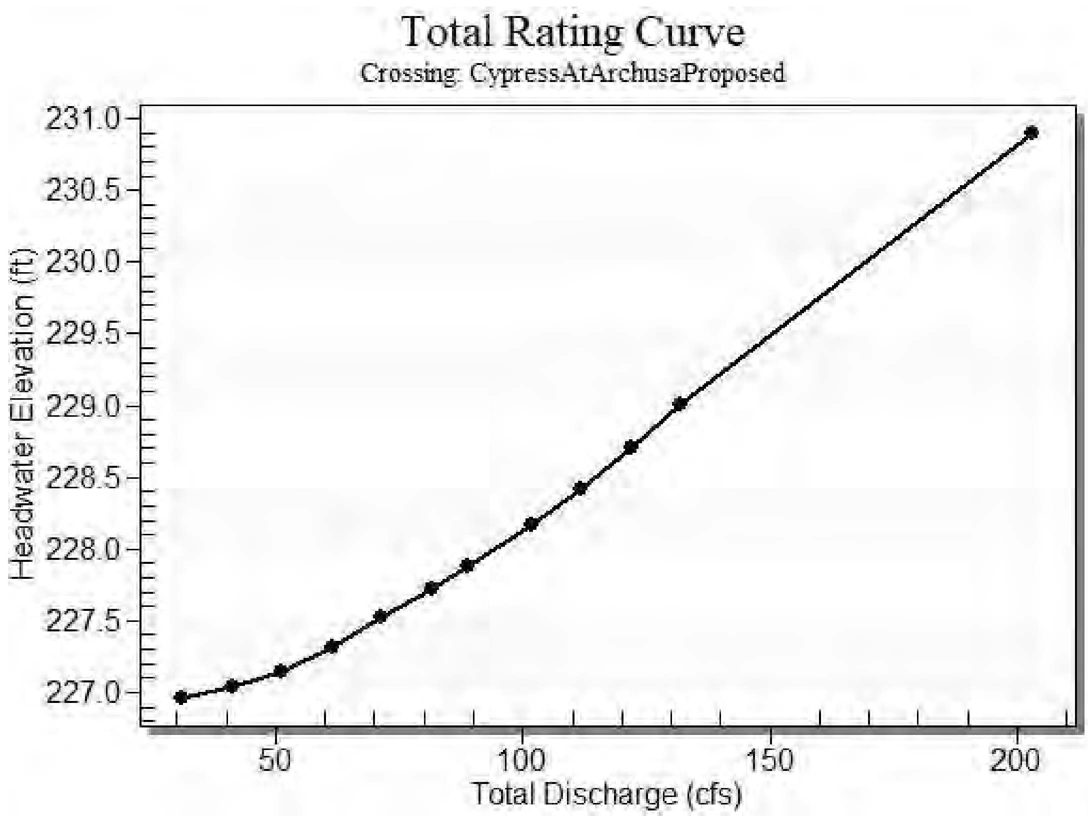
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
31.00	31.00	226.97	1.178	1.666	1-S1t	0.596	0.841	2.670	2.670	1.408	0.000
41.10	41.10	227.04	1.388	1.743	1-S1t	0.688	0.983	2.670	2.670	1.867	0.000
51.20	51.20	227.15	1.589	1.849	1-S1t	0.772	1.114	2.670	2.670	2.326	0.000
61.30	61.30	227.31	1.796	2.014	1-S1t	0.850	1.236	2.670	2.670	2.784	0.000
71.40	71.40	227.52	2.003	2.219	1-S1t	0.925	1.347	2.792	2.792	3.171	4.750
81.50	81.50	227.72	2.212	2.418	1-S1t	0.996	1.450	2.959	2.959	3.565	4.750
89.00	89.00	227.88	2.368	2.584	1-S1f	1.048	1.521	3.000	3.083	3.904	4.750
101.70	101.70	228.17	2.637	2.872	1-S1f	1.134	1.639	3.000	3.267	4.461	4.750
111.80	111.80	228.42	2.856	3.121	1-S1f	1.201	1.732	3.000	3.417	4.904	4.750
121.90	121.90	228.70	3.081	3.400	1-S1f	1.268	1.819	3.000	3.577	5.347	4.750
132.00	132.00	229.00	3.312	3.704	1-S1f	1.334	1.906	3.000	3.737	5.790	4.750

Table 2 - Culvert Summary Table: Culvert 1

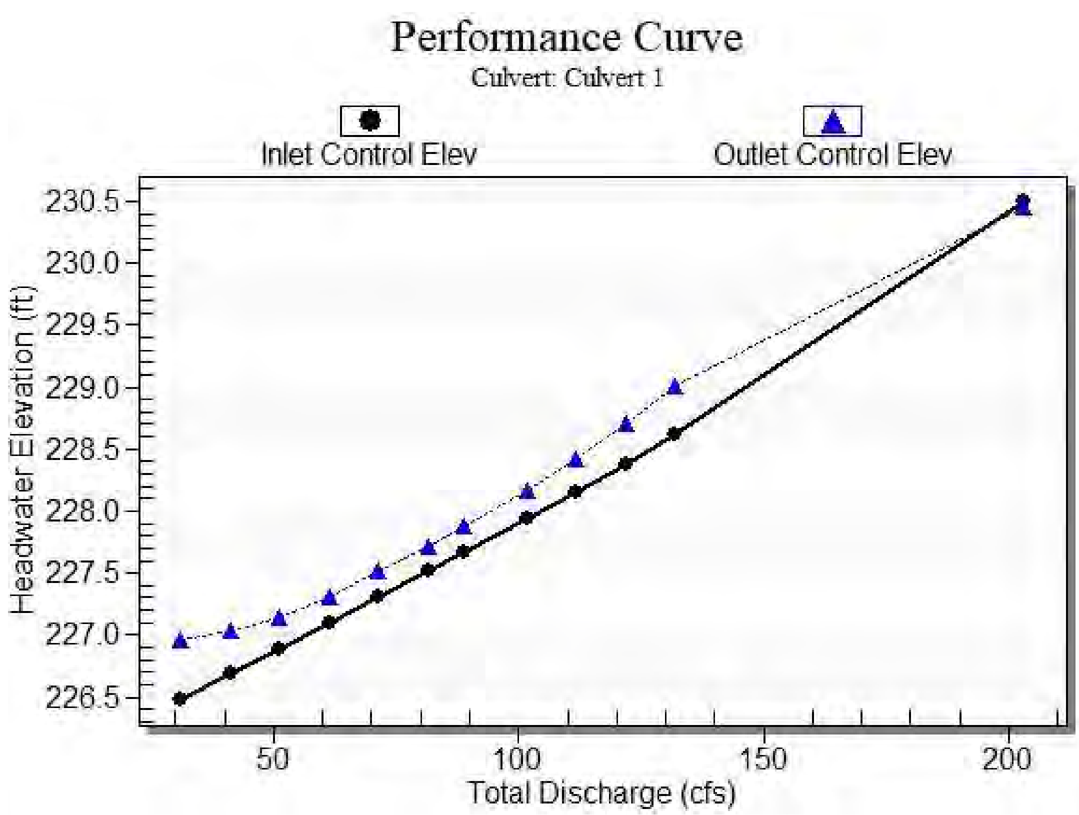
Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow
Minimum Flow: 31 cfs
Design Flow: 89 cfs
Maximum Flow: 132 cfs

Rating Curve Plot for Crossing: CypressAtArchusaProposed



*Culvert Performance Curve Plot: Culvert 1**



Water Surface Profile Plot for Culvert: Culvert 1

Site Data - Culvert 1
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 225.30 ft
Outlet Station: 113.00 ft
Outlet Elevation: 224.20 ft
Number of Barrels: 2
Culvert Data Summary - Culvert 1
Barrel Shape: Pipe Arch
Barrel Span: 58.50 in
Barrel Rise: 36.00 in
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

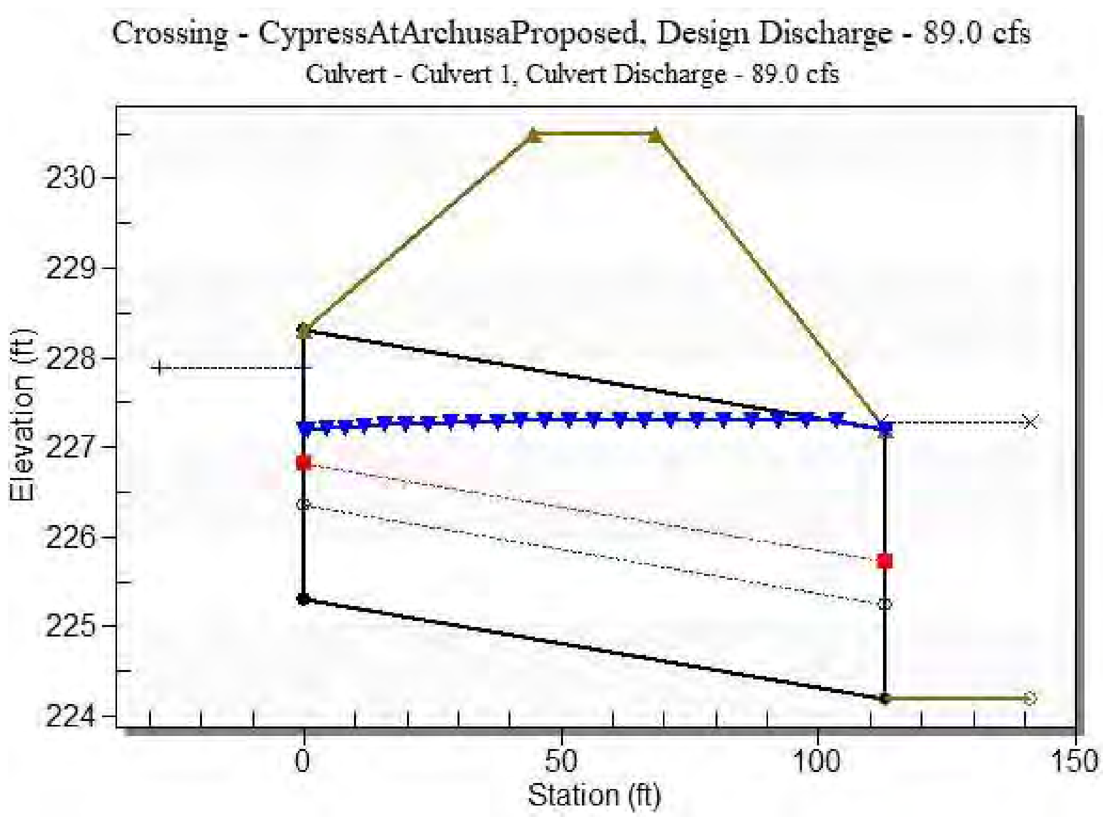


Table 3 - Downstream Channel Rating Curve (Crossing: CypressAtArchusaProposed)
Tailwater Channel Data - CypressAtArchusaProposed

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
64.00	226.87	2.67	4.75
89.00	227.28	3.08	4.71
110.00	227.59	3.39	4.57
132.00	227.94	3.74	4.28

Tailwater Channel Option: Enter Rating Curve
Channel Invert Elevation: 224.20 ft

Roadway Data for Crossing: CypressAtArchusaProposed
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 500.00 ft
Crest Elevation: 230.50 ft
Roadway Surface: Paved
Roadway Top Width: 24.00 ft

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: N ARCHUSA AVE.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #1611-1612 CVI32	Size: 12" Type: PLASTIC
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet
OUTLET - Depth of silt ❑ < 0.5' ☑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: CYPRESS ST.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #1613-1614 CVI33	Size: 14" / Type: CONC.
Condition: ❑ Poor ☑ Fair ❑ Good	High water elevation or height above inlet
OUTLET - Depth of silt: ❑ < 0.5' ☑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion: ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining

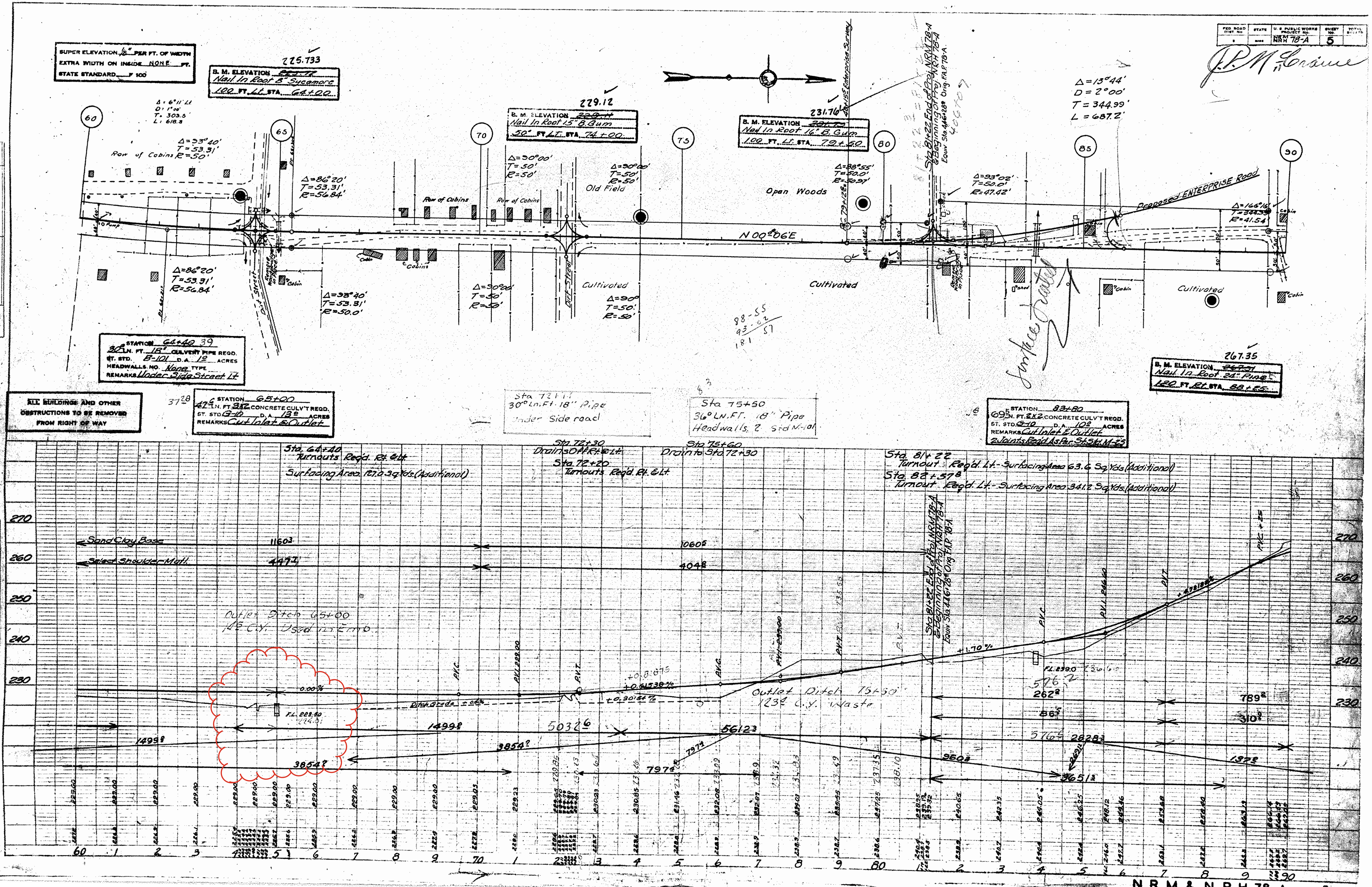
FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH


SUPER ELEVATION 1/2" PER FT. OF WIDTH
EXTRA WIDTH ON INSIDE NONE FT.
STATE STANDARD F 100
225.733
B. M. ELEVATION
Nail In Root 8" Sycamore
100 FT. LT. STA. 64+00
229.12
B. M. ELEVATION
Nail In Root 15" B. Gum
50 FT. LT. STA. 74+00
231.76
B. M. ELEVATION
Nail In Root 16" B. Gum
100 FT. LT. STA. 79+50
Enterprise Survey
Sta. 81+22 End of Proj. NRM 78-A
& Beginning of Proj. NRH 78-A
Equiv. Sta. 46+28 Orig. F.A.P. 78-A
Δ=13°44'
D=2°00'
T=344.99'
L=687.2'
Row of Cabins
Old Field
Open Woods
Row of Cabins
N 00°06' E
Proposed ENTERPRISE Road
Cultivated
Cultivated
Cultivated
Cabin
Cabins
Dirt Street
Δ=86°20'
T=53.31'
R=56.84'
Δ=33°40'
T=53.31'
R=50.0'
Δ=90°00'
T=50'
R=50'
Δ=88°55'
T=50.0'
R=50.97'
Δ=93°02'
T=50.0'
R=47.42'
Δ=166°16'
T=344.99'
R=41.54'
267.35
B. M. ELEVATION
Nail In Root 24" Pine
120 FT. Rt. STA. 88+25
STATION 64+40 39
30 LN. FT. 18" CULVERT PIPE REQD.
ST. STD. B-101 D.A. 12 ACRES
HEADWALLS NO. None TYPE
REMARKS Under Side Street Lt.
ALL BUILDINGS AND OTHER OBSTRUCTIONS TO BE REMOVED FROM RIGHT OF WAY
STATION 65+00
42 LN. FT. 3x2 CONCRETE CULV'T REQD.
ST. STD. G-10 D.A. 13 ACRES
REMARKS Cut Inlet & Outlet
Sta 72+17
30 Ln. Ft. 18" Pipe
Under Side road
Sta 75+50
36 Ln. Ft. 18" Pipe
Headwalls 2 Std N-101
STATION 83+80
69 LN. FT. 2x2 CONCRETE CULV'T REQD.
ST. STD. G-10 D.A. 10 ACRES
REMARKS Cut Inlet & Outlet
2 Joints Reqd. As Per Std. M-25
Sta. 64+40
Turnouts Reqd. Rt. & Lt.
Surfacing Area 127.0 Sq. Yds. (Additional)
Sta. 72+30
Drains Off Rt. & Lt.
Sta. 72+20
Turnouts Reqd. Rt. & Lt.
Sta. 75+60
Drain to Sta. 72+30
Sta. 81+22
Turnout Reqd. Lt. - Surfacing Area 63.6 Sq. Yds. (Additional)
Sta. 82+57
Turnout Reqd. Lt. - Surfacing Area 341.2 Sq. Yds. (Additional)
Sand Clay Base
Select Shoulder Matl.
Outlet Ditch 65+00
14 C.Y. Used in Emb.
Outlet Ditch 75+50
123 C.Y. Waste
Ditch Grade
0.00%
+1.70%
270
260
250
240
230
60
70
80
90
N.R.M. & N.R.H. 78-A
5

Hyd. No. 23

Downstream of Archusa Ave

Hydrograph type	= SCS Runoff	Peak discharge	= 31.06 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 64.10 ac	Curve number	= 67
Basin Slope	= 3.0 %	Hydraulic length	= 4640 ft
Tc method	= LAG	Time of conc. (Tc)	= 90.7 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 326,862 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.10	31.06 <<

...End

Hydrograph Report

Hyd. No. 23

Downstream of Archusa Ave

Hydrograph type	= SCS Runoff	Peak discharge	= 47.88 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Drainage area	= 64.10 ac	Curve number	= 67
Basin Slope	= 3.0 %	Hydraulic length	= 4640 ft
Tc method	= LAG	Time of conc. (Tc)	= 90.7 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 485,569 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.07	47.88 <<

...End

Hydrograph Report

Hyd. No. 23

Downstream of Archusa Ave

Hydrograph type	= SCS Runoff	Peak discharge	= 63.84 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 64.10 ac	Curve number	= 67
Basin Slope	= 3.0 %	Hydraulic length	= 4640 ft
Tc method	= LAG	Time of conc. (Tc)	= 90.7 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 636,508 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.03	63.84 <<

...End

Hydrograph Report

Hyd. No. 23

Downstream of Archusa Ave

Hydrograph type	= SCS Runoff	Peak discharge	= 88.66 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 64.10 ac	Curve number	= 67
Basin Slope	= 3.0 %	Hydraulic length	= 4640 ft
Tc method	= LAG	Time of conc. (Tc)	= 90.7 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 872,756 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.00	88.66 <<

...End

Hydrograph Report

Hyd. No. 23

Downstream of Archusa Ave

Hydrograph type	= SCS Runoff	Peak discharge	= 109.68 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 64.10 ac	Curve number	= 67
Basin Slope	= 3.0 %	Hydraulic length	= 4640 ft
Tc method	= LAG	Time of conc. (Tc)	= 90.7 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,073,973 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.00	109.68 <<

...End

Hydrograph Report

Hyd. No. 23

Downstream of Archusa Ave

Hydrograph type	= SCS Runoff	Peak discharge	= 132.21 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 64.10 ac	Curve number	= 67
Basin Slope	= 3.0 %	Hydraulic length	= 4640 ft
Tc method	= LAG	Time of conc. (Tc)	= 90.7 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,291,546 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.00	132.21 <<

...End

Hydrograph Report

Hyd. No. 22

Archusa downstream channel

Hydrograph type	= SCS Runoff	Peak discharge	= 43.20 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 93.70 ac	Curve number	= 67
Basin Slope	= 3.0 %	Hydraulic length	= 5065 ft
Tc method	= LAG	Time of conc. (Tc)	= 97.3 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 475,741 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.17	43.20 <<

...End

Hydrograph Report

Hyd. No. 22

Archusa downstream channel

Hydrograph type	= SCS Runoff	Peak discharge	= 66.63 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Drainage area	= 93.70 ac	Curve number	= 67
Basin Slope	= 3.0 %	Hydraulic length	= 5065 ft
Tc method	= LAG	Time of conc. (Tc)	= 97.3 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 706,735 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.13	66.63 <<

...End

Hydrograph Report

Hyd. No. 22

Archusa downstream channel

Hydrograph type	= SCS Runoff	Peak discharge	= 88.85 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 93.70 ac	Curve number	= 67
Basin Slope	= 3.0 %	Hydraulic length	= 5065 ft
Tc method	= LAG	Time of conc. (Tc)	= 97.3 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 926,424 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.10	88.85 <<

...End

Hydrograph Report

Hyd. No. 22

Archusa downstream channel

Hydrograph type	= SCS Runoff	Peak discharge	= 123.42 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 93.70 ac	Curve number	= 67
Basin Slope	= 3.0 %	Hydraulic length	= 5065 ft
Tc method	= LAG	Time of conc. (Tc)	= 97.3 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,270,277 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.07	123.42 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 22

Archusa downstream channel

Hydrograph type	= SCS Runoff	Peak discharge	= 152.71 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 93.70 ac	Curve number	= 67
Basin Slope	= 3.0 %	Hydraulic length	= 5065 ft
Tc method	= LAG	Time of conc. (Tc)	= 97.3 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,563,142 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.07	152.71 <<

...End

Hydrograph Report

Hyd. No. 22

Archusa downstream channel

Hydrograph type	= SCS Runoff	Peak discharge	= 184.13 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 93.70 ac	Curve number	= 67
Basin Slope	= 3.0 %	Hydraulic length	= 5065 ft
Tc method	= LAG	Time of conc. (Tc)	= 97.3 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

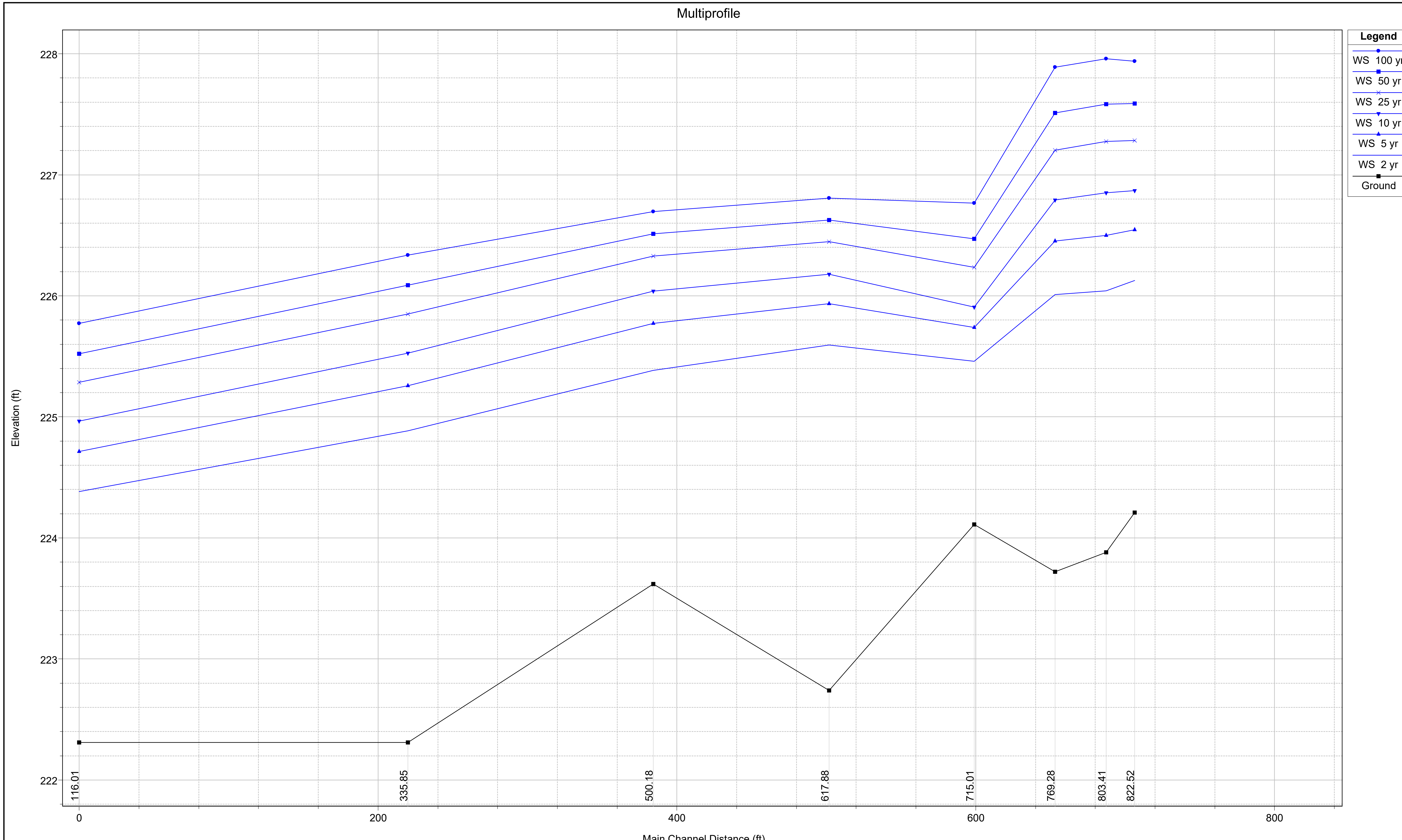
Hydrograph Volume = 1,879,816 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
13.07	184.13 <<

...End

Channel Downstream of Archusa Avenue
Water-surface Profiles



Channel Downstream of Archusa Avenue
Water-surface Elevation Table

HEC-RAS Plan: Multiprofile River: CypressDownstrea Reach: CypressDownstrea

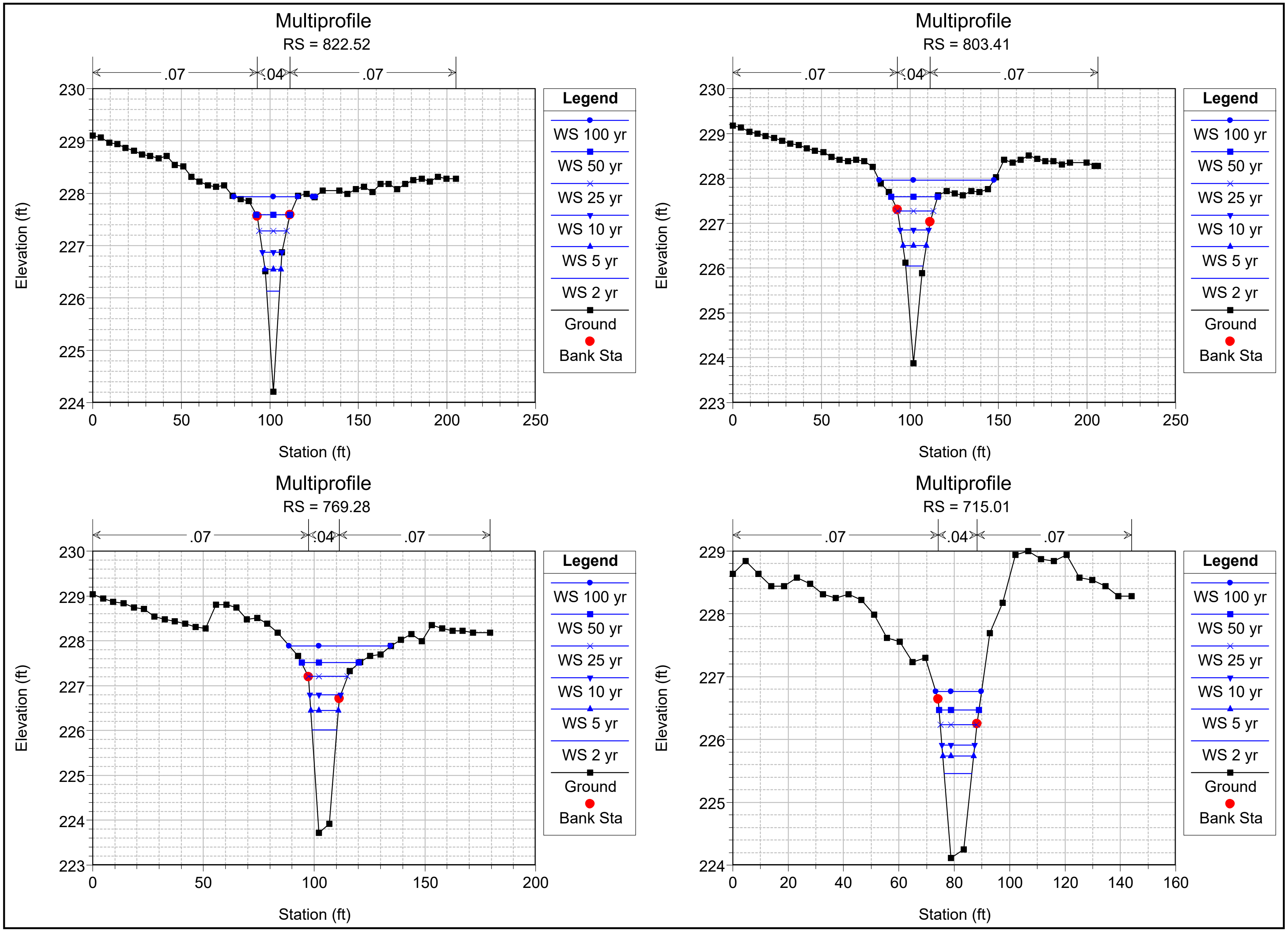
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
CypressDownstrea	822.52	2 yr	31.00	224.21	226.127		226.44	0.018202	4.48	6.91	7.21	0.81
CypressDownstrea	822.52	5 yr	48.00	224.21	226.547		226.89	0.015345	4.67	10.28	8.88	0.77
CypressDownstrea	822.52	10 yr	64.00	224.21	226.870		227.22	0.014286	4.75	13.47	10.88	0.75
CypressDownstrea	822.52	25 yr	89.00	224.21	227.283		227.63	0.013706	4.71	18.88	15.36	0.75
CypressDownstrea	822.52	50 yr	110.00	224.21	227.588		227.91	0.011799	4.57	24.08	19.00	0.71
CypressDownstrea	822.52	100 yr	132.00	224.21	227.937	227.39	228.22	0.007549	4.28	32.83	37.78	0.59
CypressDownstrea	803.41	2 yr	31.00	223.88	226.041		226.18	0.006990	3.03	10.25	9.73	0.52
CypressDownstrea	803.41	5 yr	48.00	223.88	226.500		226.65	0.006259	3.10	15.49	13.26	0.51
CypressDownstrea	803.41	10 yr	64.00	223.88	226.852		227.00	0.005451	3.10	20.66	16.08	0.48
CypressDownstrea	803.41	25 yr	89.00	223.88	227.276		227.43	0.004533	3.17	28.30	20.40	0.45
CypressDownstrea	803.41	50 yr	110.00	223.88	227.584		227.75	0.003703	3.23	35.48	26.31	0.42
CypressDownstrea	803.41	100 yr	132.00	223.88	227.958		228.10	0.002613	3.07	54.64	64.75	0.37
CypressDownstrea	769.28	2 yr	31.00	223.72	226.009		226.06	0.001517	1.79	17.28	11.17	0.25
CypressDownstrea	769.28	5 yr	48.00	223.72	226.452		226.52	0.001766	2.13	22.52	12.49	0.28
CypressDownstrea	769.28	10 yr	64.00	223.72	226.793		226.88	0.001903	2.38	26.97	13.99	0.30
CypressDownstrea	769.28	25 yr	89.00	223.72	227.204		227.32	0.002059	2.72	33.47	17.66	0.31
CypressDownstrea	769.28	50 yr	110.00	223.72	227.511		227.64	0.002053	2.95	39.98	25.90	0.32
CypressDownstrea	769.28	100 yr	132.00	223.72	227.888		228.02	0.001788	3.01	53.63	45.79	0.31
CypressDownstrea	715.01	2 yr	43.00	224.11	225.459		225.79	0.018283	4.63	9.29	9.92	0.84
CypressDownstrea	715.01	5 yr	67.00	224.11	225.738	225.66	226.20	0.020752	5.48	12.23	11.08	0.92
CypressDownstrea	715.01	10 yr	89.00	224.11	225.907	225.91	226.52	0.024441	6.28	14.16	11.78	1.01
CypressDownstrea	715.01	25 yr	123.00	224.11	226.237	226.24	226.94	0.023267	6.73	18.27	13.15	1.01
CypressDownstrea	715.01	50 yr	153.00	224.11	226.470	226.47	227.26	0.022290	7.15	21.48	14.32	1.00
CypressDownstrea	715.01	100 yr	194.00	224.11	226.767	226.77	227.66	0.020506	7.59	25.99	16.48	0.99
CypressDownstrea	617.88	2 yr	43.00	222.74	225.595		225.61	0.000285	0.86	51.56	35.01	0.12
CypressDownstrea	617.88	5 yr	67.00	222.74	225.935		225.95	0.000384	1.07	67.31	59.50	0.14
CypressDownstrea	617.88	10 yr	89.00	222.74	226.177		226.20	0.000452	1.22	83.49	77.80	0.15
CypressDownstrea	617.88	25 yr	123.00	222.74	226.449		226.47	0.000543	1.42	107.12	100.11	0.17
CypressDownstrea	617.88	50 yr	153.00	222.74	226.627		226.65	0.000631	1.60	128.97	140.79	0.18
CypressDownstrea	617.88	100 yr	194.00	222.74	226.807		226.84	0.000744	1.82	156.01	160.60	0.20
CypressDownstrea	500.18	2 yr	43.00	223.62	225.385		225.50	0.006438	2.82	18.96	44.68	0.51
CypressDownstrea	500.18	5 yr	67.00	223.62	225.771		225.84	0.003753	2.41	45.50	89.17	0.40
CypressDownstrea	500.18	10 yr	89.00	223.62	226.039		226.09	0.002590	2.15	75.76	133.39	0.34
CypressDownstrea	500.18	25 yr	123.00	223.62	226.328		226.36	0.001832	1.99	126.67	220.46	0.29
CypressDownstrea	500.18	50 yr	153.00	223.62	226.511		226.54	0.001558	1.96	172.83	273.83	0.27
CypressDownstrea	500.18	100 yr	194.00	223.62	226.697		226.72	0.001291	1.92	225.93	295.90	0.25

Channel Downstream of Archusa Avenue
Water-surface Elevation Table

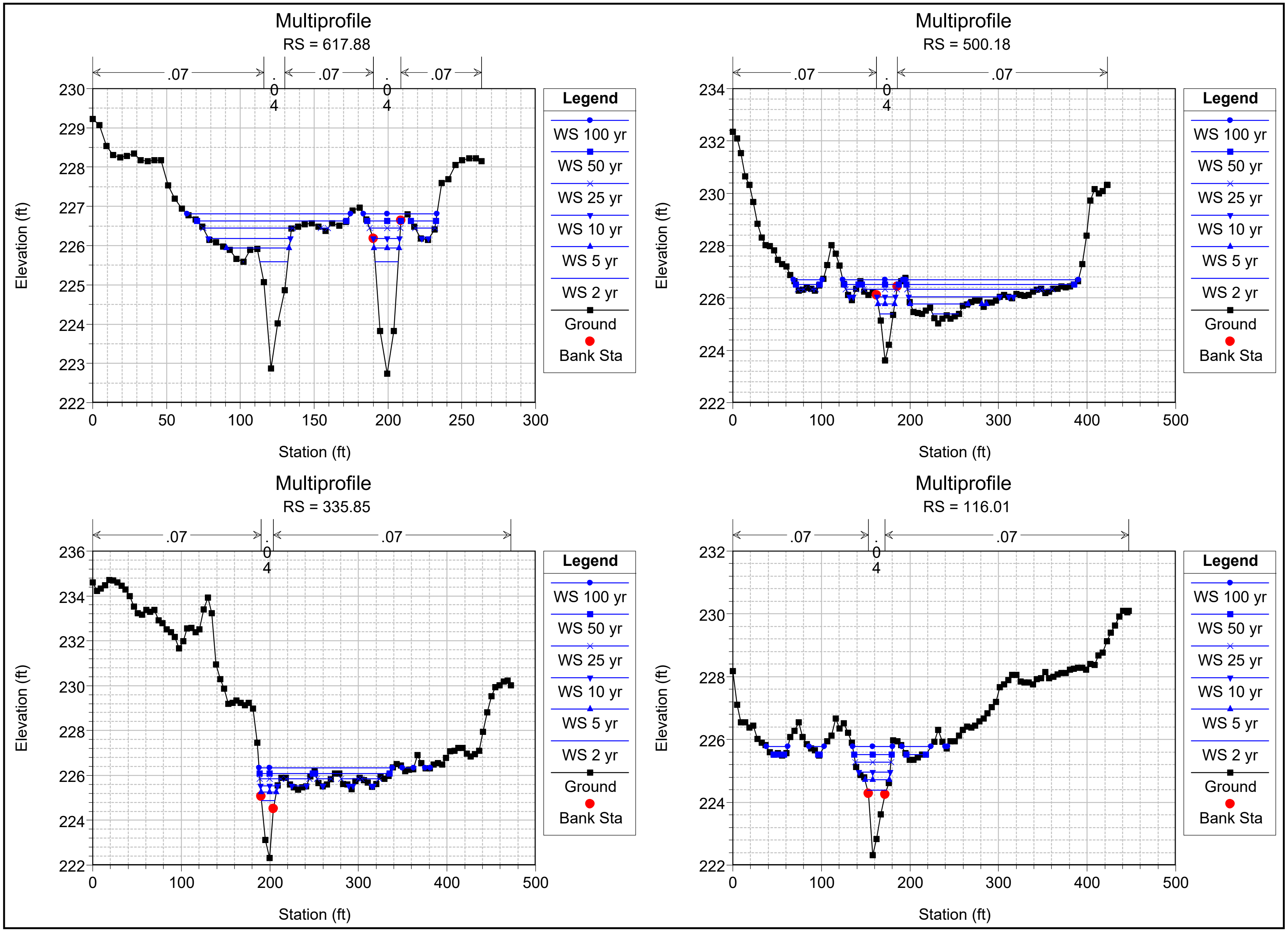
HEC-RAS Plan: Multiprofile River: CypressDownstrea Reach: CypressDownstrea (Continued)

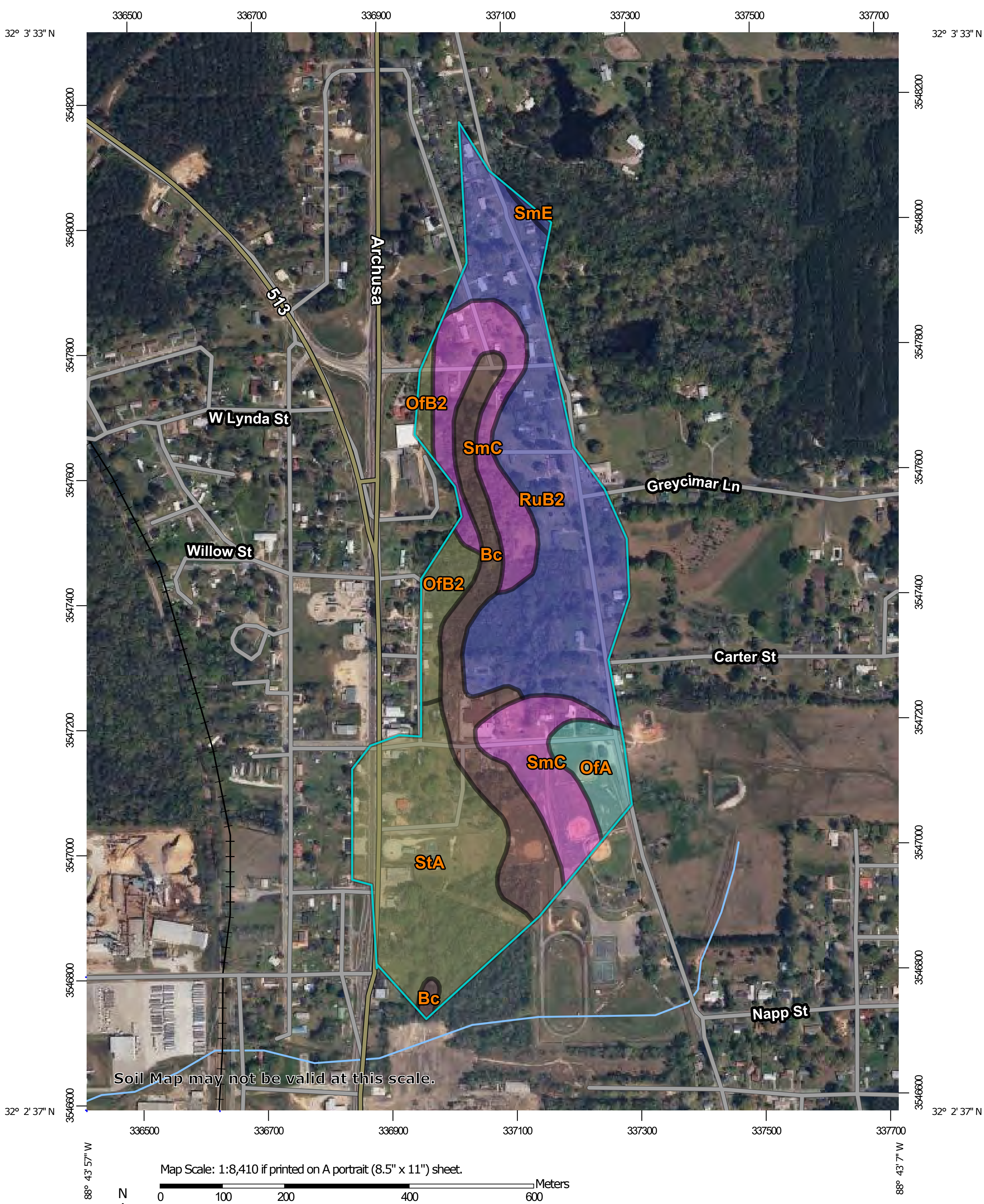
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
CypressDownstrea	335.85	2 yr	43.00	222.31	224.885		224.95	0.001959	2.09	20.88	15.13	0.30
CypressDownstrea	335.85	5 yr	67.00	222.31	225.257		225.36	0.002326	2.58	26.98	17.58	0.33
CypressDownstrea	335.85	10 yr	89.00	222.31	225.527		225.66	0.002542	2.95	33.68	43.55	0.36
CypressDownstrea	335.85	25 yr	123.00	222.31	225.850		226.00	0.002582	3.27	58.79	105.90	0.37
CypressDownstrea	335.85	50 yr	153.00	222.31	226.087		226.23	0.002341	3.31	89.26	144.42	0.36
CypressDownstrea	335.85	100 yr	194.00	222.31	226.336		226.45	0.002047	3.29	127.44	169.07	0.34
CypressDownstrea	116.01	2 yr	43.00	222.31	224.383	223.63	224.45	0.002705	2.05	21.09	21.18	0.34
CypressDownstrea	116.01	5 yr	67.00	222.31	224.715	223.91	224.81	0.002702	2.44	29.27	27.38	0.36
CypressDownstrea	116.01	10 yr	89.00	222.31	224.966	224.12	225.08	0.002705	2.71	37.10	35.34	0.37
CypressDownstrea	116.01	25 yr	123.00	222.31	225.285	224.36	225.42	0.002702	3.04	49.31	40.29	0.38
CypressDownstrea	116.01	50 yr	153.00	222.31	225.522	224.56	225.67	0.002703	3.27	61.10	71.18	0.38
CypressDownstrea	116.01	100 yr	194.00	222.31	225.772	224.77	225.94	0.002703	3.51	86.01	121.05	0.39

Channel Downstream of Archusa Avenue
Cross-section Plots



Channel Downstream of Archusa Avenue
Cross-section Plots





Map Scale: 1:8,410 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 100, 200, 400, 600

Feet: 0, 400, 800, 1600, 2400

N

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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 21, Sep 6, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 3, 2021—May 8, 2021

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	12.2	14.2%
OfA	Ora fine sandy loam, 0 to 2 percent slopes	C	3.6	4.2%
OfB2	Ora fine sandy loam, 2 to 5 percent slopes, moderately eroded	C/D	4.1	4.7%
RuB2	Ruston fine sandy loam, 2 to 5 percent slopes, moderately eroded	B	28.9	33.5%
SmC	Smithdale fine sandy loam, 5 to 8 percent slopes	A	16.0	18.6%
SmE	Smithdale fine sandy loam, 12 to 17 percent slopes	B	0.3	0.3%
StA	Stough fine sandy loam, 0 to 2 percent slopes	C/D	21.2	24.6%
Totals for Area of Interest			**86.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX K

KIRKLAND CHANNEL AND CULVERT

- Hydrology Summary
- Inundation Boundary for 5-yr
- Culvert Inspection Report
- Hydrographs
- HECRAS Output
- Soil Data Report

Proposed Kirkland Avenue Channel and Culvert

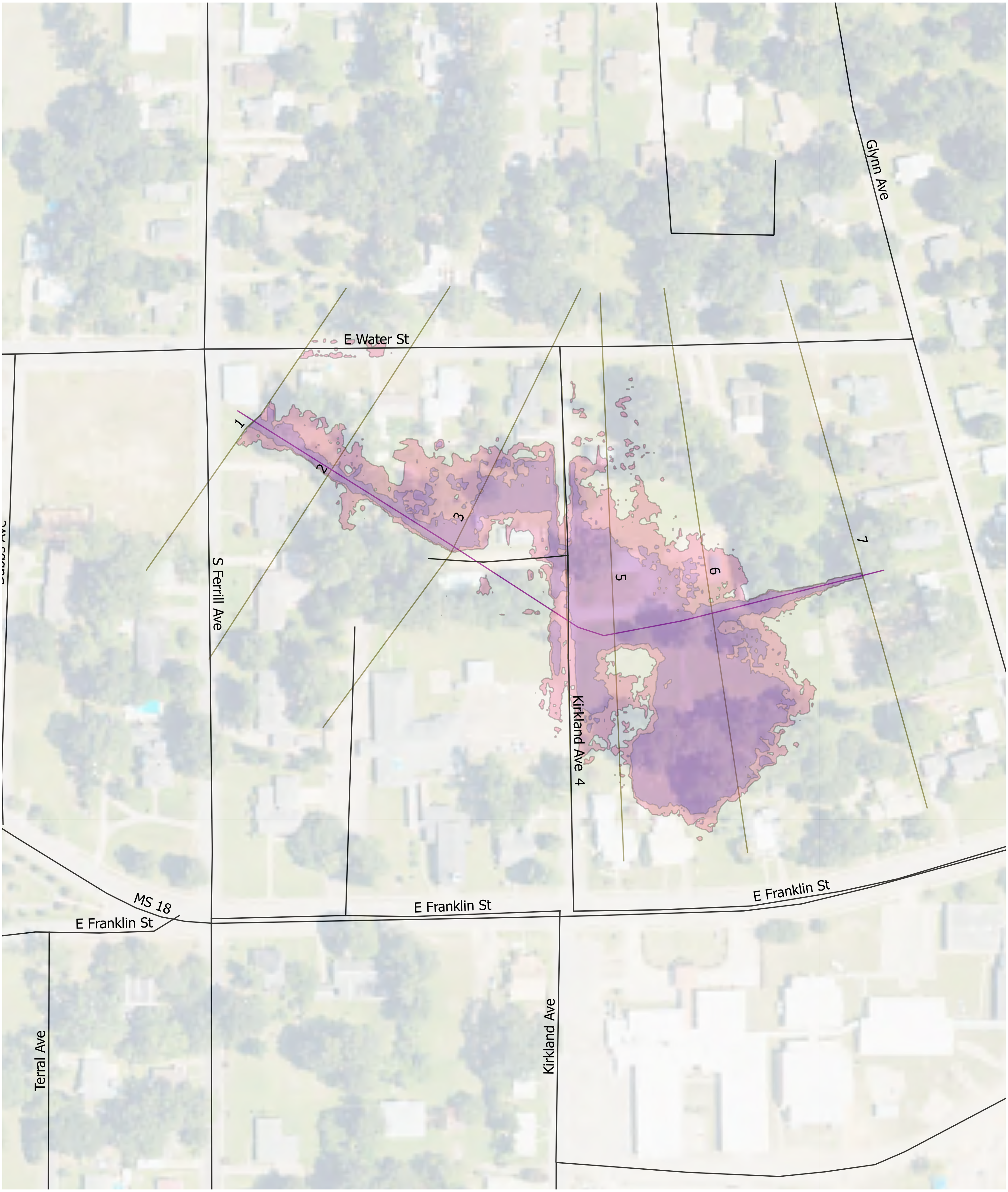
Hydrology Summary

Basin Parameters

Location	Drainage Area (acres)	Runoff Curve Number	Basin Slope (percent)	Hydraulic Length (feet)	Storm Distribution	Time Interval (min)
Kirkland Ave	19.2	83	1	1530	Type III	2

Peak Discharges

Location	2-yr Recurrence Peak Discharge (cfs)	5-yr Recurrence Peak Discharge (cfs)	10-yr Recurrence Peak Discharge (cfs)	25-yr Recurrence Peak Discharge (cfs)	50-yr Recurrence Peak Discharge (cfs)	100-yr Recurrence Peak Discharge (cfs)
Kirkland Ave	30	39	48	61	72	82



Existing vs Proposed, 5-yr Inundation Area
Culvert at Kirkland Avenue
Red = Existing, Blue = Proposed

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: KIRKLAND AVE.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #2431-2434 CVI72-74	Size: 24"	Type: CONC.
Condition: ☑ Poor ❑ Fair ❑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ❑ < 0.5' ❑ 0.5' - 1' ☑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 18

Kirkland

Hydrograph type	= SCS Runoff	Peak discharge	= 29.54 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 19.20 ac	Curve number	= 83
Basin Slope	= 1.0 %	Hydraulic length	= 1530 ft
Tc method	= LAG	Time of conc. (Tc)	= 40.6 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 186,170 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.47	29.54 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 18

Kirkland

Hydrograph type	= SCS Runoff	Peak discharge	= 39.39 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Drainage area	= 19.20 ac	Curve number	= 83
Basin Slope	= 1.0 %	Hydraulic length	= 1530 ft
Tc method	= LAG	Time of conc. (Tc)	= 40.6 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 248,969 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.47	39.39 <<

...End

Hydrograph Report

Hyd. No. 18

Kirkland

Hydrograph type	= SCS Runoff	Peak discharge	= 48.14 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 19.20 ac	Curve number	= 83
Basin Slope	= 1.0 %	Hydraulic length	= 1530 ft
Tc method	= LAG	Time of conc. (Tc)	= 40.6 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 305,573 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.47	48.14 <<

...End

Hydrograph Report

Hyd. No. 18

Kirkland

Hydrograph type	= SCS Runoff	Peak discharge	= 61.04 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 19.20 ac	Curve number	= 83
Basin Slope	= 1.0 %	Hydraulic length	= 1530 ft
Tc method	= LAG	Time of conc. (Tc)	= 40.6 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 390,443 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.47	61.04 <<

...End

Hydrograph Report

Hyd. No. 18

Kirkland

Hydrograph type	= SCS Runoff	Peak discharge	= 71.52 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 19.20 ac	Curve number	= 83
Basin Slope	= 1.0 %	Hydraulic length	= 1530 ft
Tc method	= LAG	Time of conc. (Tc)	= 40.6 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 460,357 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.47	71.52 <<

...End

Hydrograph Report

Hyd. No. 18

Kirkland

Hydrograph type	= SCS Runoff	Peak discharge	= 82.47 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 19.20 ac	Curve number	= 83
Basin Slope	= 1.0 %	Hydraulic length	= 1530 ft
Tc method	= LAG	Time of conc. (Tc)	= 40.6 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

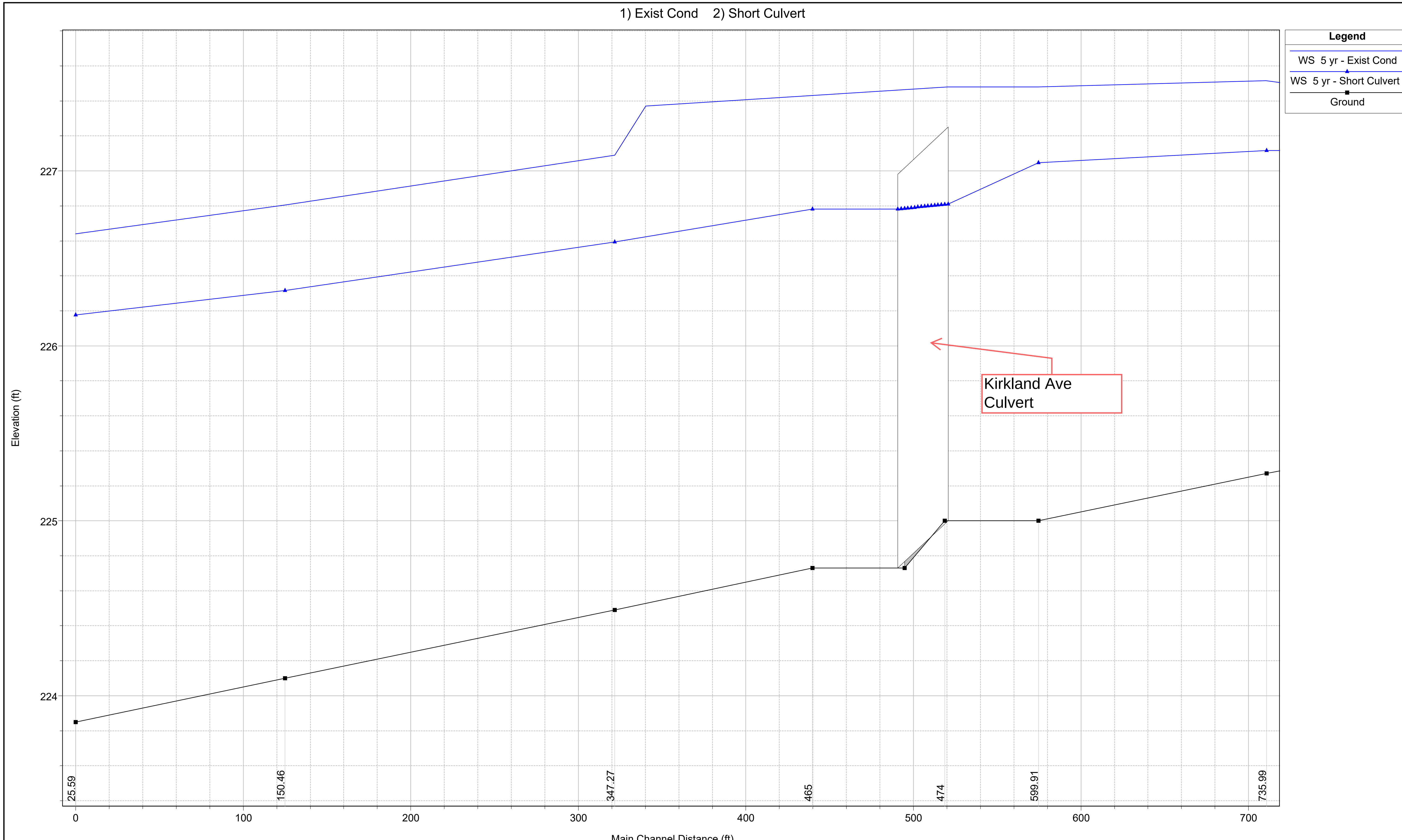
Hydrograph Volume = 534,277 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.47	82.47 <<

...End

Kirkland Avenue Channel and Culvert
Water-surface Profiles

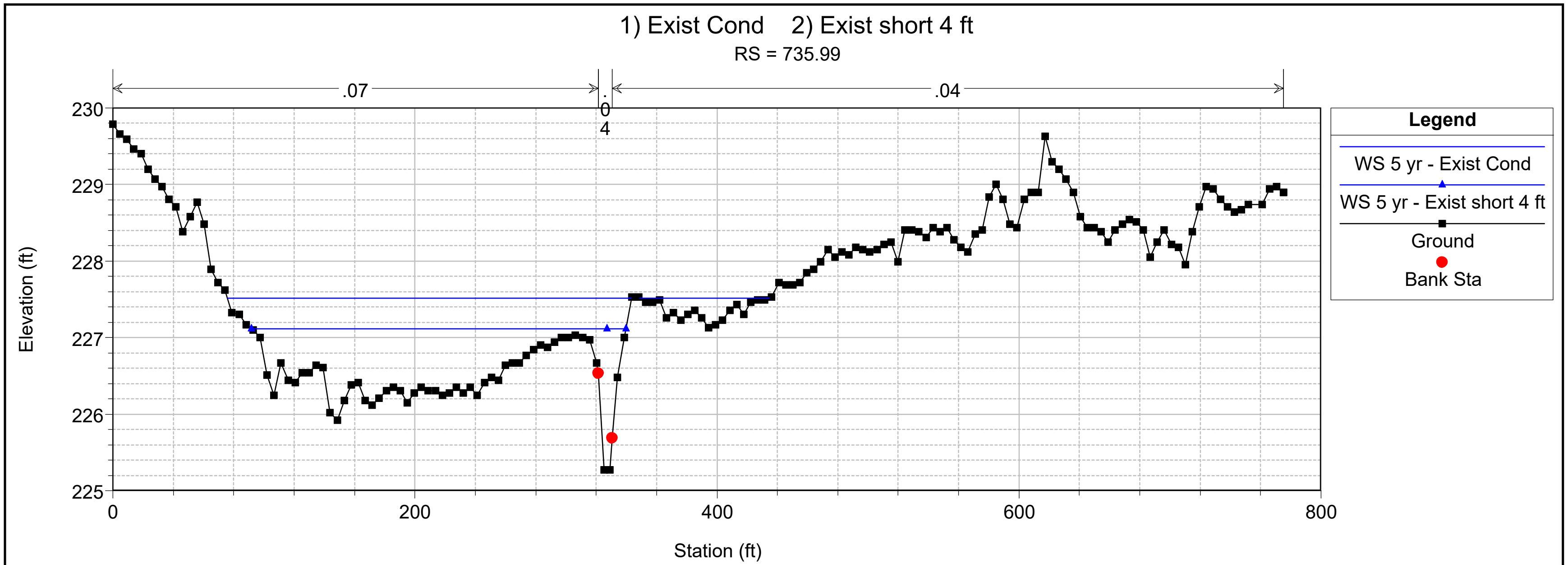


HEC-RAS   River: KirklandCenterli   Reach: KirklandCenterli

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
KirklandCenterli	947.17	2 yr	Exist Cond	30.00	225.62	227.391		227.59	0.011377	3.61	8.31	8.74	0.65
KirklandCenterli	947.17	2 yr	Exist short 4 ft	30.00	225.69	226.947		227.09	0.008913	3.07	9.78	11.55	0.59
KirklandCenterli	947.17	5 yr	Exist Cond	39.00	225.62	227.270	227.27	227.72	0.027650	5.36	7.28	8.27	1.01
KirklandCenterli	947.17	5 yr	Exist short 4 ft	39.00	225.69	227.111		227.28	0.009134	3.32	11.75	12.53	0.60
KirklandCenterli	947.17	10 yr	Exist Cond	48.00	225.62	227.412	227.41	227.91	0.027412	5.65	8.49	8.82	1.02
KirklandCenterli	947.17	10 yr	Exist short 4 ft	48.00	225.69	227.326		227.49	0.007680	3.29	14.59	13.83	0.56
KirklandCenterli	947.17	25 yr	Exist Cond	61.00	225.62	227.610	227.61	228.15	0.025989	5.91	10.32	9.59	1.01
KirklandCenterli	947.17	25 yr	Exist short 4 ft	61.00	225.69	227.436		227.66	0.009430	3.78	16.14	14.48	0.63
KirklandCenterli	947.17	50 yr	Exist Cond	72.00	225.62	227.749	227.75	228.34	0.025719	6.16	11.69	10.14	1.01
KirklandCenterli	947.17	50 yr	Exist short 4 ft	72.00	225.69	227.420		227.74	0.013656	4.53	15.91	14.39	0.76
KirklandCenterli	947.17	100 yr	Exist Cond	82.00	225.62	227.868	227.87	228.49	0.025385	6.34	12.93	10.60	1.01
KirklandCenterli	947.17	100 yr	Exist short 4 ft	82.00	225.69	227.327	227.29	227.82	0.022378	5.62	14.60	13.83	0.96
KirklandCenterli	735.99	2 yr	Exist Cond	30.00	225.49	227.510		227.51	0.000026	0.24	271.72	351.82	0.04
KirklandCenterli	735.99	2 yr	Exist short 4 ft	30.00	225.27	226.838		226.84	0.000355	0.81	96.73	199.01	0.13
KirklandCenterli	735.99	5 yr	Exist Cond	39.00	225.49	227.515		227.52	0.000043	0.31	273.51	352.87	0.05
KirklandCenterli	735.99	5 yr	Exist short 4 ft	39.00	225.27	227.116		227.12	0.000173	0.64	159.53	248.06	0.09
KirklandCenterli	735.99	10 yr	Exist Cond	48.00	225.49	227.526		227.53	0.000063	0.38	277.45	355.17	0.05
KirklandCenterli	735.99	10 yr	Exist short 4 ft	48.00	225.27	227.379		227.38	0.000093	0.52	232.34	314.55	0.07
KirklandCenterli	735.99	25 yr	Exist Cond	61.00	225.49	227.542		227.54	0.000097	0.47	283.08	361.06	0.07
KirklandCenterli	735.99	25 yr	Exist short 4 ft	61.00	225.27	227.528		227.53	0.000089	0.54	281.63	355.40	0.07
KirklandCenterli	735.99	50 yr	Exist Cond	72.00	225.49	227.556		227.56	0.000128	0.55	288.24	361.63	0.08
KirklandCenterli	735.99	50 yr	Exist short 4 ft	72.00	225.27	227.559		227.56	0.000115	0.62	292.81	361.72	0.08
KirklandCenterli	735.99	100 yr	Exist Cond	82.00	225.49	227.598		227.60	0.000144	0.59	303.39	363.33	0.08
KirklandCenterli	735.99	100 yr	Exist short 4 ft	82.00	225.27	227.560		227.56	0.000149	0.70	293.39	361.79	0.09
KirklandCenterli	599.91	2 yr	Exist Cond	30.00	224.68	227.489	225.90	227.50	0.000202	0.82	36.55	308.36	0.10
KirklandCenterli	599.91	2 yr	Exist short 4 ft	30.00	225.00	226.740	225.86	226.76	0.000907	1.23	25.24	124.13	0.20
KirklandCenterli	599.91	5 yr	Exist Cond	39.00	224.68	227.480	226.02	227.50	0.000346	1.07	36.37	303.55	0.14
KirklandCenterli	599.91	5 yr	Exist short 4 ft	39.00	225.00	227.047	225.99	227.07	0.000675	1.24	32.37	153.78	0.18
KirklandCenterli	599.91	10 yr	Exist Cond	48.00	224.68	227.473	226.11	227.50	0.000531	1.32	36.24	300.00	0.17
KirklandCenterli	599.91	10 yr	Exist short 4 ft	48.00	225.00	227.324	226.12	227.35	0.000562	1.27	38.79	239.54	0.17
KirklandCenterli	599.91	25 yr	Exist Cond	61.00	224.68	227.455	226.22	227.50	0.000885	1.70	35.91	287.10	0.22
KirklandCenterli	599.91	25 yr	Exist short 4 ft	61.00	225.00	227.460	226.23	227.49	0.000700	1.49	41.94	288.91	0.19
KirklandCenterli	599.91	50 yr	Exist Cond	72.00	224.68	227.435	226.30	227.50	0.001275	2.03	35.54	280.04	0.26
KirklandCenterli	599.91	50 yr	Exist short 4 ft	72.00	225.00	227.542	226.32	227.54	0.000103	0.59	213.02	388.88	0.07
KirklandCenterli	599.91	100 yr	Exist Cond	82.00	224.68	227.567	226.37	227.57	0.000238	0.91	222.68	403.26	0.11
KirklandCenterli	599.91	100 yr	Exist short 4 ft	82.00	225.00	227.438	226.39	227.50	0.001318	2.03	41.43	280.89	0.26
KirklandCenterli	474			Culvert									
KirklandCenterli	465	2 yr	Exist short 4 ft	30.00	224.73	226.561	225.68	226.61	0.001737	1.76	17.09	73.63	0.28
KirklandCenterli	465	5 yr	Exist short 4 ft	39.00	224.73	226.781	225.82	226.84	0.001805	1.93	20.16	120.31	0.29

HEC-RAS River: KirklandCenterli Reach: KirklandCenterli (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
KirklandCenterli	465	10 yr	Exist short 4 ft	48.00	224.73	226.942	225.94	227.01	0.001981	2.13	22.51	147.23	0.30
KirklandCenterli	465	25 yr	Exist short 4 ft	61.00	224.73	227.102	226.11	227.12	0.000823	1.44	92.84	158.42	0.20
KirklandCenterli	465	50 yr	Exist short 4 ft	72.00	224.73	227.228	226.22	227.24	0.000723	1.40	112.97	161.87	0.19
KirklandCenterli	465	100 yr	Exist short 4 ft	82.00	224.73	227.327	226.32	227.34	0.000690	1.40	129.72	172.09	0.18
KirklandCenterli	347.27	2 yr	Exist Cond	30.00	225.00	226.902	226.28	227.00	0.003351	2.50	12.01	144.28	0.39
KirklandCenterli	347.27	2 yr	Exist short 4 ft	30.00	224.49	226.370		226.41	0.001590	1.66	18.57	24.62	0.26
KirklandCenterli	347.27	5 yr	Exist Cond	39.00	225.00	227.090	226.43	227.10	0.000635	1.19	82.38	154.40	0.17
KirklandCenterli	347.27	5 yr	Exist short 4 ft	39.00	224.49	226.595		226.64	0.001488	1.74	29.35	90.98	0.26
KirklandCenterli	347.27	10 yr	Exist Cond	48.00	225.00	227.211	226.55	227.22	0.000569	1.19	101.50	159.82	0.17
KirklandCenterli	347.27	10 yr	Exist short 4 ft	48.00	224.49	226.779		226.82	0.001215	1.67	49.56	120.59	0.24
KirklandCenterli	347.27	25 yr	Exist Cond	61.00	225.00	227.359	226.71	227.37	0.000527	1.21	126.23	171.92	0.16
KirklandCenterli	347.27	25 yr	Exist short 4 ft	61.00	224.49	226.990		227.02	0.000928	1.55	79.55	149.44	0.21
KirklandCenterli	347.27	50 yr	Exist Cond	72.00	225.00	227.473	226.84	227.48	0.000494	1.22	146.18	178.01	0.16
KirklandCenterli	347.27	50 yr	Exist short 4 ft	72.00	224.49	227.130		227.15	0.000802	1.50	101.21	159.92	0.20
KirklandCenterli	347.27	100 yr	Exist Cond	82.00	225.00	227.558	226.95	227.57	0.000487	1.25	161.71	185.57	0.16
KirklandCenterli	347.27	100 yr	Exist short 4 ft	82.00	224.49	227.238		227.26	0.000728	1.47	118.60	164.50	0.19
KirklandCenterli	150.46	2 yr	Exist Cond	30.00	224.77	226.633		226.69	0.002388	1.96	18.17	32.98	0.32
KirklandCenterli	150.46	2 yr	Exist short 4 ft	30.00	224.10	226.090		226.13	0.001306	1.51	19.83	15.93	0.24
KirklandCenterli	150.46	5 yr	Exist Cond	39.00	224.77	226.805		226.87	0.002336	2.12	24.83	46.65	0.32
KirklandCenterli	150.46	5 yr	Exist short 4 ft	39.00	224.10	226.317		226.36	0.001349	1.65	23.65	18.37	0.25
KirklandCenterli	150.46	10 yr	Exist Cond	48.00	224.77	226.932		227.00	0.002335	2.25	31.23	56.05	0.33
KirklandCenterli	150.46	10 yr	Exist short 4 ft	48.00	224.10	226.510		226.56	0.001370	1.78	27.74	25.86	0.25
KirklandCenterli	150.46	25 yr	Exist Cond	61.00	224.77	227.078		227.15	0.002408	2.44	40.42	70.36	0.34
KirklandCenterli	150.46	25 yr	Exist short 4 ft	61.00	224.10	226.725		226.78	0.001441	1.95	34.92	38.97	0.26
KirklandCenterli	150.46	50 yr	Exist Cond	72.00	224.77	227.187		227.27	0.002543	2.62	49.65	96.39	0.35
KirklandCenterli	150.46	50 yr	Exist short 4 ft	72.00	224.10	226.864		226.93	0.001520	2.08	41.76	53.14	0.27
KirklandCenterli	150.46	100 yr	Exist Cond	82.00	224.77	227.283		227.36	0.002387	2.63	59.65	108.91	0.34
KirklandCenterli	150.46	100 yr	Exist short 4 ft	82.00	224.10	226.971		227.04	0.001583	2.18	47.94	62.85	0.28
KirklandCenterli	25.59	2 yr	Exist Cond	30.00	223.85	226.464	225.35	226.50	0.001001	1.63	29.21	59.25	0.22
KirklandCenterli	25.59	2 yr	Exist short 4 ft	30.00	223.85	225.952	224.79	225.98	0.001000	1.38	21.82	18.60	0.21
KirklandCenterli	25.59	5 yr	Exist Cond	39.00	223.85	226.640	225.51	226.68	0.001001	1.74	41.65	80.56	0.22
KirklandCenterli	25.59	5 yr	Exist short 4 ft	39.00	223.85	226.177	224.94	226.21	0.001001	1.53	26.56	24.53	0.22
KirklandCenterli	25.59	10 yr	Exist Cond	48.00	223.85	226.771	225.65	226.81	0.001001	1.82	54.47	110.00	0.22
KirklandCenterli	25.59	10 yr	Exist short 4 ft	48.00	223.85	226.369	225.06	226.41	0.001002	1.65	32.81	49.86	0.22
KirklandCenterli	25.59	25 yr	Exist Cond	61.00	223.85	226.921	225.86	226.96	0.001000	1.90	71.51	116.79	0.23
KirklandCenterli	25.59	25 yr	Exist short 4 ft	61.00	223.85	226.584	225.23	226.63	0.001001	1.79	45.99	77.44	0.23
KirklandCenterli	25.59	50 yr	Exist Cond	72.00	223.85	227.032	226.02	227.07	0.001000	1.97	84.94	129.59	0.23
KirklandCenterli	25.59	50 yr	Exist short 4 ft	72.00	223.85	226.723	225.35	226.77	0.001002	1.87	58.11	104.03	0.23
KirklandCenterli	25.59	100 yr	Exist Cond	82.00	223.85	227.130	226.12	227.17	0.001002	2.02	98.51	154.26	0.23
KirklandCenterli	25.59	100 yr	Exist short 4 ft	82.00	223.85	226.829	225.45	226.88	0.001001	1.93	69.80	112.69	0.23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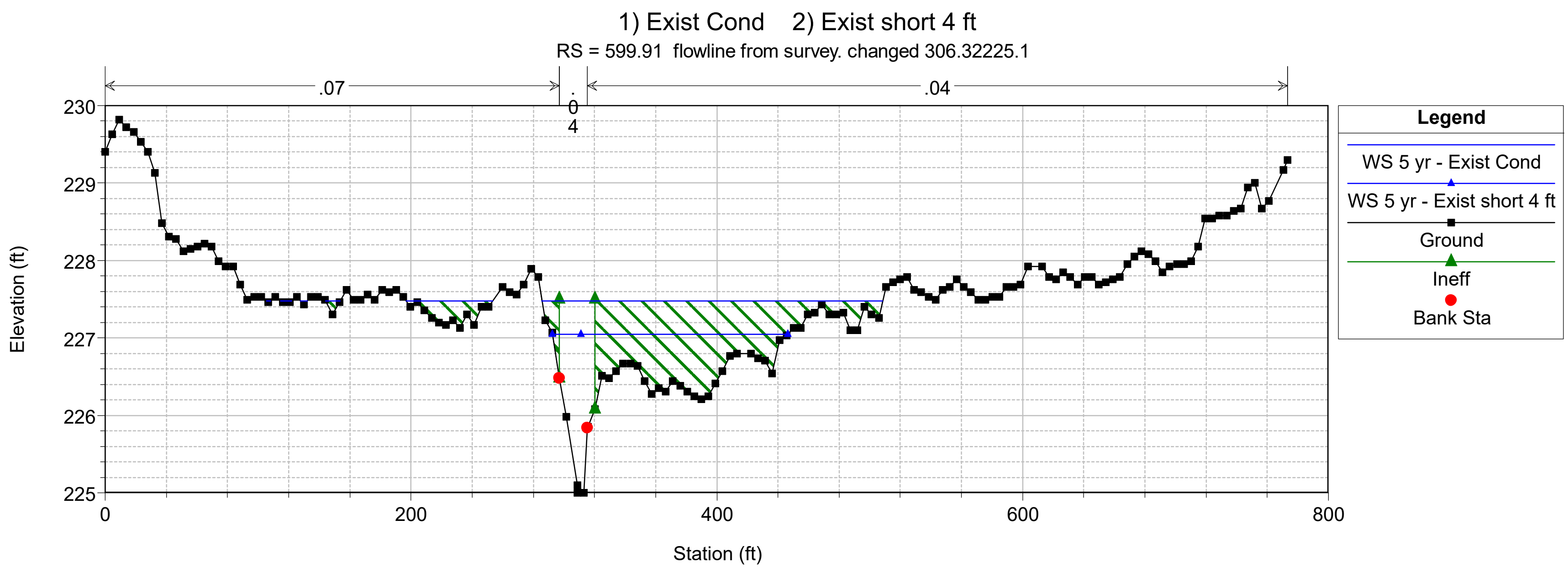
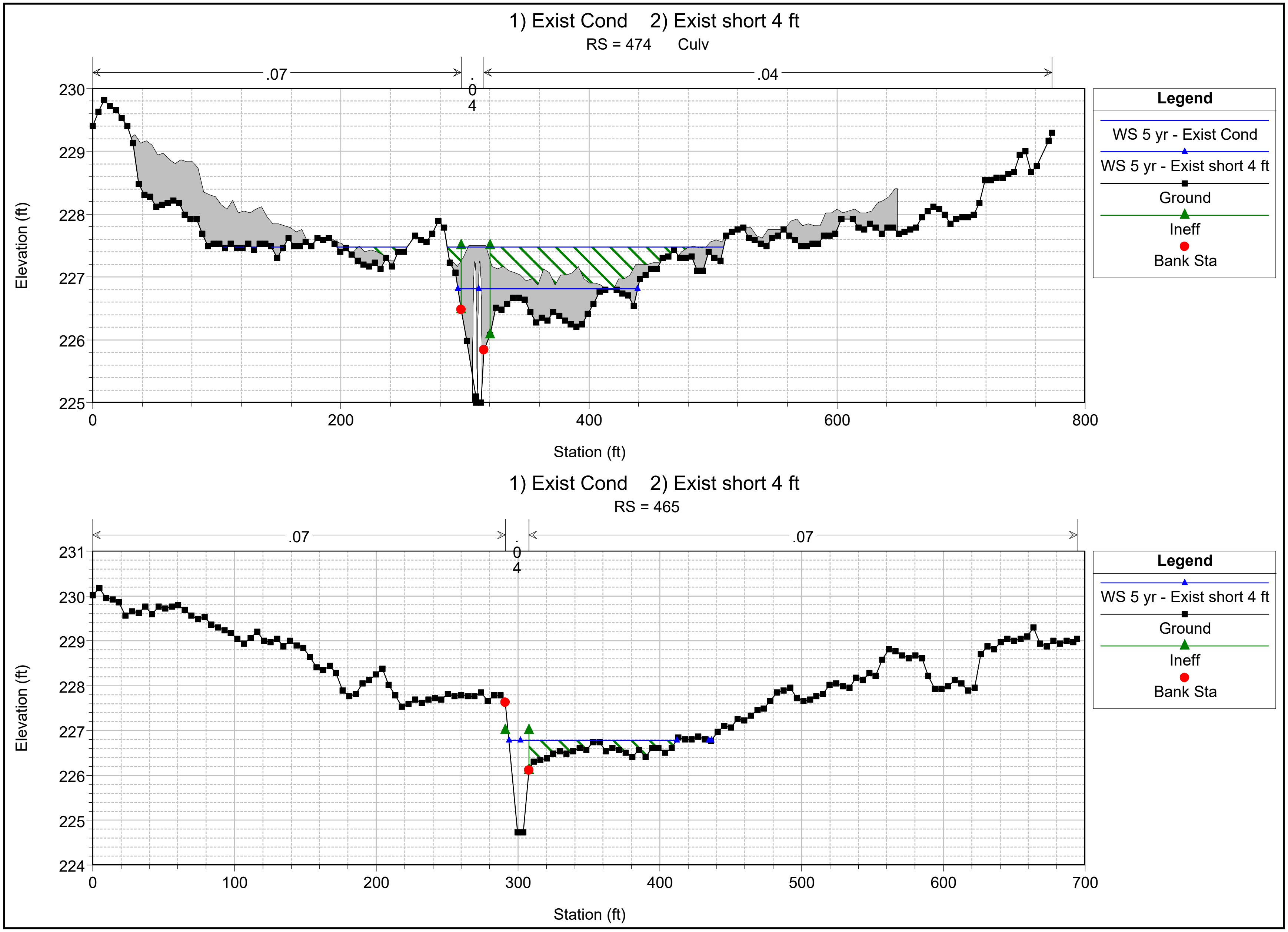
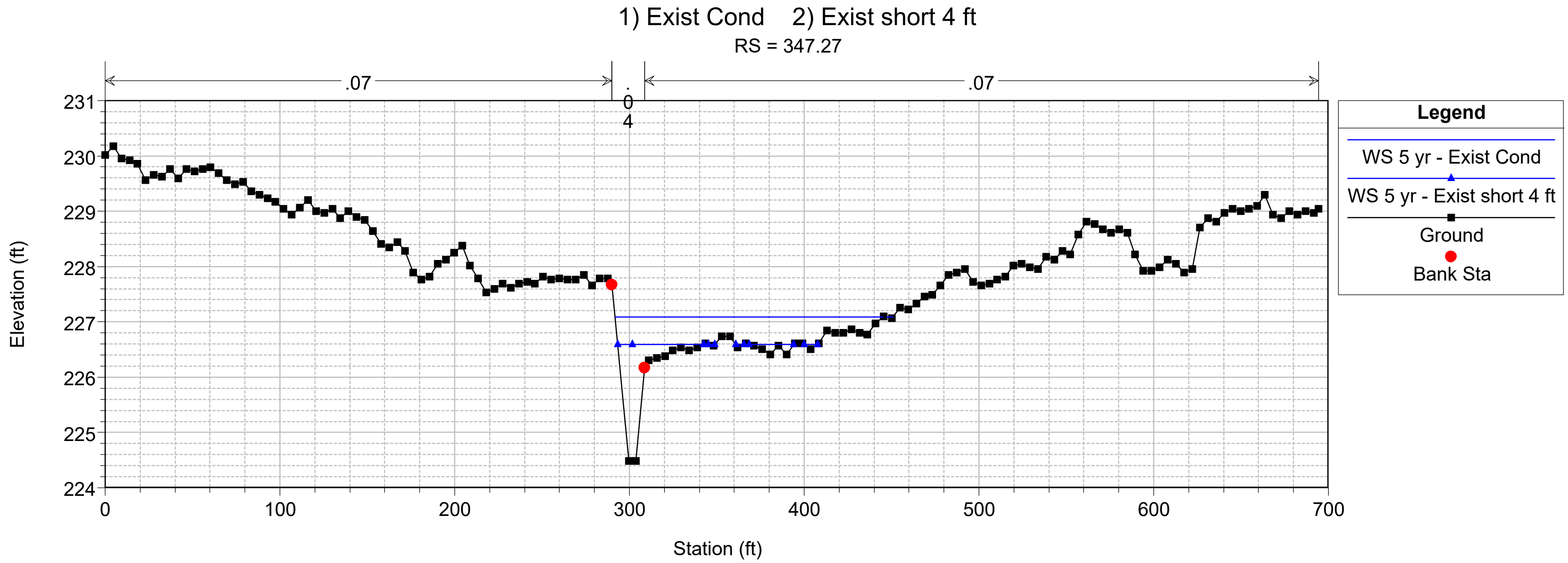
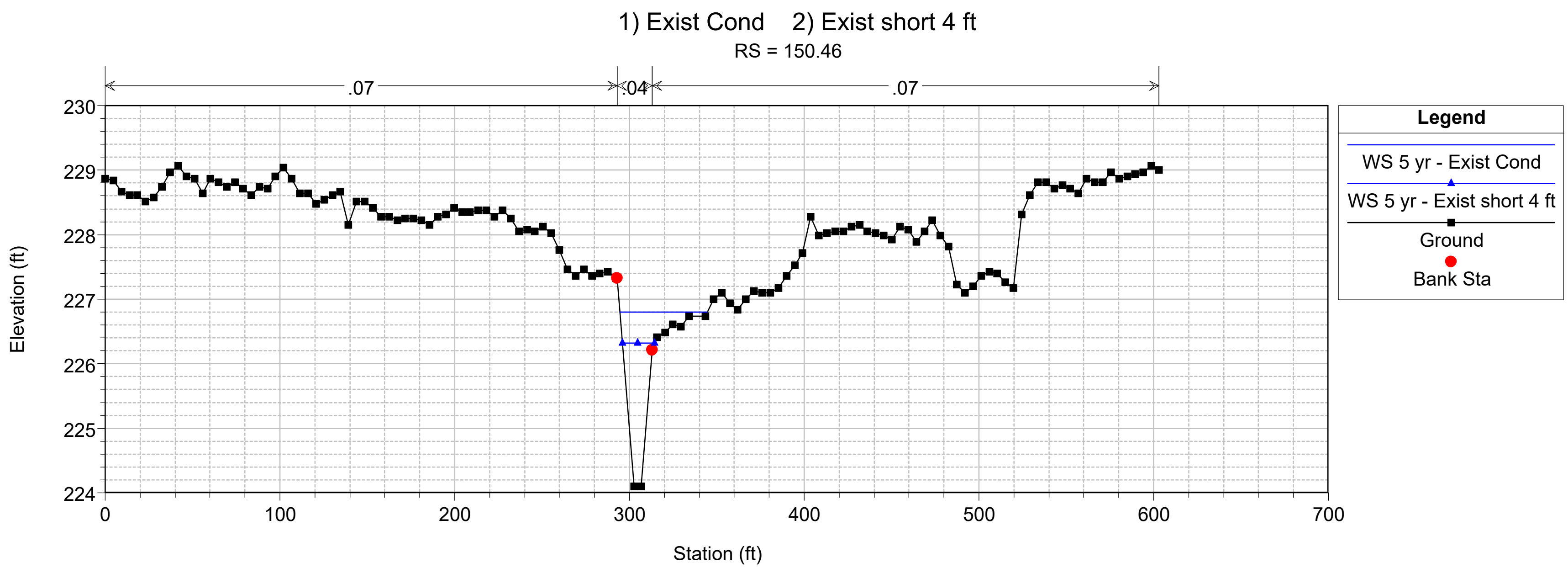
.07
.04
.04
Elevation (ft)
Station (ft)
230
229
228
227
226
225
0
200
400
600
800
Legend
WS 5 yr - Exist Cond
WS 5 yr - Exist short 4 ft
Ground
Bank Sta


1) Exist Cond 2) Exist short 4 ft
RS = 599.91 flowline from survey. changed 306.32225.1
.07
.04
.04
Elevation (ft)
Station (ft)
230
229
228
227
226
225
0
200
400
600
800
Legend
WS 5 yr - Exist Cond
WS 5 yr - Exist short 4 ft
Ground
Ineff
Bank Sta


1) Exist Cond 2) Exist short 4 ft
RS = 474 Culv
.07
.04
.04
Elevation (ft)
Station (ft)
230
229
228
227
226
225
0
200
400
600
800
Legend
WS 5 yr - Exist Cond
WS 5 yr - Exist short 4 ft
Ground
Ineff
Bank Sta
1) Exist Cond 2) Exist short 4 ft
RS = 465
.07
.04
.07
Elevation (ft)
Station (ft)
231
230
229
228
227
226
225
224
0
100
200
300
400
500
600
700
Legend
WS 5 yr - Exist short 4 ft
Ground
Ineff
Bank Sta



1) Exist Cond 2) Exist short 4 ft
RS = 347.27
.07
.
0
4
.07
Legend
WS 5 yr - Exist Cond
WS 5 yr - Exist short 4 ft
Ground
Bank Sta
Elevation (ft)
Station (ft)
231
230
229
228
227
226
225
224
0
100
200
300
400
500
600
700



1) Exist Cond 2) Exist short 4 ft
RS = 150.46
.07
.04
.07
Legend
WS 5 yr - Exist Cond
WS 5 yr - Exist short 4 ft
Ground
Bank Sta
Elevation (ft)
Station (ft)
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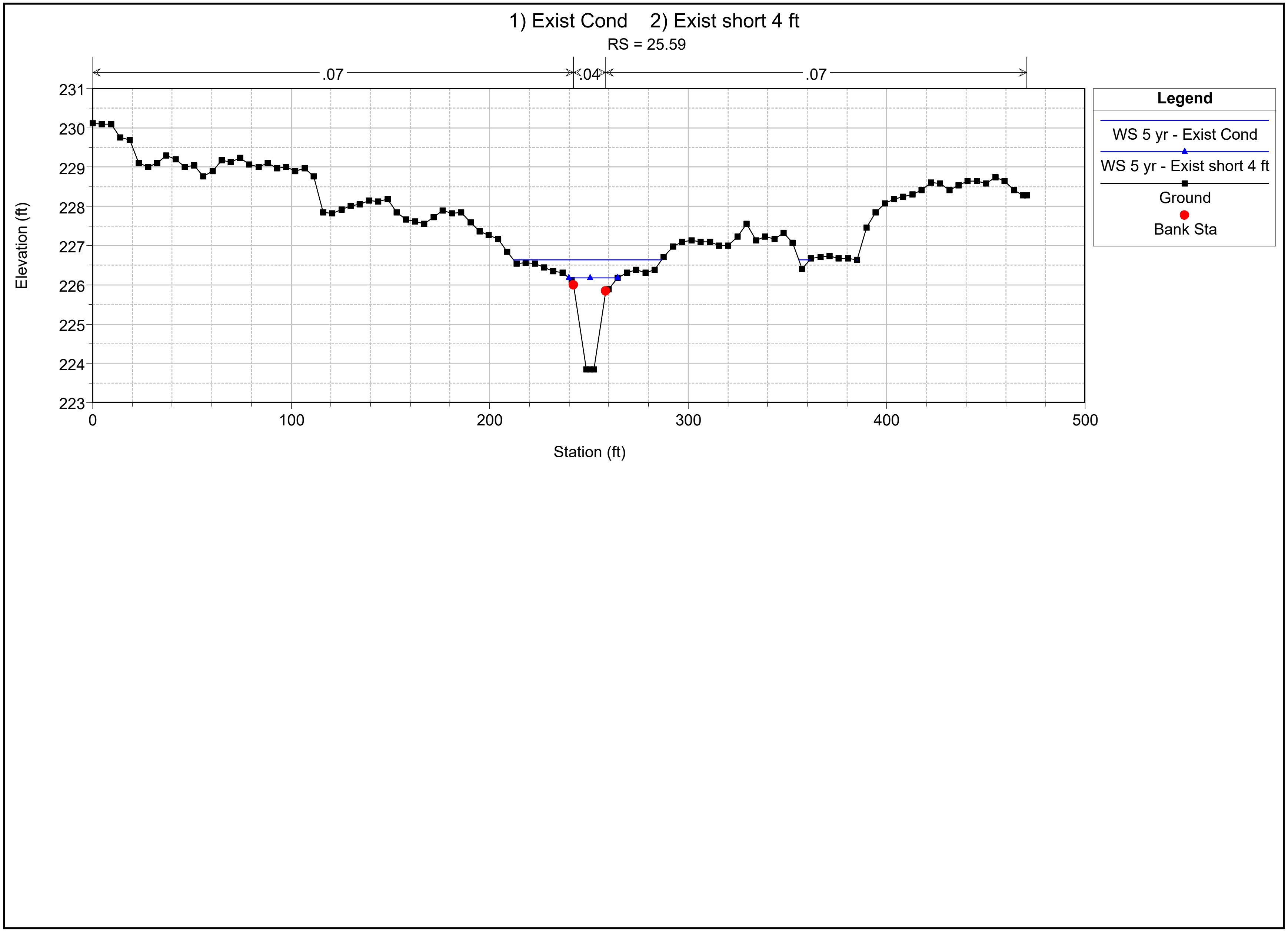
229
228
227
226
225
224
0
100
200
300
400
500
600
700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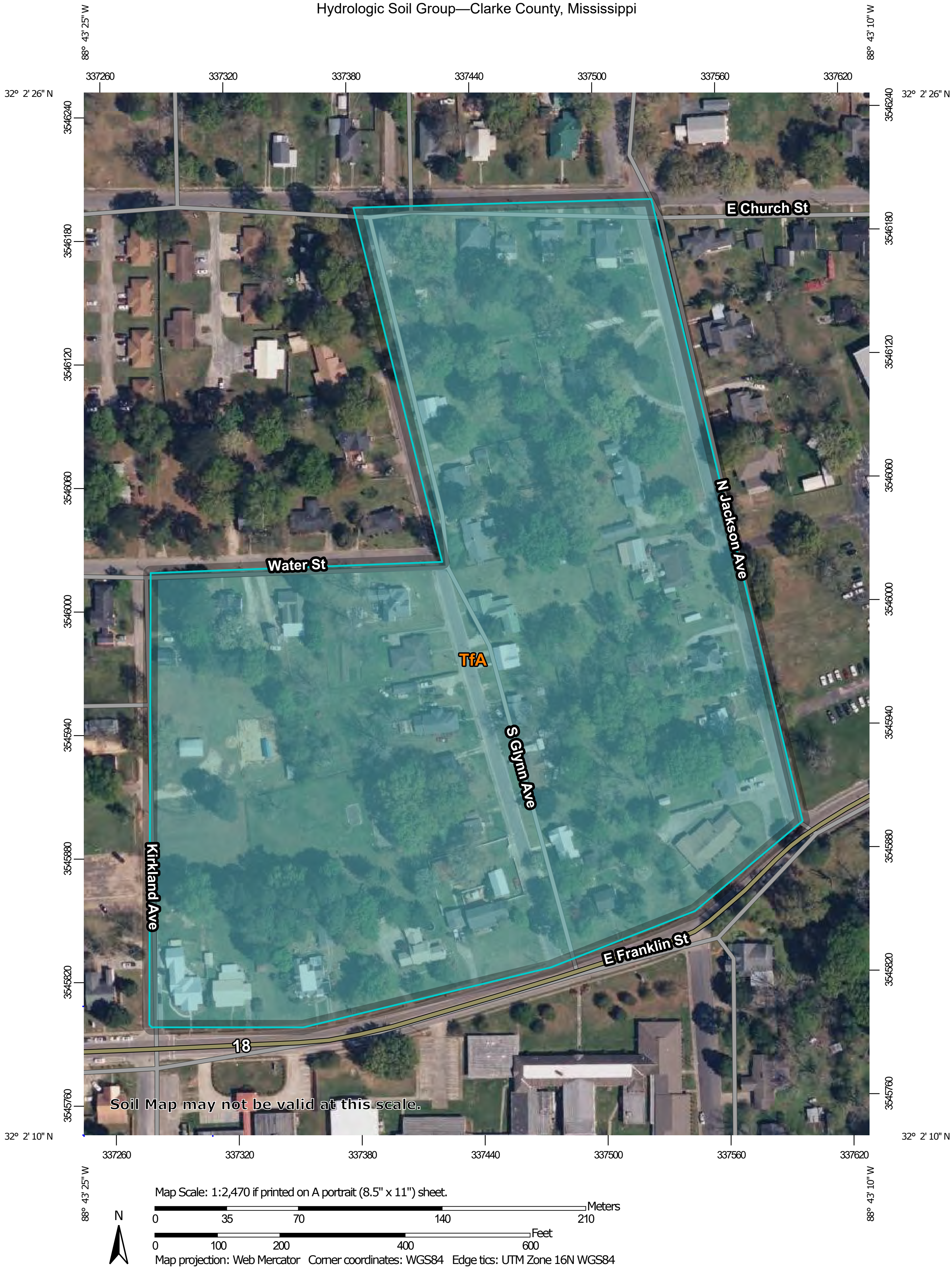
RS = 25.59
.07
.04
.07
Elevation (ft)
Station (ft)
231
230
229
228
227
226
225
224
223
0
100
200
300
400
500
Legend
WS 5 yr - Exist Cond
WS 5 yr - Exist short 4 ft
Ground
Bank Sta


88° 43' 25" W
88° 43' 10" W
32° 2' 26" N
32° 2' 10" N
337260
337320
337380
337440
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337560
337620
3546240
3546180
3546120
3546060
3546000
3545940
3545880
3545820
3545760
E Church St
Water St
N Jackson Ave
TfA
S Glynn Ave
Kirkland Ave
E Franklin St
18
Soil Map may not be valid at this scale.
Map Scale: 1:2,470 if printed on A portrait (8.5" x 11") sheet.
Meters
0 35 70 140 210
Feet
0 100 200 400 600
N
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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 21, Sep 6, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 3, 2021—May 8, 2021

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
TfA	Tilden fine sandy loam, 0 to 2 percent slopes (savannah)	C	21.4	100.0%
Totals for Area of Interest			**21.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX L

NORTH JACKSON AVENUE

- Hydrology Summary
- HY-8 Report
- Culvert Inspection Reports
- Hydrographs
- HECRAS Output
- Soil Data Report

Proposed Jackson Avenue Culvert Replacement

Hydrology Summary

Basin Parameters

Location	Drainage Area (acres)	Runoff Curve Number	Basin Slope (percent)	Hydraulic Length (feet)	Storm Distribution	Time Interval (min)
Jackson Ave	14.0	70	2	1000	Type III	2
Downstream of Recreational Fields	43.7	71	2	2780	Type III	5

Peak Discharges

Location	2-yr Recurrence Peak Discharge (cfs)	5-yr Recurrence Peak Discharge (cfs)	10-yr Recurrence Peak Discharge (cfs)	25-yr Recurrence Peak Discharge (cfs)	50-yr Recurrence Peak Discharge (cfs)	100-yr Recurrence Peak Discharge (cfs)
Jackson Ave	15	22	29	40	48	58
Downstream of Recreational Fields	32	47	61	82	100	119

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow
Minimum Flow: 15 cfs
Design Flow: 40 cfs
Maximum Flow: 58 cfs

Table 1 - Summary of Culvert Flows at Crossing: Jackson Avenue 2

Headwater Elevation (ft)	Total Discharge (cfs)	Proposed Discharge (cfs)	Roadway Discharge (cfs)	Iterations
231.38	15.00	15.00	0.00	1
231.68	19.30	19.30	0.00	1
231.95	23.60	23.60	0.00	1
232.20	27.90	27.90	0.00	1
232.45	32.20	32.20	0.00	1
232.71	36.50	36.50	0.00	1
232.93	40.00	40.00	0.00	1
233.27	45.10	45.10	0.00	1
233.58	49.40	49.40	0.00	1
233.92	53.70	53.70	0.00	1
234.29	58.00	58.00	0.00	1
235.91	73.55	73.55	0.00	Overtopping

****

Straight Culvert
Inlet Elevation (invert): 229.64 ft, Outlet Elevation (invert): 229.22 ft
Culvert Length: 38.00 ft, Culvert Slope: 0.011

Rating Curve Plot for Crossing: Jackson Avenue 2

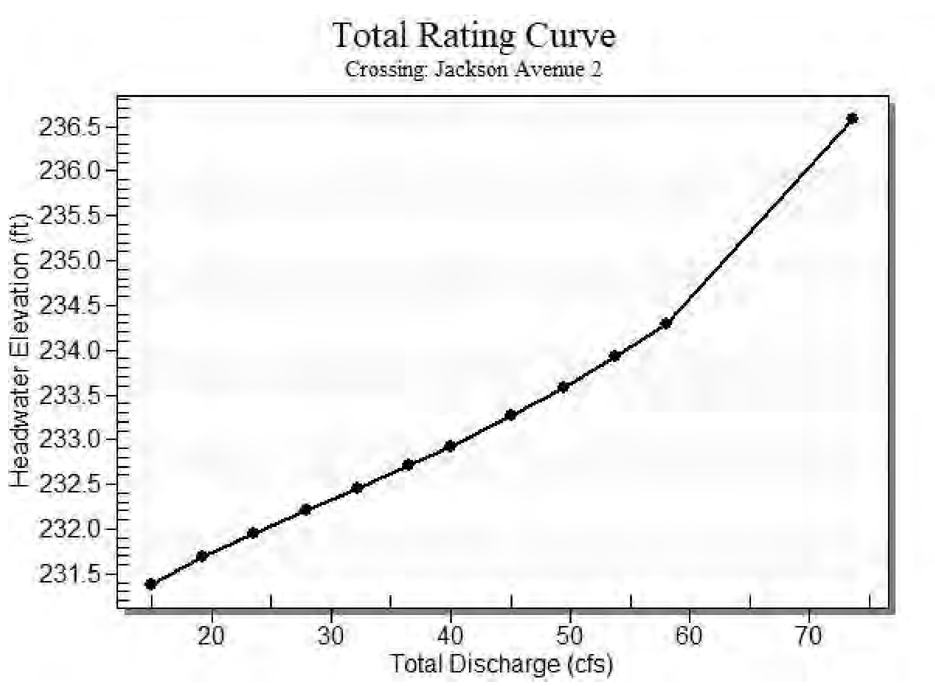
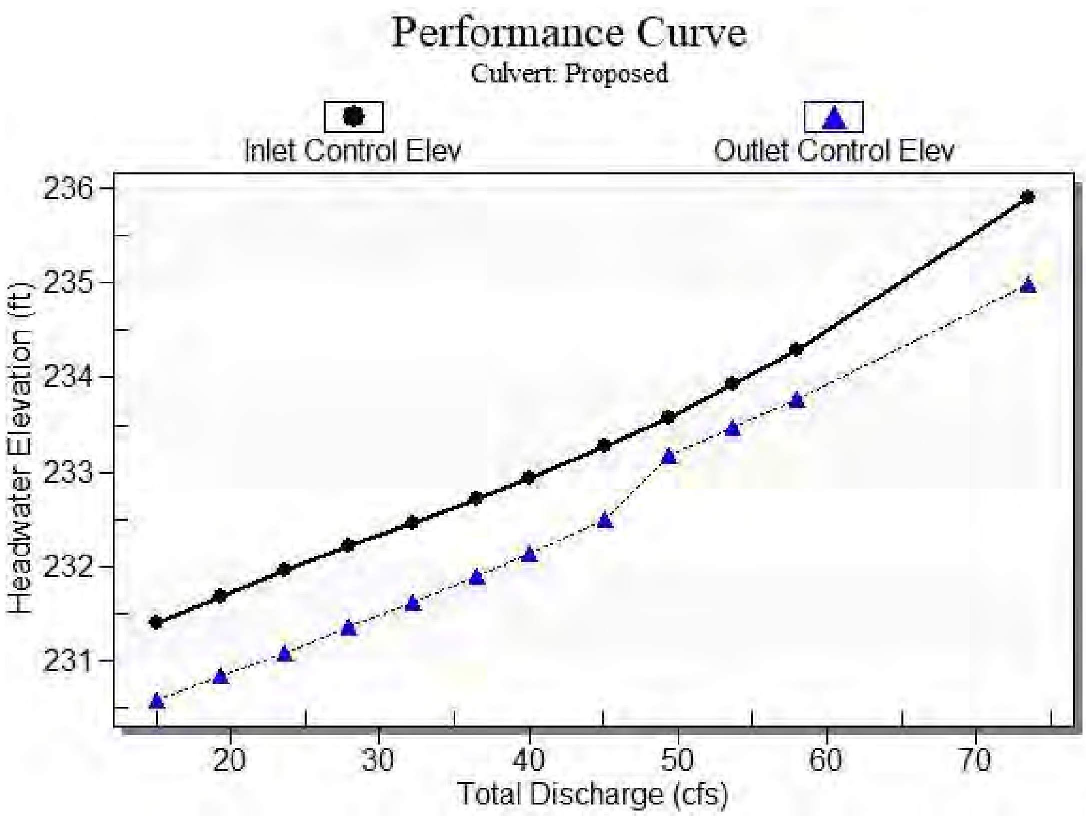


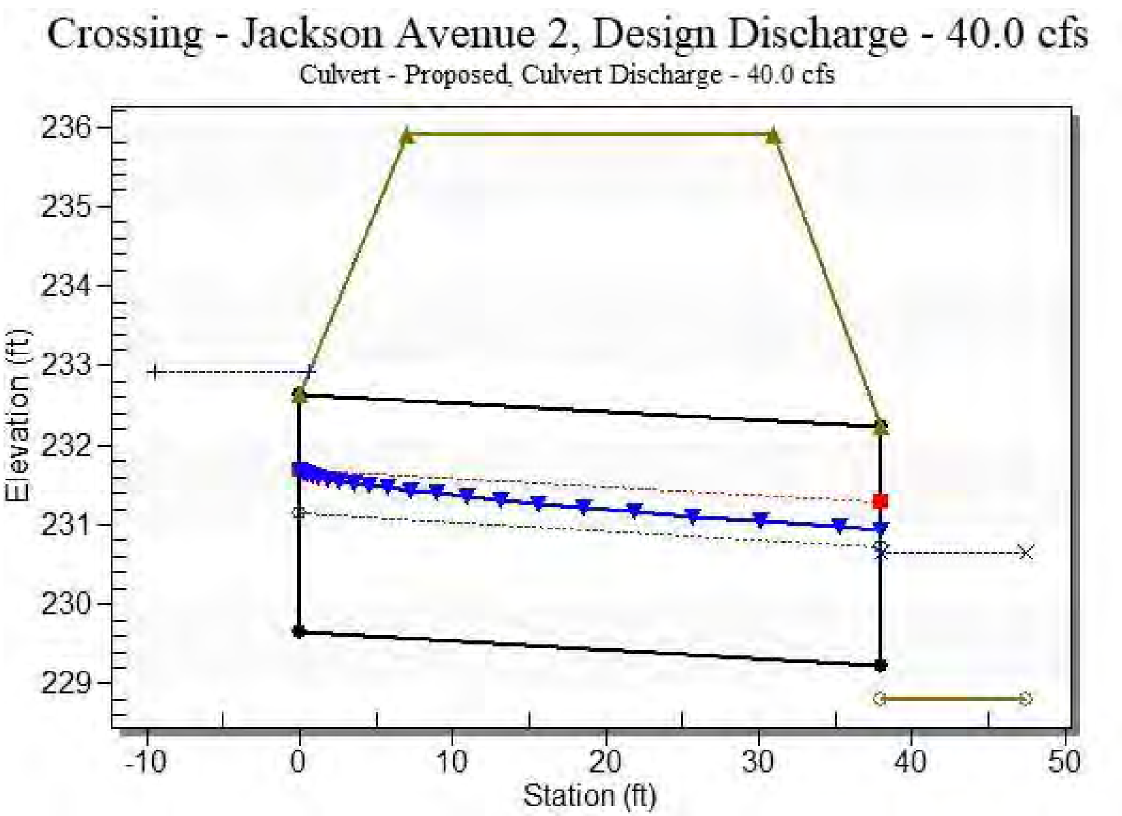
Table 2 - Culvert Summary Table: Proposed

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
15.00	15.00	231.38	1.744	0.932	1-S2n	0.879	1.231	0.971	1.219	7.318	1.342
19.30	19.30	231.68	2.041	1.190	1-S2n	1.003	1.409	1.119	1.363	7.762	1.436
23.60	23.60	231.95	2.309	1.443	1-S2n	1.117	1.563	1.254	1.489	8.143	1.514
27.90	27.90	232.20	2.563	1.704	1-S2n	1.224	1.705	1.382	1.602	8.485	1.583
32.20	32.20	232.45	2.813	1.977	1-S2n	1.327	1.838	1.502	1.687	8.800	1.670
36.50	36.50	232.71	3.068	2.258	5-S2n	1.426	1.960	1.617	1.767	9.096	1.739
40.00	40.00	232.93	3.286	2.499	5-S2n	1.505	2.057	1.708	1.829	9.326	1.785
45.10	45.10	233.27	3.626	2.861	5-S2n	1.619	2.185	1.835	1.914	9.653	1.840
49.40	49.40	233.58	3.939	3.537	5-S2n	1.715	2.285	1.939	1.982	9.920	1.879
53.70	53.70	233.92	4.280	3.822	5-S2n	1.812	2.378	2.041	2.047	10.184	1.912
58.00	58.00	234.29	4.652	4.123	5-S2n	1.910	2.463	2.141	2.109	10.455	1.940

Culvert Performance Curve Plot: Proposed



Water Surface Profile Plot for Culvert: Proposed



Site Data - Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 229.64 ft
Outlet Station: 38.00 ft
Outlet Elevation: 229.22 ft
Number of Barrels: 1

Culvert Data Summary - Proposed

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Jackson Avenue 2)
Tailwater Channel Data - Jackson Avenue 2

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
15.00	230.03	1.22	1.34	0.15	0.27
19.30	230.17	1.36	1.44	0.17	0.28
23.60	230.30	1.49	1.51	0.19	0.28
27.90	230.41	1.60	1.58	0.20	0.29
32.20	230.50	1.69	1.67	0.21	0.30
36.50	230.58	1.77	1.74	0.22	0.32
40.00	230.64	1.83	1.78	0.23	0.32
45.10	230.72	1.91	1.84	0.24	0.33
49.40	230.79	1.98	1.88	0.25	0.34
53.70	230.86	2.05	1.91	0.26	0.34
58.00	230.92	2.11	1.94	0.26	0.34

Tailwater Channel Option: Irregular Channel
Channel Slope: 0.0020
User Defined Channel Cross-Section:

Coord No.	Station (ft)	Elevation (ft)	Manning's n
1	245.98	231.86	0.0700
2	255.27	231.73	0.0700
3	264.55	231.63	0.0700
4	273.83	231.33	0.0700
5	283.11	230.91	0.0700
6	292.40	230.41	0.0400
7	297.04	229.66	0.0400
8	301.68	228.97	0.0400
9	306.32	228.81	0.0400
10	310.96	230.41	0.0700
11	315.60	231.69	0.0000

Roadway Data for Crossing: Jackson Avenue 2

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 1000.00 ft
Crest Elevation: 235.91 ft
Roadway Surface: Paved
Roadway Top Width: 24.00 ft

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: N Jackson Ave.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #621, 624 CVI16	Size: 16"	Type: CONC
Condition: ☒ Poor ❑ Fair ❑ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ❑ < 0.5' ☒ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs

☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

℄

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: N Jackson Ave.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #622-623 CVI17	Size: 25"X 25" / Type: SQ. CONC
Condition: ❑ Poor ❑ Fair ☒ Good	High water elevation or height above inlet
OUTLET - Depth of silt ☒ < 0.5' ❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs
☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

℄

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 19

Jackson Avenue North site

Hydrograph type	= SCS Runoff	Peak discharge	= 15.10 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 14.00 ac	Curve number	= 70
Basin Slope	= 2.0 %	Hydraulic length	= 1000 ft
Tc method	= LAG	Time of conc. (Tc)	= 30 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 81,838 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.37	15.10 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 19

Jackson Avenue North site

Hydrograph type	= SCS Runoff	Peak discharge	= 22.37 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Drainage area	= 14.00 ac	Curve number	= 70
Basin Slope	= 2.0 %	Hydraulic length	= 1000 ft
Tc method	= LAG	Time of conc. (Tc)	= 30 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 118,796 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.37	22.37 <<

...End

Hydrograph Report

Hyd. No. 19

Jackson Avenue North site

Hydrograph type	= SCS Runoff	Peak discharge	= 29.20 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 14.00 ac	Curve number	= 70
Basin Slope	= 2.0 %	Hydraulic length	= 1000 ft
Tc method	= LAG	Time of conc. (Tc)	= 30 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 153,525 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.33	29.20 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 19

Jackson Avenue North site

Hydrograph type	= SCS Runoff	Peak discharge	= 39.68 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 14.00 ac	Curve number	= 70
Basin Slope	= 2.0 %	Hydraulic length	= 1000 ft
Tc method	= LAG	Time of conc. (Tc)	= 30 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 207,354 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.33	39.68 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 19

Jackson Avenue North site

Hydrograph type	= SCS Runoff	Peak discharge	= 48.43 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 14.00 ac	Curve number	= 70
Basin Slope	= 2.0 %	Hydraulic length	= 1000 ft
Tc method	= LAG	Time of conc. (Tc)	= 30 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 252,849 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.33	48.43 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 19

Jackson Avenue North site

Hydrograph type	= SCS Runoff	Peak discharge	= 57.73 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 14.00 ac	Curve number	= 70
Basin Slope	= 2.0 %	Hydraulic length	= 1000 ft
Tc method	= LAG	Time of conc. (Tc)	= 30 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 301,785 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.33	57.73 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 20

Jackson Ave downstream of culverts

Hydrograph type	= SCS Runoff	Peak discharge	= 31.87 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 43.70 ac	Curve number	= 71
Basin Slope	= 2.0 %	Hydraulic length	= 2780 ft
Tc method	= LAG	Time of conc. (Tc)	= 66.2 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 265,080 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.80	31.87 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 20

Jackson Ave downstream of culverts

Hydrograph type	= SCS Runoff	Peak discharge	= 46.90 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Drainage area	= 43.70 ac	Curve number	= 71
Basin Slope	= 2.0 %	Hydraulic length	= 2780 ft
Tc method	= LAG	Time of conc. (Tc)	= 66.2 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 382,019 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.77	46.90 <<

...End

Hydrograph Report

Hyd. No. 20

Jackson Ave downstream of culverts

Hydrograph type	= SCS Runoff	Peak discharge	= 60.86 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 43.70 ac	Curve number	= 71
Basin Slope	= 2.0 %	Hydraulic length	= 2780 ft
Tc method	= LAG	Time of conc. (Tc)	= 66.2 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 491,488 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.73	60.86 <<

...End

Hydrograph Report

Hyd. No. 20

Jackson Ave downstream of culverts

Hydrograph type	= SCS Runoff	Peak discharge	= 82.31 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 43.70 ac	Curve number	= 71
Basin Slope	= 2.0 %	Hydraulic length	= 2780 ft
Tc method	= LAG	Time of conc. (Tc)	= 66.2 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 660,639 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.73	82.31 <<

...End

Hydrograph Report

Hyd. No. 20

Jackson Ave downstream of culverts

Hydrograph type	= SCS Runoff	Peak discharge	= 100.19 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 43.70 ac	Curve number	= 71
Basin Slope	= 2.0 %	Hydraulic length	= 2780 ft
Tc method	= LAG	Time of conc. (Tc)	= 66.2 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 803,261 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.73	100.19 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 20

Jackson Ave downstream of culverts

Hydrograph type	= SCS Runoff	Peak discharge	= 119.20 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 43.70 ac	Curve number	= 71
Basin Slope	= 2.0 %	Hydraulic length	= 2780 ft
Tc method	= LAG	Time of conc. (Tc)	= 66.2 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

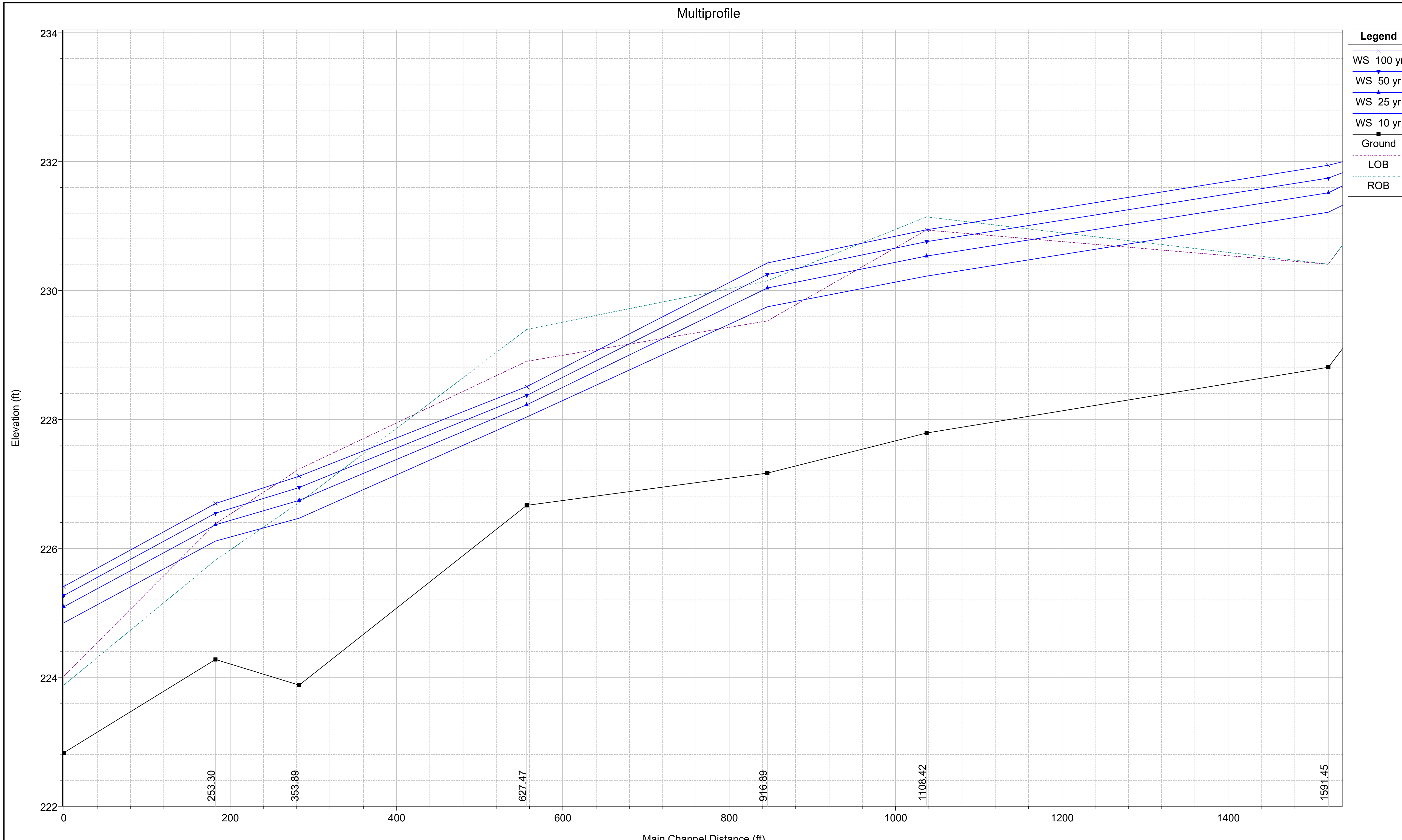
Hydrograph Volume = 956,417 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.73	119.20 <<

...End

North Jackson Avenue
Channel Downstream of Culverts

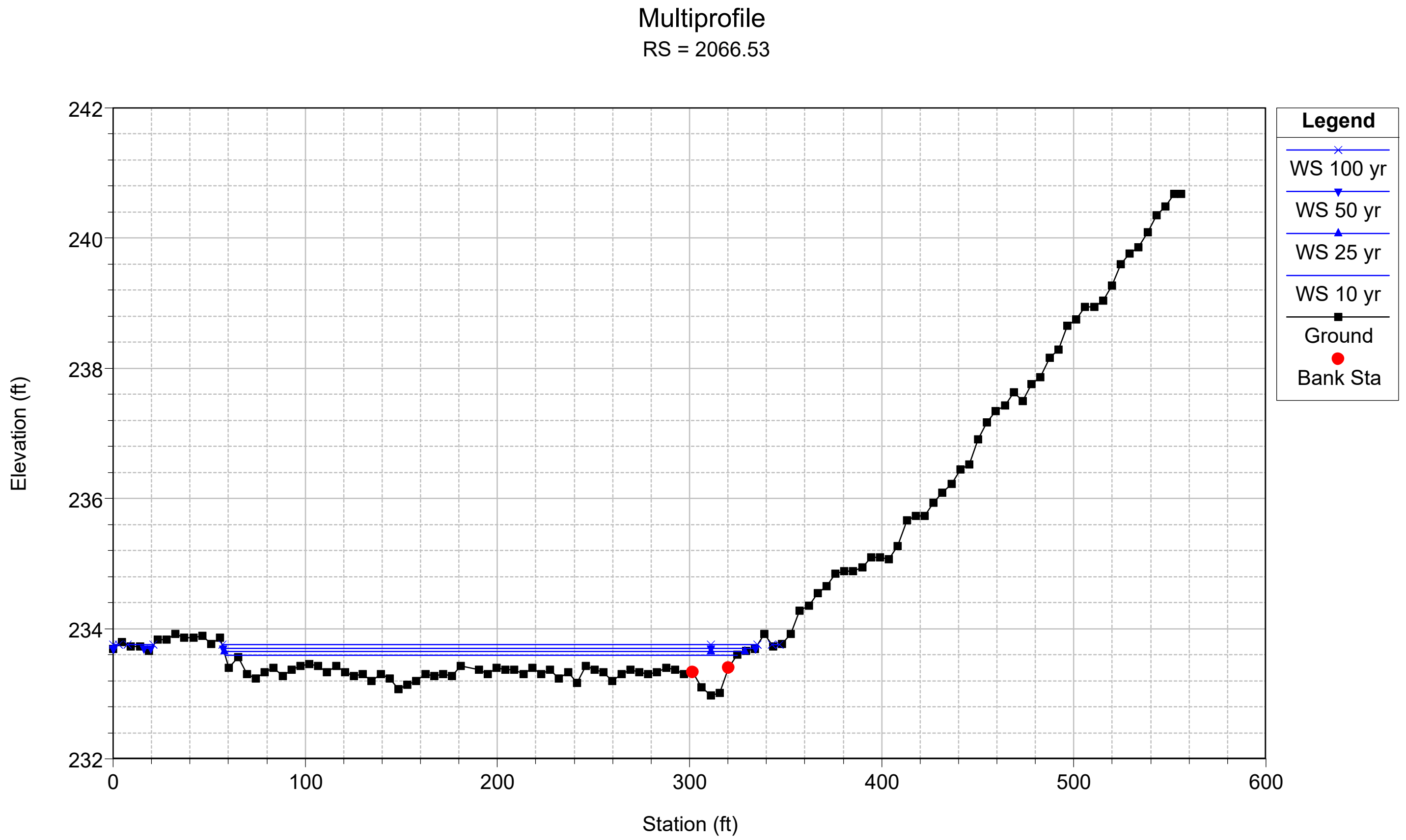


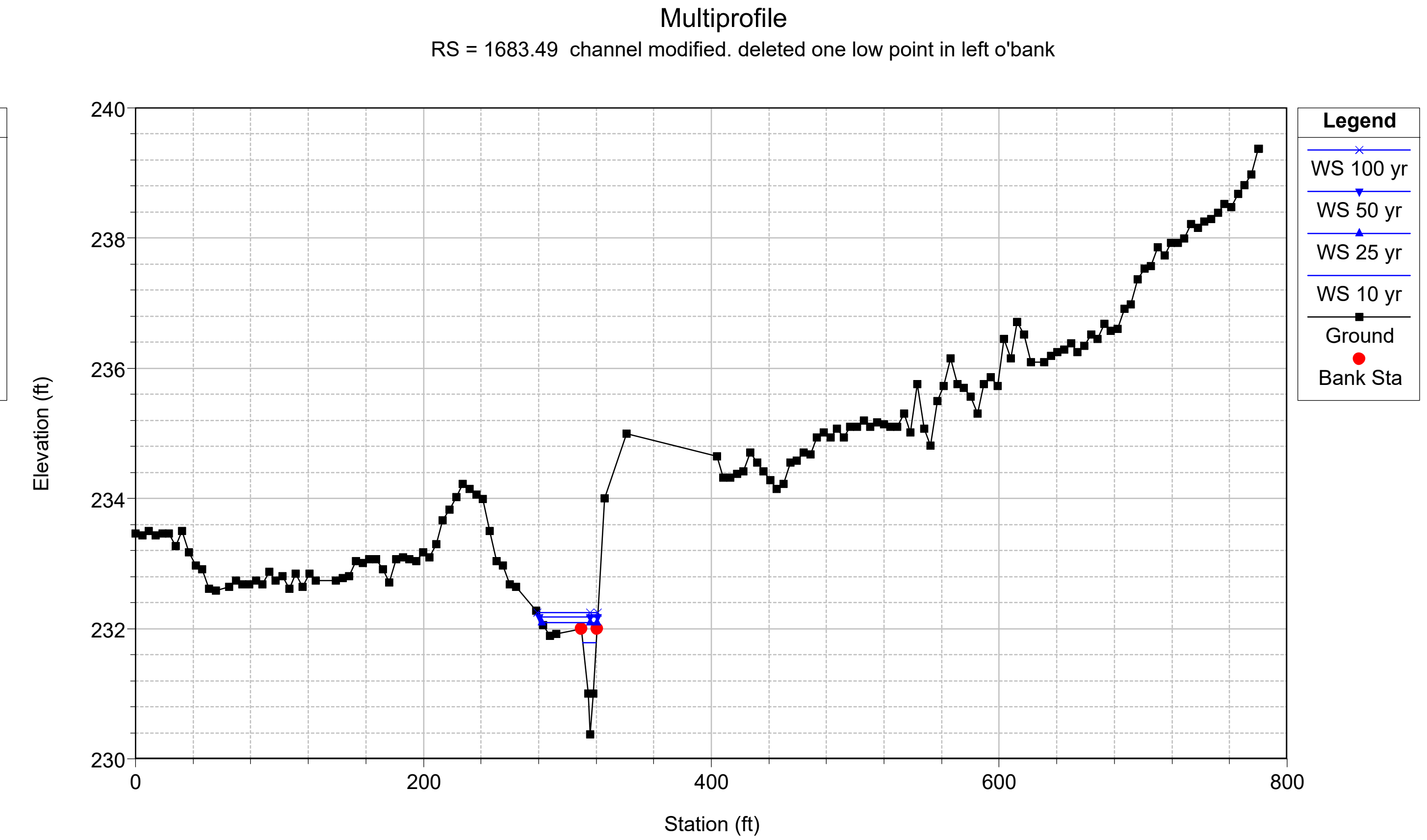
North Jackson Avenue
Channel Downstream of Culverts
Water-Surface Elevations

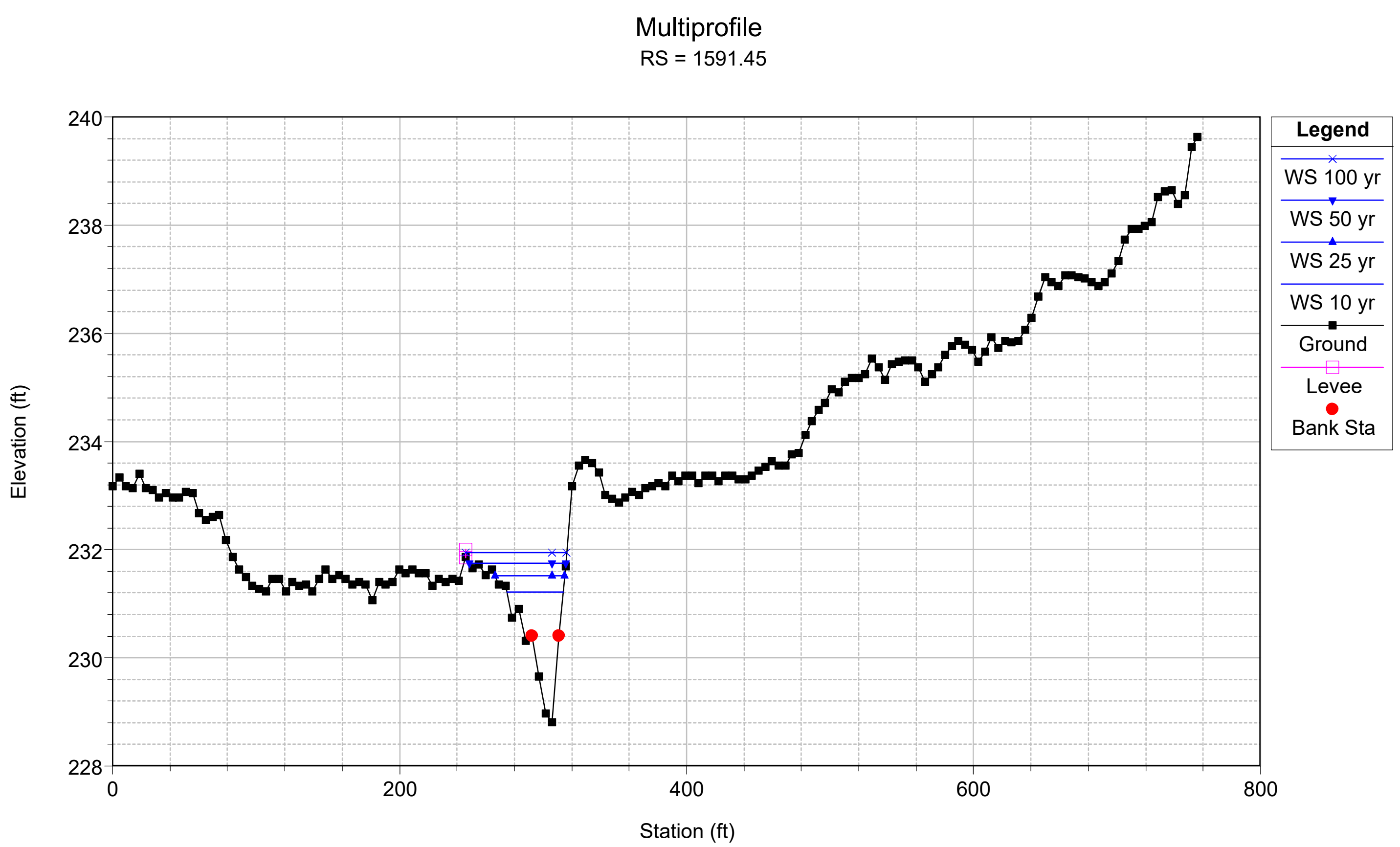
HEC-RAS Plan: Multiprofile River: JacksonAveNorthC Reach: JacksonAveNorthC

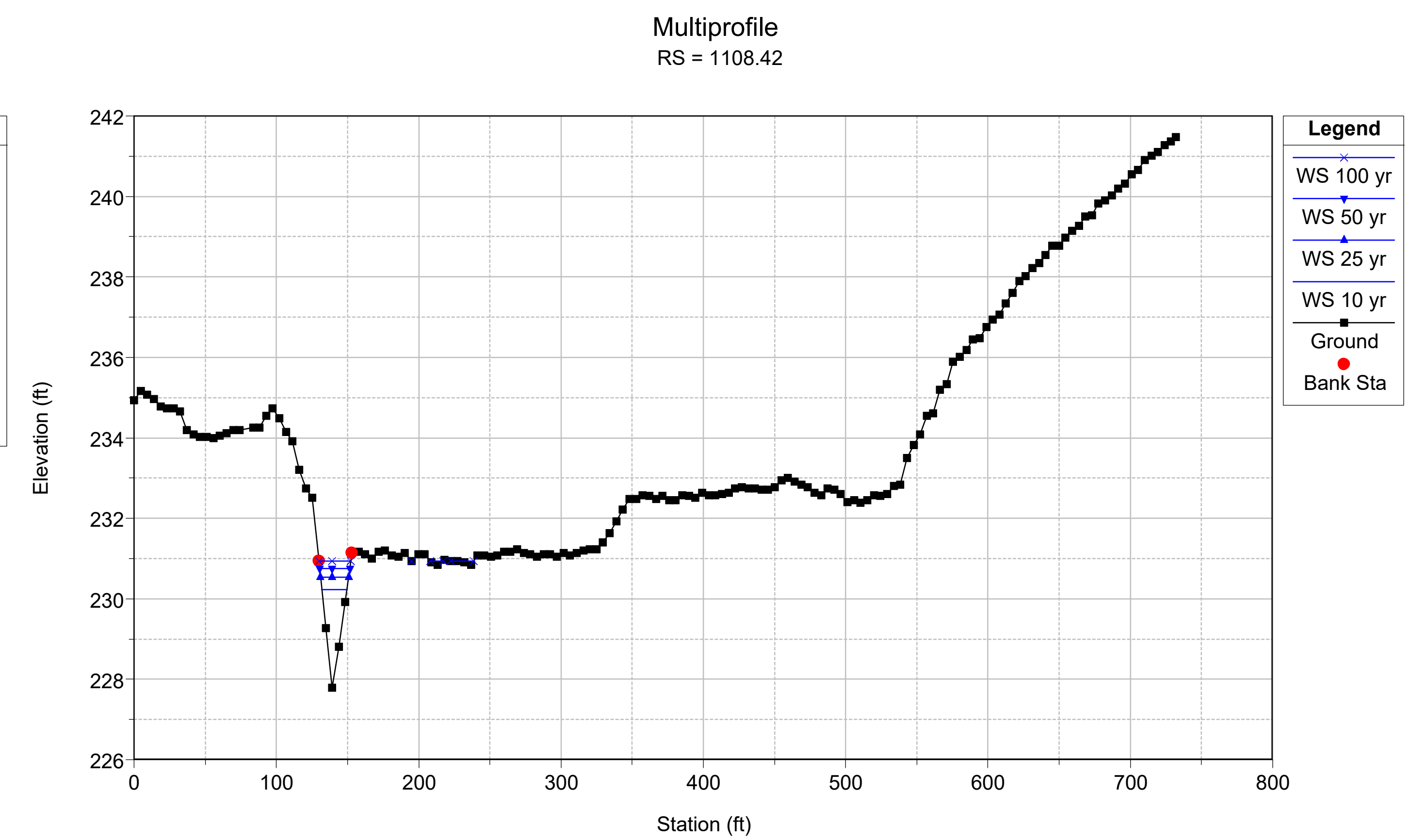
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
JacksonAveNorthC	70.93	10 yr	61.00	222.83	224.844	224.51	225.10	0.008014	4.19	17.84	20.14	0.61
JacksonAveNorthC	70.93	25 yr	82.00	222.83	225.094	224.74	225.40	0.008001	4.65	23.58	29.17	0.63
JacksonAveNorthC	70.93	50 yr	100.00	222.83	225.270	224.92	225.61	0.008015	4.97	30.32	44.73	0.64
JacksonAveNorthC	70.93	100 yr	119.00	222.83	225.411	225.11	225.76	0.008001	5.21	36.89	48.16	0.65
JacksonAveNorthC	253.30	10 yr	61.00	224.28	226.115		226.24	0.004966	2.88	21.36	19.33	0.47
JacksonAveNorthC	253.30	25 yr	82.00	224.28	226.368		226.52	0.004840	3.16	26.50	21.21	0.47
JacksonAveNorthC	253.30	50 yr	100.00	224.28	226.546		226.72	0.004787	3.41	30.44	23.09	0.48
JacksonAveNorthC	253.30	100 yr	119.00	224.28	226.695		226.90	0.004960	3.68	34.00	24.69	0.50
JacksonAveNorthC	353.89	10 yr	61.00	223.88	226.467		226.54	0.001918	2.20	27.72	16.59	0.30
JacksonAveNorthC	353.89	25 yr	82.00	223.88	226.747		226.85	0.002215	2.52	32.52	17.86	0.33
JacksonAveNorthC	353.89	50 yr	100.00	223.88	226.943		227.06	0.002415	2.78	36.19	19.57	0.35
JacksonAveNorthC	353.89	100 yr	119.00	223.88	227.122		227.26	0.002628	3.03	39.82	21.12	0.36
JacksonAveNorthC	627.47	10 yr	61.00	226.67	228.040	228.04	228.44	0.026626	5.07	12.02	15.41	1.01
JacksonAveNorthC	627.47	25 yr	82.00	226.67	228.230	228.23	228.69	0.025457	5.44	15.08	16.82	1.01
JacksonAveNorthC	627.47	50 yr	100.00	226.67	228.373	228.37	228.88	0.024712	5.69	17.57	17.88	1.01
JacksonAveNorthC	627.47	100 yr	119.00	226.67	228.511	228.51	229.06	0.024064	5.92	20.11	18.91	1.01
JacksonAveNorthC	916.89	10 yr	61.00	227.17	229.745		229.82	0.001840	2.14	28.81	20.13	0.30
JacksonAveNorthC	916.89	25 yr	82.00	227.17	230.038		230.13	0.001978	2.41	35.30	24.05	0.31
JacksonAveNorthC	916.89	50 yr	100.00	227.17	230.249		230.35	0.002054	2.61	40.67	27.14	0.32
JacksonAveNorthC	916.89	100 yr	119.00	227.17	230.426		230.54	0.002094	2.79	55.41	136.56	0.33
JacksonAveNorthC	1108.42	10 yr	61.00	227.79	230.226		230.34	0.004238	2.74	22.24	17.74	0.43
JacksonAveNorthC	1108.42	25 yr	82.00	227.79	230.535		230.67	0.004090	2.92	28.05	19.78	0.43
JacksonAveNorthC	1108.42	50 yr	100.00	227.79	230.757		230.90	0.004057	3.07	32.60	21.24	0.44
JacksonAveNorthC	1108.42	100 yr	119.00	227.79	230.943		231.11	0.004174	3.24	37.68	48.06	0.45
JacksonAveNorthC	1591.45	10 yr	61.00	228.81	231.215	230.10	231.26	0.001057	1.73	43.11	39.14	0.23
JacksonAveNorthC	1591.45	25 yr	82.00	228.81	231.517	230.29	231.57	0.001047	1.92	56.34	48.48	0.24
JacksonAveNorthC	1591.45	50 yr	100.00	228.81	231.746	230.44	231.80	0.001052	2.06	69.52	67.15	0.24
JacksonAveNorthC	1591.45	100 yr	119.00	228.81	231.941	230.58	232.00	0.001027	2.15	83.06	70.39	0.24
JacksonAveNorthC	1683.49	10 yr	29.00	230.38	231.783	231.78	232.13	0.029709	4.72	6.14	9.24	1.02
JacksonAveNorthC	1683.49	25 yr	40.00	230.38	232.094	232.09	232.33	0.015058	4.01	13.11	38.42	0.76
JacksonAveNorthC	1683.49	50 yr	48.00	230.38	232.177	232.18	232.42	0.014295	4.15	16.40	40.33	0.75
JacksonAveNorthC	1683.49	100 yr	58.00	230.38	232.242	232.24	232.51	0.015381	4.50	19.06	41.81	0.79

North Jackson Avenue
Channel Downstream of Culverts
Cross-section Plots

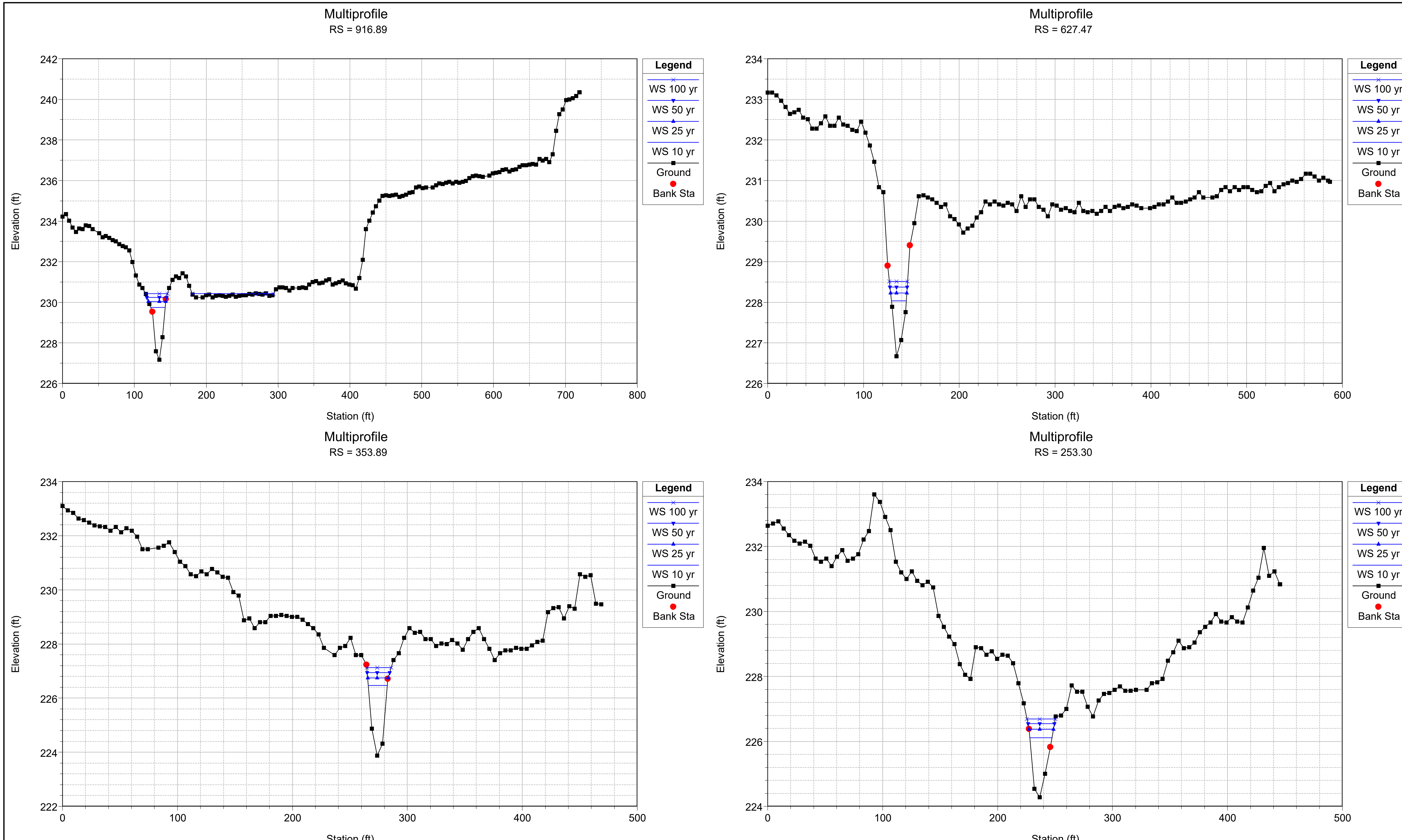


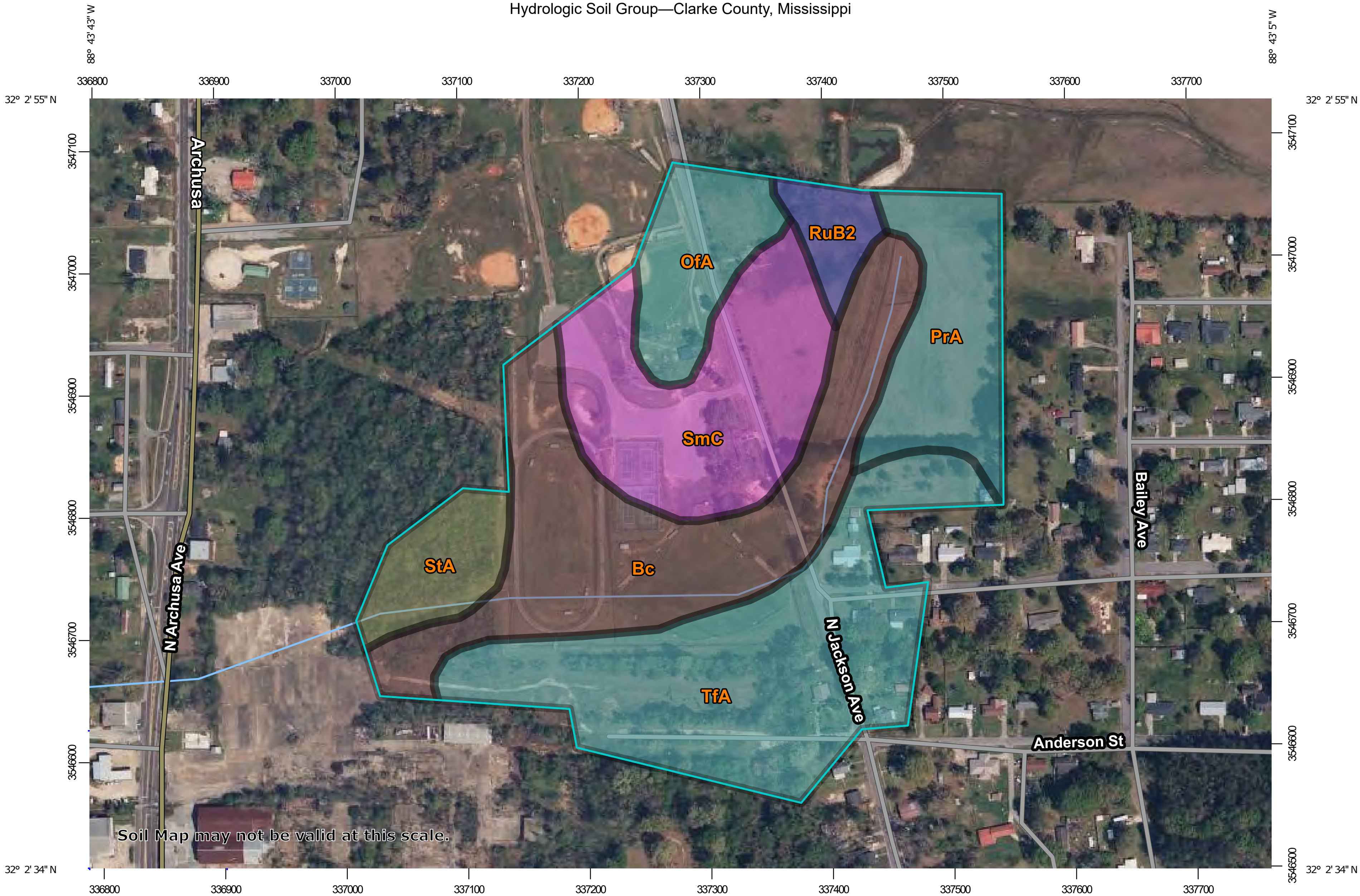






North Jackson Avenue
Channel Downstream of Culverts
Cross-section Plots





Map Scale: 1:4,450 if printed on A landscape (11" x 8.5") sheet.

N

0 50 100 200 300 Meters

0 200 400 800 1200 Feet

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 Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 21, Sep 6, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 3, 2021—May 8, 2021

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	11.6	25.9%
OfA	Ora fine sandy loam, 0 to 2 percent slopes	C	3.4	7.7%
PrA	Prentiss fine sandy loam, 0 to 2 percent slopes	C	5.0	11.1%
RuB2	Ruston fine sandy loam, 2 to 5 percent slopes, moderately eroded	B	1.4	3.1%
SmC	Smithdale fine sandy loam, 5 to 8 percent slopes	A	8.2	18.4%
StA	Stough fine sandy loam, 0 to 2 percent slopes	C/D	2.5	5.6%
TfA	Tilden fine sandy loam, 0 to 2 percent slopes (savannah)	C	12.6	28.2%
Totals for Area of Interest			**44.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

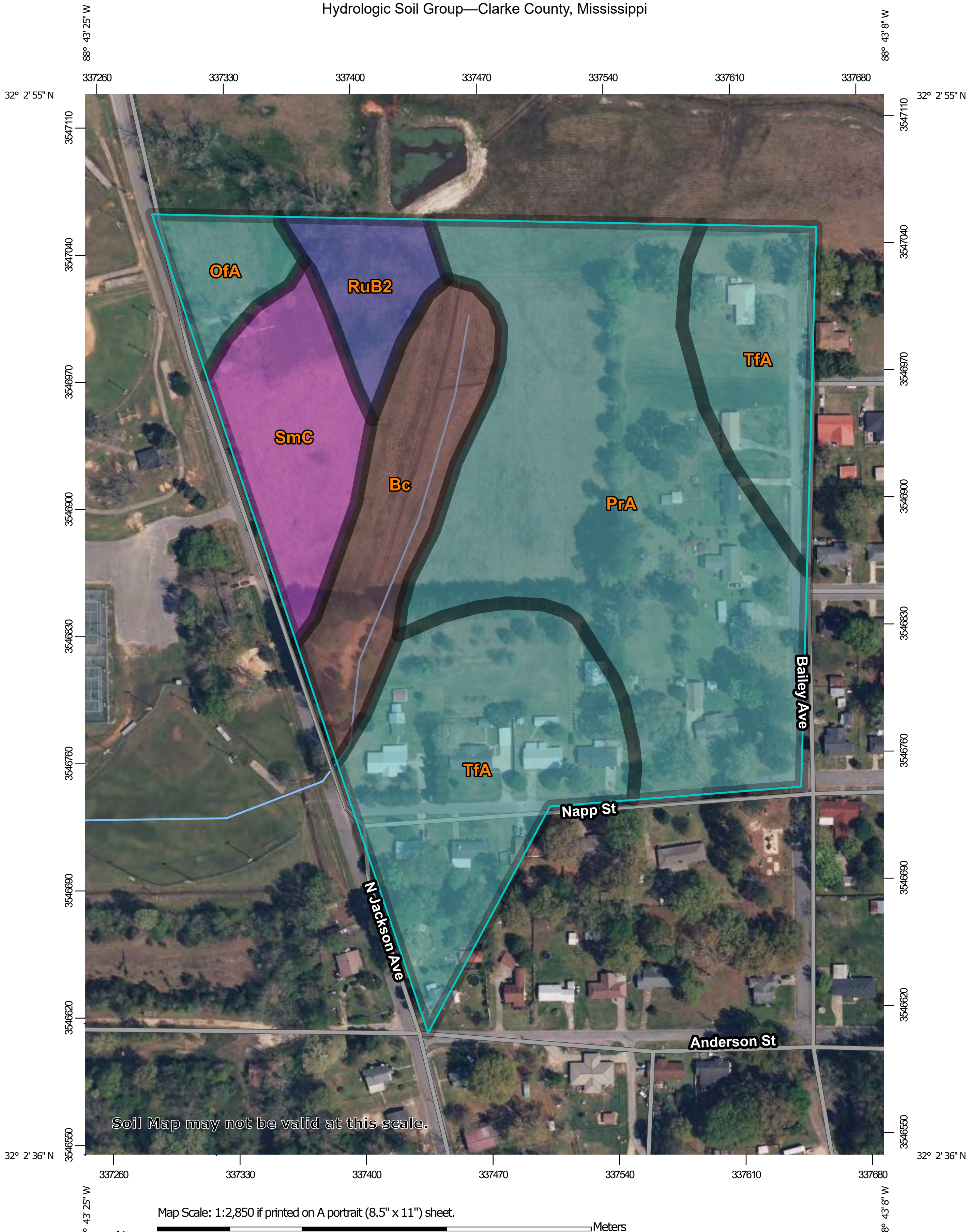
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Map Scale: 1:2,850 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 40, 80, 160, 240

Feet: 0, 100, 200, 400, 600

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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 21, Sep 6, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 3, 2021—May 8, 2021

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	2.9	11.2%
OfA	Ora fine sandy loam, 0 to 2 percent slopes	C	1.0	3.8%
PrA	Prentiss fine sandy loam, 0 to 2 percent slopes	C	10.6	40.4%
RuB2	Ruston fine sandy loam, 2 to 5 percent slopes, moderately eroded	B	1.3	4.9%
SmC	Smithdale fine sandy loam, 5 to 8 percent slopes	A	2.6	10.0%
TfA	Tilden fine sandy loam, 0 to 2 percent slopes (savannah)	C	7.7	29.7%
Totals for Area of Interest			**26.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX M

SHIRLEY DRIVE AND STOKES CIRCLE CULVERTS

- Hydrology Summary
- Watershed Boundaries
- Inundation Boundary for 25-yr
- Culvert Inspection Report
- Hydrographs
- HECRAS Output
- Soil Data Report

Proposed Shirley Drive and Stokes Circle Culverts

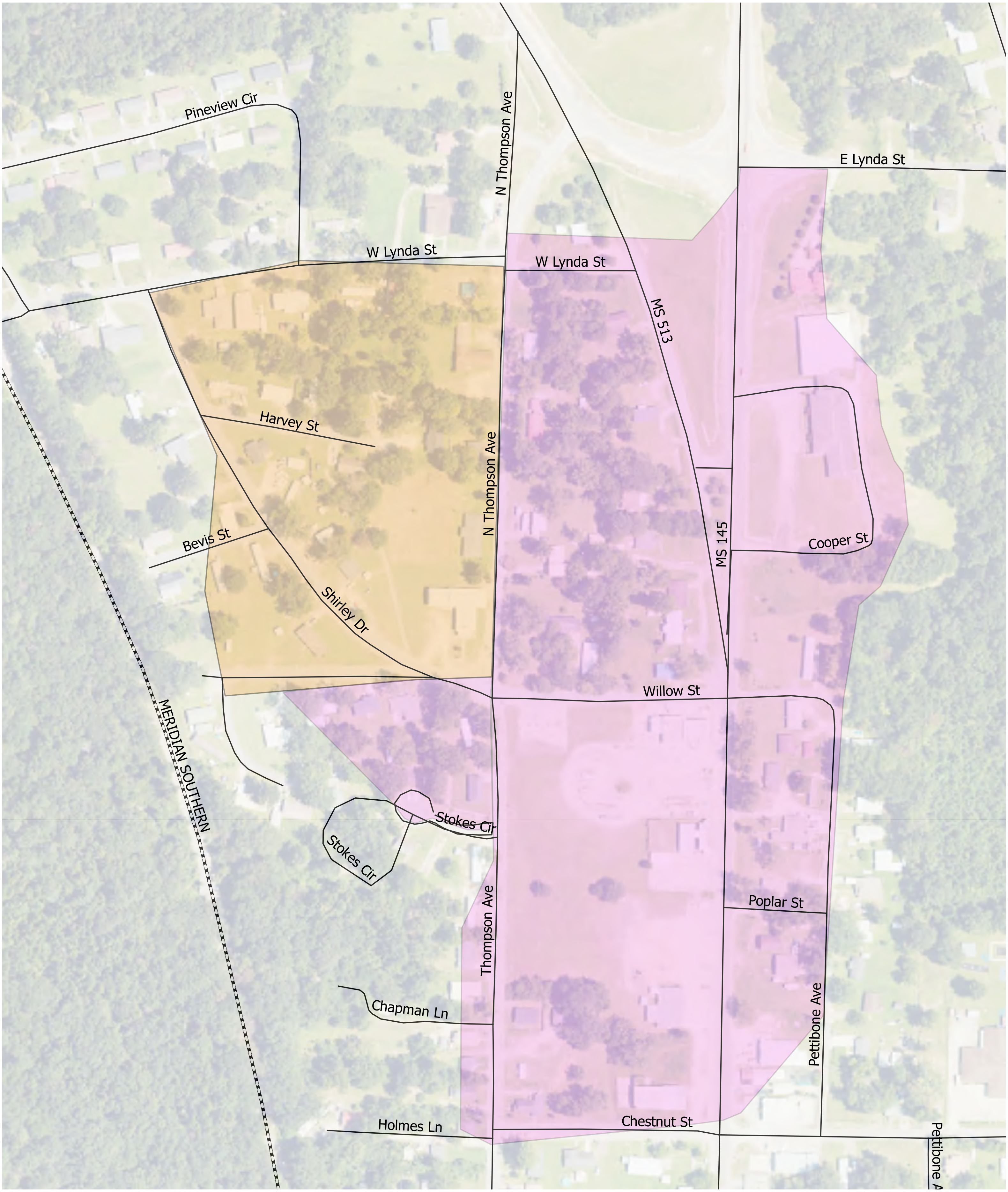
Hydrology Summary

Basin Parameters

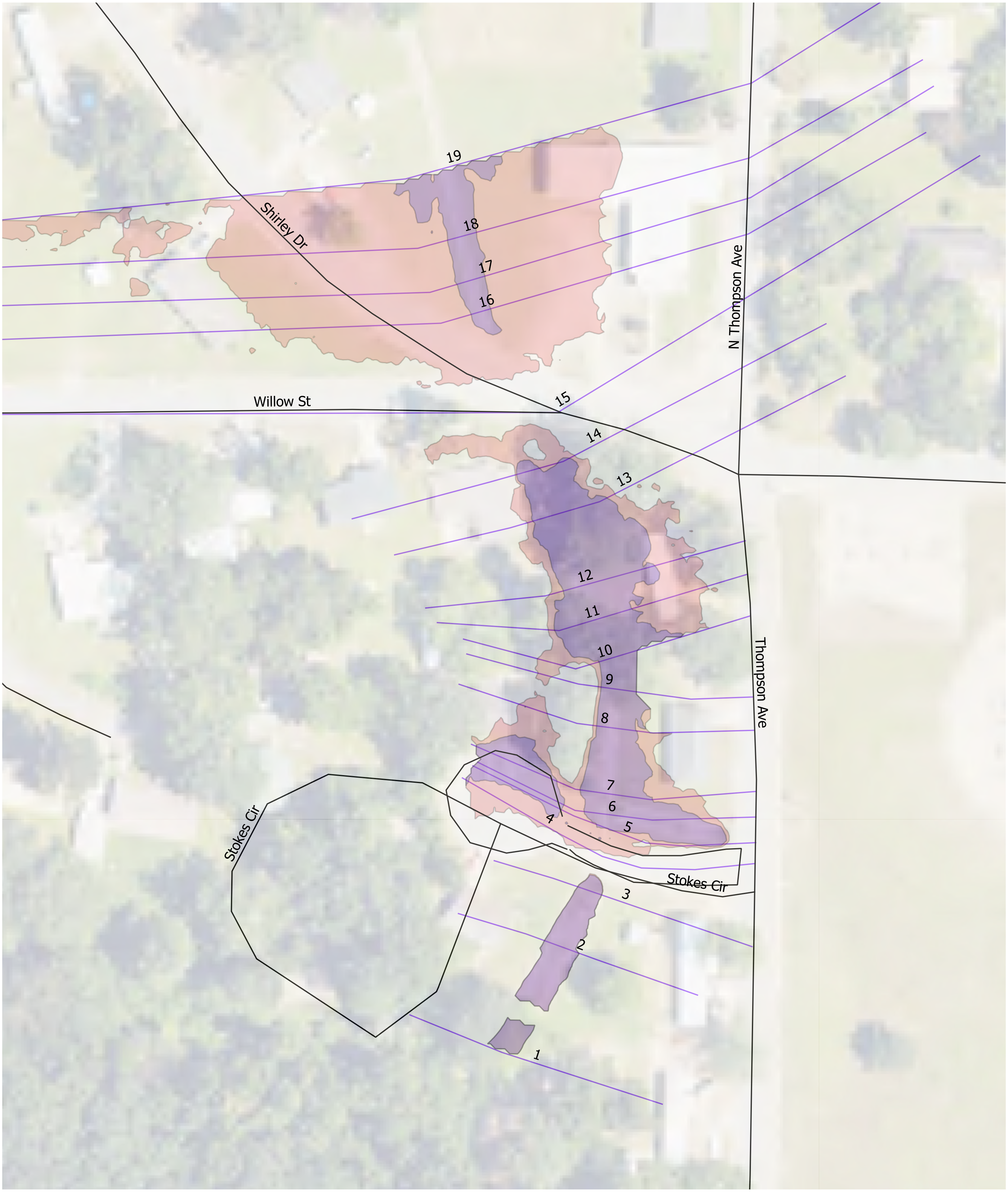
Location	Drainage Area (acres)	Runoff Curve Number	Basin Slope (percent)	Hydraulic Length (feet)	Storm Distribution	Time Interval (min)
Stokes Circle	45	81	4.8	8450	Type III	2
Shirley Drive	12	81	4.8	7192	Type III	2

Peak Discharges

Location	2-yr Recurrence Peak Discharge (cfs)	5-yr Recurrence Peak Discharge (cfs)	10-yr Recurrence Peak Discharge (cfs)	25-yr Recurrence Peak Discharge (cfs)	50-yr Recurrence Peak Discharge (cfs)	100-yr Recurrence Peak Discharge (cfs)
Stokes Circle	87	117	144	184	217	251
Shirley Drive	26	35	53	55	65	75



Watershed Boundaries
Orange = Shirley Drive
Magenta = Stokes Circle



Existing vs Proposed, 25-yr Inundation Area
Culverts at Shirley Drive and Stokes Circle
Red = Existing, Blue = Proposed

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: Willow St / Shirley DR.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #541 CVI14	Size: 28"	Type: CONC.
Condition: ❑ Poor ❑ Fair ☒ Good	High water elevation or height above inlet	
OUTLET - Depth of silt ☒ < 0.5' ❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Major ❑ Minor ❑ Severe w/undermining	

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs
☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

℄

ENGINEERING-SURVEYING, INC.

CULVERT FIELD INSPECTION REPORT

For culverts 50 sq. ft. or smaller

Project no.: 23117	Subaccount:	
Location: Stokes Cir.		Date:
Inspector:		

EXISTING STRUCTURE:

Reference no.: #798-799 CVI24	Size: 32" / Type: CONC.
Condition: ❑ Poor ❑ Fair ☒ Good	High water elevation or height above inlet
OUTLET - Depth of silt ☒ < 0.5' ❑ 0.5' - 1' ❑ 1' - 2' ❑ > 2'	OUTLET - Erosion ❑ None ❑ Minor ❑ Major ❑ Severe w/undermining

FLOW:

❑ Continous ❑ Irrigation Water right Q __________ cfs W.S. profile Q __________ cfs
☒ Intermittent ❑ Stock pass Does irrigation ditch carry runoff: ❑ yes ❑ no

Irrigation company	Ditch rider
Phone no.	Phone no.

SKETCH

℄

Hydrograph Report

Hyd. No. 1

Stokes Circle

Hydrograph type	= SCS Runoff	Peak discharge	= 86.85 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 45.00 ac	Curve number	= 81
Basin Slope	= 4.8 %	Hydraulic length	= 1800 ft
Tc method	= LAG	Time of conc. (Tc)	= 22.5 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 410,749 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.27	86.85 <<

...End

Hydrograph Report

Hyd. No. 1

Stokes Circle

Hydrograph type	= SCS Runoff	Peak discharge	= 117.19 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Drainage area	= 45.00 ac	Curve number	= 81
Basin Slope	= 4.8 %	Hydraulic length	= 1800 ft
Tc method	= LAG	Time of conc. (Tc)	= 22.5 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 555,555 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.27	117.19 <<

...End

Hydrograph Report

Hyd. No. 1

Stokes Circle

Hydrograph type	= SCS Runoff	Peak discharge	= 144.23 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 45.00 ac	Curve number	= 81
Basin Slope	= 4.8 %	Hydraulic length	= 1800 ft
Tc method	= LAG	Time of conc. (Tc)	= 22.5 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 686,780 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.27	144.23 <<

...End

Hyd. No. 1

Stokes Circle

Hydrograph type	= SCS Runoff	Peak discharge	= 184.24 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 45.00 ac	Curve number	= 81
Basin Slope	= 4.8 %	Hydraulic length	= 1800 ft
Tc method	= LAG	Time of conc. (Tc)	= 22.5 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 884,354 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.27	184.24 <<

...End

Hydrograph Report

Hyd. No. 1

Stokes Circle

Hydrograph type	= SCS Runoff	Peak discharge	= 217.01 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 45.00 ac	Curve number	= 81
Basin Slope	= 4.8 %	Hydraulic length	= 1800 ft
Tc method	= LAG	Time of conc. (Tc)	= 22.5 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,047,628 cuft

Hydrograph Discharge Table

Time -- Outflow (hrs	cfs)
12.23	217.01 <<

...End

Hydrograph Report

Hyd. No. 1

Stokes Circle

Hydrograph type	= SCS Runoff	Peak discharge	= 251.36 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 45.00 ac	Curve number	= 81
Basin Slope	= 4.8 %	Hydraulic length	= 1800 ft
Tc method	= LAG	Time of conc. (Tc)	= 22.5 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,220,614 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.23	251.36 <<

...End

Hydrograph Report

Hyd. No. 2

Shirley Dr

Hydrograph type	= SCS Runoff	Peak discharge	= 25.78 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 12.00 ac	Curve number	= 81
Basin Slope	= 4.8 %	Hydraulic length	= 1050 ft
Tc method	= LAG	Time of conc. (Tc)	= 14.6 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 104,921 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.17	25.78 <<

...End

Hydrograph Report

Hyd. No. 2

Shirley Dr

Hydrograph type	= SCS Runoff	Peak discharge	= 34.82 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Drainage area	= 12.00 ac	Curve number	= 81
Basin Slope	= 4.8 %	Hydraulic length	= 1050 ft
Tc method	= LAG	Time of conc. (Tc)	= 14.6 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 141,910 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.17	34.82 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Shirley Dr

Hydrograph type	= SCS Runoff	Peak discharge	= 42.89 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 12.00 ac	Curve number	= 81
Basin Slope	= 4.8 %	Hydraulic length	= 1050 ft
Tc method	= LAG	Time of conc. (Tc)	= 14.6 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 175,430 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.17	42.89 <<

...End

Hydrograph Report

Hyd. No. 2

Shirley Dr

Hydrograph type	= SCS Runoff	Peak discharge	= 54.82 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 12.00 ac	Curve number	= 81
Basin Slope	= 4.8 %	Hydraulic length	= 1050 ft
Tc method	= LAG	Time of conc. (Tc)	= 14.6 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 225,898 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.17	54.82 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Shirley Dr

Hydrograph type	= SCS Runoff	Peak discharge	= 64.53 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 12.00 ac	Curve number	= 81
Basin Slope	= 4.8 %	Hydraulic length	= 1050 ft
Tc method	= LAG	Time of conc. (Tc)	= 14.6 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 267,605 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.17	64.53 <<

...End

Hydrograph Report

Hyd. No. 2

Shirley Dr

Hydrograph type	= SCS Runoff	Peak discharge	= 74.69 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 12.00 ac	Curve number	= 81
Basin Slope	= 4.8 %	Hydraulic length	= 1050 ft
Tc method	= LAG	Time of conc. (Tc)	= 14.6 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

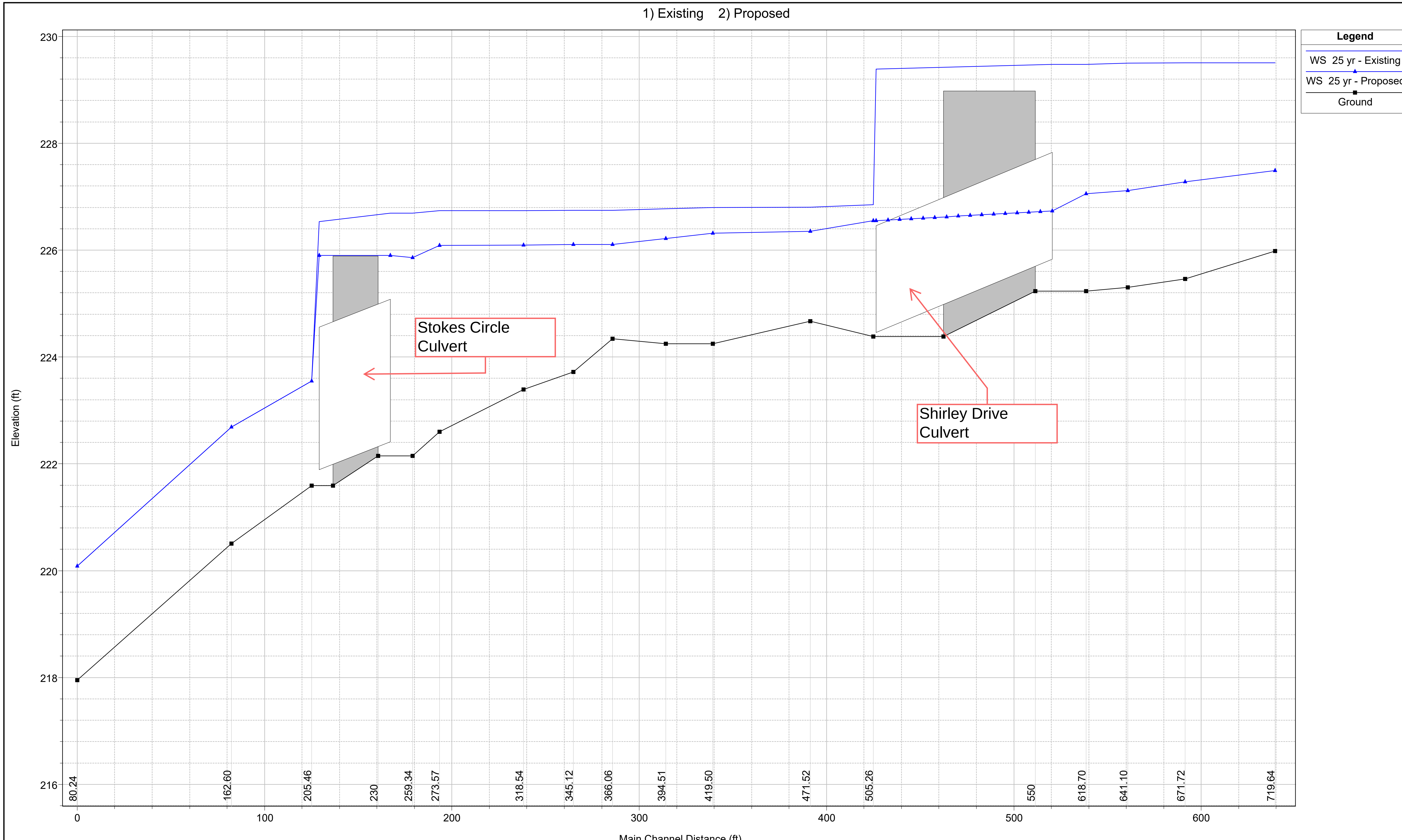
Hydrograph Volume = 311,792 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.17	74.69 <<

...End

Shirley Drive and Stokes Circle
Water-surface Profiles
Proposed vs Existing, 25-yr Flow



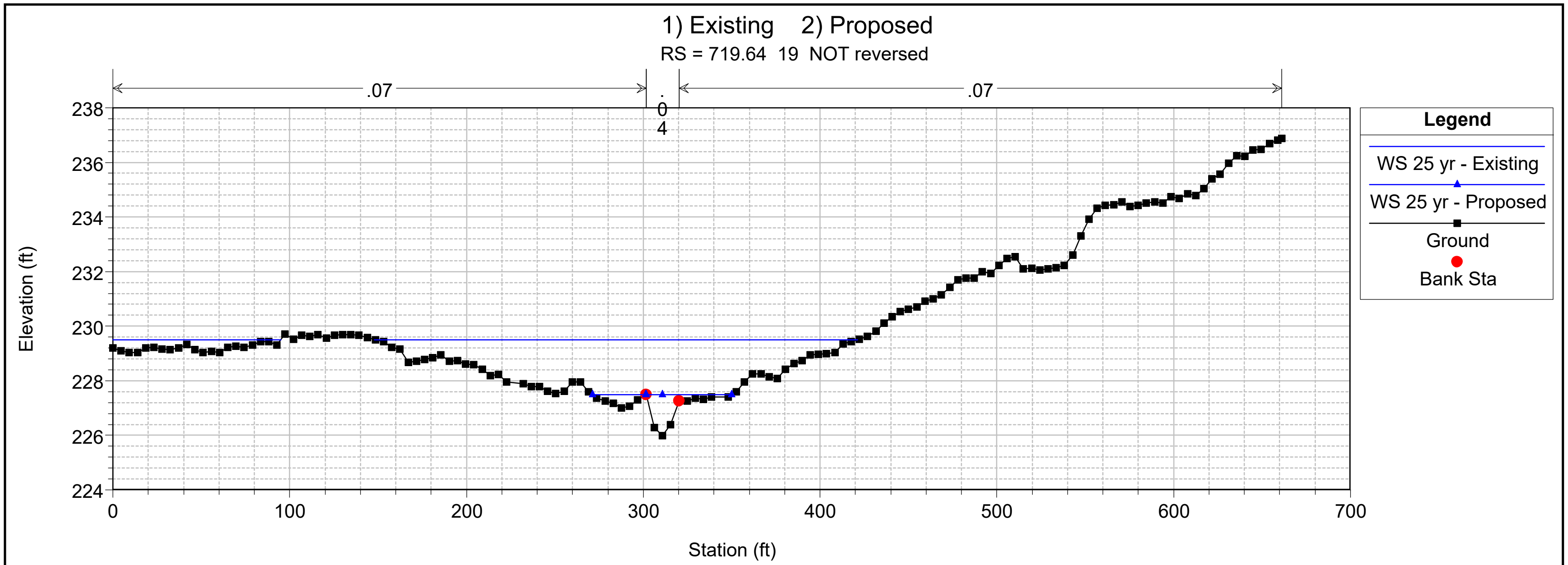
HEC-RAS River: ShirleyStokesCen Reach: ShirleyStokesCen Profile: 25 yr

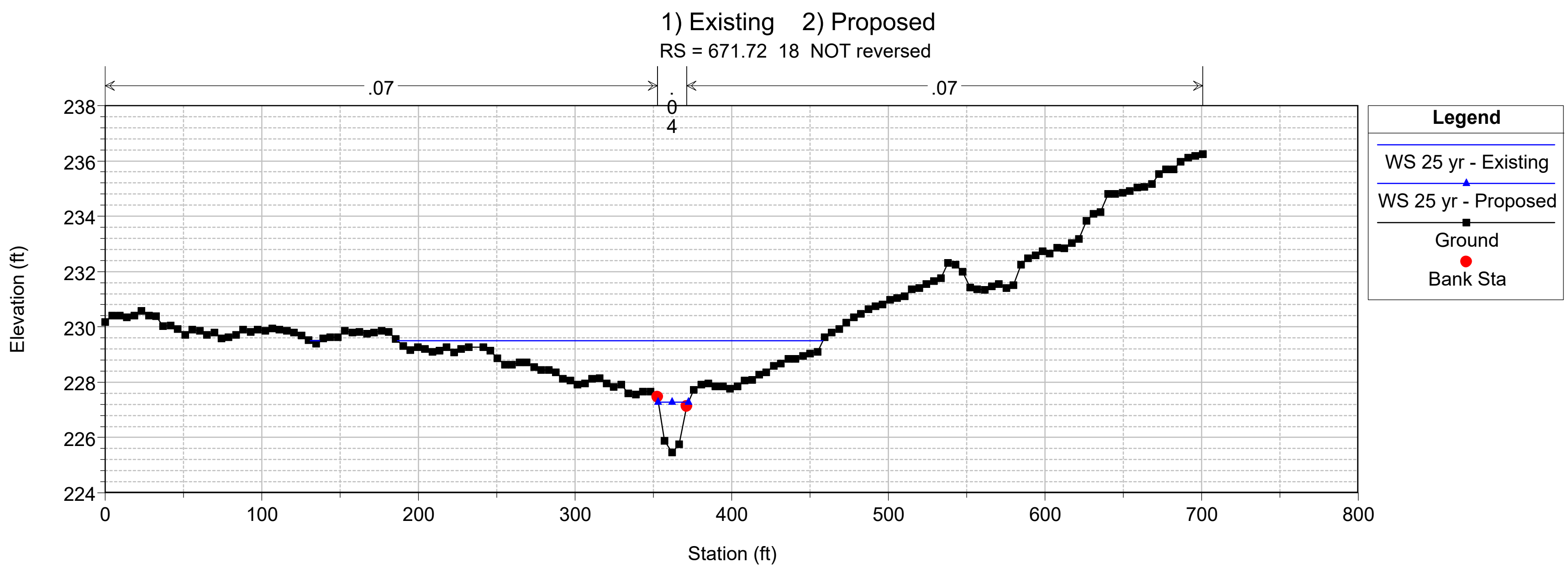
Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
ShirleyStokesCen	719.64	25 yr	Existing	55.00	225.98	229.506		229.51	0.000017	0.32	423.63	368.39	0.03
ShirleyStokesCen	719.64	25 yr	Proposed	55.00	225.98	227.487		227.58	0.005276	2.64	30.30	78.85	0.47
ShirleyStokesCen	671.72	25 yr	Existing	55.00	225.46	229.504		229.51	0.000025	0.41	326.57	277.84	0.04
ShirleyStokesCen	671.72	25 yr	Proposed	55.00	225.46	227.278		227.38	0.003624	2.51	22.02	19.18	0.40
ShirleyStokesCen	641.10	25 yr	Existing	55.00	225.30	229.502		229.50	0.000032	0.50	292.87	253.03	0.05
ShirleyStokesCen	641.10	25 yr	Proposed	55.00	225.30	227.116		227.25	0.004504	2.95	19.91	19.24	0.45
ShirleyStokesCen	618.70	25 yr	Existing	55.00	225.23	229.475	226.81	229.50	0.000224	1.19	46.52	235.61	0.12
ShirleyStokesCen	618.70	25 yr	Proposed	55.00	224.56	227.055	225.94	227.16	0.002672	2.55	21.55	12.63	0.34
ShirleyStokesCen	550			Culvert									
ShirleyStokesCen	505.26	25 yr	Existing	55.00	224.38	226.852	225.77	226.96	0.002922	2.65	20.73	12.13	0.36
ShirleyStokesCen	505.26	25 yr	Proposed	55.00	224.38	226.549	225.77	226.71	0.004864	3.20	17.20	11.22	0.46
ShirleyStokesCen	471.52	25 yr	Existing	55.00	224.67	226.803		226.86	0.001752	2.03	40.02	64.59	0.29
ShirleyStokesCen	471.52	25 yr	Proposed	55.00	224.67	226.353		226.51	0.007016	3.24	18.72	26.28	0.54
ShirleyStokesCen	419.50	25 yr	Existing	55.00	224.25	226.798		226.81	0.000352	1.06	88.16	94.35	0.13
ShirleyStokesCen	419.50	25 yr	Proposed	55.00	224.25	226.316		226.35	0.001193	1.61	50.39	62.69	0.24
ShirleyStokesCen	394.51	25 yr	Existing	55.00	224.25	226.772		226.80	0.000653	1.48	66.25	111.27	0.19
ShirleyStokesCen	394.51	25 yr	Proposed	55.00	224.25	226.218		226.30	0.002768	2.45	30.98	43.58	0.36
ShirleyStokesCen	366.06	25 yr	Existing	55.00	224.34	226.745	225.49	226.78	0.000754	1.71	63.42	85.32	0.20
ShirleyStokesCen	366.06	25 yr	Proposed	55.00	224.34	226.107	225.49	226.21	0.003267	2.83	25.14	21.45	0.40
ShirleyStokesCen	345.12	25 yr	Existing	55.00	223.72	226.743	224.98	226.76	0.000349	1.27	64.45	49.56	0.14
ShirleyStokesCen	345.12	25 yr	Proposed	55.00	223.72	226.105	224.98	226.16	0.001172	1.92	36.66	38.86	0.25
ShirleyStokesCen	318.54	25 yr	Existing	55.00	223.39	226.736	224.57	226.76	0.000256	1.19	67.47	55.15	0.12
ShirleyStokesCen	318.54	25 yr	Proposed	55.00	223.39	226.092	224.57	226.13	0.000683	1.64	40.34	29.19	0.19
ShirleyStokesCen	273.57	25 yr	Existing	55.00	222.60	226.740		226.74	0.000083	0.80	185.08	176.23	0.07
ShirleyStokesCen	273.57	25 yr	Proposed	55.00	222.60	226.090		226.11	0.000259	1.25	91.85	97.07	0.13
ShirleyStokesCen	259.34	25 yr	Existing	184.00	222.15	226.692	224.03	226.73	0.000398	1.94	218.55	178.76	0.16
ShirleyStokesCen	259.34	25 yr	Proposed	184.00	222.15	225.858	224.03	226.04	0.001715	3.51	55.38	108.60	0.33
ShirleyStokesCen	230			Culvert									

HEC-RAS River: ShirleyStokesCen Reach: ShirleyStokesCen Profile: 25 yr (Continued)

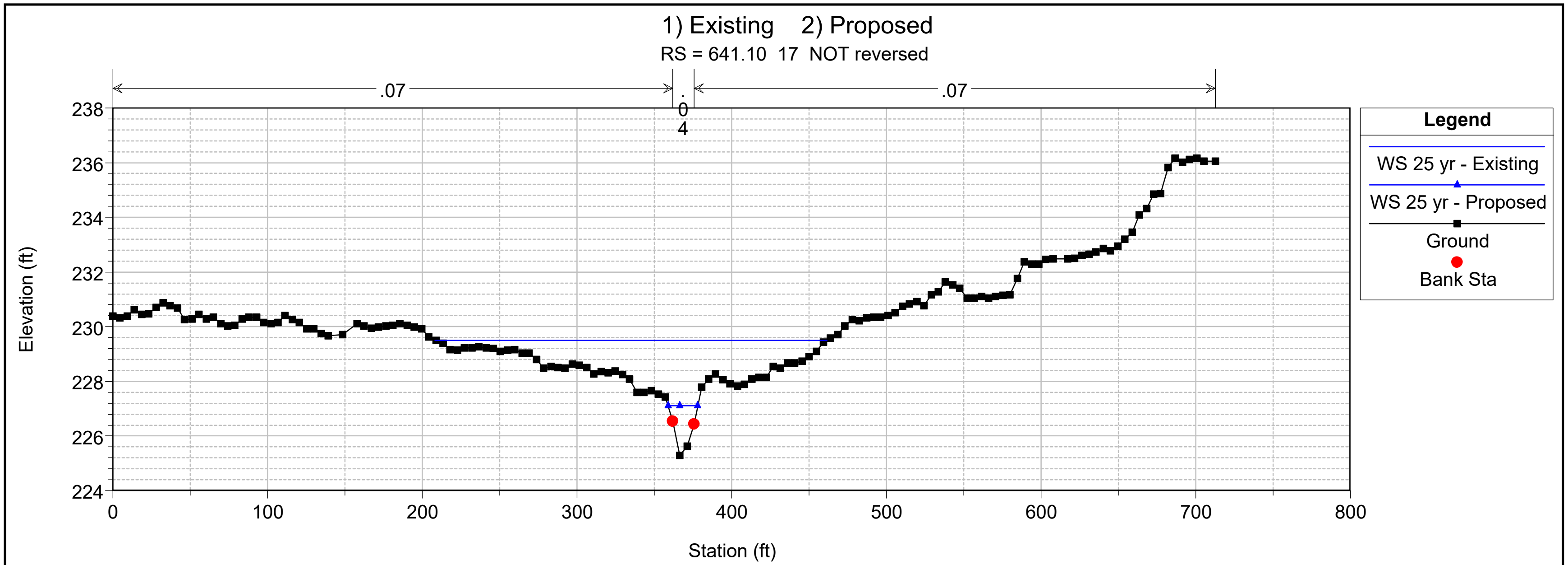
Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
ShirleyStokesCen	205.46	25 yr	Existing	184.00	221.59	223.552	223.55	224.43	0.023260	7.51	24.51	16.87	1.00
ShirleyStokesCen	205.46	25 yr	Proposed	184.00	221.59	223.552	223.55	224.43	0.023260	7.51	24.51	16.87	1.00
ShirleyStokesCen	162.60	25 yr	Existing	184.00	220.51	222.690	222.69	223.39	0.017616	7.02	31.66	25.65	0.94
ShirleyStokesCen	162.60	25 yr	Proposed	184.00	220.51	222.690	222.69	223.39	0.017616	7.02	31.66	25.65	0.94
ShirleyStokesCen	80.24	25 yr	Existing	184.00	217.95	220.083	220.08	220.78	0.022250	6.70	27.48	20.10	1.01
ShirleyStokesCen	80.24	25 yr	Proposed	184.00	217.95	220.083	220.08	220.78	0.022250	6.70	27.48	20.10	1.01

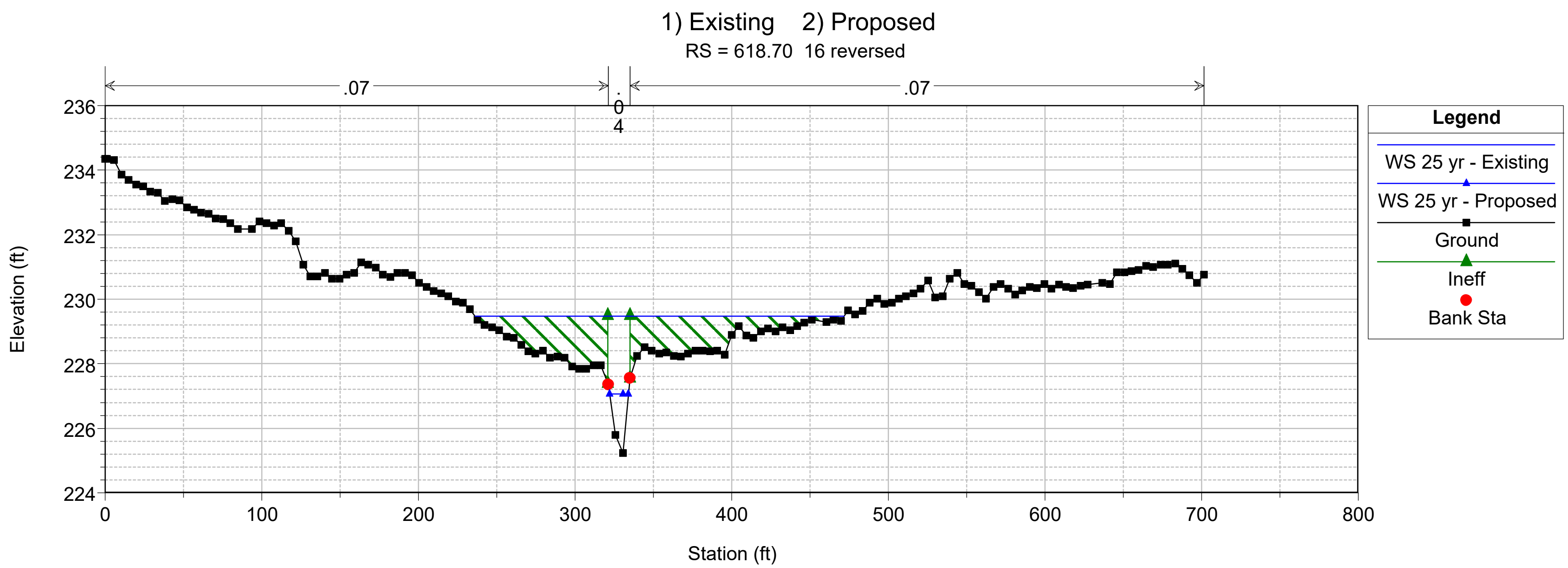
Shirley Drive and Stokes Circle
Cross-section Plots
Proposed vs Existing



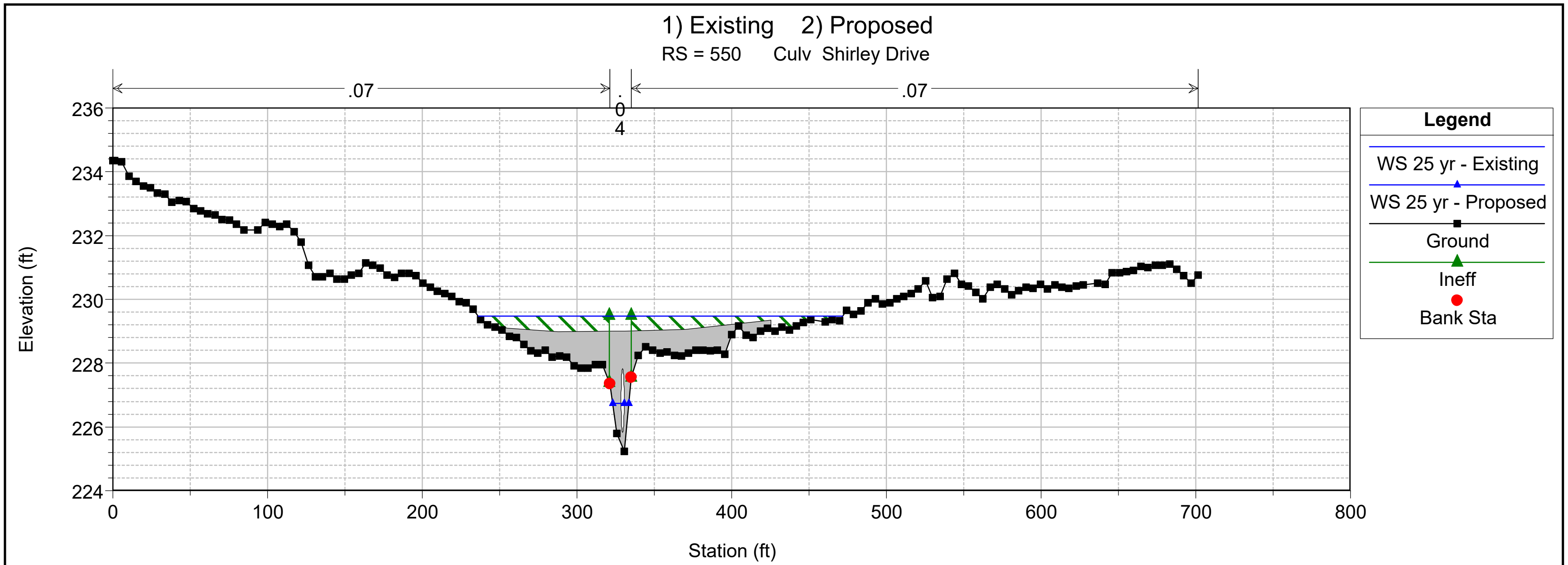


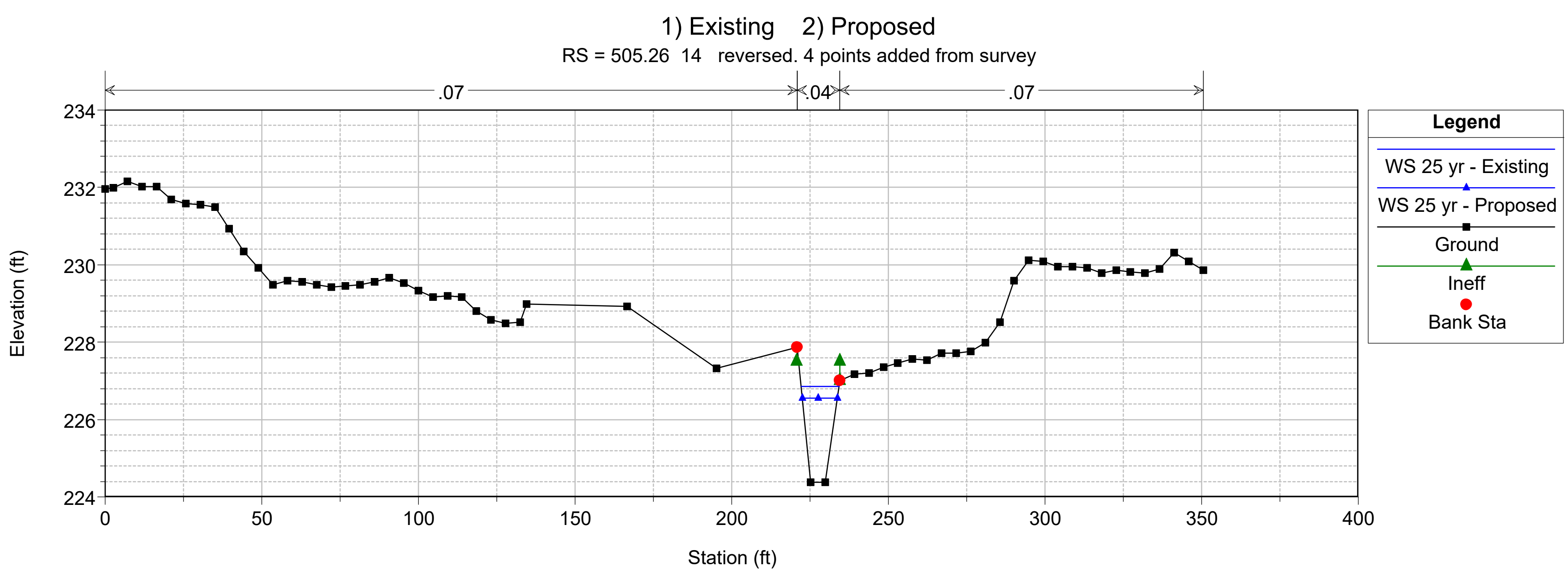
Shirley Drive and Stokes Circle
Cross-section Plots
Proposed vs Existing



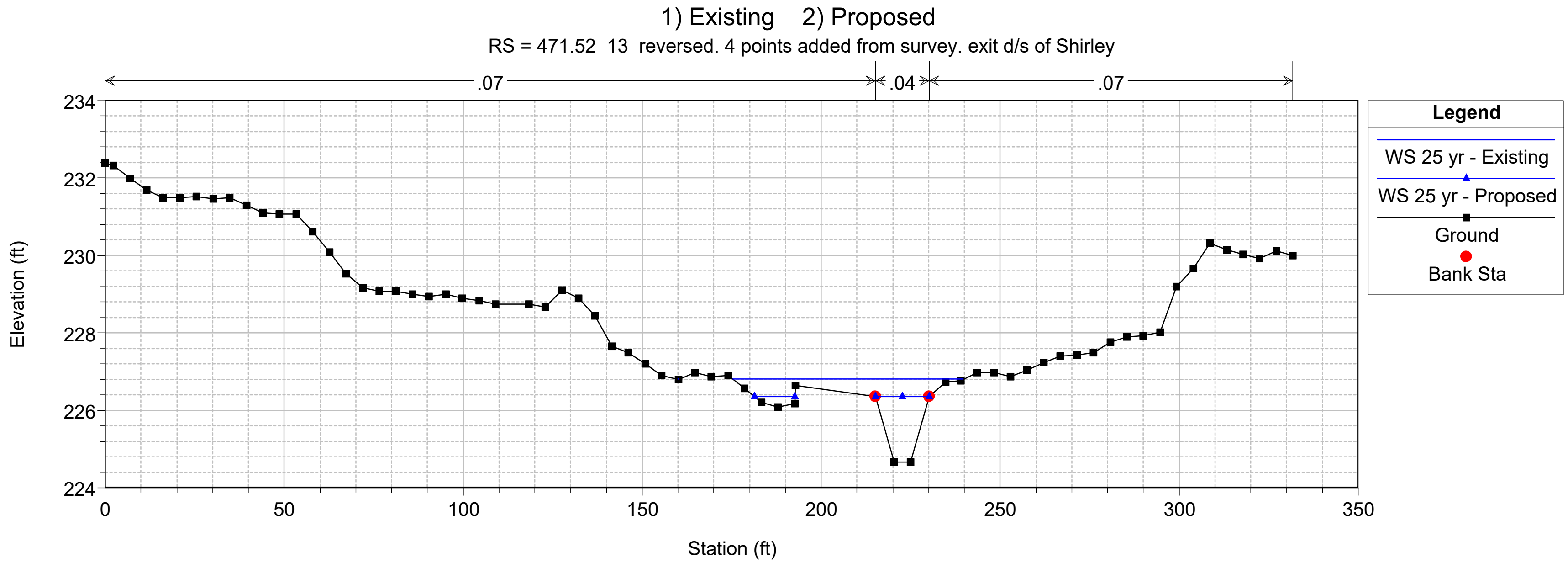


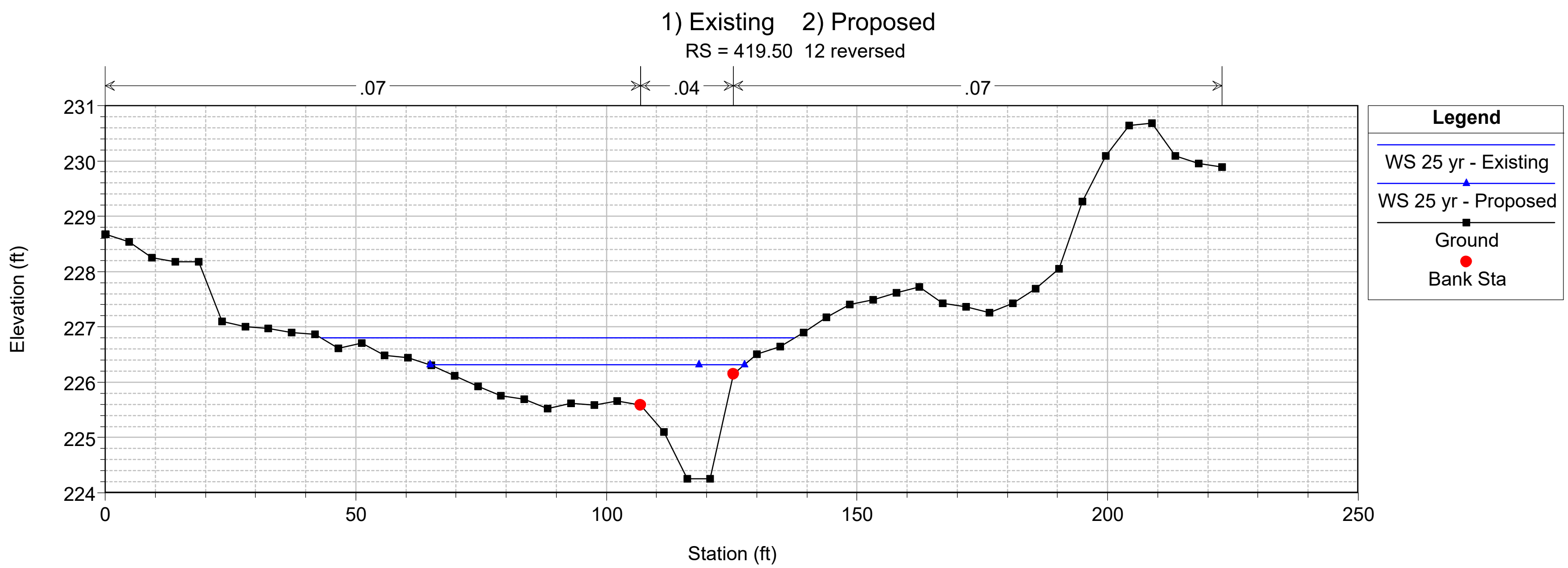
Shirley Drive and Stokes Circle
Cross-section Plots
Proposed vs Existing



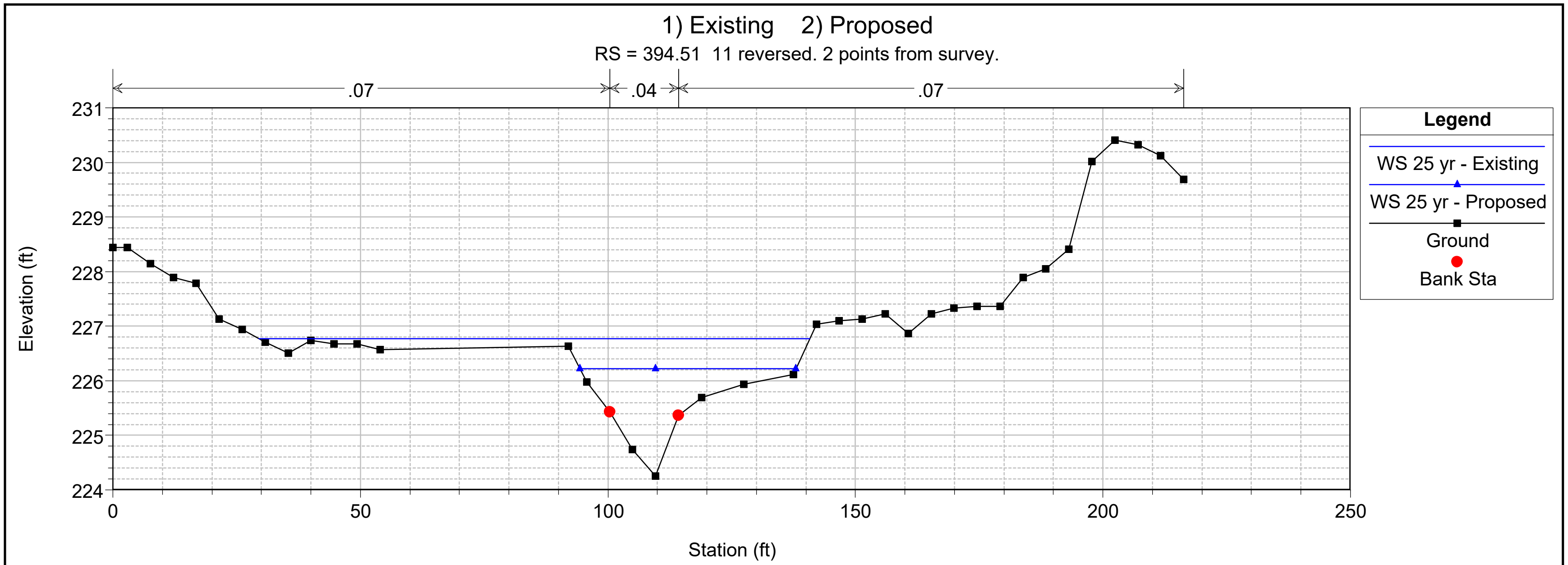


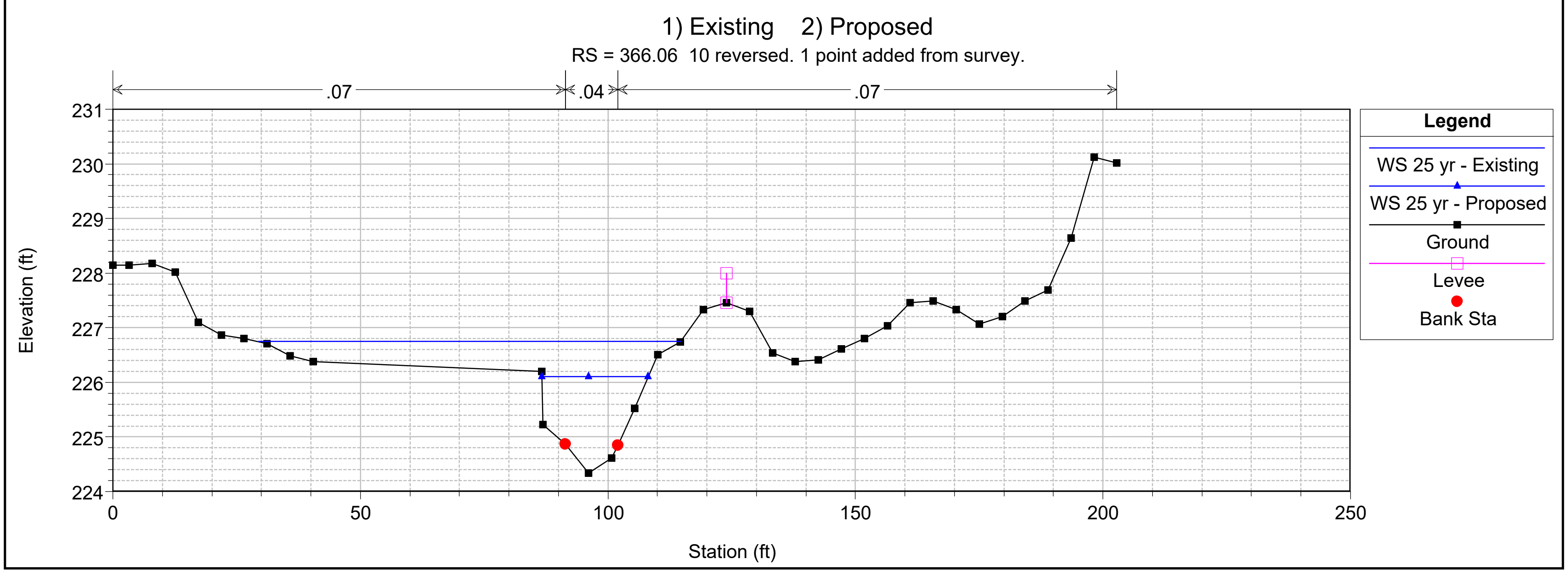
Shirley Drive and Stokes Circle
Cross-section Plots
Proposed vs Existing



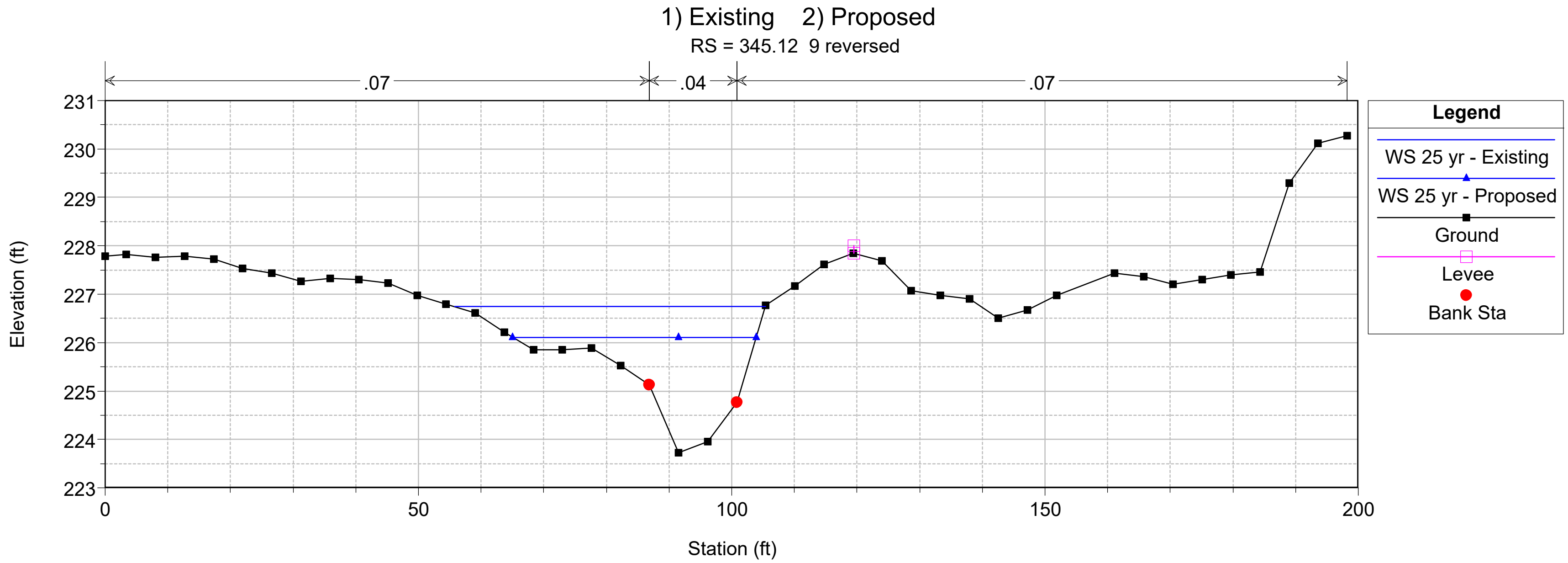


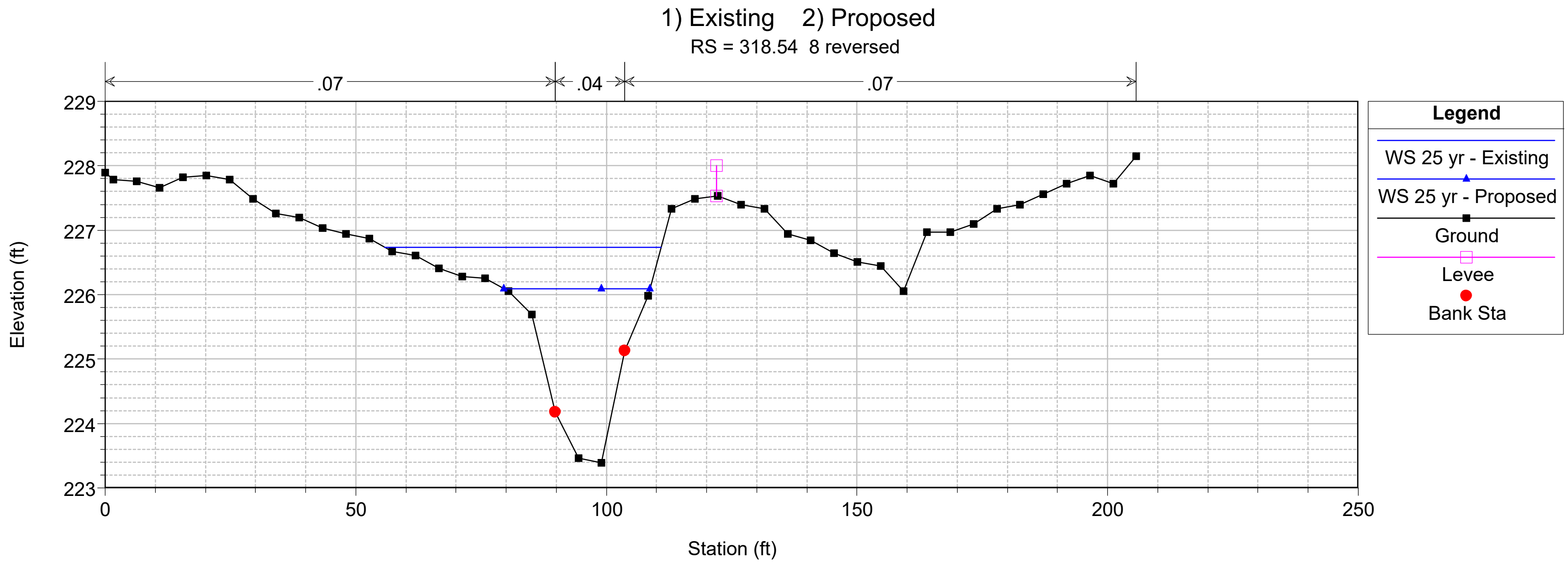
Shirley Drive and Stokes Circle
Cross-section Plots
Proposed vs Existing



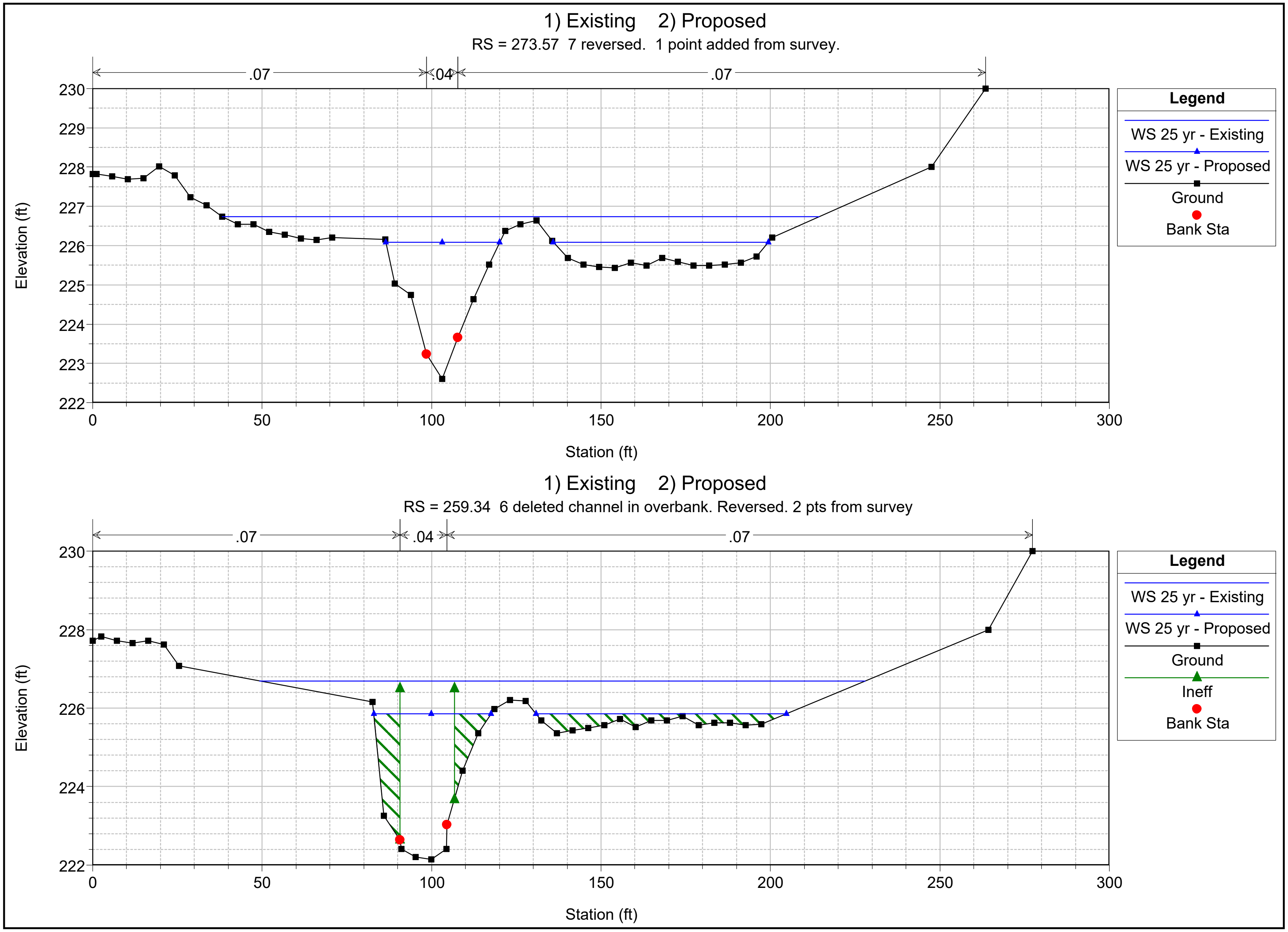


Shirley Drive and Stokes Circle
Cross-section Plots
Proposed vs Existing

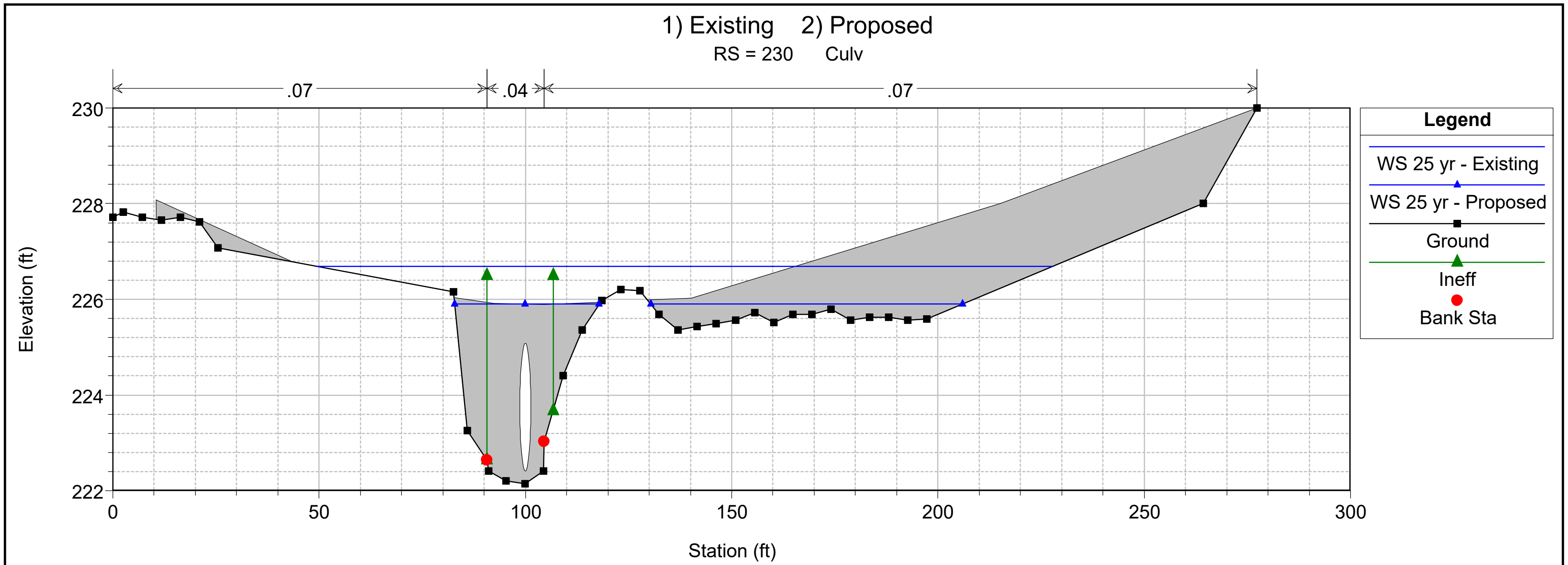


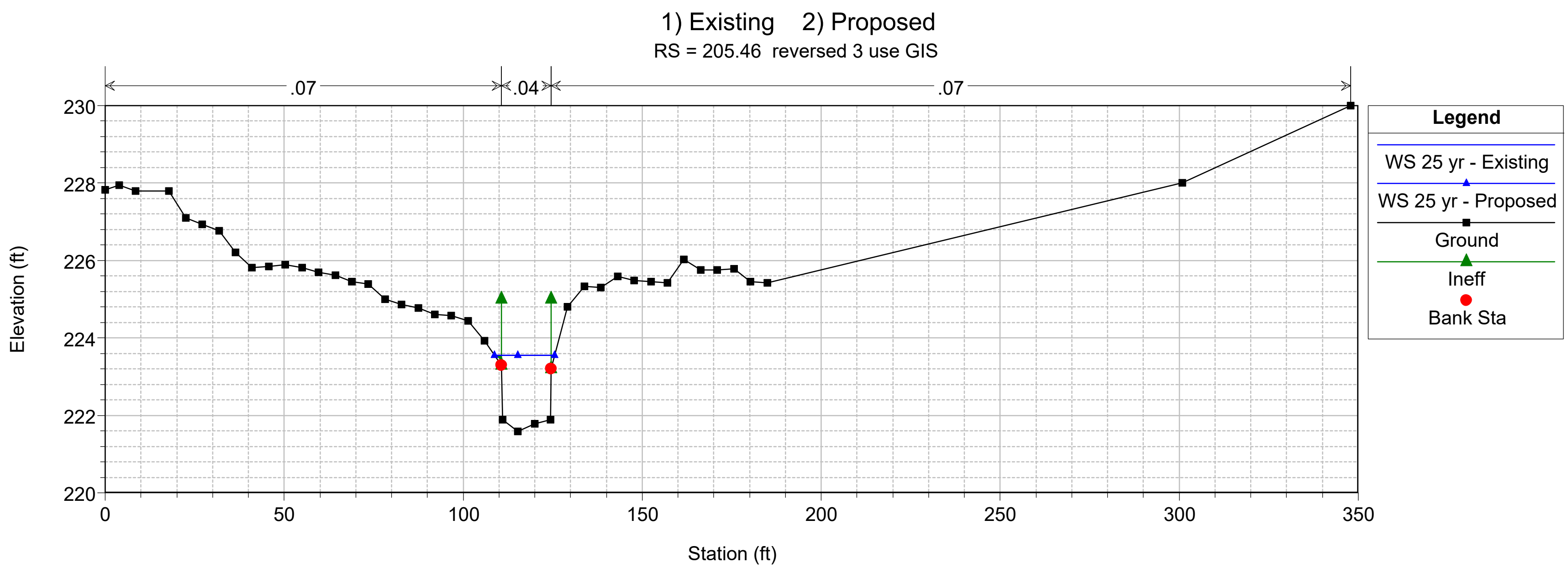


Shirley Drive and Stokes Circle
Cross-section Plots
Proposed vs Existing

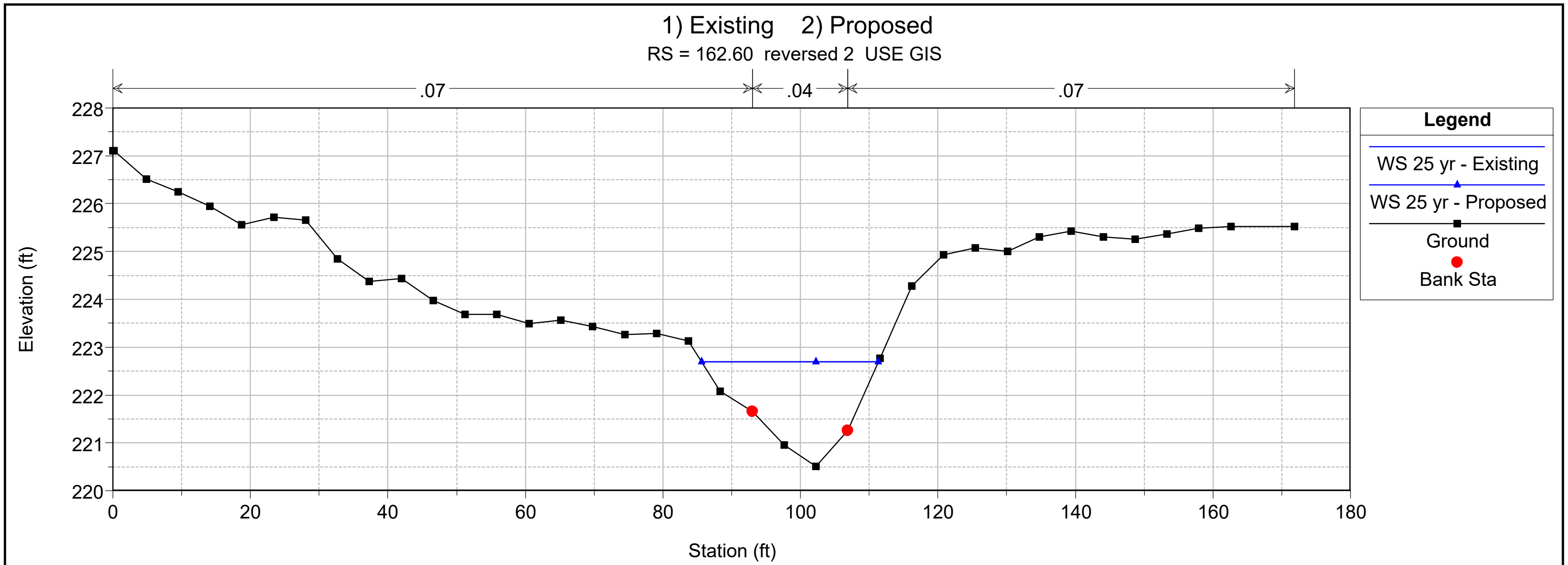


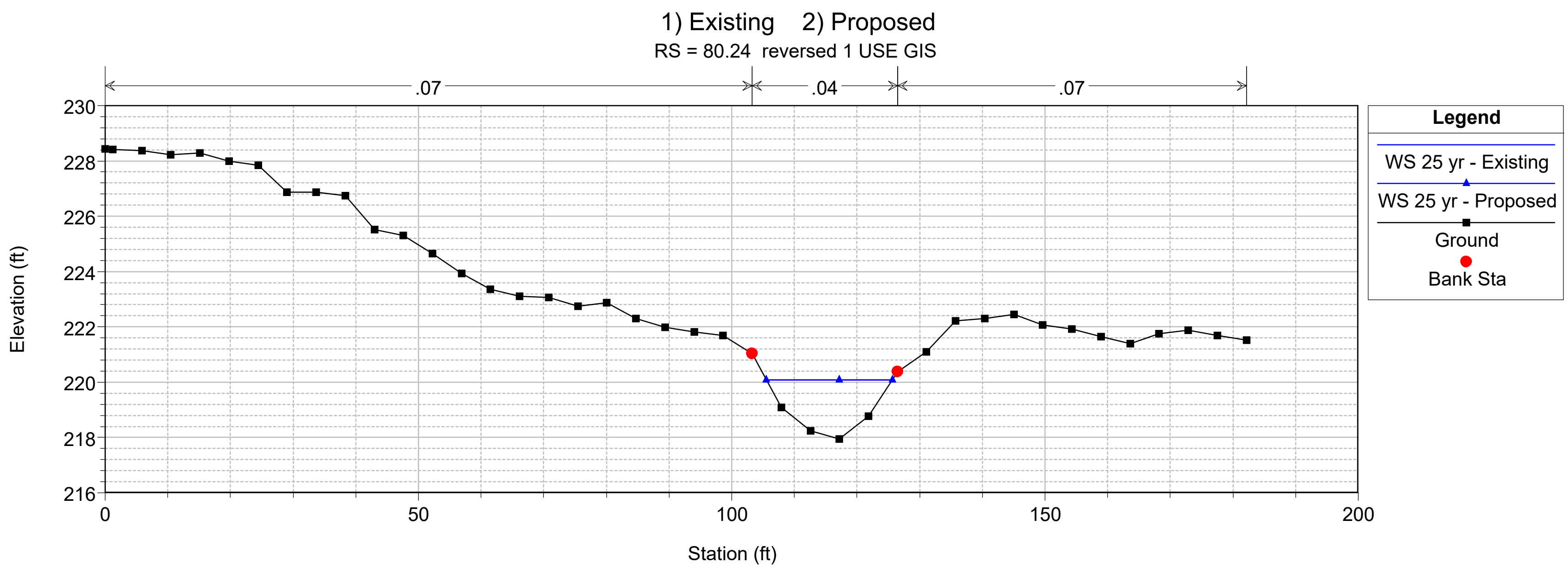
Shirley Drive and Stokes Circle
Cross-section Plots
Proposed vs Existing

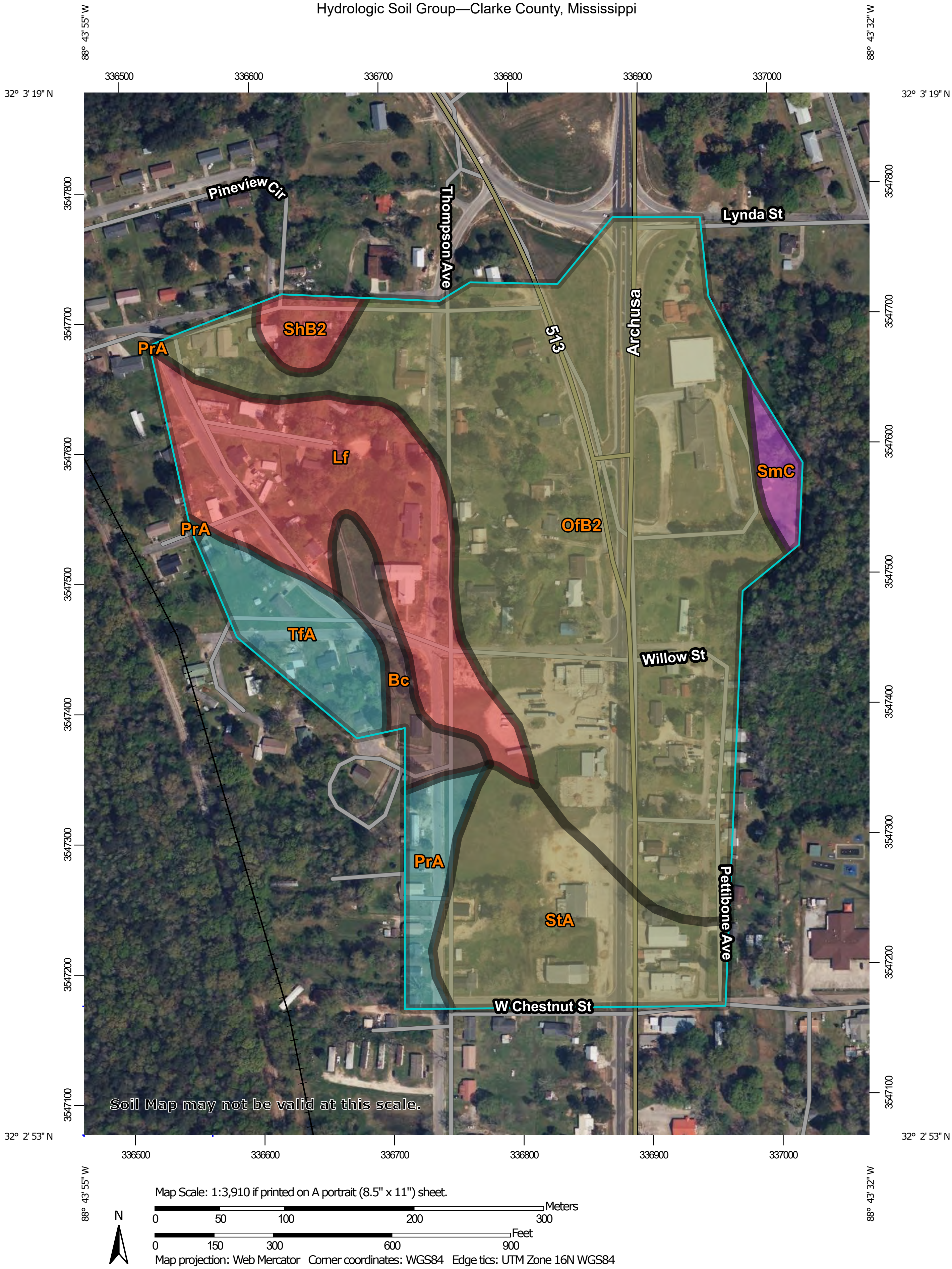




Shirley Drive and Stokes Circle
Cross-section Plots
Proposed vs Existing






88° 43' 55" W
88° 43' 32" W
32° 3' 19" N
32° 2' 53" N
336500
336600
336700
336800
336900
337000
3547800
3547700
3547600
3547500
3547400
3547300
3547200
3547100
Pineview Cir
Thompson Ave
Lynda St
513
Archusa
ShB2
PrA
Lf
SmC
OfB2
TfA
Bc
Willow St
StA
Pettibone Ave
W Chestnut St
Soil Map may not be valid at this scale.
Map Scale: 1:3,910 if printed on A portrait (8.5" x 11") sheet.
Meters
0 50 100 200 300
Feet
0 150 300 600 900
N
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 Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 21, Sep 6, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 3, 2021—May 8, 2021

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	1.6	3.2%
Lf	Leaf fine sandy loam	D	8.2	16.4%
OfB2	Ora fine sandy loam, 2 to 5 percent slopes, moderately eroded	C/D	27.6	55.2%
PrA	Prentiss fine sandy loam, 0 to 2 percent slopes	C	1.6	3.2%
ShB2	Shubuta fine sandy loam, 2 to 5 percent slopes, moderately eroded	D	0.9	1.8%
SmC	Smithdale fine sandy loam, 5 to 8 percent slopes	A	0.8	1.6%
StA	Stough fine sandy loam, 0 to 2 percent slopes	C/D	6.6	13.2%
TfA	Tilden fine sandy loam, 0 to 2 percent slopes (savannah)	C	2.7	5.5%
Totals for Area of Interest			**49.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX N

CULVERT AT DOGWOOD AVENUE

- Hydrology Summary
- HY-8 Report
- Watershed boundary
- Hydrographs
- Soil Data Report

Proposed Replacement Culvert at Dogwood Avenue

Hydrology Summary

Basin Parameters

Drainage Area (acres)	Runoff Curve Number	Basin Slope (percent)	Hydraulic Length (feet)	Storm Distribution	Time Interval (min)
55	81	2.0	2,630	Type III	2

Peak Discharges

2-yr Recurrence Peak Discharge (cfs)	5-yr Recurrence Peak Discharge (cfs)	10-yr Recurrence Peak Discharge (cfs)	25-yr Recurrence Peak Discharge (cfs)	50-yr Recurrence Peak Discharge (cfs)	100-yr Recurrence Peak Discharge (cfs)
75	102	126	161	189	219

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 102 cfs

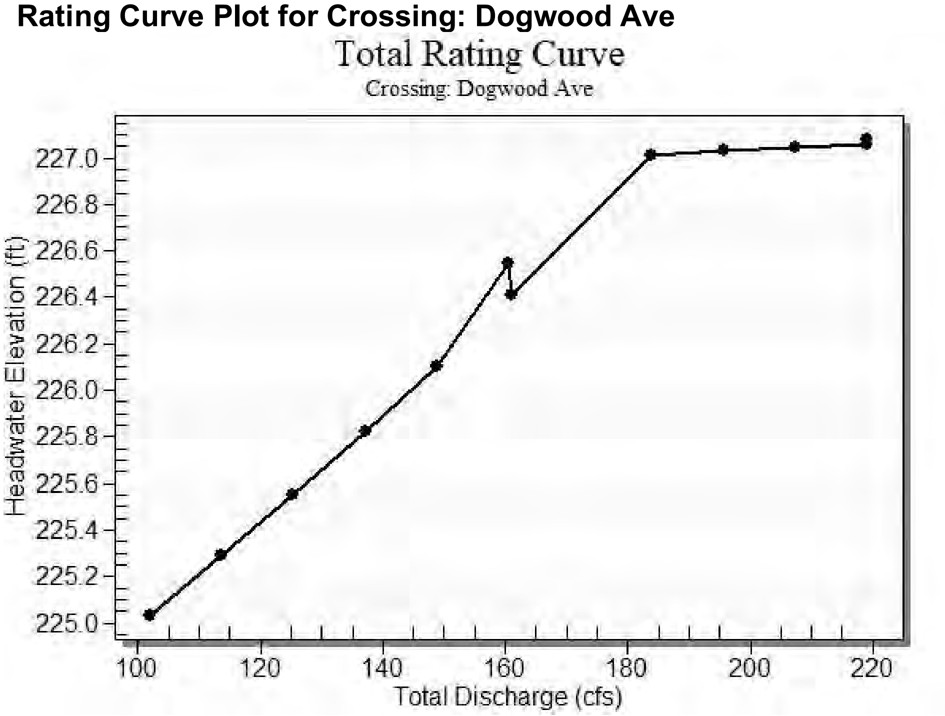
Design Flow: 161 cfs

Maximum Flow: 219 cfs

Table 1 - Summary of Culvert Flows at Crossing: Dogwood Ave

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
225.03	102.00	102.00	0.00	1
225.29	113.70	113.70	0.00	1
225.55	125.40	125.40	0.00	1
225.82	137.10	137.10	0.00	1
226.11	148.80	148.80	0.00	1
226.55	160.50	160.50	0.00	1
226.41	161.00	161.00	0.00	1
227.01	183.90	178.28	4.58	44
227.03	195.60	178.28	16.56	5
227.05	207.30	178.28	28.28	4
227.06	219.00	178.28	39.31	3
227.00	178.28	178.28	0.00	Overtopping

Rating Curve Plot for Crossing: Dogwood Ave



Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
102.00	102.00	225.03	2.635	1.404	1-JS1f	0.990	1.642	3.000	3.470	4.474	1.070
113.70	113.70	225.29	2.889	1.875	1-JS1f	1.054	1.749	3.000	3.762	4.987	1.114
125.40	125.40	225.55	3.152	2.365	5-JS1f	1.117	1.848	3.000	4.055	5.500	1.158
137.10	137.10	225.82	3.423	2.936	5-JS1f	1.179	1.947	3.000	4.409	6.014	1.179
148.80	148.80	226.11	3.706	3.664	5-S1f	1.240	2.039	3.000	4.767	6.527	1.199
160.50	160.50	226.55	4.000	4.148	1-S1f	1.301	2.126	3.000	5.125	7.040	1.219
161.00	161.00	226.41	4.013	2.340	5-JS1f	1.304	2.130	3.000	5.140	7.062	1.220
183.90	178.28	227.01	4.473	5.459	4-FFf	1.394	2.254	3.000	6.015	7.820	1.212
195.60	178.28	227.03	4.473	5.933	4-FFf	1.394	2.254	3.000	6.489	7.820	1.206
207.30	178.28	227.05	4.473	6.429	4-FFf	1.394	2.254	3.000	6.985	7.820	1.198
219.00	178.28	227.06	4.473	3.000	5-JS1f	1.394	2.254	3.000	7.480	7.820	1.190

Table 2 - Culvert Summary Table: Culvert 1

****

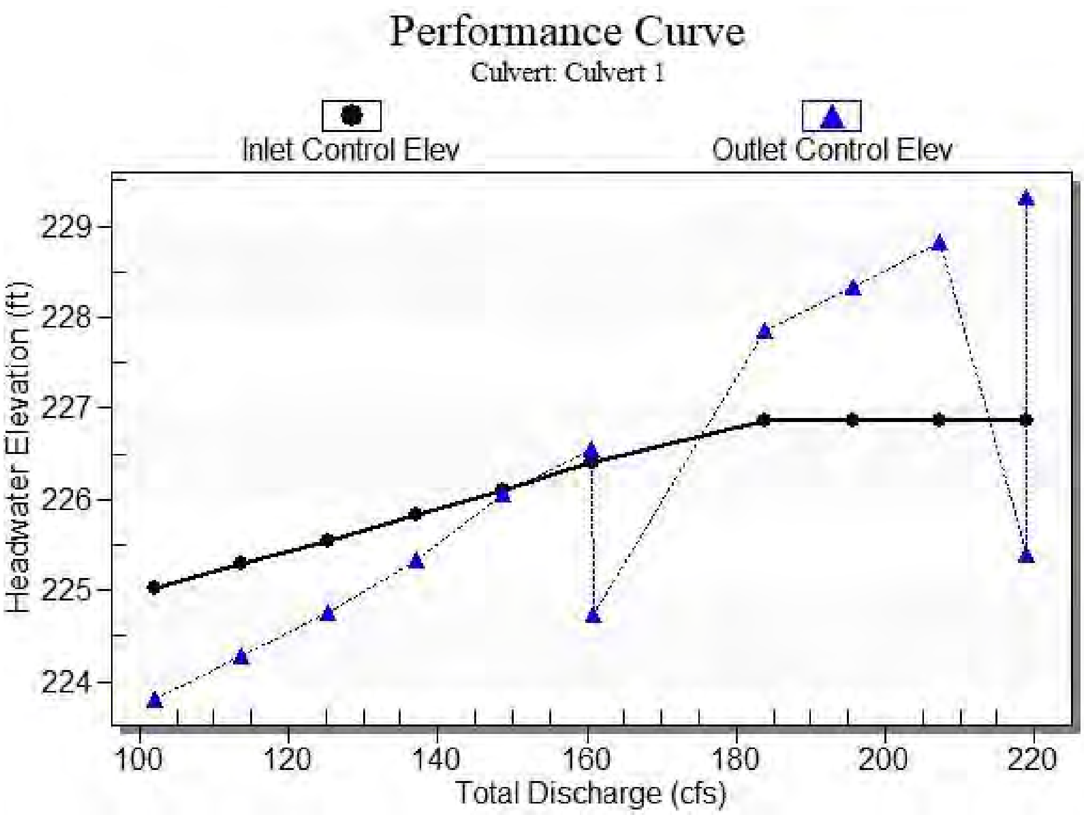
Straight Culvert

Inlet Elevation (invert): 222.40 ft, Outlet Elevation (invert): 219.60 ft

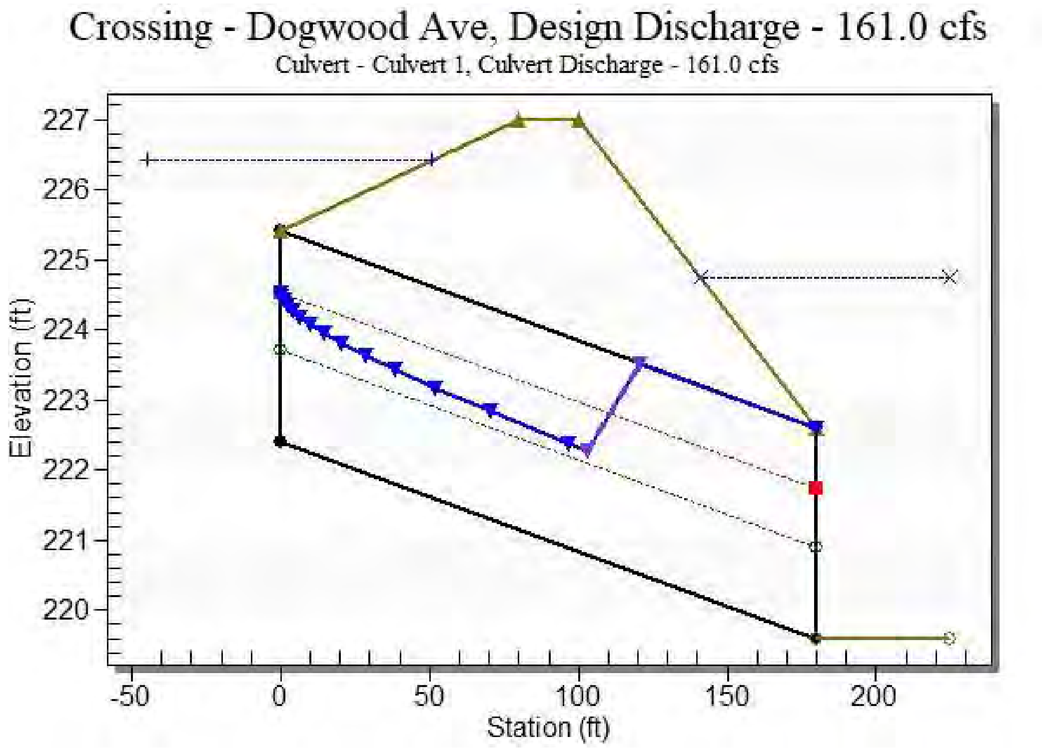
Culvert Length: 180.02 ft, Culvert Slope: 0.0156

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 222.40 ft

Outlet Station: 180.00 ft

Outlet Elevation: 219.60 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Pipe Arch

Barrel Span: 58.50 in

Barrel Rise: 36.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Dogwood Ave)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
102.00	223.07	223.07	1.07
126.00	223.67	223.67	1.16
161.00	224.74	224.74	1.22
189.00	225.81	225.81	1.21
219.00	227.08	227.08	1.19

Tailwater Channel Data - Dogwood Ave

Tailwater Channel Option: Enter Rating Curve

Channel Invert Elevation: 219.60 ft

Roadway Data for Crossing: Dogwood Ave

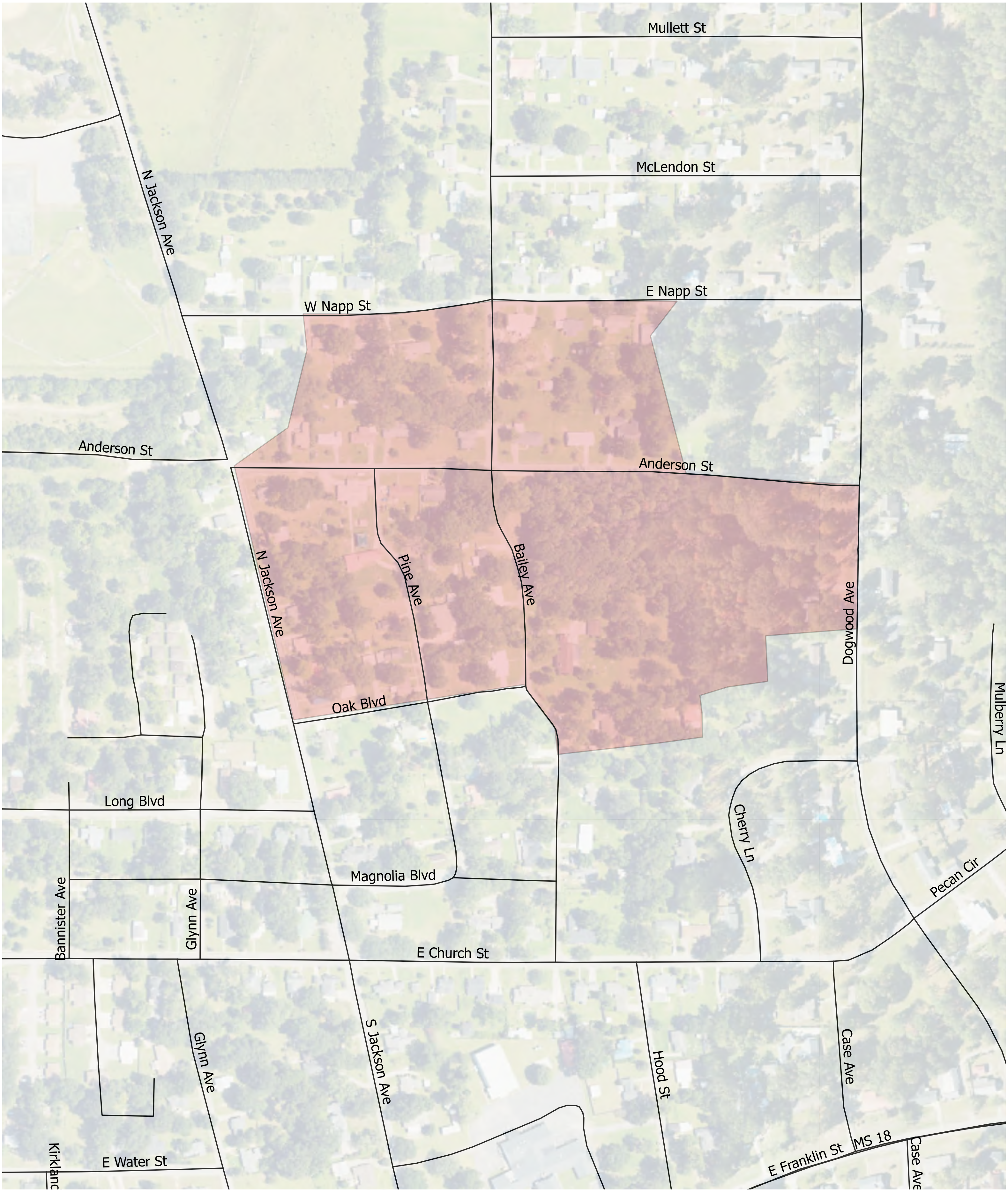
Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 1000.00 ft

Crest Elevation: 227.00 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft



Watershed Boundary
Culvert at Dogwood Avenue

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 13

Dogwood Avenue

Hydrograph type	= SCS Runoff	Peak discharge	= 75.34 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 55.00 ac	Curve number	= 81
Basin Slope	= 2.0 %	Hydraulic length	= 2630 ft
Tc method	= LAG	Time of conc. (Tc)	= 47.2 min
Total precip.	= 4.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 488,816 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.53	75.34 <<

...End

Hydrograph Report

Hyd. No. 13

Dogwood Avenue

Hydrograph type	= SCS Runoff	Peak discharge	= 101.86 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Drainage area	= 55.00 ac	Curve number	= 81
Basin Slope	= 2.0 %	Hydraulic length	= 2630 ft
Tc method	= LAG	Time of conc. (Tc)	= 47.2 min
Total precip.	= 5.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 661,143 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.50	101.86 <<

...End

Hydrograph Report

Hyd. No. 13

Dogwood Avenue

Hydrograph type	= SCS Runoff	Peak discharge	= 125.58 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 55.00 ac	Curve number	= 81
Basin Slope	= 2.0 %	Hydraulic length	= 2630 ft
Tc method	= LAG	Time of conc. (Tc)	= 47.2 min
Total precip.	= 6.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 817,310 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.50	125.58 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 13

Dogwood Avenue

Hydrograph type	= SCS Runoff	Peak discharge	= 160.76 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 55.00 ac	Curve number	= 81
Basin Slope	= 2.0 %	Hydraulic length	= 2630 ft
Tc method	= LAG	Time of conc. (Tc)	= 47.2 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,052,433 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.50	160.76 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 13

Dogwood Avenue

Hydrograph type	= SCS Runoff	Peak discharge	= 189.40 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 55.00 ac	Curve number	= 81
Basin Slope	= 2.0 %	Hydraulic length	= 2630 ft
Tc method	= LAG	Time of conc. (Tc)	= 47.2 min
Total precip.	= 8.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,246,740 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.50	189.40 <<

...End

Hydrograph Report

Hyd. No. 13

Dogwood Avenue

Hydrograph type	= SCS Runoff	Peak discharge	= 219.41 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 55.00 ac	Curve number	= 81
Basin Slope	= 2.0 %	Hydraulic length	= 2630 ft
Tc method	= LAG	Time of conc. (Tc)	= 47.2 min
Total precip.	= 9.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,452,604 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
12.50	219.41 <<

...End

Hydrologic Soil Group—Clarke County, Mississippi

Map Scale: 1:4,150 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 200, 400, 800, 1200

N

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 Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:15,800.

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: Clarke County, Mississippi
Survey Area Data: Version 20, Sep 9, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 3, 2021—May 8, 2021

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bc	Bibb and Chastain fine sandy loams (bibb and una)	B/D	0.9	1.7%
PrA	Prentiss fine sandy loam, 0 to 2 percent slopes	C	18.6	34.8%
TfA	Tilden fine sandy loam, 0 to 2 percent slopes (savannah)	C	34.0	63.5%
Totals for Area of Interest			**53.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher