NOTICE OF REGULAR TELEPHONE/VIDEO

CONFERENCE MEETING

October 13, 2020

MONTGOMERY CITY COUNCIL

STATE OF TEXAS **AGENDA**

COUNTY OF MONTGOMERY

CITY OF MONTGOMERY

NOTICE TO THE PUBLIC IS HEREBY GIVEN in accordance with the order of the Office of the Governor issued March 16, 2020, the Montgomery City Council will conduct a Regular Meeting scheduled for **6:00 p.m. on Tuesday, October 13, 2020**, at City of Montgomery City Hall, 101 Old Plantersville Road, Montgomery, Texas via Zoom Teleconferencing.

This meeting will be closed to in-person attendance by the public. A temporary suspension of the Open Meetings Act to allow telephone or videoconference public meetings has been granted by Governor Greg Abbott. These actions are being taken to mitigate the spread of COVID-19 by avoiding meetings that bring people into a group setting and in accordance with Section 418.016 of the Texas Government Code. Telephonic and videoconferencing capabilities will be utilized to allow individuals to address the City Council. ***Members of the public who wish to submit their written comments on a listed agenda item must submit their comments by email to shensley@ci.montgomery.tx.us by 3:00 p.m. on October 13, 2020.***

Members of the public are entitled to participate remotely via Zoom Teleconferencing. Citizens may join the Zoom Meeting by logging on at **https://us02web.zoom.us/j/86514805165** and using **Meeting ID: 865 1480 5165**. They may also join by calling (346) 248-7799 and entering the **Meeting ID: 865 1480 5165.** The Meeting Agenda Pack will be posted online at **www.montgomerytexas.gov**. The meeting will be recorded and uploaded to the City's website.

Notice - any person(s) using profane, abusive or threatening language may result in them being removed from the Teleconference Meeting.

CALL TO ORDER

INVOCATION

PLEDGE OF ALLEGIANCE TO FLAGS

VISITOR/CITIZENS FORUM:

Any citizen with business not scheduled on the agenda may speak to the City Council. Prior to speaking, each speaker must be recognized by the Mayor. City Council may not discuss or take any action on an item but may place the issue on a future agenda. The number of speakers along with the time allowed per speaker may be limited.

CONSENT AGENDA:

1. Matters related to the approval of minutes of the September 15, 2020, Public Hearing and Special Meeting and September 22, 2020, Regular Meeting.

2. Consideration and possible action regarding an Application by Cindy Haynes and business partner Damon Haynes, Playhouse Media, LLC, for a **BG - Wine and Beer Retailer's Permit** for Wings over Montgomery located at 14335 Liberty Street, Montgomery.

CONSIDERATION AND POSSIBLE ACTION:

3. Consideration and possible action regarding the presentation of Town Creek Watershed Study by William Kotlan, P.E., of BGE.

4. Consideration and possible action regarding approval of construction plans for Hills of Town Creek Section 4.

5. Consideration and possible action regarding the Certificate of Substantial Completion, Certificate of Acceptance, and completion of the one year warranty period for the 18" Gravity Sanitary Sewer Line Extension Phase II project.

6. Consideration and possible action regarding approval of Certificate of Substantial Completion for the Stewart Creek Wastewater Treatment Plant Lift Station Relocation project.

7. Consideration and possible action regarding adoption of the following Ordinance:
   AN ORDINANCE BY THE CITY COUNCIL OF THE CITY OF MONTGOMERY, TEXAS, AMENDING CHAPTER 98, "ZONING," ARTICLE II, "ADMINISTRATION AND ENFORCEMENT," DIVISION 2, "PLANNING AND ZONING COMMISSION," SECTION 98-50, "MEMBERSHIP AND APPOINTMENT," OF THE CODE OF ORDINANCES OF THE CITY OF MONTGOMERY, TEXAS TO CONFORM TO THE ADMINISTRATION OF THE BOARD OF ADJUSTMENT; REPEALING ALL OTHER CONFLICTING ORDINANCE PROVISIONS; PROVIDING A SEVERABILITY CLAUSE; PROVIDING FOR A TEXAS OPEN MEETINGS ACT CLAUSE; AND PROVIDING AN EFFECTIVE DATE

8. Consideration and possible action regarding establishing minimum standards for creation of Special Purpose Districts.

EXECUTIVE SESSION:

The City Council reserves the right to discuss any of the items listed specifically under this heading or for any items listed above in executive closed session as permitted by law including if they meet the qualifications in Sections 551.071(consultation with attorney), 551.072 (deliberation regarding real property),551.073 (deliberation regarding gifts), 551.074 (personnel matters), 551.076 (deliberation regarding security devices), and 551.087 (deliberation regarding economic development negotiations) of Chapter 551 of the Government Code of the State of Texas.

9. Adjourn into Closed Executive Session as authorized by the Texas Open Meetings Act, Chapter 551 of the Government Code, in accordance with the authority contained in the following:
   a) Section 551.071 (consultation with attorney);
   b) Section 551.072 (deliberation regarding real property); and
   c) Section 551.074 (personnel matters) concerning the City Administrator's Performance Review.

Reconvene into Open Session.

POSSIBLE ACTION FROM EXECUTIVE SESSION:

10. Consideration and possible action(s), if necessary, on matter(s) deliberated in Closed Executive Session.

COUNCIL INQUIRY:

Pursuant to Texas Government Code Sect. 551.042 the Mayor and Council Members may inquire about a subject not specifically listed on this Agenda. Responses are limited to the recitation of existing policy or a statement of specific factual information given in response to the inquiry. Any deliberation or decision shall be limited to a proposal to place on the agenda of a future meeting.

ADJOURNMENT

CITY OF MONTGOMERY, TEXAS ★ FOUNDED 1837 ★

Susan Hensley, City Secretary

I certify that the attached notice of meeting was posted on the bulletin board at City of Montgomery City Hall, 101 Old Plantersville Road, Montgomery, Texas, on the 9th day of October 2020 at 1:15 o'clock p.m. I further certify that the following news media was notified of this meeting as stated above: The Courier

---

This facility is wheelchair accessible and accessible parking spaces are available. Please contact the City Secretary's office at 936-597-6434 for further information or for special accommodations.

MINUTES OF PUBLIC HEARING AND SPECIAL TELEPHONE

CONFERENCE/VIDEO MEETING

September 15, 2020

MONTGOMERY CITY COUNCIL

CALL TO ORDER

Mayor Sara Countryman declared a quorum was present and called the meeting to order at 6:00 p.m.

Present:	Sara Countryman	Mayor
	Kevin Lacy	City Council Place # 1
	Randy Burleigh	City Council Place # 2
	T.J. Wilkerson	City Council Place # 3
	Rebecca Huss	City Council Place # 4
	Tom Cronin	City Council Place # 5

Absent:

Also Present:	Richard Tramm	City Administrator
	Dave McCorquodale	Assistant City Administrator
	Susan Hensley	City Secretary
	Alan Petrov	City Attorney

INVOCATION

T.J. Wilkerson gave the Invocation.

PLEDGE OF ALLEGIANCE TO FLAGS

VISITOR/CITIZENS FORUM:

Any citizen with business not scheduled on the agenda may speak to the City Council. Prior to speaking, each speaker must be recognized by the Mayor. Council may not discuss or take any action on an item, but may place the issue on a future agenda. The number of speakers along with the time allowed per speaker may be limited.

- State or type your name at the time of making your comment.
- Limit comment to a maximum of three minutes.

PUBLIC HEARING

Convene into Public Hearing:

For the purpose of giving all interested persons the right to appear and be heard regarding the following:

1. **Tax Rate Public Hearing**: - the 2020 tax rate of **$.4000 per $100 valuation** as proposed by the governing body of the City of Montgomery as the 2020 City Tax Rate.

   Mayor Countryman convened the Public Hearing at 6:02 p.m.
   Mr. Tramm advised there were no comments submitted to the City for the Public Hearing.

   Adjourn Public Hearing
   Mayor Countryman adjourned the Public Hearing at 6:02 p.m.

   Reconvene into Special Meeting

   Mayor Countryman reconvened the Special Meeting at 6:03 p.m.

CONSENT AGENDA:

2. Matters related to the approval of minutes of August 25, 2020, Regular Meeting. (*Tabled at the September 8, 2020 Meeting*)

   Randy Burleigh moved to approve the minutes of August 25, 2020, Regular Meeting. Tom Cronin seconded the motion, the motion carried unanimously. (5-0)

CONSIDERATION AND POSSIBLE ACTION:

3. Consider, Adopt and Set by Order the 2020 Ad Valorem Tax Rate for Maintenance and Operation, **$.2805/$100.**

   Mr. Tramm advised on August 25, 2020, the City Council unanimously voted to set the proposed tax rate for 2020 at $.4000/per $100 valuation, with maintenance and operations at

$.2805 and debt service (interest and sinking) at $.1195. Mr. Tramm noted that items 3, 4 and 5 are all linked.

Mr. Tramm stated on the final item, as stated by the Tax Assessor/Collector, Agenda Item 5 is the adoption of the tax rate.

Mr. Tramm said the first item is to set the tax rate for maintenance and operations at $.2805/per $100 valuation.

Rebecca Huss asked to confirm that the action was unanimous at the full quorum attended meeting to set the proposed tax ad valorem rates for maintenance and operations and debt service. Mr. Tramm confirmed that information. Mr. Tramm said attached in the pack was a copy of the Notice of Public Hearing on the Tax Rate Increase, which while the tax rate remains the same, it is called a Tax Rate Increase because it generates additional revenue and shows the record vote that took place at the meeting that showed all five votes being in favor of the rates, no votes opposed and the Mayor was noted as present but not voting.

Rebecca Huss moved to adopt and set by Order the 2020 Ad Valorem Tax Rate for Maintenance and Operations at $.2805/per $100 valuation. Randy Burleigh seconded the motion, the motion carried unanimously. (5-0)

4. Consider, Adopt and Set by Order the 2020 Ad Valorem Tax Rate for Debt Services, **$.1195/$100.**

Mr. Tramm said this was similar to the item that was just acted on, but this is for the debt service tax rate (interest and sinking rate).

Rebecca Huss moved to adopt the 2020 Ad Valorem Tax Rate for Debt Service at $.1195/$100 valuation. T.J. Wilkerson seconded the motion, the motion carried unanimously. (5-0)

5. Consideration and possible action regarding adoption of the following Ordinance:
AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF MONTGOMERY, TEXAS, SETTING THE AD VALOREM TAX RATE OF THE CITY OF MONTGOMERY, FOR

THE YEAR 2020 AT A RATE OF $0.4000 PER ONE HUNDRED DOLLARS ($100.00) VALUATION ON ALL TAXABLE PROPERTY WITHIN THE CORPORATE LIMITS OF THE CITY OF MONTGOMERY AS OF JANUARY 1, 2020 SPECIFYING SEPARATE COMPONENTS OF SUCH RATE FOR OPERATIONS AND MAINTENANCE AND FOR DEBT SERVICE; LEVYING AN AD VALOREM TAX FOR THE YEAR 2020 PROVIDING FOR DUE AND DELINQUENT DATES TOGETHER WITH PENALTIES AND INTEREST; PROVIDING FOR COLLECTION AND ORDAINING OTHER RELATED MATTERS.

Mr. Tramm advised this rate is the rate that was discussed and voted on by City Council for the proposed tax rate on August 25, 2020. Mr. Tramm said the two rates, $.2805/$100 for maintenance and operations, and $.1195/$100 for debt service added together total the tax rate of $.4000/100 valuation. Mr. Tramm said this is the same tax rate the City has had for the last two years. Mr. Tramm said there is required language for the adoption of this Ordinance.

Rebecca Huss moved to adopt the Ordinance and that the property tax rate be increased by the adoption of the tax rate of $.4000/per $100 valuation, which is effectively a 4.09 percent increase in the tax rate. Randy Burleigh seconded the motion.

Discussion: City Secretary Susan Hensley asked to confirm that Randy Burleigh seconded the motion. Randy Burleigh confirmed that he had done so.

Randy Burleigh – Aye
Kevin Lacy – Aye
T.J. Wilkerson – Aye
Rebecca Huss – Aye
Tom Cronin - Aye

The motion carried unanimously. (5-0)

6. Consideration and possible action regarding a variance request for a proposed sign located at 14030 Liberty Street as submitted by Freedom Benefit Solutions.

Mr. McCorquodale advised at the last City Council Meeting, City Council directed staff to work with the applicant and sign company to find a solution that might be more in keeping with the spirit and intent of the City's sign ordinance. Mr. McCorquodale said they have included the revised sign, where they are asking for a variance of four feet on the overall area of the sign, which would mean the maximum height of the sign would be 14-feet.

Mr. McCorquodale said the sign would be in the area to the left, where a portable sign used to be located. Mr. McCorquodale said the static display would be internally lit and have the business name on it. Mr. McCorquodale said they want to make sure the sign company understands the programming of the sign and what is allowed regarding messages and the length of time it must remain before changing so there are no flashing messages. Mr. McCorquodale said they are showing approximately five feet of a masonry base for the sign.

Mayor Countryman asked if the sign was at the roof line or below. Mr. McCorquodale said it would be below the roof line. Randy Burleigh asked to confirm the sign has the same message on both sides. Mr. McCorquodale said that was correct. Rebecca Huss said the masonry looks like cinder block and asked if it is the intent to have that covered with a facing of some type. Mr. McCorquodale said yes, it would be a brick veneer. Mr. McCorquodale said they would construct the sign with cinder blocks and then would be clad in brick. Rebecca Huss said they had done a good job of making the sign comply with the spirit of the sign ordinance. Randy Burleigh said he really liked the sign with the shrubs around the base. Mr. McCorquodale said the shrubs are an option that they are willing to add around the foundation if City Council would like that. Randy Burleigh said the landscaping makes the sign appear smaller and not as tall.

Mayor Countryman asked to confirm that the sign would not impede on the intersection. Mr. McCorquodale said that was correct, the center of the sign would be staked out and the foundation would be set, and they would have a building inspection, where they will ensure the sign is placed correctly.

Randy Burleigh said they show a good sign on top of the building, which they are not the only business in town with this, and asked if the ordinance regulates the number of signs a business can put on their building. Mr. McCorquodale said the ordinance does, but it is not very

limiting. Mr. McCorquodale said for roof signs, they can be 24-inches or higher above the roofline, in terms of wall signs a business can have up to 60 percent of the wall as a sign. Mr. McCorquodale said there are conditions when it gets to an elevation that faces a residential area, there are restrictions related to that, but in the large part, there are not a whole lot of restrictions. Mr. Burleigh said he noticed with the new businesses in town they have so many signs plastered all over the building and every window has a sign in it, but that was something for another day.

Kevin Lacy said he loves the new sign design but wanted to make sure that bottom section that is LED was not blindingly bright as some signs are at night. Kevin Lacy asked if there was any way to make sure it is either dammed or disabled at night, so it does not blind drivers approaching the sign. Mr. McCorquodale said yes, one of the requirements, in terms of the brightness of the LED sign or internally lit sign, is they cannot be greater than a specific number of lux which is similar to a lumen, but this is measured from the outside. Mr. McCorquodale said when they are too bright, they are almost unsafe, but they do have safeguards in place to regulate that. Randy Burleigh asked if the Code Enforcement Officer would be the person that would be responsible for checking those signs. Mr. McCorquodale said Public Works crews will often check those signs. Randy Burleigh said Kevin Lacy is right, when the sign on the bypass first was installed it looked like Las Vegas from five miles away, and it could have distracted people enough that they could have an accident.

Mr. Islam advised they could adjust the brightness of the sign by setting a schedule so at different times the sign could be dimmed at night and they could adjust the level of brightness and meet the City's desired brightness level. Mayor Countryman asked if there were nighttime lumens that they cannot exceed. Mr. McCorquodale said the City's requirement is 24 hours per day at 700 lux, but said when a sign is too bright it is obvious, so it is good to hear the sign has the ability to be adjusted if there is a safety issue. Mr. Islam advised the sign is controlled by a laptop computer.

Ms. Bonnie Albright said the brick on the sign will look very nice, and said they had different options, but they picked one they thought would look older like the historic area in town. Ms. Albright said the sign will look classy, and noted they were paying an extra $2,000 just to have the brick on the sign to make it look as nice as they can. Mayor Countryman said they are

taking the "old" comment as a compliment. Ms. Albright said she meant it as one, stating they are here because they love Montgomery.

Rebecca Huss moved to allow a variance request for the proposed sign located at 14030 Liberty Street for 38 square feet of additional signage area and four feet over the height allowance. Tom Cronin seconded the motion, the motion carried unanimously. (5-0)

EXECUTIVE SESSION:

The City Council reserves the right to discuss any of the items listed specifically under this heading or for any items listed above in executive closed session as permitted by law including if they meet the qualifications in Sections 551.071(consultation with attorney), 551.072 (deliberation regarding real property),551.073 (deliberation regarding gifts), 551.074 (personnel matters), 551.076 (deliberation regarding security devices), and 551.087 (deliberation regarding economic development negotiations) of Chapter 551 of the Government Code of the State of Texas.

7. Adjourn into Closed Executive Session as authorized by the Texas Open Meetings Act, Chapter 551 of the Government Code, in accordance with the authority contained in the following:
    a) Section 551.071 (consultation with attorney); and
    b) Section 551.072 (deliberation regarding real property).

No Executive Session was conducted during the meeting.

Reconvene into Open Session.

POSSIBLE ACTION FROM EXECUTIVE SESSION:

8. Consideration and possible action(s), if necssary, on matter(s) deliberated in Closed Executive Session.

No action was taken.

COUNCIL INQUIRY:

Pursuant to Texas Government Code Sect. 551.042 the Mayor and Council Members may inquire about a subject not specifically listed on this Agenda. Responses are limited to recitation of existing policy

or a statement of specific factual information given in response to the inquiry. Any deliberation or decision shall be limited to a proposal to place on the agenda of a future meeting.

There were no comments made.

ADJOURNMENT

Kevin Lacy moved to adjourn the meeting at 6:25 p.m. Tom Cronin seconded the motion, the motion carried unanimously. (5-)

Submitted by: _____ Date Approved: _____
Susan Hensley, City Secretary

_____
Mayor Sara Countryman

MINUTES OF REGULAR TELEPHONE/VIDEO CONFERENCE MEETING

September 22, 2020

MONTGOMERY CITY COUNCIL

CALL TO ORDER

Mayor Sara Countryman declared a quorum was present and called the meeting to order at 6:00 p.m.

Present:	Sara Countryman	Mayor
	Kevin Lacy	City Council Place #1
	Randy Burleigh	City Council Place #2
	T.J. Wilkerson	City Council Place #3
	Rebecca Huss	City Council Place #4
	Tom Cronin	City Council Place #5

Absent:

Also Present:	Richard Tramm	City Administrator
	Susan Hensley	City Secretary
	Alan Petrov	City Attorney

INVOCATION

T.J. Wilkerson gave the Invocation.

PLEDGE OF ALLEGIANCE TO FLAGS

VISITOR/CITIZENS FORUM:

Any citizen with business not scheduled on the agenda may speak to the City Council. Prior to speaking, each speaker must be recognized by the Mayor. City Council may not discuss or take any action on an item but may place the issue on a future agenda. The number of speakers along with the time allowed per speaker may be limited.

Mr. Tramm stated the City had received a press release from hydrocephaluskids.org declaring that Montgomery's Kaylie Mae Lingor has been announced as the 2020 National Ambassador for Hydrocephalus Awareness for incurable brain cancer and is the female Ambassador for the organization.

Mr. Tramm said Kaylie Mae, nearly four years old, was diagnosed with an incurable brain condition before she was born. Mr. Tramm said Kaylie Mae has already faced six life-saving brain surgeries before her fourth birthday in April.

Mr. Tramm said Kaylie Mae has also had a battle with meningitis and has gone through seven additional surgeries for various things from tubes for her ears, surgery on her feet, and back to major cranial reconstruction.

Mr. Tramm stated Kaylie Mae was selected as one of two children to serve as this year's National Ambassador of Hydrocephalus Awareness for the Pediatric Hydrocephalus Foundation to help raise the level of awareness and education about Hydrocephalus in the United States.

Mr. Tramm said Kaylie Mae, whose family lives in Montgomery, Texas, will represent the girls, while eight-year-old Jared Stallbories of Tennessee will represent the boys.

Mr. Tramm said this is not the first meeting they have had with Kaylie Mae as she is part of a rock finding duo that has returned several of the rocks, more than anyone else, since they have been hiding them for a couple of contests. Mr. Tramm said Kaylie Mae's story is well known in City Hall and she is probably well on her way to becoming a legend because if there is any good finder of hidden materials out there in the City, the Lingor's are definitely the people.

Mayor Countryman read the City of Montgomery, Texas Proclamation, and informed Kaylie Mae she would be able to receive her signed Proclamation at City Hall tomorrow, as follows:

***WHEREAS**, occurring in approximately one of every 500 births and in over one million Americans today, Hydrocephalus is a condition in which excessive fluid gathers in the brain, abnormally widening spaces in the brain and placing potentially harmful pressure on brain tissues; and*

***WHEREAS,** in 2009, the United States House of Representatives passed a resolution designating the month of September as National Hydrocephalus Awareness Month; and*

WHEREAS, *at almost four years old, Kaylie Mae Lingor was diagnosed with an incurable brain condition before she was born and has already faced six life-saving brain surgeries before her fourth birthday in April: and*

WHEREAS, *Kaylie Mae also had a battle with meningitis and has gone through seven additional surgeries for various things from tubes for her ears, surgery on her feet and back to a major Cranio reconstruction; and*

WHEREAS, *Kaylie Mae, who lives in Montgomery was selected as one of two children to serve as this year's "National Ambassador of Hydrocephalus Awareness", for the Pediatric Hydrocephalus Foundation, to help raise the level of awareness and education about Hydrocephalus in the United States; and*

WHEREAS, *Kaylie Mae, whose family lives in Montgomery, Texas, will represent the girls, while 8-year-old Jared Stallbories of Tennessee will represent the boys; and*

NOW, THEREFORE, *I, Sara Countryman, Mayor of the City of Montgomery, Texas do hereby proclaim September 2020 as HYDROCEPHALUS AWARENESS MONTH and recognize Kaylie Mae Lingor of Montgomery, Texas as the "2020 Female Pediatric Hydrocephalus Ambassador."*

CONSENT AGENDA:

1. Matters related to the approval of minutes of the September 8, 2020, Public Hearing and Regular Meeting.

   Rebecca Huss stated she did not have any comments regarding the minutes.

   Tom Cronin moved to accept the Consent Agenda as presented. Rebecca Huss seconded the motion, the motion carried unanimously. (5-0)

CONSIDERATION AND POSSIBLE ACTION:

2. Consideration and possible action on Department Reports.

   A. City Administrator's Report

   Mr. Tramm said they had a recent overlap of tropical activity with Hurricane Laura preparation a couple of weeks ago and fortunately the primary storm activities missed the City. Mr. Tramm said they had some electrical issues with brownouts by Entergy and now there are bands of rain from the tropical storm. Mr. Tramm said through all this, work continues as normal as possible during the pandemic, keeping services open to the public and following COVID-19 guidelines.

Mr. Tramm said they had great progress this month with the Home Grant homes. Mr. Tramm said three of the homes are well on their way to completion and the fourth is early in the construction process.

Mr. Tramm stated they recently posted an RFQ on the City's website for the City Engineer that was previously authorized by City Council. Mr. Tramm said the responses are due by October 13th which envisions will be like the City Attorney RFQ where the top firms will be interviewed by City Council.

Mr. Tramm said two Planning and Zoning Commission members' terms are expiring in October and they are accepting applications through October 16th which will give staff time to vet and submit to City Council for selection before the end of October.

B. Public Works Report

Mr. Tramm said they replaced two irrigation nodes at Memory Park and Fernland recorded 418 visitors and provided 25 tours.

Mr. Tramm said some may have seen around town or on social media that Public Works has completed the first goat silhouette cut-out as part of the City's social media icon campaign. Mr. Tramm said they have a two-dimensional goat with the Texas flag logo represented on it so people will begin to see more of the goat around town and on social media.

C. Police Department Report

Mr. Tramm stated the Police Department had no major incidents to report this month and is currently working with several groups who are planning local events.

Mr. Tramm stated he was happy to report Officer Bauer has been promoted to the rank of Sergeant within the department and thinks he is very deserving.

D. Court Department Report

Mr. Tramm advised the report was self-explanatory.

E. Utility/Development Report

Mr. Tramm said there were no large miscellaneous categories of income.

Mr. Tramm said in the arrears categories, accounts that are on payment plans and being properly paid are considered current accounts. Mr. Tramm said there is a setting in the software that allows payment plans to be automatically billed to the customers, so it does not require additional math on the part of the staff.

Mr. Tramm said the category of 120+ days that is currently shown are closed accounts with an outstanding balance. Mr. Tramm said they should always plan to review those annually, if not semi-annually, to prevent them from building up to a large amount which has happened in the past. Mr. Tramm said before considering any final action, they would make a final effort to collect and reach out one last time. Rebecca Huss said or send them to collections for professionals who find them. Mr. Tramm agreed and said it might just be sending a letter to them resulting in a payment and they get 100 percent of the payment.

Mr. Tramm said there are 845 active accounts and a year ago there were 784 which is nearly an eight percent growth rate over last year, which is significant. Mr. Tramm said they do have a fair amount of construction and are continuing to move forward, so they are seeing strong growth in residential and commercial construction in the City.

Mr. Tramm said the water consumption charts were also adjusted so the scale of use of larger accounts does not throw off the imaging and you can read the smaller accounts.

Randy Burleigh asked why the usage for Cedar Brake Park restrooms was so high when it normally runs a thousand or two just for the restroom. Randy Burleigh said it was 14,000 gallons in July and 12,000 gallons in June, which is quite a bit for that restroom. Randy Burleigh asked if there might be a leak somewhere. Mr. Muckleroy said he was not sure and would investigate. Randy Burleigh said the sewer plant flow has been around 1,000 gallons ever since they put the bleach injection pump in it has been creeping up and asked if they use it more than just for the restroom at the sewer plant. Mr. Muckleroy said recently the contractor for Lift Station #1 Project has been using it a lot at their project and they have a water hose running from their office to the back and it has been that way

for the last couple of months. Mr. Muckleroy said if he does not get an answer by the end of the reports he will have an answer tomorrow regarding the restrooms at Cedar Brake Park.

Kevin Lacy asked who controls the fountain at Memory Park and whether it was not working or just shut off. Mr. Muckleroy said he thinks it went down when they lost power at the last outage. Mr. Muckleroy said they went and checked it today and it looks like the motor could be burned up so they have Solomon Electric looking at getting a replacement and getting a fail-safe switch so it will not kick back on when power is lost.

Kevin Lacy said he assumed the water level would be going back up at Memory Park after the rain they had and asked if they typically let it go down that low. Mr. Muckleroy said he tries not to add water to the pond until they talk to the Rotary Club because they have a good eye for the levels since it takes a lot of water to fill the pond up. Mr. Muckleroy said they have not had to do it this year and hopefully with this rain, it will resume the normal water level. Kevin Lacy said it seems like the lower the water is the more snakes they see. Mr. Muckleroy said he had not heard that and does not know why that would be. Rebecca Huss said overall, wildlife gets more desperate and the only reliable water source is probably right there, so it does not have anything to do with the water level itself, but just the lack of availability everywhere else. Rebecca Huss said she gets that too with their pond and they start seeing quite a bit more activity.

F. Water Report

Mr. Michael Williams, with Gulf Utility, advised there were several district alerts and many of them were due to power issues or pumps acting up.

Rebecca Huss asked if this was related to the specific power outages that the whole City experienced and not a return to the dirty power issues. Mr. Williams said that was correct and said they have not had any issues of dirty power this summer.

Mr. Williams said the flow for August was 4,552,000 gallons, the daily peak flow was on August 8th at 226,000 gallons and the daily average flow was 146,800 gallons, which is 37% of permitted capacity.

Mr. Williams said all samples were compliant for August and reported 1.50 inches of rainfall for the month.

Mr. Williams stated they sourced a total of 12.368 million gallons, had a flushing of 227,000 gallons and sold 14,799,000 gallons which brings it to 100% accountability, with a connection count of 970.

Rebecca Huss asked about the total amount produced, just over 15 million gallons versus last September producing 19 million gallons, which is a 4-million-gallon difference when they have a fair number of additional connections. Randy Burleigh said that is the leak. Rebecca Huss asked if the leak was only a million gallons. Randy Burleigh said he did not think so. Rebecca Huss asked if it was more than that. Randy Burleigh said yes. Mayor Countryman said the difference might be the schools too. Randy Burleigh said the difference is the leak.

Mr. Williams said he failed to point out the note below the chart on page six where Well #3 had gone down and they did calculate the flows. Rebecca Huss said they estimated it so they should be in the ballpark because he didn't say their accountability was better or worse than 100 and their behavior was different in terms of getting to lower usage with higher prices although they haven't raised prices in a while and she was just wondering if that was the driver. Mr. Williams said they estimated the flow based on the well's elapsed time meter so they were able to get the actual amount of time the well ran compared to the flows they received out of the well before and after that time period, so he was confident with the number they came up with. Randy Burleigh asked if they used the run time like they use the lift station. Mr. Williams said yes. Randy Burleigh said hopefully next month they will have a good month because the last three months they over billed then they under billed and then the water meter went out and he thinks they have averaged around 95 percent. Rebecca Huss said she was just curious because they were seeing a difference in behavior year-round year to account for the difference and asked if Randy Burleigh thought it was a four-million-gallon leak. Randy Burleigh said yes.

G. Financial Report & Quarterly Investment Report

Mr. Lasky, Senior Accounting Clerk, stated in the Operating Fund there is a little over five months of reserves, the MEDC fund is close to two and a half years reserves and there are 10 months reserves in the Utility Fund.

Mr. Lasky said the Cash Flow account did receive the sales tax of $375,019.12 and a quarter of that amount was transferred to the MEDC Fund.

Mr. Lasky said the budget for the Operating Fund did receive the September amount of $225,114.00 and $168,835.00 went into the General Fund and the remaining $56,278 went toward the MEDC Fund, which leaves a balance in that account of $2.293 million. Mr. Lasky said there are two accounts he wanted to point out that are a bit under which are the ad valorem taxes and the fines, otherwise, everything else looks good.

Mr. Lasky said on page 24 of the report it shows the debt payments due on September 1st and the next ones will not be due until March 1st of next year which will be principal and interest.

Mr. Lasky apologized for the delay regarding the Quarterly Investment Report and stated it should have been received a month earlier and said he will meet with Municipal Accounts to receive it earlier. Mr. Lasky stated this report has all the investments for the money market and CDs and all the transactions which took place ending June 30, 2020. Mr. Lasky said the next report should be ready by the December 8th meeting.

Mr. Lasky stated he will be out of the office for the last meeting in October but will plan to have the report out a week early so if there are any questions for the September financials he will be able to address them.

Randy Burleigh said he noticed going through the budget there were some COVID-19 items like additional supplies and monies and asked if the County or Federal government offered money for COVID-19 type items. Mr. Tramm said they have filed the necessary paperwork and have inserted those lines in the report to help track those expenses. Mr.

Tramm said since the emergency condition is still ongoing and even under the best circumstances, it is usually a three-year wait for receiving money and cannot say if it is three years from the beginning of the emergency or three years from the conclusion of the emergency. Mr. Tramm said they are tracking those items that are necessary and they would not have needed face shields and N-95 masks and other emergency materials they have acquired and changes in their operations. Mr. Tramm said, fortunately, they have not had as much expense as other places have, but they have had expenses directly related to COVID-19, with some of them being employee time-based. Mr. Tramm said they will continue to track those and seek what reimbursement they can and that is what those items in the budget are referencing. Mr. Tramm said they have received some supplies and materials from the County, but they have not received any cash funds.

Mayor Countryman said they do have funds, but there are hoops you have to jump through and she has spoken with other City Councils and Mayors who have said they spend their money and expect a payback and then there is so much red tape that they are likely not going to get paid back.

Mayor Countryman asked the Police Chief if their personal protective equipment (PPE) was free through the County and said she has been in contact with the County through Mr. Jason Millsaps and if they ever needed it they could pick it up. Mr. Tramm said they have received some supplies in a bulk shipment that included N-95 masks, face shields, gowns, and gloves and some of those have been distributed here to City personnel and some are still in storage.

H. Engineer's Report

Mr. Chris Roznovsky, City Engineer, said they have received comments on the contracts from the Texas Water Development Board regarding the Downtown Waterline Improvements which have already been executed by the contractor and sent over to the City Attorney to do a final review.

Mr. Roznovsky said regarding the 18" Gravity Sanitary Sewer Extension, the contractor was able to do testing now that the lift station is complete and discovered the manhole on The Shoppe's retail center site was buried by the contractor. Mr. Roznovsky said Public

Works met with the contractor and developer and they will be raising that manhole and once that is done, they will be able to complete the project.

Mr. Roznovsky said they met again last week with BGE regarding the draining analysis and reviewed the status of the report and recommendations. Mr. Roznovsky said he did receive something back from them yesterday and thinks they have some preliminary results. Mr. Roznovsky said they also met with the Grant Administrator to get clarification on the scope and they had good responses in the fact of the GLO loosening up on some of their guidelines so it will be a more efficient project than was initially thought.

Mr. Roznovsky said they had the final inspection on September 3, 2020, and put in service Lift Station No. 1 Replacement and there have been no issues. Mr. Roznovsky said there was a power outage at the time, but the generator turned on as programmed and powered the plant. Mr. Roznovsky said the contractors are working through the final punch list items and documents so at the next meeting they will bring certificates of substantial completion to start their warranty time. Mr. Roznovsky said they had a pay estimate of $67,122.00 this month which brings them to 97% complete by value, which is without retainage so there is still 10% held which is roughly $103-106,000 retainage.

Mr. Roznovsky said they received revised plans for the townhomes on Plez Morgan and work has begun on that site. Mr. Roznovsky said they provided plan approval for AutoZone on September 2, 2020. Mr. Roznovsky said they received revised plans for the Hills of Town Creek on Friday and will be reviewing those this week, and if approved, they will be coming back to Council for approval. Mr. Roznovsky said they submitted additional comments to Moon Over Montgomery.

Mr. Roznovsky said regarding the Hills of Town Creek and Emma's Way the contractors who did that work have gone under so the developer has hired another contractor to complete the work and starting the Hills of Town Creek Section 4. Mr. Roznovsky said they are getting a scope and proposal from them regarding exactly how they are going to address the items.

Mr. Roznovsky said at the previous City Council meeting they spoke about Town Creek and the potential issues with it. Mr. Roznovsky said Public Works went out and took pictures which show it is full of debris and one of the box culverts under FM 149 is 60% full of sediment. Mr. Roznovsky said they reached out to TxDOT, since it is their culvert, to request their assistance in getting it cleaned out. Mr. Roznovsky said they have also reached out to the property owner who is willing to meet and discuss obtaining results.

Mr. Roznovsky said they are still contending with the easements and right-of-way regarding TxDOT and Atkins Creek and they have been going back and forth with TxDOT to get clarification on exactly what they are needing to obtain. Mr. Roznovsky said they have had to talk with a couple of different people at TxDOT because no one could give them the answer they are looking for. Mr. Roznovsky said they are still planning on starting that project in January 2021and are trying to get what they need or at least get the process started with the property owners.

Kevin Lacy asked if Mr. Roznovksy had reached out to Mr. Larry Jacobs with Moon Over Montgomery concerning his plans on when he is going to build the retention pond. Mr. Roznovsky said yes and in Mr. Jacobs's current plans it shows the pond is going in with Phase I.

Randy Burleigh asked what they did with the old generator for Lift Station No. 1. Mr. Roznovsky said Mr. Muckleroy took the generator, the pumps, and maybe the control panel over to the old sewer plant and stored them there. Mr. Muckleroy said they are going to try and put the generator at Lift Station No. 6, which is at the stadium and they received a quote to do the work from NTS last year in the range of $30,000, but everything was put on hold. Mr. Muckleroy said he hopes to get that done next year. Randy Burleigh asked what was driving it to go to No. 6 instead of No. 8. Mr. Muckleroy said because the whole west side of town runs through No. 6, then No. 5 and then to No. 2. Mr. Muckleroy said Nos. 5 & 2 already have generators so the only thing they are lacking on that side of town is No. 6 and with the future development going in at Hills of Town Creek, they decided No. 6 would probably be the smarter place to install it. Randy Burleigh said to be careful as far as storing it because you could lose the entire generator if it sits too long.

Randy Burleigh moved to accept the Departmental Reports as presented. Tom Cronin seconded the motion, the motion carried unanimously. (5-0)

3. Consideration and possible action regarding street closures for Downtown Halloween Event by HMBA.

Mr. Tramm said HMBA is planning a Halloween event for Saturday, October 31st and those plans include a car show at the Community Building parking lot at 11:00 a.m., trick or treat beginning at 1:00 p.m. through 4:00 p.m., a parade at 2:00 p.m., vendors will set up for Sip-n-Stroll at 3:30 p.m., and Sip-n-Stroll begins at 4:30 p.m. through 7:30 p.m.

Mr. Tramm said the Police Department has met with HMBA and reviewed the parade route. Mr. Tramm said the Police Chief was satisfied with the parade route and there may be some flexibility in the exact timing of the schedule, but this was a good general representation.

Mr. Tramm said the item is presented for action from City Council on the street closures as Council would deem fit. Mr. Tramm said it is his understanding that in the past street closures have been presented to City Council for approval and after reviewing the City Ordinances it is meant for City Administrator approval but he did not want to change anything without discussing it first with City Council. Mr. Tramm said in the future if Council would prefer to have all closures run through City Council, they could discuss changing the Ordinance, otherwise, he would approve them in the future administratively and report them to Council.

Rebecca Huss said going with the Ordinance as being the legal way to go, she is fine with that, but they have discussed before that street closure is a very broad thing and they need to respect the impact that it has on the businesses within the area, so setting up the most expeditious closure and reopening is an important part of the process. Mr. Tramm agreed.

Randy Burleigh asked the Chief when they close SH 105 for the parade or reduce the flow for it, will there be signs set up at the outside of town directing people to go around. Chief Solomon said yes when they set the detours up on the east and west side they had an actual detour with signs to direct people where they need to go. Chief Solomon said if you do not have the detour clearly marked people get lost and they will also have police officers in those areas. Chief

Solomon said all those closures came from TxDOT because they had to close it down and City Council is exactly right because when you start doing street closures you have to make sure you are not affecting someone's business and they need to be notified to know how long their business is going to be affected. Chief Solomon said streets must be opened as soon as possible once the event is over. Chief Solomon said they have done this on several occasions, and they do understand.

Mayor Countryman asked Ms. Kambra Drummond how large of a parade are they expecting to have and how many entries. Ms. Drummond said now they are looking at 15 floats with a total of 25 vehicles. Rebecca Huss asked what the length of the floats are. Ms. Drummond said they have been reduced to a 16-foot trailer so they can maintain social distancing on the floats and all that information is going out to anyone that joins and they will be made aware of all the restrictions and guidelines which need to be followed for COVID-19. Ms. Drummond said the Fire Department has agreed that they would like to enter but all floats would need to be reduced to 16-feet in length.

Rebecca Huss said she was looking at the map to see if they could drive from SH 105 up to College Street but with the float, she does not think you could make that turn. Ms. Drummond said they discussed that in their meeting with the Chief, and if the trucks with the trailers could not make the turn at College Street maybe they could go through Jim's parking lot to come back so they have an easier turn radius coming into Jim's parking lot and then exiting out onto College Street. Rebecca Huss said that is Clepper Street. Ms. Drummond said Clepper Street was correct.

Ms. Drummond said she did receive an email back from the officers that reviewed their proposal and they have requested that the parade be earlier and the car show later and have they requested those two items switch time slots, which is what she initially thought would happen, so now it is back to the original with the early parade, then the car show, trick or treating, and then Sip-n-Stroll in the evening.

Mayor Countryman said Jennifer Skinner started this and in the first year, they estimated that 1,200 kids came through. Ms. Drummond said she thinks it is a good addition and all of this works great together.

Mayor Countryman asked how you register to be in the parade. Ms. Drummond said they are trying to funnel everyone to the HMBA website at this moment.

Kevin Lacy asked regarding the trick or treating festivities as it is, what types of things are they working on to maintain social distancing. Ms. Drummond said she cannot answer that as Jennifer Skinner is handling the trick or treating, but said she is assuming that Ms. Skinner is following the same guidelines she is. Ms. Drummond said you can ask that the participants maintain social distancing and family members can stay together, but you try and distance from other families and that is how all of the businesses are participating when they have shoppers in the buildings, and she knows that trick or treaters will be treated the same way. Ms. Drummond said most trick or treating is done outside of the buildings, it is an in-passing situation, so you don't have a lot of people congregating, as it is rather a steady flow moving through town. Rebecca Huss said by opening the longer periods, hopefully, that will stretch things out too. Rebecca Huss said if people know that it lasts longer then they will not all show up at the starting gate at the same time. Ms. Drummond agreed and said you do not have to rush through as everybody will get a chance to participate. Ms. Drummond said she knows that all the candy is wrapped, and no one will be giving out handmade items, it will all be store-bought and sealed. Chief Solomon said there will be no handing out candy from the floats. Ms. Drummond said yes, there will be no handing or throwing candy. Kevin Lacy stated that rule did not seem to work very well for the Christmas parade. Ms. Drummond said no it did not. Rebecca Huss said everyone must learn how to dance a new dance and they will learn as they go along.

Rebecca Huss said she would like to give Mr. Tramm direction to follow the Ordinance as it is written and thinks it is the most logical way to proceed. Kevin Lacy asked if it needed a second. The City Attorney stated you do not need a motion because the City Code already authorizes it, but thinks Mr. Tramm was wanting consensus.

4. Update on Water Well #3 Project.

Mr. Tramm said this is an informational update and no action is needed. Mr. Tramm stated as discussed at the last meeting the project is on hold pending inspection of the Ground Storage Tank and the timing of getting a diver to inspect the tank while still in operation is over six

weeks out which means draining and inspecting the tank physically from the inside will be the best way to accomplish this quickly.

Mr. Tramm said the engineers have confirmed that the contractor for the project is willing to hold their bid price long enough for the inspection to be performed. Mr. Tramm said the tentative timeline for the inspection is to drain the tank and conduct the physical inspection the first week in October and provide an inspection report and recommendation to City Council for the October 13th meeting.

Mr. Tramm said City Council should be able to act on the project at the October 27, 2020 meeting.

Randy Burleigh asked what the internal inspection consists of and is it just a visual. Mr. Roznovsky said it is a visual with metal thickness readings at points. Mr. Roznovsky said at a minimum it is a point thickness throughout the tank and then a visual inspection. Mr. Roznovsky is also getting recommendations on scan options. Randy Burleigh asked if Mr. Roznovsky mentioned that he had a grid before. Mr. Roznovsky said that is correct and they divided it up into eighths. Randy Burleigh asked if he has some comparisons to look at. Mr. Roznovsky said yes.

Mr. Roznovsky said he knows with this project there are a handful of questions so they will put a summary together and do a final review and cost estimates for the conversion of doing a liquid bleach instead of gas chlorine. Mr. Roznovsky said that is complete but he needs to do a final look and send it over to staff so they can take a look as well as some of the alternatives they talked about regarding tank sizes and pump sizes. Mr. Roznovsky said they are working with the contractor to see what his bid price would have been so they can tie it all together in their discussion.

T.J. Wilkerson asked if there was a cooling tower with the tank. Mr. Roznovsky said that was correct. T.J. Wilkerson asked if they are going to inspect it also. Mr. Roznovsky said the cooling tower is part of the project but will not be inspected. Mr. Roznovsky said he knows what they had talked about last time was doing an additional look at some of the materials and conditions that are out there, and the thought would be when they get the contractor out there

before he orders parts to do some of that so they aren't taking it offline. Mr. Roznovsky said they will meet with staff and Public Works and if it is something they can take offline for a short period to do some of those inspections while they are out there the first week of October they can do that.

T.J. Wilkerson asked if they have run across any cooling tower with any type of algae growing. Mr. Roznovsky said he would need to do some research on that because it is chlorinated water that is going in so it should remain relatively clear, but he has not had a chance to look at that specifically and if that has been an issue.

EXECUTIVE SESSION:

The City Council reserves the right to discuss any of the items listed specifically under this heading or for any items listed above in executive closed session as permitted by law including if they meet the qualifications in Sections 551.071(consultation with attorney), 551.072 (deliberation regarding real property),551.073 (deliberation regarding gifts), 551.074 (personnel matters), 551.076 (deliberation regarding security devices), and 551.087 (deliberation regarding economic development negotiations) of Chapter 551 of the Government Code of the State of Texas.

5. Adjourn into Closed Executive Session as authorized by the Texas Open Meetings Act, Chapter 551 of the Government Code, in accordance with the authority contained in the following:
    a) Section 551.071 (consultation with attorney); and
    b) Section 551.072 (deliberation regarding real property).

Mayor Countryman adjourned into Closed Executive Session at 6:58 p.m.

Reconvene into Open Session.

Mayor Countryman reconvened into Open Session at 7:31 p.m.

POSSIBLE ACTION FROM EXECUTIVE SESSION:

6. Consideration and possible action(s), if necessary, on matter(s) deliberated in Closed Executive Session.

Kevin Lacy moved to authorize the City Administrator and City Attorney to move forward regarding negotiations of real property and direct the Mayor to sign all associated contracts. Randy Burleigh seconded the motion, the motion carried unanimously. (5-0)

COUNCIL INQUIRY:

Pursuant to Texas Government Code Sect. 551.042 the Mayor and Council Members may inquire about a subject not specifically listed on this Agenda. Responses are limited to the recitation of existing policy or a statement of specific factual information given in response to the inquiry. Any deliberation or decision shall be limited to a proposal to place on the agenda of a future meeting.

T.J. Wilkerson said he would like to thank Mayor Countryman, Ms. Hensley, Mr. McCorquodale, Chief Solomon, and Lieutenant Belmares for helping him out with the COVID-19 drive-thru free testing that was held on September 5, 2020, at Mount Sinai and also the volunteers and Pastor Davis for reaching out. T.J. Wilkerson said it showed that the community could come together and really accomplish something worthwhile. T.J. Wilkerson said he told Pastor Davis going forward they could look at bringing other things such as blood drives, mammograms, and prostate cancer testing.

T.J. Wilkerson said he also wanted to thank Chick-Fil-A for providing lunch for everyone and all the volunteers involved. Mayor Countryman thanked T.J. Wilkerson for working so hard in organizing the event.

Kevin Lacy asked T.J. Wilkerson to share information regarding a prayer event. T.J. Wilkerson said Ms. Chery Gegelman reached out to him and said they are hosting a prayer vigil for the City on Saturday, September 26, 2020, at Cedar Brake Park starting at 9:00 a.m. to pray for the City, the officials, and leaders of the City to establish unity within the community. Kevin Lacy asked if it would be appropriate to post the event on the City Facebook page. Rebecca Huss said possibly, they would follow-up on that and see what they could do.

ADJOURNMENT

Kevin Lacy moved to adjourn the meeting at 7:23 p.m. T.J. Wilkerson seconded the motion, the motion carried unanimously. (5-0)

Submitted by: _____ Date Approved: _____
Susan Hensley, City Secretary

_____
Mayor Sara Countryman

Montgomery City Council
AGENDA REPORT

Meeting Date: October 13, 2020	**Budgeted Amount: N/A**
Department: Administrative	
Prepared By: Susan Hensley, City Secretary	**Exhibits: Beverage Permit Application Pack with Distance Map attached.**
Date Prepared: October 6, 2020	

Subject

Application by Cindy Haynes and business partner Damon Haynes, Playhouse Media, LLC, for a **BG - Wine and Beer Retailer's Permit** for Wings over Montgomery located at 14335 Liberty Street, Montgomery, as submitted by Cindy and Damon Haynes.

Recommendation

Approval of the Application for a BG – Wine and Beer Retailer's Permit for Wings over Montgomery located at 14335 Liberty Street, Montgomery, as submitted by Cindy and Damon Haynes, Playhouse Media, LLC.

Discussion

The Montgomery Code of Ordinances states the following:

> ***City Code - Sec. 6-33***. – *Approval of license application by City Council. After all the requirements for a license application under the provisions of this article have been met as determined by the City Administrator, the application shall be presented to the City Council for approval at a public meeting.*

A map showing the distance from Wings over Montgomery to the front door of the Church of Christ Church is approximately 415 feet. This map shows the establishment to be in compliance with the 300-foot distance requirement from any church, school or hospital.

Approved By

City Secretary & Director of Administrative Services	Susan Hensley, City Secretary	Date: October 6, 2020
City Administrator	Richard Tramm, City Administrator RT	Date: October 6, 2020

City of Montgomery Alcohol Beverage License Application

City of Montgomery, Texas
P.O. Box 708
Montgomery, Texas 77356
936-597-3288
www.montgomerytexas.gov

APPLICATION FOR THE SALE OF ALCOHOLIC BEVERAGE LICENSE

Date Received by the City: 10/05/2020

1. Type of Alcoholic Beverage License: (*attach completed TABC Application Form*)

   _____ (1) Category A – Off Premises Consumption Sale of All Alcoholic Beverages – Package Store

   _____ (2) Category B – Off Premises Consumption Sale of Wine, Beer or Ale.

   _____ (3) Category C – Off Premises Consumption Sale of Beer.

   X (4) Category D – On Premises Consumption Sale of Beer, Wine and Mixed beverages – Restaurant or Café, where the sale of beer, wine and mixed beverage on the premises would be incidental to the restaurant or café.

   _____ (5) Category E – On Premises Consumption Sale of Beer, Wine and Mixed beverages – Tavern, Lounge, or Bar. The sale of Beer, Wine and Mixed beverages for On-Premises Consumption being the principal business line.

   _____ (6) Category F – Warehouse storage of Beer, Wine or Liquor for Distributors – No sale of Beer for on or Off-Premises Consumption permitted on the Premises.

2. Legal Description of the property for which License is sought. (Either by Lot and Block number or by a Metes and Bounds Description: Block B, Tract 27 MONTGOMERY TOWNSITE

3. Exact Nature of the Business to be operated. (*Must be fully described in cover letter on company letterhead*).

4. Attach a Plat of the property to the Application showing the improvements, parking areas, location of signage and other structures on the property and within three hundred (300) feet to scale.

5. Description of signs and the hours they will be operated to be attached as a separate document.

6. Attach floor plan of the building in which the business is to be conducted (showing fixtures, furniture, restrooms, kitchen and other equipment).

7. Attach a verified statement stating that the building is not within three hundred (300) feet of a church, school or hospital and that the building is in compliance with the requirements of this chapter for separate and adequate toilet facilities for men and women if used for on-premises consumption of beer, liquor or wine. This can be included in cover letter.

8. Business Owner: Cindy Haynes Phone:: _____
   Address: 14335 Liberty St. Montgomery, TX 77356
   Home Address: 1817 St. Beulah Chapel Rd, 77316 Phone: —
   Check if you are leasing property: [ ]

9. Land Owner: _____ Phone: _____
   Address: _____

10. Business Partners: Damon Haynes Phone: _____
    Address: _____
    Home Address: _____ Phone: _____

This is to certify that I, Cindy Haynes have complied with all State, County, Codes and Regulations of the City of Montgomery, Texas.

C J Haynes _____ or _____

Business Owner and/or Lessee Partner if Applicable

11. A cover letter on your company's letterhead shall include a description of the nature of the business to be conducted, the names and address and interests of all persons having a direct or indirect financial interest in the property. The cover letter can include any other requested information that needs further description.

Upon receipt of this application form and confirmation that all items have been received, you will be notified of the date and time of the City Council Meeting by the City Secretary.

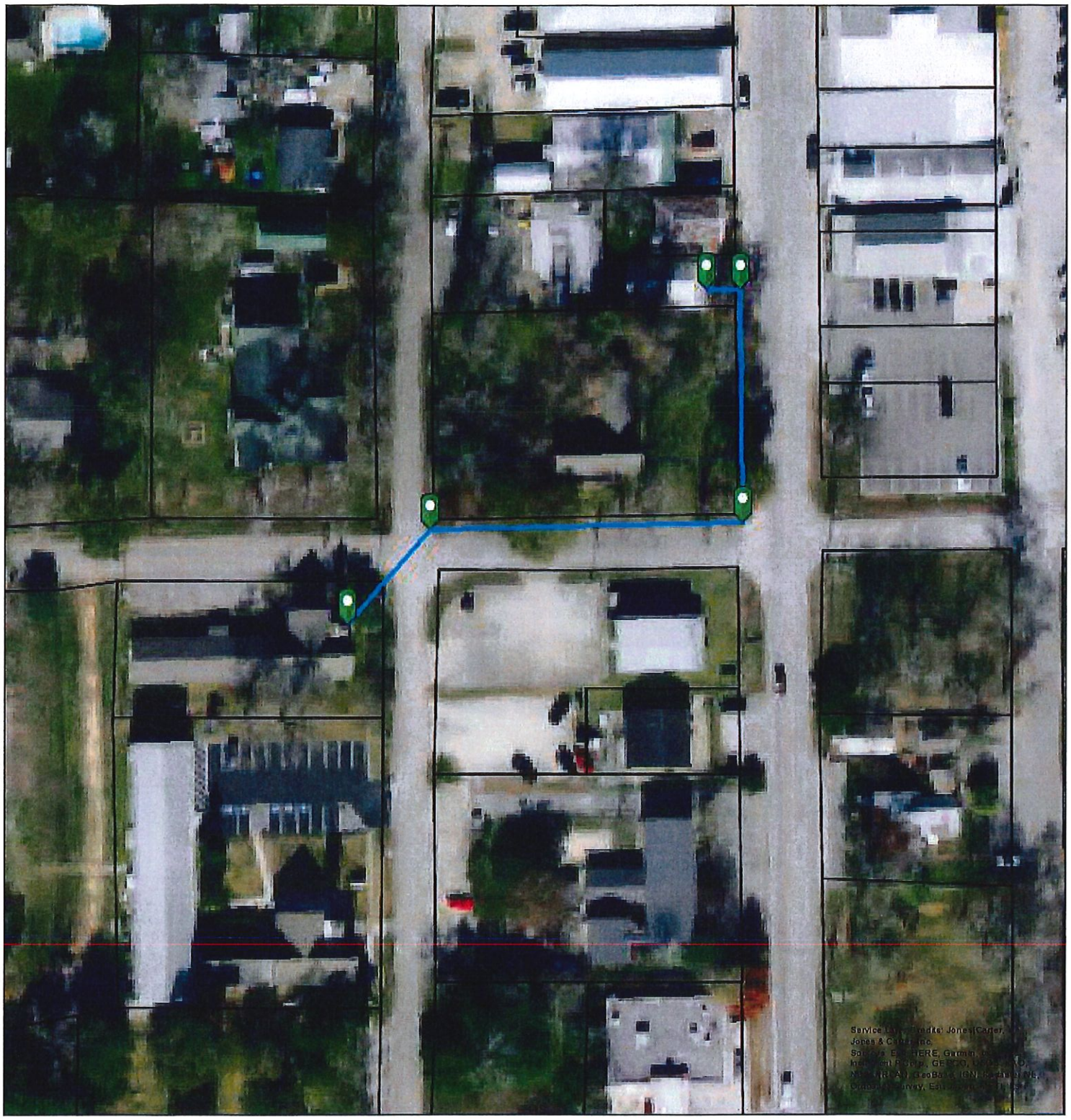
The provisions of City Code shall be considered concurrent with or in addition to the Texas Alcoholic Beverage Code, and, where a conflict may be found to exist, the provisions of the Texas Alcoholic Beverage Code shall apply. Applicants for a City alcoholic beverage license must comply with all applicable state and county codes and regulations as well as the requirements of the City Code.

It shall be unlawful for any person to manufacture, brew, distill, sell or distribute any wine, beer, liquor or other alcoholic beverage within the City, or engage in any other activity for which a license or permit is required by the Texas Alcoholic Beverage Code, without first obtaining a license so to do from the City. The annual fee for each such license shall be an amount equal to one-half the fee charged by the state for a license or permit to engage in a similar activity.

Note: The Alcoholic Beverage Code, provides that a mixed beverage permit is exempt from City permit fees during the three year period following the issuance of the permit.

If you require any additional information, please contact the City Secretary, Susan Hensley at (936) 597-3288.

Wings Over Montgomery TABC Exhibit



1 inch equals 94 feet

CITY OF MONTGOMERY
TEXAS EST 1837
BIRTHPLACE OF THE TEXAS FLAG

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439

How the TABC Measures Distance Requirements:

For Churches: Along the property lines of the street fronts and from front door to front door, and in a direct line across intersections. The distance requirement is at least 300 feet.

Wings Over Montgomery front door to Church of Christ front door:

approx. 415 feet

N
W E
S

Date: 10/8/2020

Wings Over Montgomery
14355 Liberty Street
Montgomery, TX 77356

To Whom it May Concern,

Please let this letter serve as a part of the Application for the Sale of Alcoholic Beverages License for Wings Over Montgomery located 14335 Liberty Street. This letter is in supplement to the application itself, the property plat, the description of the sign, and the floorplan, as requested within the application.

Exact Nature of the Business:

Wings Over Montgomery is a counter service restaurant cooking and serving chicken wings and associated side items, drinks, and desserts. The restaurant will be open for takeout and eat-in experiences to the extent current conditions allow.

Attach a verified statement:

The building is not within three hundred (300) feet of a church, school, or hospital. The building is in compliance with the requirements of this chapter for adequate toilet facilities for men and women.

Names and addresses and interests of all persons having a direct or indirect financial interest in the property:

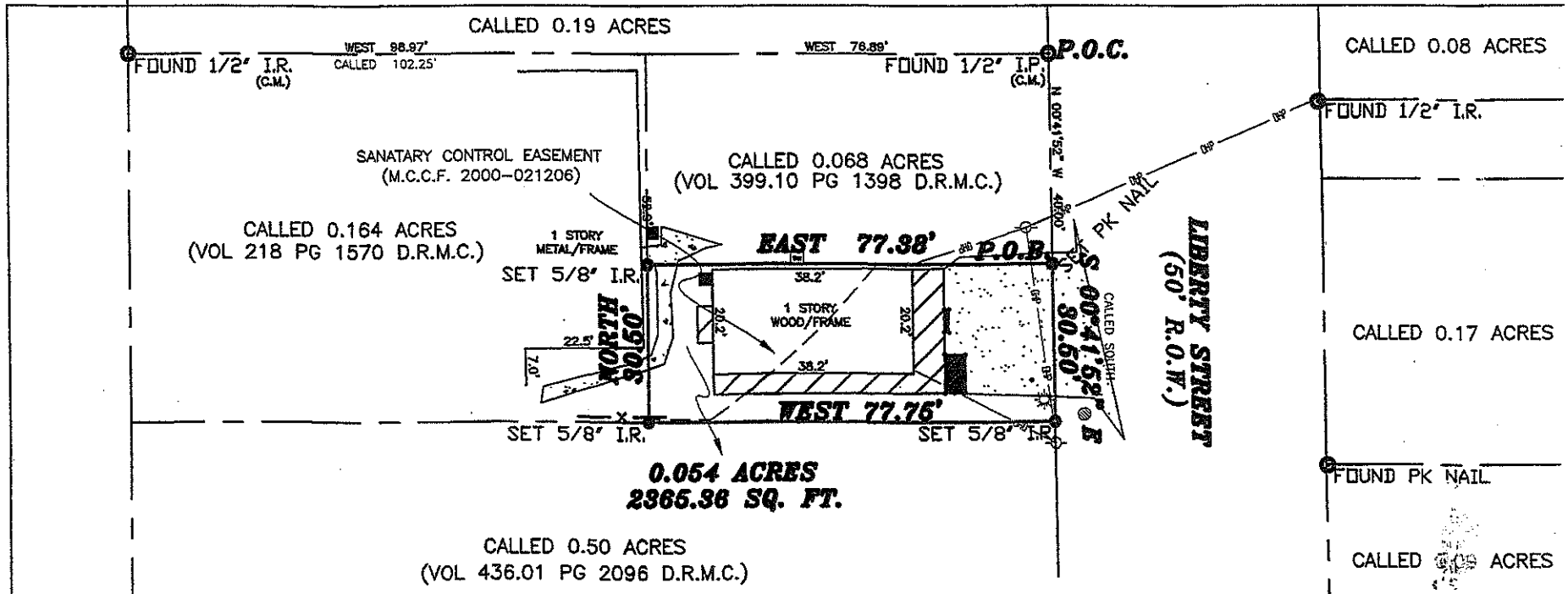
Damon Haynes
1817 Saint Beulah Chapel Road
Montgomery, TX 77316

Cindy Haynes
1817 Saint Beulah Chapel Road
Montgomery, TX 77316

First Financial Bank
14125 S Liberty St.
Montgomery, TX 77316

Respectfully submitted,

Cindy Haynes



LEGEND

These standard symbols will be found in the drawing.

- FOUND MONUMENT
- SET 5/8" I.R. W/CAP
- LIGHT POLE
- POWER POLE
- SANITARY MAN HOLE
- WATER METER
- AC PAD
- COVERED AREA
- ASPHALT
- STAIRS
- DP —— OVERHEAD POWER
- —— EASEMENT LINE

1" = 30'

Survey Reviewed and Accepted
X:
X:
Date:

NOTES:
THIS SURVEY WAS PERFORMED IN CONJUNCTION WITH A WRITTEN METES AND BOUNDS DESCRIPTION
SURVEYOR DID NOT RESEARCH SUBJECT PROPERTY FOR ANY UNDISCLOSED EASEMENTS
ANY IMPROVEMENTS SHOWN HEREON ARE NOT TO BE USED TO REESTABLISH PROPERTY LINES
BEARINGS BASED ON RECORDED PLAT/DEED OF (VOL 568, PG 216 D.R.M.C.)
FLOOD INFORMATION PROVIDED HEREON IS BASED ON SCALING THE SUBJECT TRACT ON THE FIRMS
THE INFORMATION SHOULD ONLY BE USED TO DETERMINE FLOOD INSURANCE RATES AND NOT TO
ANY ACTUAL FLOODING CONDITIONS. WE ARE NOT RESPONSIBLE FOR THE ACCURACY OF THE FIRMS

DESCRIPTION: BEING A 0.054 PARCEL			
RECORDATION: VOL 568, PG 216 D.R.M.C.	**COUNTY:** MONTGOMERY	**ST:** TX	**ABSTRACT:** JOHN CORNER A – 8
RECORD OWNER: RAMON LAUGHTER	**TITLE COMPANY:** OLD REPUBLIC TITLE		
PURCHASER: DAMON & CINDY HAYNES			**JOB #:** 1906143
ADDRESS: 14335 LIBERTY ST MONTGOMERY TX 77356			

This lot DOES NOT appear to li in the 100 year flood plain on appears to be in ZONE(s) X located by the Federal Insuranc Administration designated Flood Hazard Area by Community Panel No. 48339C0200G dated 08/18/2014

FIELD WORK:	DK, JR
DRAFTED BY:	DK, JR (07/10/2019)
CHECKED BY:	DK, SR
G.F. NUMBER	74620-GAT86

STATE OF TEXAS REGISTERED DAVID E. KING 4503 PROFESSIONAL LAND SURVEYOR

FIRM NO. 10152100

I, David E. King, Sr., Texas Registered Professional Surveyor Number 4503, hereby certify to the Title Insurer, Lender, and Purchaser referenced herein ONLY, that this plat was made from an actual survey on the ground by me under my direction; this survey substantially complies to the current Texas Society of Professional Surveyors Standards and Specifications. Not valid without both electronic seal and signature.

DAVID E. KING — 07/10/19 DATE

KLSS
KING'S LAND SURVEYING SOLUTIONS, LLC
Professional Land Surveyors
315 CHERRY STREET #C3 SPRING, TX 77373 (281)

KLSS
KING'S LAND SURVEYING
SOLUTIONS, LLC
Professional Land Surveyors
www.kingslandsurveying.com
"We set the boundaries you need in life"

METES AND BOUNDS
0.054 ACRE PARCEL
LOCATED IN THE
JOHN CORNER SURVEY,
ABSTRACT 8,
MONTGOMERY COUNTY, TEXAS

Being a 0.054 acre parcel of land situated in the John Corner Survey, Abstract 8, Montgomery County, Texas, as recorded under volume 588, page 216 Deed Records Montgomery County, being the same 0.054 acres with the basis of bearings being said deed, *and being more particularly described as follows:*

COMMENCING at a 1/2" iron pipe found for the west right of way of Liberty Street (50' R.O.W), and marking the northeast corner of the called 0.068 acres as recorded under volume 399.10, page 1398 D.R.M.C., **THENCE**, South 00° 41' 52" East, a distance of 40.00 feet to a set 5/8" iron rod with cap for the northeast corner of the herein described parcel and the **POINT OF BEGINNING;**

THENCE, South 00° 41' 52" East, (called South) a distance of 30.50 feet along the west right of way of Liberty Street to a set 5/8" iron rod with cap marking the northeast corner of the called 0.50 acres as recorded under volume 436.01, page 2096 D.R.M.C., and marking the southeast corner of the herein described parcel;

THENCE, West, a distance of 77.75 feet along a northern line of the called 0.50 acres to a set 5/8" iron rod with cap for the southeast corner of the called 0.164 acres as recorded under volume 218, page 1570 D.R.M.C., and marking the southwest corner of the herein described parcel;

THENCE, North, a distance of 30.50 feet along the eastern line of the called 0.164 acres to a set 5/8" iron rod with cap for the southwest corner of the called 0.068 acres, and marking the northwest corner of the herein described parcel;

THENCE, East, a distance of 77.38 feet along the southern line of the called 0.068 acres back to the **POINT OF BEGINNING** and containing 0.054 acres of land.

This metes and bounds description was made in conjunction with a survey plat.

David E. King, Sr .
King's Land Surveying Solutions, LLC
July 10, 2019
Job Number 1907143
Firm Number 10152100

Survey Reviewed and Accepted
X:
X:
Date: 7/30/19

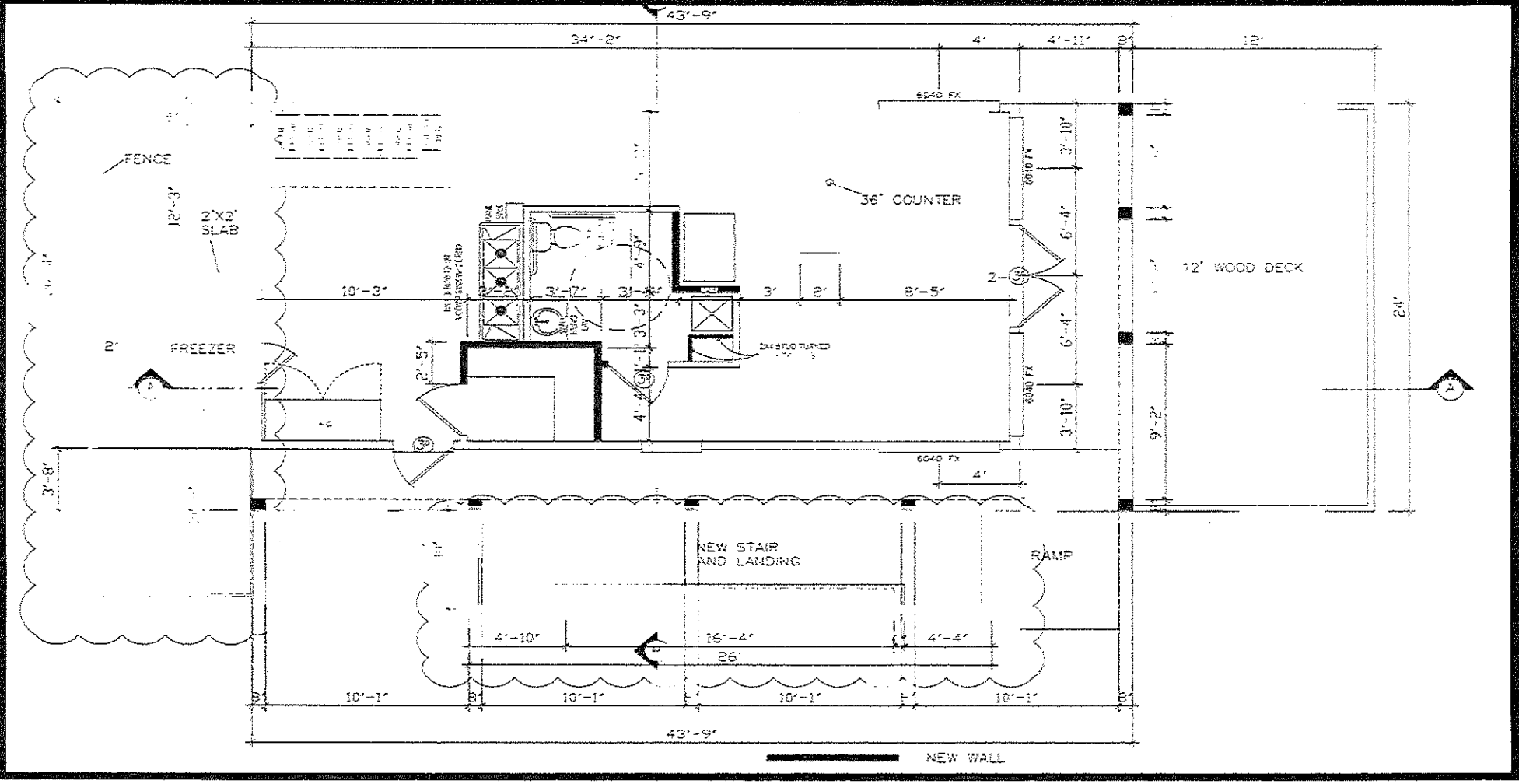
est. 2019
WINGS
over montgomery

Application for the Sales of Alcoholic Beverage License

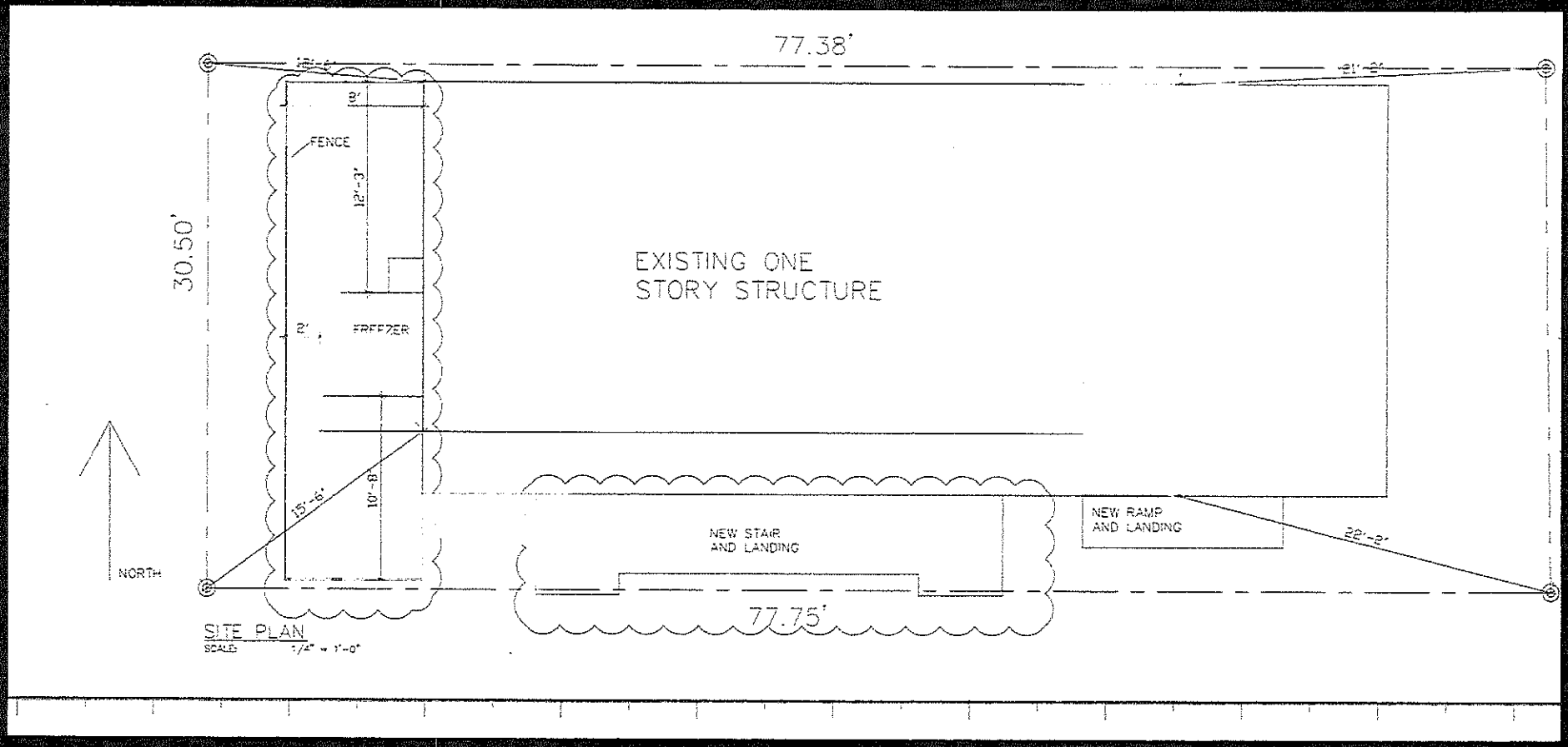
Description of Sign:

The Wings Over Montgomery sign is located in the center of the building in a black and white color scheme. The sign type is a building wall sign with a single light shining onto it for illumination. The sign itself is not illuminated. The sign will be illuminated congruent to the current business hours of the restaurant. 7 days a week from 11am-10pm.

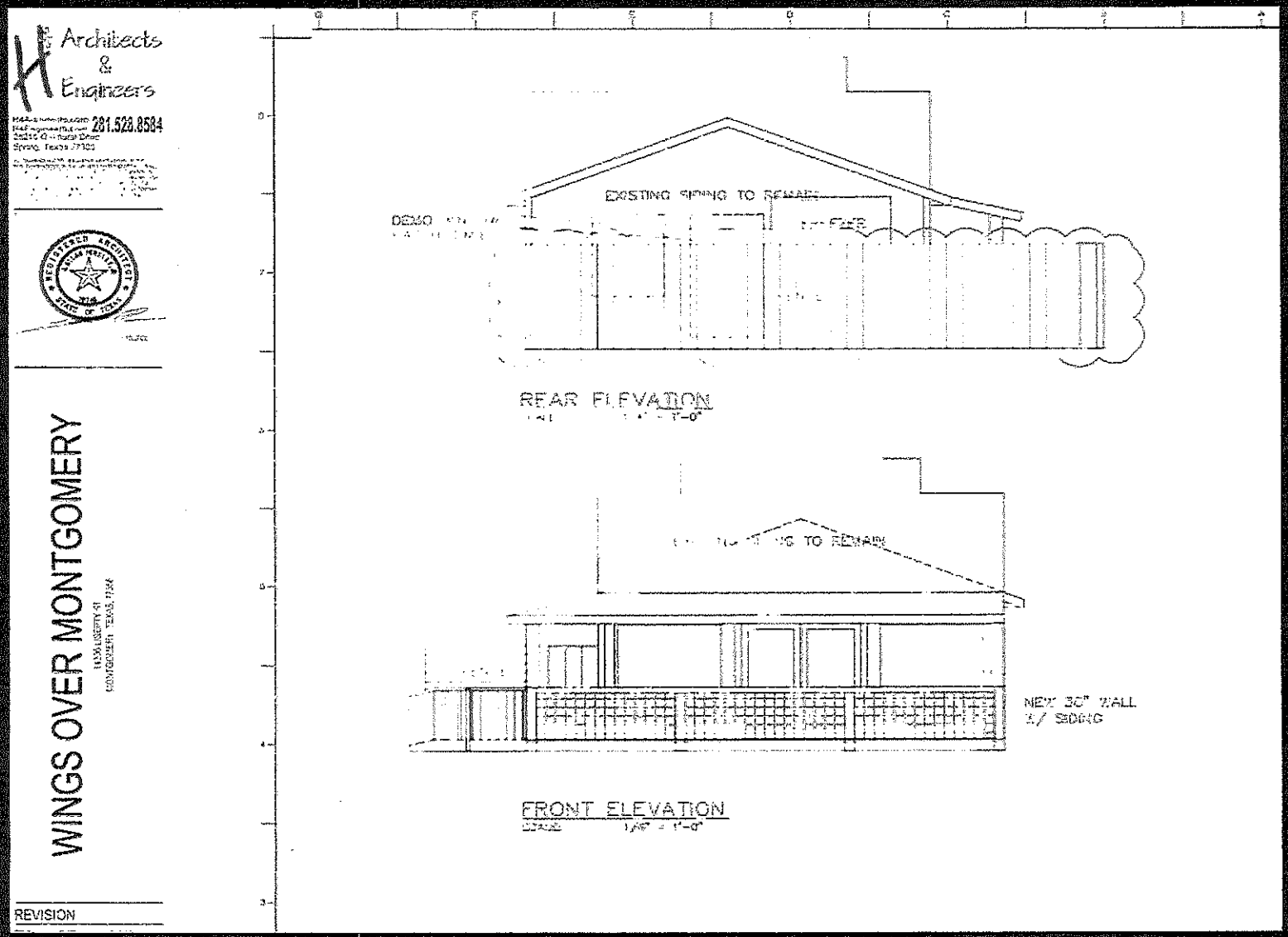
Wings Over Montgomery



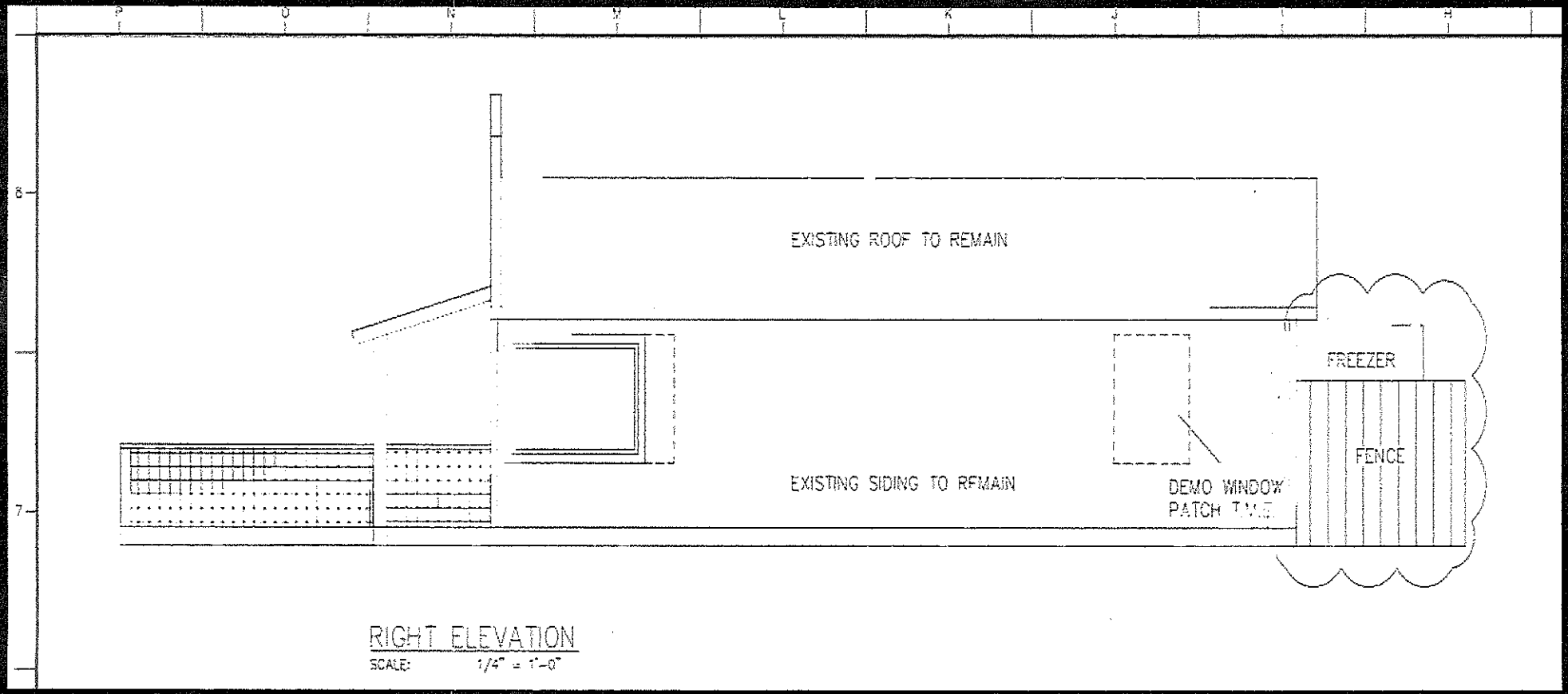
Wings Over Montgomery



gs Over Montgomery



Wings Over Montgomery



RIGHT ELEVATION

SCALE: 1/4" = 1'-0"

TEXAS ALCOHOLIC BEVERAGE COMMISSION
Texans Helping Businesses & Protecting Communities

ON-PREMISE PREQUALIFICATION PACKET

L-ON (9/2019)

Submit this packet to the proper governmental entities to obtain certification for the type of license/permit for which you are applying as required by Sections 11.37, 11.39, 11.46(b), 61.37, 61.38, 61.42 and Rule §33.13
Contact your local TABC office to verify requirements of Sections 11.391 and 61.381 as you may be required to post a sign at your proposed location 60-days prior to the issuance of your license/permit.
All statutory and rule references mentioned in this application refer to and can be found in the Texas Alcoholic Beverage Code or Rules located on our website. ***www.tabc.texas.gov/laws/code_and_rules.asp***

LOCATION INFORMATION

1. Application for: ☒ Original ☐ Add Late Hours Only License/Permit Number _____
☐ Reinstatement ☐ Reinstatement and Change of Trade Name License/Permit Number _____
☐ Change of Location ☐ Change of Location and Trade Name License/Permit Number _____

2. Type of On-Premise License/Permit

- ☒ **BG** Wine and Beer Retailer's Permit
- ☐ **BE** Beer Retail Dealer's On-Premise License
- ☐ **BL** Retail Dealer's On-Premise Late Hours License
- ☐ **BP** Brewpub License
- ☐ **V** Wine & Beer Retailer's Permit for Excursion Boats
- ☐ **MB** Mixed Beverage Permit
- ☐ **O** Private Carrier's Permit **–Brewpubs (BP) with a BG only**
- ☐ **LB** Mixed Beverage Late Hours Permit
- ☐ **MI** Minibar Permit
- ☐ **CB** Caterer's Permit
- ☐ **FB** Food and Beverage Certificate
- ☐ **PE** Beverage Cartage Permit
- ☐ **RM** Mixed Beverage Restaurant Permit with FB
- ☐ **E** Local Cartage Permit - **Wine/Beer retailers (BG) Only**

3. Indicate Primary Business at this Location
☒ Restaurant ☐ Sporting Arena, Civic Center, Hotel ☐ Bar
☐ Grocery/Market ☐ Sexually Oriented ☐ Miscellaneous _____

4. Trade Name of Location (Name of restaurant, bar, store, etc.)
Wings Over Montgomery

5. Location Address
14335 Liberty St.

City	County	State	Zip Code
Montgomery	Montgomery	TX	77356

6. Mailing Address
1817 St. Beulah Chapel Road

City	State	Zip Code
Montgomery	TX	77316

7. Business Phone No.	Alternate Phone No.	E-mail Address
832-372-0450		

OWNER INFORMATION

8. Type of Owner
☐ Individual ☐ Corporation ☐ City/County/University
☐ Partnership ☒ Limited Liability Company ☐ Other _____
☐ Limited Partnership ☐ Joint Venture
☐ Limited Liability Partnership ☐ Trust

9. Owner of Business/Applicant (Name of Corporation, LLC, etc.)
Playhouse Media, LLC

PRIMARY CONTACT PERSON

The primary contact person should be a person who can answer questions TABC may have about the application. The contact **phone and email are mandatory and must be active and updated regularly.** If additional information is needed, it will be requested from this contact person. **Delays in responding to requests may delay the processing and approval of your license/permit.**

10. Contact Person: Cindy Haynes	Relation to Business: Owner
Phone	Email

TABC DATESTAMP

11. Are you, the applicant a veteran-owned business?	☐ Yes	■ No
12. Are you, the applicant a Historically Underutilized Business (HUB)?	☐ Yes	■ No

13. As indicated on the chart, enter the individuals that pertain to your business type:
(For additional space, use Form L-OIC)

Individual/Individual Owner	Limited Liability Company/All Officers or Managers
Partnership/All Partners	Joint Venture/Venturers
Limited Partnership/All General Partners	Trust/Trustee(s)
Corporation/All Officers	City, County, University/Official

Last Name	First Name	MI	Title
Haynes	Cindy	L	Owner
Haynes	Damon	E	Owner

MEASUREMENT INFORMATION

Section 109.31 et seq.

14. Will your business be located within 300 feet of a church or public hospital? ☐ Yes ■ No

NOTE: *For churches or public hospitals measure from front door to front door, along the property lines of the street fronts and in a direct line across intersections.*

15. Will your business be located within 300 feet of any private/public school, day care or child care facility? ☐ Yes ■ No

15.a If "YES," are the facilities located on different floors or stories of the building? ☐ Yes ☐ No

NOTE: *For private/public schools, day care centers and child care facilities measure in a direct line from the nearest property line of the school, day care center or child care facility to the nearest property line of the place of business, and in a direct line across intersections.*

NOTE: *For multistory building: businesses may be within 300 feet of a day care center or child care facility as long as the facilities are located on different floors of the building.*

NOTE: *If located on or above the fifth story of a multistory building: measure in a direct line from the property line of the private/public school to property line of your place of business in a direct line across intersections vertically up the building at the property line to the base of the floor on which your business is located.*

16. Will your business be located within 1,000 feet of a private school? ☐ Yes ■ No

17. Will your business be located within 1,000 feet of a public school? ☐ Yes ■ No

60-DAY SIGN

18. If required under Section 11.391 and 61.381, enter the exact date the 60-Day sign was posted at your location.	Exact Date (MM/DD/YYYY)

ALL APPLICANTS

19. IF YOUR LOCATION IS NOT WITHIN THE CITY LIMITS, CHECK HERE ☐
I, the applicant, have confirmed I am not located in the city limits of any city, therefore, city certifications are not required.

COMPLETE THE FOLLOWING CHECKLIST BEFORE SUBMITTING YOUR APPLICATION

Per Sec. 102.01, a tied house is defined as any overlapping ownership between those engaged in the alcoholic beverage industry at different levels of the three-tier system. No person having an interest in a permit issued by TABC may secure or hold, directly or indirectly, an ownership interest in a business on a different level.

All required forms have been completed.	■ Yes ☐ No
I have reviewed all forms to ensure they are complete.	■ Yes ☐ No
I have obtained all required local and state certifications (pages 3-5).	☐ Yes ☐ No
All application packets have been notarized.	☐ Yes ☐ No
Phone numbers and email address for Contact Person are up to date.	■ Yes ☐ No
All additional documentation as required by the application packets is attached	☐ Yes ☐ No
If required, out of state criminal history checks are attached (PHS #7).	☐ Yes ☐ No ■ N/A
Certification of publication in local newspaper has been completed (page 5).	☐ Yes ☐ No ☐ N/A
A copy of the newspaper publication is attached (page 5).	☐ Yes ☐ No ☐ N/A

WARNING AND SIGNATURE

IF APPLICANT IS SHOWN AS:	WHO MUST SIGN:
Proprietorship	Individual Owner
Partnership	Partner
Corporation	Officer
Limited Partnership	General Partner
Limited Liability Partnership	General Partner
Limited Liability Company	Officer/Manager

WARNING: Section 101.69 of the Texas Alcoholic Beverage Code states: "...a person who makes a false statement or false representation in an application for a permit or license or in a statement, report, or other instrument to be filed with the Commission and required to be sworn commits an offense punishable by imprisonment in the Texas Department of Criminal Justice for not less than 2 nor more than 10 years."

I, UNDER PENALTY OF LAW, HEREBY SWEAR THAT I HAVE READ ALL THE INFORMATION PROVIDED IN THE APPLICATION AND ANY ATTACHMENTS AND THE INFORMATION IS TRUE AND CORRECT. I ALSO UNDERSTAND ANY FALSE STATEMENT OR REPRESENTATION IN THIS APPLICATION CAN RESULT IN MY APPLICATION BEING DENIED AND/OR CRIMINAL CHARGES FILED AGAINST ME. I ALSO AUTHORIZE THE TEXAS ALCOHOLIC BEVERAGE COMMISSION TO USE ALL LEGAL MEANS TO VERIFY THE INFORMATION PROVIDED.

PRINT NAME Cindy Haynes **SIGN HERE** C J Haynes

TITLE Officer / Owner

Before me, the undersigned authority, on this 16th day of September, 2020, the person whose name is signed to the foregoing application personally appeared and, duly sworn by me, states under oath that he or she has read the said application and that all the facts therein set forth are true and correct.

SIGN HERE _____ **NOTARY PUBLIC**

SEAL

JONATHAN KYLE WATKINS
Notary Public, State of Texas
Comm. Expires 07-28-2024
Notary ID 132593353

CERTIFICATE OF CITY SECRETARY (FOR MB, RM & V)

Section 11.37

I hereby certify on this _____ day of _____, 20_____, that the location for which the license/permit is sought is inside the boundaries of this city or town, in a **"wet"** area for such license/permit, and not prohibited by charter or ordinance in reference to the sale of such alcoholic beverages.

SIGN HERE _____ City Secretary/Clerk _____ City **, TEXAS**

SEAL

CERTIFICATE OF CITY SECRETARY (FOR BG & BE)

Section 11.37 & 61.37

I hereby certify on this_____ day of_____, 20_____, that the location for which the license/permit is sought is inside the boundaries of this city or town, in a **"wet"** area for such license/permit, and not prohibited by charter or ordinance in reference to the sale of such alcoholic beverages.

Election for given location was held for:

- ☐ legal sale of all alcoholic beverages
- ☐ legal sale of all alcoholic beverages except mixed beverages
- ☐ legal sale of all alcoholic beverages including mixed beverages
- ☐ legal sale of beer/wine (17%) on-premise ***AFTER*** Sept. 1, 1999
- ☐ legal sale of beer/wine (14%) on-premise ***BEFORE*** Sept. 1, 1999

OR IF ABOVE DOES NOT APPLY:

Be advised the location must have had two election passages per Section 25.14 or Section 69.17 of the TABC Code. One for beer and wine off-premise and one for mixed beverage.

- ☐ legal sale of beer and wine for off-premise consumption only

AND EITHER:

- ☐ legal sale of mixed beverages

OR

- ☐ legal sale of mixed beverages in restaurants by food and beverage certificate holders (applicant must apply for FB with BG or BE)

SIGN HERE _____ City Secretary/Clerk _____ City **, TEXAS**

SEAL

CERTIFICATE OF CITY SECRETARY FOR LATE HOURS LICENSE/PERMIT (LB & BL)

Chapters 29 & 70 et seq.

I hereby certify on this _____ day of _____, 20_____, that one of the below is correct:

☐ The governing body of this city has by ordinance authorized the sale of ***mixed beverages*** between midnight and 2:00 A.M.; or

☐ The governing body of this city has by ordinance authorized the sale of ***beer*** between midnight and _____ A.M.; or

☐ The population of the city or county where premises are located was 500,000 or more according to the 22nd Decennial Census of the United States as released by the Bureau of the Census on March 12, 2001; or

☐ The population of the city or county where premises are located was 800,000 or more according to the last Federal Census (2010).

SIGN HERE _____, **TEXAS**

City Secretary/Clerk — City

SEAL

CERTIFICATE OF COUNTY CLERK (FOR MB, RM & V)

Section 11.37

I hereby certify on this _____ day of _____, 20_____, that the location for which the license/permit is sought is in a **"wet"** area for such license/permit, and is not prohibited by any valid order of the Commissioner's Court.

SIGN HERE _____ _____ **COUNTY**

County Clerk

SEAL

CERTIFICATE OF COUNTY CLERK (FOR BG & BE)

Section 11.37 & 61.37

I hereby certify on this _____ day of _____, 20_____, that the location for which the license/permit is sought is in a **"wet"** area and is not prohibited by any valid order of the Commissioner's Court.

Election for given location was held for:

☐ legal sale of all alcoholic beverages

☐ legal sale of all alcoholic beverages except mixed beverages

☐ legal sale of all alcoholic beverages including mixed beverages

☐ legal sale of beer/wine (17%) on-premise ***AFTER*** Sept. 1, 1999

☐ legal sale of beer/wine (14%) on-premise ***BEFORE*** Sept. 1, 1999

OR IF ABOVE DOES NOT APPLY:

Be advised the location must have had two election passages per 25.14 or 69.17 of the TAB Code. One for beer and wine off-premise and one for mixed beverage.

☐ legal sale of beer and wine for off-premise consumption only

AND EITHER:

☐ legal sale of mixed beverages

OR

☐ legal sale of mixed beverages in restaurants by food and beverage certificate holders (applicant must apply for FB with BG or BE)

SIGN HERE _____ _____ **COUNTY**

County Clerk

SEAL

CERTIFICATE OF COUNTY CLERK FOR LATE HOURS LICENSE/PERMIT (LB & BL)

Chapters 29 & 70 et seq

I hereby certify on this _____ day of _____, 20_____, that one of the below are correct:

☐ The Commissioner's Court of the county has by order authorized the sale of ***mixed beverages*** between midnight and 2:00 A.M.; or

☐ The Commissioner's Court of the county has by order authorized the sale of ***beer*** between midnight and _____ A.M.; or

☐ The population of the city or county where premises are located was 500,000 or more according to the 22nd Decennial Census of the United States as released by the Bureau of the Census on March 12, 2001; or

☐ The population of the city or county where premises are located was 800,000 or more according to the last Federal Census (2010).

SIGN HERE _____ _____ **COUNTY**

County Clerk

SEAL

COMPTROLLER OF PUBLIC ACCOUNTS CERTIFICATE

Section 11.46 (b) & 61.42 (b)

This is to certify on this _____ day of _____, 20_____, the applicant holds or has applied for and satisfies all legal requirements for the issuance of a Sales Tax Permit under the Limited Sales, Excise and Use Tax Act or the applicant as of this date is not required to hold a Sales Tax Permit.

Sales Tax Permit Number _____ Outlet Number _____

Print Name of Comptroller Employee _____

Print Title of Comptroller Employee _____

SIGN HERE _____ **FIELD OFFICE** _____

SEAL

PUBLISHER'S AFFIDAVIT (FOR MB, LB, RM, BP, BG, BE, BL & V)

Section 11.39 and 61.38

Name of newspaper		ATTACH PRINTED COPY OF THE NOTICE HERE Hover over to see example
City, County		
Dates notice published in daily/weekly newspaper (MM/DD/YYYY)		
Publisher or designee certifies attached notice was published in newspaper stated on dates shown.		
Signature of publisher or designee		
Sworn to and subscribed before me on this date (MM/DD/YYYY)		
Signature of Notary Public		
SEAL		

TEXAS ALCOHOLIC BEVERAGE COMMISSION
Texans Helping Businesses & Protecting Communities

OWNERSHIP INFORMATION
Continued for Prequalification Packet

L-OIC
(09/2019)

LOCATION INFORMATION

1. Trade Name of Location
Wings Over Montgomery

2. Location Address
14355 Liberty Street

City	County	State	Zip Code
Montgomery	Montgomery	TX	77316

OWNER INFORMATION

3. Type of Owner

- ☐ Individual
- ☐ Corporation
- ☐ City/County/University
- ☐ Partnership
- ☒ Limited Liability Company
- ☐ Other _____
- ☐ Limited Partnership
- ☐ Joint Venture
- ☐ Limited Liability Partnership
- ☐ Trust

Last Name	First Name	MI	Title
Haynes	Cindy	L	Co-owner
Haynes	Damon	E	Co-owner

Montgomery City Council
AGENDA REPORT

Meeting Date: October 13, 2020	**Budgeted Amount: N/A**
Prepared By: Richard Tramm	**Exhibits: Draft Town Creek Watershed Study**

Subject

Presentation of Town Creek Watershed Study by Bill Kotlan of BGE.

Description

Observe the presentation of the study by Mr. Kotlan, who will also be available to answer questions from City Council and staff following.

Recommendation

Receive the presentation and direct staff to move forward, as appropriate.

Approved By

City Administrator	Richard Tramm RT	Date: 10/08/2020

City of Montgomery, Texas

Town Creek Watershed Study

Montgomery County, Texas

Released only for Review
By Yousef U. Husain, P.E., CFM
Texas PE 107412
Date: 09/17/2020

BGE, Inc.
TBPE Registration No. F-1046

BGE Job No. 7680-00
September 2020

Contents

Exhibits

Appendices

Executive Summary

The City of Montgomery has recently experienced significant street and structural flooding, particularly on the upstream (west) side of Farm to Market Road (FM) 149 along Town Creek Tributary No. 1 (Trib 1). It is believed that the existing crossing at FM 149 is undersized, which may be a significant source of the recent flooding which has occurred. Additionally, the area along Trib 1 between Dr. Martin Luther King, Jr (MLK) Drive and FM 149 is characterized by heavy brush and tree cover within the main channel as well as the channel overbanks, which likely impacts conveyance capacity along that portion of Trib 1.

BGE, Inc. (BGE) was tasked with developing a study which evaluated existing hydrologic and hydraulic conditions along portions of Trib 1 and Town Creek. The objectives of this study are listed below:

- Develop hydrologic and hydraulic models for Trib 1 within Montgomery City Limits and for Town Creek downstream of the confluence with Trib 1 to Buffalo Springs Drive. These models will be used to evaluate existing flood hazard conditions in the study area.

- Identify "problem areas" including undersized culverts, areas experiencing significant erosion and overbank flooding.

- Develop potential Capital Improvement Projects (CIPs) to reduce the flood hazard risk and erosion hazard risk within the Town Creek watershed, particularly for the residential area located along Trib 1, between FM 149 and MLK Drive. This is the primary objective of this analysis.

- Develop preliminary costs for recommended CIPs

- Develop design concepts for recommended CIPs to be used as a basis for detailed design. Recommended improvements shall conform to the requirements of the Disaster Recovery Grant administered by the Texas General Land Office (GLO).

The results of the existing condition hydraulic analysis, performed using HEC-RAS version 5.0.6, indicate the following:

- The existing culvert at FM 149 (2-54″ RCPs) is overtopped even during the 10-year storm event. The undersized culvert, along with the low conveyance due to heavy tree/brush cover upstream of FM 149 poses a significant flood risk to existing structures located near FM 149 and MLK Drive, many of which have previously flooded. Reducing the flood hazard in this area should be a high priority since existing homes/structures are at high risk. Potential improvements include increasing the conveyance capacity of the FM 149 crossing and clearing some of the brush/trees from

the channel and overbank area of Trib 1 upstream of FM 149. Erosion protection, if not already in place at FM 149, should also be provided due to high velocities.

- The survey elevations and LiDAR elevations indicate that there is significant erosion along both Town Creek and Trib 1, within the vicinity of the confluence. The model shows a 17-foot difference in channel flowline elevation between Trib 1 and Town Creek, and a 13-foot difference in channel flowline along Town Creek, between the reaches upstream and downstream of the confluence. If left unchecked, this erosion will continue to make its way upstream along both Town Creek and Trib 1, potentially undermining existing roadway crossings at Plez Morgan and Lone Star Parkway. Erosion/Grade control structures at these locations should be high priority improvement projects.

- The existing crossings at MLK Drive, Plez Morgan and Buffalo Springs Drive all appear to have sufficient capacity to adequately convey Atlas 14 100-year flows. MLK Drive is partially overtopped during the 10-year event, but this is a function of the roadway profile elevation rather than an undersized culvert. No conveyance improvements are recommended at MLK Drive, Plez Morgan or Buffalo Springs Drive.

- The reach of Town Creek between the Trib 1 confluence and Buffalo Springs Drive appears to fully convey Atlas 14 100-year flows. No drainage or conveyance related improvements are recommended within this reach.

A summary of the two proposed condition alternatives evaluated for this analysis is provided below. These alternatives were developed based on the existing hydraulic analysis results.

Alternative 1

- Project 1 – Remove and replace existing culverts at FM 149 with 2-10′x4′ RCBs.

- Project 2 – Clearing and Channel Improvements Along Trib 1 between MLK Drive and FM 149.

- Project 3 – Construct a proposed detention basin (minimum of 7.3 acre-feet) to offset potential adverse flow and WSEL impacts along Trib 1 downstream of FM 149.

Alternative 2

- Project 2 – Clearing and Channel Improvements Along Trib 1 between MLK Drive and FM 149.

- Project 3 – Construct a proposed detention basin (minimum of 7.6 acre-feet) to offset potential adverse flow and WSEL impacts along Trib 1 downstream of FM 149.

- Project 4 – Remove and replace existing culverts at FM 149 with 35-foot single span bridge.

Based on the results of the proposed condition hydraulic analysis documented in **Section 5**, along with the preliminary cost estimate presented in **Section 6**, proposed Alternative 1 is the recommended alternative. The total preliminary cost for the Alternative 1 improvements, including a 20% contingency, is $1,046,100.

Both Alternative 1 and Alternative 2 significantly reduce WSELs along Trib 1 upstream of FM 149 and provide a 10-year level of service for the FM 149 crossing. However, Alternative 2 is approximately $150,000 more than Alternative 1, which is a significant amount. Alternative 1 meets project objectives at a lower cost. Therefore, the following improvements are recommended based on the results of this analysis.

- **Project 1** - Remove the existing dual 54″ RCPs at the FM 149 crossing of Trib 1 and replace them with dual 10′x4′ RCBs. The results indicate that this proposed improvement will provide a 10-year level of service for the FM 149 crossing of Trib 1, which currently is overtopped during the 10-year storm event.

- **Project 2** - Widen the existing Trib 1 channel upstream of FM 149, between cross sections 2958.7 and 2258 (approximately 700 linear feet). At the very upstream end of the improvements, the channel will be widened by a total of 20 feet, but for a majority of the reach the channel will be widened by an average of 40 feet. The footprint area of the proposed channel improvements and clearing is approximately one acre. Existing brush and tree cover will be removed within the limits of the channel improvements in order to further improve conveyance capacity of the channel. The existing channel slope and side slopes are proposed to be maintained, but this may be altered if necessary, during the design phase. The footprint of the proposed channel improvements and clearing is shown on **Exhibit 4** and comprises approximately one acre.

- **Project 3** - Construct a proposed detention pond along Trib 1, immediately downstream of FM 149, in order to mitigate any potential flow and WSEL impacts along Trib 1, downstream of FM 149. The proposed detention pond will have a minimum Atlas 14 100-year volume of 7.3 acre-feet and its proposed footprint is shown on **Exhibit 4**. Final modeling and design of the pond will occur during the detailed design phase.

In addition to the above recommendations, which are entirely related to reducing the flood hazard risk along Trib 1 upstream of FM 149, the following erosion related improvements are recommended as part of a separate project.

- It is highly recommended to construct an erosion control structure along Trib 1 to prevent existing headcutting from further making its way upstream and potentially undermining Plez Morgan. Based on recent field visits, the headcutting/erosion has made its way upstream along Trib 1 but has not yet reached Plez Morgan.

- Similar to the above recommendation, it is highly recommended to construct an erosion control structure along Town Creek to prevent existing headcutting from further making its way upstream and potentially undermining Lone Star Parkway. Based on field visits and topographic survey data, the erosion/headcutting is present along Town Creek, upstream of the Trib 1 confluence but has not yet reached Lone Star Parkway.

- The Buffalo Springs Drive bridge appears to experience extremely high velocities (in excess of 8.0 fps), during the 10-year, 100-year and Atlas 14 100-year storm event. The as-built plans and field investigation indicate that there are existing erosion protection measures in place (riprap and slope paving). However, it is recommended that the riprap specified on the as-built plans be reevaluated based on the velocities documented in this study.

With the recommended improvements in place, it can be concluded that the existing flood hazard within the Town Creek watershed, particularly along Trib 1 between MLK Drive and FM 149, will be significantly reduced for storm events up to and including the Atlas 14 100-year event.

Section 1: Introduction

1.1 Study Purpose

The City of Montgomery has recently experienced significant street and structural flooding, particularly on the upstream (west) side of Farm to Market Road (FM) 149 along Town Creek Tributary No. 1 (Trib 1). It is believed that the existing crossing at FM 149 is undersized, which may be a significant source of the recent flooding which has occurred. Additionally, the area along Trib 1 between Dr. Martin Luther King, Jr (MLK) Drive and FM 149 is characterized by heavy brush and tree cover within the main channel as well as the channel overbanks, which likely impacts conveyance capacity along that portion of Trib 1.

BGE, Inc. (BGE) was tasked with developing a study which evaluated existing hydrologic and hydraulic conditions along portions of Trib 1 and Town Creek. The limits of the detailed hydraulic analysis prepared for this study are shown on **Exhibit 1** and are described below:

- Town Creek from 1,000 feet downstream of Buffalo Springs Drive Bridge (downstream limit) to just downstream of the Lone Star Parkway (upstream limit).

- Town Creek Trib 1 from the Town Creek confluence to FM 1097.

This study will ultimately provide recommendations for capital improvement projects (CIPs) intended to reduce the flood hazard risk, particularly for the residential area located within the vicinity of FM 149. The objectives of this study are listed below:

- Develop hydrologic and hydraulic models for Trib 1 within Montgomery City Limits and for Town Creek downstream of the confluence with Trib 1 to Buffalo Springs Drive. These models will be used to evaluate existing flood hazard conditions in the study area.

- Identify "problem areas" including undersized culverts, areas experiencing significant erosion and overbank flooding.

- Develop potential CIPs to reduce the flood hazard risk and erosion hazard risk within the Town Creek watershed, particularly for the residential area located along Trib 1, between FM 149 and MLK Drive. This is the primary objective of this analysis.

- Develop preliminary costs for recommended CIPs

- Develop design concepts for recommended CIPs to be used as a basis for detailed design. Recommended improvements shall conform to the requirements of the Disaster Recovery Grant administered by the Texas General Land Office (GLO).

1.2 Existing Conditions

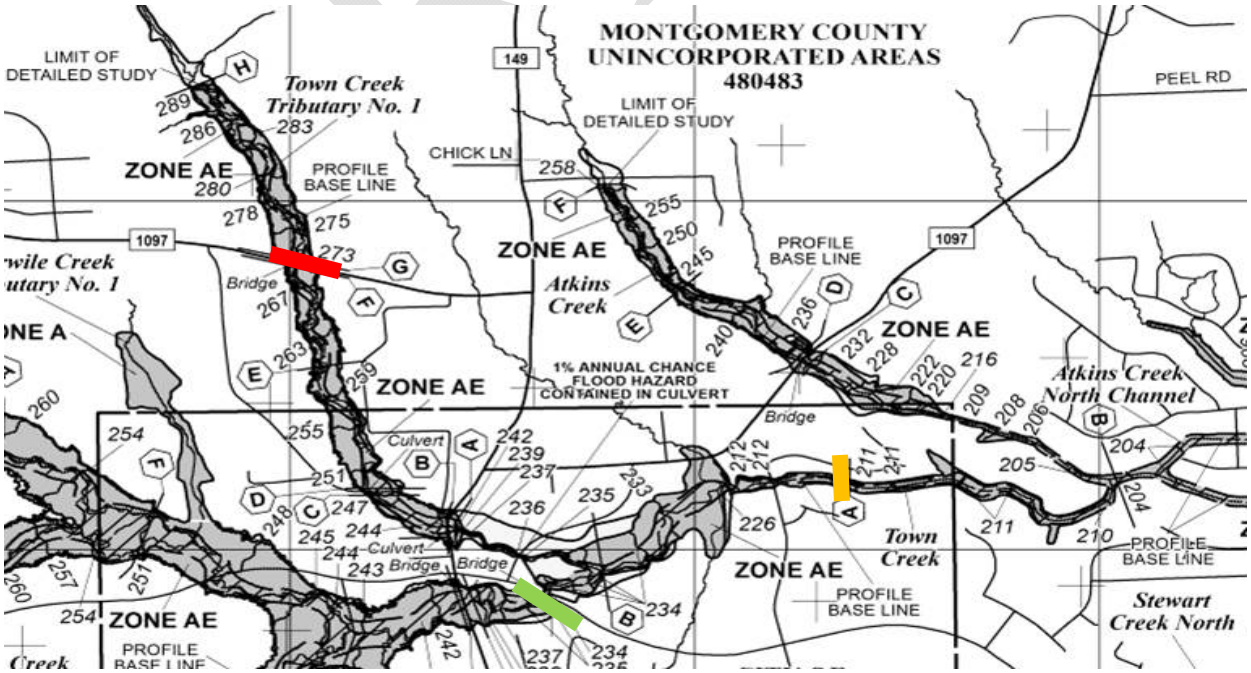
1.2.1 Watershed Description and Effective FIRM Panel

The Town Creek watershed in its current condition is mostly undeveloped, with a composite impervious cover value of approximately 10%. This indicates that there is significant potential for future development within the Town Creek watershed. The average watershed slope for the study area was determined to be approximately 2.5%, which is a moderately steep slope. The channel slope of Trib 1 within the study area was determined to be 0.4%, while the Town Creek channel slope downstream of the Trib 1 confluence was determined to be 0.2%.

The total Town Creek watershed drainage area just downstream of the Trib 1 confluence (Town Creek effective cross section 'B') was determined to be approximately 6.40 square miles, which is consistent with the FEMA effective Flood Insurance Study (FIS) study, which lists a drainage area of 6.35 square miles at the same location. Subwatershed boundaries delineated for this analysis are shown on **Exhibit 2**. Town Creek flows into Atkins Creek which ultimately outfalls into Lake Conroe, approximately 7,000 feet downstream of the Town Creek and Atkins Creek confluence. **Appendix A** contains FEMA effective documentation for Town Creek and Trib 1, including Discharge Summary Tables and Floodway Data Tables.

Figure 1.1 shows effective FIRM Panel 48339C0200G (effective August 18, 2014) within the vicinity of the Trib 1 confluence with Town Creek. The red line in **Figure 1.1** represents the upstream limit of hydraulic analysis for this study along Trib 1. The green and orange lines represent the approximate upstream and downstream limits of hydraulic analysis along Town Creek.

Figure 1.1 – Effective FIRM Panel 48339C0200G



A few observations about **Figure 1.1** are provided below:

- The effective 100-year and 500-year floodplains along Trib 1 are significantly wider upstream of FM 149 when compared to downstream, which indicates this crossing is a likely bottleneck. Additionally, the Trib 1 channel and overbank area have significantly more tree cover upstream of FM 149 when compared to downstream, which also likely impacts conveyance. Between FM 1097 and FM 149 both the 100-year and 500-year floodplains are not contained within the banks of Trib 1.

- The Town Creek effective 100-year and 500-year floodplains near the downstream end of the study limits (yellow line) appear to be fully contained within the channel. Both floodplains appear to be fully contained within the channel the remainder of the way to Lake Conroe.

1.2.2 Summary of Crossings Within Study Area

A summary of roadway crossings along Trib 1 and Town Creek, within the study area, is provided below. Photographs of the listed crossings obtained on a recent field visit are provided in **Appendix B**.

- MLK Drive – This culvert along Trib 1 consists of a single 108″ steel pipe (64 square feet flow area). As-built plans were obtained for this crossing and are also provided in **Appendix B**.

- FM 149 – This crossing along Trib 1 is located downstream of MLK Drive and consists of dual 54″ RCPs, which were measured in the field. BGE was not able to obtain as-built plans for this crossing. The total flow area of the culverts at FM 149 is approximately 32 square feet, which is half of the flow area available at MLK Drive.

- Plez Morgan – This crossing along Trib 1 consists of dual 9′x9′ reinforced concrete boxes (RCBs). As-built plans were obtained for this crossing and are also provided in **Appendix B**. The total flow area at this crossing is 162 square feet, which is significantly greater than the flow area available at FM 149.

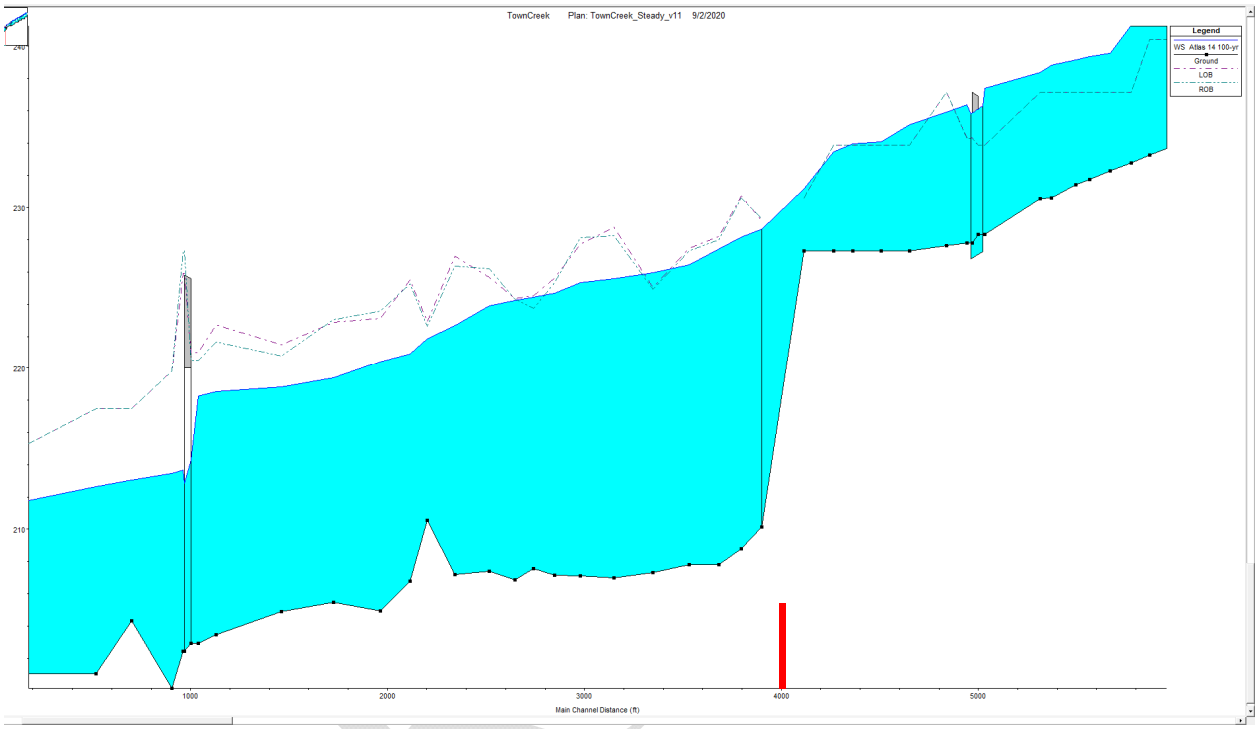
- Buffalo Springs Drive – This crossing is located along Town Creek, downstream of the Trib 1 confluence and consists of a 90-foot single span bridge, with 2:1 sloping abutments. As-built plans for this bridge were obtained and are provided in **Appendix B**. This bridge was significantly damaged during a flood event in May 2016 and was out of operation until it could be repaired and improved. Improvements consisted of adding concrete slope paving and riprap within the vicinity of the bridge.

1.2.3 Existing Erosion Issues

The same May 2016 event that significantly damaged the Buffalo Springs Drive bridge also caused an existing erosion control structure, located along Town Creek approximately 400 feet upstream of Buffalo Springs Drive, to fail. The failure of the existing erosion control structure

has led to significant head cutting, which has made its way upstream to at least the confluence of Trib 1 and Town Creek (and likely beyond). This has also resulted in a significant deposit of sediment downstream of the former erosion control structure. **Figure 1.2** contains a plot which shows the channel flowline profile of Trib 1 and Town Creek within the vicinity of the confluence.

Figure 1.2 – Trib 1 and Town Creek Channel Profile



The large drop in channel flowline which occurs around Station 4000 (indicated by the red line) occurs at the Trib 1 and Town Creek confluence. Topographic survey data was obtained along Town Creek from the confluence to Buffalo Springs Drive and this data indicates a Town Creek flowline elevation of approximately 210 feet at the confluence.

Channel survey data was not obtained along Trib 1, so elevation data for Trib 1 is based off 2018 LiDAR. The LiDAR flowline elevation at the downstream end of Trib 1 is approximately 227 feet, which indicates an estimated drop in channel flowline elevation of approximately 17 feet. The culvert located upstream of the drop is Plez Morgan; based on field investigation and survey shots obtained at the Plez Morgan crossing, the head cutting has not made its way to Plez Morgan (approximately 1,000 feet upstream of the confluence) yet. However, if left unchecked the erosion will continue to make its way upstream and will put Plez Morgan at risk of being undermined.

A similar situation occurs along Town Creek between the flowline elevations upstream and downstream of the Trib 1 confluence. Survey data was not obtained along Town Creek upstream of the confluence, but 2018 LiDAR indicates a channel flowline elevation of 223 feet

which is 13 feet higher than the Town Creek flowline elevation downstream of the confluence. If left unchecked, the erosion will likely continue to make its way upstream and will put Lone Star Parkway (approximately 1,000 feet upstream of the confluence) at risk of being undermined.

As previously mentioned, the erosion has also led to downstream sediment deposit. The channel flowline elevation shown on the Buffalo Springs Drive as-builts (from January 2018, provided in **Appendix B**) was approximately 194 feet. The channel cross section (based on July 2020 field survey) downstream of Buffalo Springs Drive, has a flowline elevation of approximately 202 feet. This indicates a significant amount of sediment deposit which has occurred along Town Creek since 2018. **Figure 1.3** contains a photo of the Buffalo Springs Drive Bridge, where noticeable amounts of sediment appear to be continually deposited.

Figure 1.3 – Town Creek at Upstream Side of Buffalo Springs Drive

1.3 Limitations and Assumptions

Limitations and assumptions associated with this study are described below.

- 2018 LiDAR was used to determine elevations for a significant portion of the study area. Field survey data was only obtained along Town Creek (within channel banks) from the Trib 1 confluence to Buffalo Springs Drive. All other elevations utilized for this analysis were obtained from 2018 TNRIS LiDAR.
- Record drawing information was not available for the FM 149 crossing. The existing culverts were field measured and the deck elevation data input into the HEC-RAS model was obtained from 2018 LiDAR.
- Roadway profile, culvert data and bridge data for MLK Drive, Plez Morgan and Buffalo Springs Drive was obtained from as-built data provided in **Appendix B**.
- The portion of the Town Creek watershed upstream of the Trib 1 confluence was modeled as a single drainage area (TCUS). This methodology was determined to be appropriate since the majority of this drainage area is located upstream of the primary area of interest (FM 149 along Trib 1).
- Finished floor elevations (FFEs) were not obtained for any of the existing structures located along Trib 1, upstream of FM 149 that previously flooded.

1.4 Data Sources

Data from the following sources was obtained, reviewed and used when appropriate to develop the existing and proposed condition models:

- TNRIS 2018 Digital Elevation Model (DEM)
- As-Built plans for Roadway Crossings at MLK Drive, Plez Morgan and Buffalo Springs Drive
- Google Earth and Nearmap Aerial Imagery
- BGE Topographic Survey Data of Town Creek (Between Trib 1 confluence and Buffalo Springs Drive)
- Effective FIS Data and FIRM Panels for Town Creek Watershed

1.5 Project Datum

The elevations in the report, tables and models are based on the NAVD 1988 (no adjustment). An adjustment of +0.92 feet was added to the TNRIS 2018 DEM. This adjustment was developed by BGE, Inc. to ensure consistency between the 2018 LiDAR data and the 2020 field survey data.

Section 2: Hydrologic Analysis

2.1 Methodology

Hydrology for this analysis was modeled using HEC-HMS version 3.4. This hydrologic analysis follows criteria outlined in the *Drainage Criteria Manual for Montgomery County, Texas* (the manual), dated November 1989 and updated July 2019. The pre-Atlas 14 10-year, 50-year and 100-year storm events, along with the Atlas 14 100-year storm event were evaluated as part of this analysis. The pre-Atlas 14 events were evaluated since all existing culverts and bridges within the study area were designed based on pre-Atlas 14 hydrology. **Table 2.1** contains point rainfall depths for the three storm events evaluated for this study. The results presented in **Table 2.1** indicate that the 24-hour, 100-year rainfall depth increases from 12.17″ to 16.10″ as a result of Atlas 14, which is an increase of approximately 32%.

Table 2.1 – 24-Hour Point Rainfall Depths, 10-Yr, 50-Yr, 100-Yr and Atlas 14 100-Yr Storm Events

Frequency Event	5 Min RF (in.)	15 Min RF (in.)	1 Hour RF (in.)	2 Hour RF (in.)	3 Hour RF (in.)	6 Hour RF (in.)	12 Hour RF (in.)	24 Hour RF (in.)
10-yr	0.68	1.49	3.14	4.13	4.61	5.56	6.72	8.09
50-yr	0.83	1.84	4.09	5.38	6.00	7.35	9.15	10.55
100-yr	0.89	2.00	4.48	5.88	6.70	8.32	10.31	12.17
Atlas 14 100-yr	1.23	2.43	4.64	6.76	8.36	11.10	13.60	16.10

Time of concentration (Tc) was determined for these areas using the Soil Conservation Service (SCS) Technical Release 55 (TR-55) methodology and the Clark Unit Hydrograph (UH) method was utilized to obtain flow hydrographs as specified in the manual. The Exponential Method was utilized to obtain runoff losses. Runoff loss parameters utilized for this analysis were obtained from the manual and are documented in **Table 2.2**.

Table 2.2 – Hydrologic Loss Parameters Used for Analysis, Exponential Loss

Initial Range (in)	Initial Coefficient $((in/hr)^{(1-x)}$	Coef Ratio	Exponent
2.5	0.2	2.0	0.55

The storage coefficient (R) value was determined using Equations 2.10 through 2.12 in the manual. Drainage areas were delineated primarily using 2018 TNRIS LiDAR data. Impervious cover calculations were prepared using recent aerials (to reflect current levels of development) and values presented in Table 2.14 of the manual. Impervious cover values for any land use type not found in the manual were obtained from the Harris County Flood Control District *Policy Criteria and Procedure Manual*, dated July 2019. **Appendix C** contains the drainage area acreages, impervious cover calculations and Tc&R calculations for all drainage areas delineated for this analysis. Drainage area boundaries delineated for this analysis are shown on **Exhibit 2**.

2.2 Hydrologic Routing

Three routing reaches were included in HEC-HMS to account for the attenuation effects of channel and floodplain volume. Routing reaches were also utilized to evaluate hydrologic impacts between existing and proposed conditions. The Modified Puls routing method was used for this analysis, as recommended by the manual. Storage-discharge relationships for each reach were developed from a storage volume-storage discharge (SVSQ) HEC-RAS model. The storage-discharge relationships for each reach, along with output from the HEC-RAS SVSQ model are provided in **Appendix C**. All hydrologic junctions are shown on **Exhibit 2**.

The three routing reaches are described below:

- Trib1_Reach1 – This reach represents the portion of Trib 1 between FM 1097 and MLK Drive (HEC-RAS cross sections 9237 and 3498). The downstream end of this reach is junction 'Trib1_JCT1'.

- Trib1_Reach2 – This reach represents the portion of Trib 1 between MLK Drive and the confluence with Town Creek (HEC-RAS cross sections 3498 and 197). This reach is located between junctions 'Trib1_JCT1' and 'Trib1_JCT2'.

- TC_Reach1 – This reach represents the portion of Town Creek between the Trib 1 confluence and Buffalo Springs Drive (HEC-RAS cross sections 3921 and 1060). This reach is located between junctions 'TC_JCT1' and '1146_JCT1'.

2.3 Drainage Areas and Hydrologic Results

Six drainage areas were delineated as a part of this analysis. All six drainage areas are depicted on **Exhibit 2**. Time of concentration, storage coefficient and impervious cover calculations for all six drainage areas are all provided in **Appendix C**. A description of each drainage area is provided below.

- Trib1US – This is an approximately 414-acre drainage area which consists of the area draining to Trib 1, upstream of FM 1097. The upstream limit of the hydraulic analysis is at FM 1097, which is why the overall Tributary 1 drainage area was subdivided in this manner. Additionally, one of the landmarks listed in the FEMA effective FIS

Discharge Tables along Trib 1 is "At FM 1097", so delineating the drainage area boundary in this manner was thought to provide a good comparison with effective data.

- Trib1DS_A – This is an approximately 140-acre drainage area which represents the area draining to Trib 1 between FM 1097 and MLK Drive.

- Trib1DS_B – This is an approximately 120-acre drainage area which represents the area draining to Trib 1 between MLK Drive and the Trib 1 confluence. The Trib 1 area downstream of FM 1097 was subdivided in order to better evaluate hydrologic impacts between existing and proposed conditions, since the proposed improvements are anticipated to be located within this vicinity. This drainage area the highest impervious cover value on account of the existing school complex and residential areas being located there.

- TC_US – This is an approximately 3,400-acre drainage area which represents the portion of the Town Creek watershed upstream of the Trib 1 confluence.

- RoTrib1 – This is an approximately 280-acre drainage area which drains into Town Creek just upstream of Buffalo Springs Drive from the north.

- TCDS - This is an approximately 290-acre drainage area which drains into Town Creek just upstream of Buffalo Springs Drive from the south.

Table 2.3 contains a summary of Time of Concentration, storage coefficient (R) Impervious Cover and peak flows (all events) for the six drainage areas delineated for this analysis.

Table 2.3 – Drainage Area Hydrologic Parameters and Peak Flows

Drainage Area	Area (ac.)	Tc (hr)	R	%Imp	10-yr Qp (cfs)	50-yr Qp (cfs)	100-yr Qp (cfs)	Atlas 14 100-yr Qp (cfs)
Trib1US	415	3.50	0.94	14	536.9	718.4	808.3	1,001.7
Trib1DS_A	139	2.29	0.43	22	263.9	349.6	387.9	448.9
Trib1DS_B	121	0.92	0.26	40	381.6	498.2	547.9	595.3
TCUS	3,420	5.44	2.14	21	2,892.0	3,915.9	4,460.7	5,823.8
RoTrib1	284	3.28	0.63	20	414.6	552.1	618.6	753.9
TCDS	292	1.79	0.37	25	644.2	851.0	940.1	1,056.4

The Atlas 14 100-year peak flows are on average 19% larger than the pre-Atlas 14 100-year peak flows. **Table 2.4** contains a summary of hydrologic junction peak flows, for all evaluated storm events (refer to **Exhibit 2** for junction locations). Existing condition HEC-HMS output is also provided in **Appendix C**.

Table 2.4 – Hydrologic Junction Peak Flows

HEC-HMS Junction ID	Description	10-yr Qp (cfs)	50-yr Qp (cfs)	100-yr Qp (cfs)	Atlas 14 100-yr Qp (cfs)
Trib1_JCT1	Trib 1 at MLK Drive	488.2	680.5	787.9	1,094.8
Trib1_JCT2	Trib 1 just u/s of Confluence	525.6	713.5	824.2	1,173.5
TC_JCT1	Town Creek d/s of Trib 1	3,360.9	4,572.3	5,227.2	6,858.9
1146_JCT1	Town Creek at Buffalo Springs Drive	3,568.0	4,873.8	5,594.0	7,442.8

Table 2.5 contains a comparison of effective (pre-Atlas 14) 100-year peak flows determined for this study and FEMA effective peak flows at four different locations in the study area. These four locations within the study area were selected since they are listed in the effective FIS Discharge Summary Tables. The results presented in **Table 2.5** show that peak flows at three of the comparison locations are within 5% of the FEMA effective flows. BGE calculated peak flows are larger than FEMA effective peak flows at these three locations. Calculated peak flows at the downstream end of Trib 1 are lower than effective flows, but still within approximately 15%.

The increase between FM 1097 and FM 149 is not as significant in the BGE model when compared to the effective model. This is a result of the timing of peak flows from subareas 'Trib1DS_A' and 'TribDS_B' occurring approximately 2-3 hours earlier than the 100-year peak flow along Trib 1 at FM 149 in the BGE model. Peak flows in the BGE model are also attenuated by routing reaches 'Trib1_Reach1' and 'Trib1_Reach2'.

Table 2.5 – Comparison of Calculated and FEMA Effective 100-Year Peak Flows

Stream	Location	Description	Effective 100-yr Qp (cfs)	BGE 100-yr Qp (cfs)	% Difference
Trib 1	At FM 1097	-	803	808	0.6
Trib 1	At FM 149	-	974	824	-15.4
Town Creek	At FM 149	-	4,285	4,461	4.1
Town Creek	XS 'B'	Just d/s of Confluence	5,017	5,227	4.2

Section 3: Existing Hydraulic Analysis

3.1 Methodology and Model Development

All hydraulic analysis for this study was performed using HEC-RAS version 5.0.6 (steady flow). The RASMapper feature within HEC-RAS version 5.0.6 was utilized to draw cross sections, stream centerlines and determine channel and overbank reach lengths. A surface developed from a combination of TNRIS 2018 LiDAR and field survey data was used for this analysis. The field survey data was limited to the Town Creek main channel, between the Trib 1 confluence and Buffalo Springs Drive. Field survey data was obtained via a drone flown in July 2020; **Figure 3.1** shows the extent of survey obtained, along with aerial imagery developed from the drone flight. One-foot contours developed from the survey data are shown as the dark green lines in **Figure 3.1**. For reference, Buffalo Springs Drive is located on the far-right side of the aerial image, while the roadway seen at the far-left side is Plez Morgan.

Figure 3.1 – Extent of Topographic Survey – Town Creek

The effective 10-year, 50-year, 100-year and Atlas 14 100-year storm events were evaluated as part of this analysis. An SVSQ hydraulic model was also developed to determine storage-volume-discharge relationships for Trib 1 and Town Creek reaches to ultimately be used for evaluating hydrologic impacts of proposed improvements. Peak flows used for the steady flow hydraulic analysis were mostly obtained from hydrologic junctions and subareas in the HEC-

HMS model. Flow change locations utilized in RAS are listed in **Table 3.1** below. Peak flows at cross sections 2465 and 1388 (sections upstream of FM 149 and Plez Morgan) do not correspond to any hydrologic junctions or subareas, peak flows at these locations were interpolated based on peak flows at Trib1_JCT1 and Trib1_JCT2. **Exhibits 3A** through **3C** show the extent and layout of HEC-RAS cross sections developed for this analysis.

Table 3.1 – Flow Change Locations, Trib 1 and Town Creek

RAS Reach	XS	Description	10-yr Q (cfs)	50-yr Q (cfs)	100-yr Q (cfs)	Atlas 14 100-yr Q (cfs)
Trib 1	9237	Trib 1 d/s of FM 1097	536.9	718.4	808.3	1,001.7
Trib 1	3498	Trib 1 u/s MLK	488.2	680.5	787.9	1,094.8
Trib 1	2465	Trib 1 u/s FM 149	501.3	692.1	800.6	1,122.0
Trib 1	1388	Trib 1 u/s Plez Morgan	513.3	702.6	812.2	1,148.0
Trib 1	348	Trib 1 near confluence	525.6	713.5	824.2	1,173.5
TC_Main	4986	Town Ck, d/s Lone Star Pkwy	2,892.0	3,915.9	4,460.7	5,823.8
DS_Trib1	3921	Town Ck, d/s Trib 1 confluence	3,360.9	4,572.3	5,227.2	6,858.9
DS_Trib1	1147	Town Ck u/s Buffalo Springs Dr	3,568.0	4,873.8	5,594.0	7,442.8

A normal depth boundary condition based on the existing channel slope between the Trib 1 and Town Creek confluence and Buffalo Springs Drive was utilized as the downstream boundary condition for this analysis. A 'known WSEL' boundary condition was not used since downstream conditions have changed significantly relative to FEMA effective data (and appear to be continually changing due to erosion and sediment deposit). Therefore, it was determined that a normal depth boundary condition was appropriate for this steady flow hydraulic analysis.

Manning's 'n' values for culverts, main channels and overbanks were obtained from the manual. A description of the different Manning's 'n' values utilized for main channels and overbanks is provided in **Table 3.2** below.

Table 3.2 – Manning's 'n' Values and Land Use Types Utilized for Hydraulic Analysis

Land Use Description	Manning's 'n' Value
MAIN CHANNEL	
Dense Tree Cover/Brush	0.1
Moderate Tree/Brush Cover	0.075
Sparse Trees/Brush	0.05
Grass	0.04
FLOODPLAIN/OVERBANK	
Dense Tree Cover	0.12
Light Tree Cover/Brush	0.06
Open Field, Short Grass	0.05
Detention	0.04
Residential Areas	0.035
Pavement (Parking Lots)	0.016

3.2 Existing Condition Hydraulic Analysis Results

Section 3.2 documents existing condition water surface elevations (WSELs), inundations at roadway crossings and channel velocities. Full HEC-RAS output for all of the evaluated storm events for both Town Creek and Trib 1 is provided in **Appendix D**. Existing condition 100-year and Atlas 14 100-year floodplain inundation boundaries are depicted on **Exhibits 3A** through **3C**.

3.2.1 Water Surface Elevation Results – Trib 1

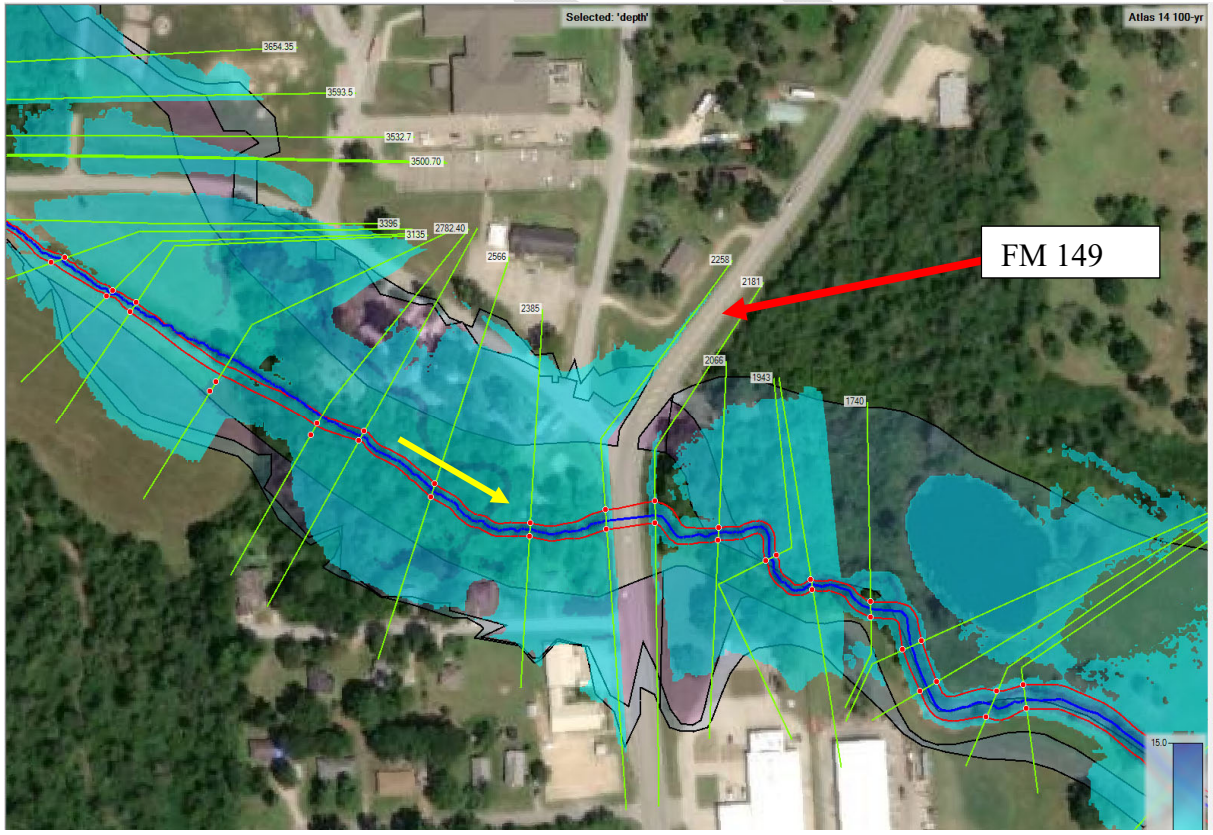
Table 3.3 shows water surface elevations along Trib 1, from just upstream of MLK Drive down to the Town Creek confluence, for the 10-year, 100-year and Atlas 14 100-year storm events. 50-year existing condition WSEL results are provided in **Appendix D**. A summary of the overall results is presented below.

- *Upstream of MLK Drive* – This stretch of Trib 1 is characterized by heavy tree cover both within the main channel as well as within the overbank. As a result, the flows for all evaluated storm events are not contained within the main channel banks and the floodplains extend well beyond the channel banks (even during the 10-year event). For

reference, the average channel top width in this reach is 20 feet, while the average 10-year and 100-year floodplain top widths are 260 feet and 305 feet, respectively.

- *MLK Drive to FM 149* – This stretch of Trib 1 is characterized by a mix of short grass overbank and relatively clean main channel closer to MLK and heavy tree cover in both channel and overbank closer to FM 149. The heavy tree cover coupled with the undersized culverts at FM 149 results in wide floodplains throughout this reach, which is consistent with the FEMA effective 100-year and 500-year floodplains. The average effective 100-year and Atlas 14 100-year floodplain top widths throughout this reach are 400 feet and 500 feet, respectively. The average existing 10-year floodplain width within this reach is also approximately 400 feet. **Figure 3.2** shows a screenshot of the Atlas 14 100-year inundation limits near FM 149 (turquoise shading). The black lines in the image below represent the FEMA effective 100-year and 500-year floodplain boundaries. The red lines in the image below indicate the channel bank stations. There also appear to be a significant number of existing structures located within the Atlas 14 100-year inundation limits, on the upstream side of FM 149. The yellow arrow in **Figure 3.2** indicates the flow direction.

Figure 3.2 – Atlas 14 100-Year Inundation Limits Upstream of FM 149



- *FM 149 to Plez Morgan* – This stretch of Trib 1 also consists of a mix of different land covers, including heavy tree cover within the left overbank near FM 149 and short grass

closer to Plez Morgan. The effective 100-year and Atlas 14 100-year floodplains are significantly narrower within this reach relative to the upstream reach but flows for these events are not fully contained within the channel banks. Average effective 100-year and Atlas 14 100-year top widths are approximately 230 feet and 300 feet, respectively. There is an existing pond located in the left overbank in the middle of this reach which could potentially be expanded or incorporated into a proposed detention pond in the future. Although the Atlas 14 100-year floodplain is not contained within the channel banks throughout this reach, no existing structures appear to be located within the limits of inundation.

- *Plez Morgan to Town Creek Confluence* – Both the effective 100-year and Atlas 14 100-year flows are nearly entirely contained within the channel throughout a majority of this reach. This area is currently experiencing significant head cutting and erosion issues (reference **Section 1.2.3**) which will get worse and continue to move upstream if left unchecked. Average effective 100-year and Atlas 14 100-year floodplain top widths are approximately 140 feet and 220 feet, respectively.

Table 3.3 – 10-Yr, 100-Yr and Atlas 14 100-Yr WSELs Along Trib 1

XS	10-Year WSEL (ft)	100-Year WSEL (ft)	Atlas 14 100-Year WSEL (ft)
3498	248.49	248.86	249.15
3454 – MLK Drive			
3396	247.86	248.17	248.43
3291	247.73	248.02	248.28
3187	247.64	247.90	248.16
3135	247.46	247.76	248.04
2959	246.51	246.93	247.28
2782	245.34	245.76	246.12
2709	244.77	245.08	245.37
2566	244.12	244.54	244.89
2465	243.35	243.69	244.11
2258	243.33	243.69	243.94

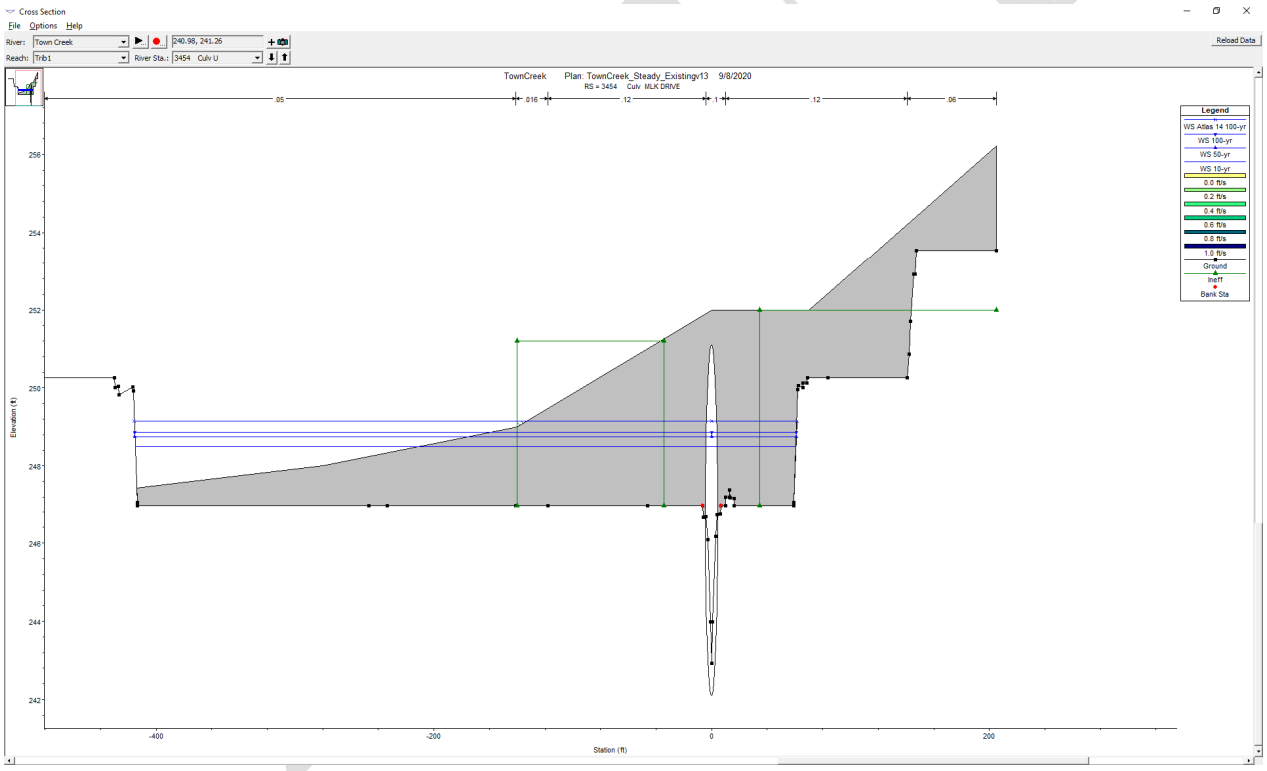
XS	10-Year WSEL (ft)	100-Year WSEL (ft)	Atlas 14 100-Year WSEL (ft)
2224 – FM 149			
2181	241.64	241.96	242.09
2066	241.40	241.84	242.14
1943	240.65	241.61	241.89
1845	238.98	240.19	241.25
1740	237.31	238.53	239.55
1635	237.08	238.31	239.35
1568	236.91	238.11	239.15
1446	236.46	237.71	238.82
1388	235.93	237.22	238.37
1107	234.69	236.06	237.36
1067 – Plez Morgan			
1016	234.49	235.60	236.34
913	234.23	235.30	235.92
728	233.61	234.68	235.14
585	232.94	234.04	234.04
442	232.26	233.31	233.93
348	231.76	232.74	233.45
197	229.07	229.67	231.18

3.2.2 Roadway Crossing Inundation and Velocity Results – Trib 1

The existing condition results indicate the following:

- The crossing at MLK Drive appears to be partially overtopped, even during the 10-year event (albeit very slightly). The roadway profile elevation varies significantly, and the roadway is overtopped within the left overbank of Trib 1, during all of the evaluated storm events. This partial overtopping does not appear to be a result of the existing 108″ culvert being undersized, but more a function of the roadway profile. **Figure 3.3** contains a cross section view of the upstream side of the MLK Drive crossing along Trib 1. The inundation associated with the overtopping appears to be confined to the recreational fields of the existing school site and does not impact any existing structures.

Figure 3.3 – Cross Section View, MLK Drive Crossing of Trib 1



- The crossing at FM 149 is fully overtopped during all of the evaluated events, including the 10-year event, which has an inundation depth of approximately 0.5′. This crossing is overtopped by 0.2′ even during the 2-year event. **Figure 3.4** contains a cross section view of the upstream side of the FM 149 crossing along Trib 1 that shows the 10-year, 50-year, 100-year and Atlas 14 100-year profiles.

- The crossing at Plez Morgan is not overtopped (not even partially) during the Atlas 14 100-year storm event. Channel freeboard at cross section 1107 (the first cross section

upstream) is approximately 0.8' during the Atlas 14 100-year event. **Figure 3.5** contains a cross section view of the upstream side of the Plez Morgan crossing along Trib 1 that shows the 10-year, 50-year, 100-year and Atlas 14 100-year profiles.

Figure 3.4 – Cross Section View, FM 149 Crossing of Trib 1

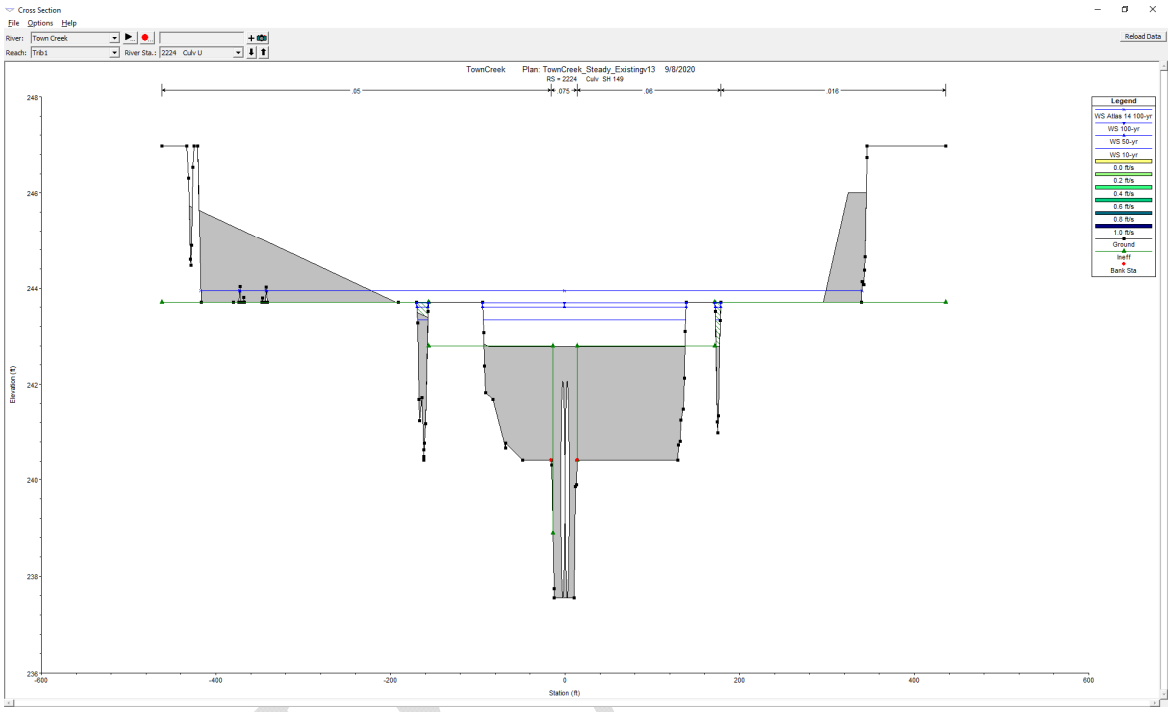


Figure 3.5 – Cross Section View, Plez Morgan Crossing of Trib 1

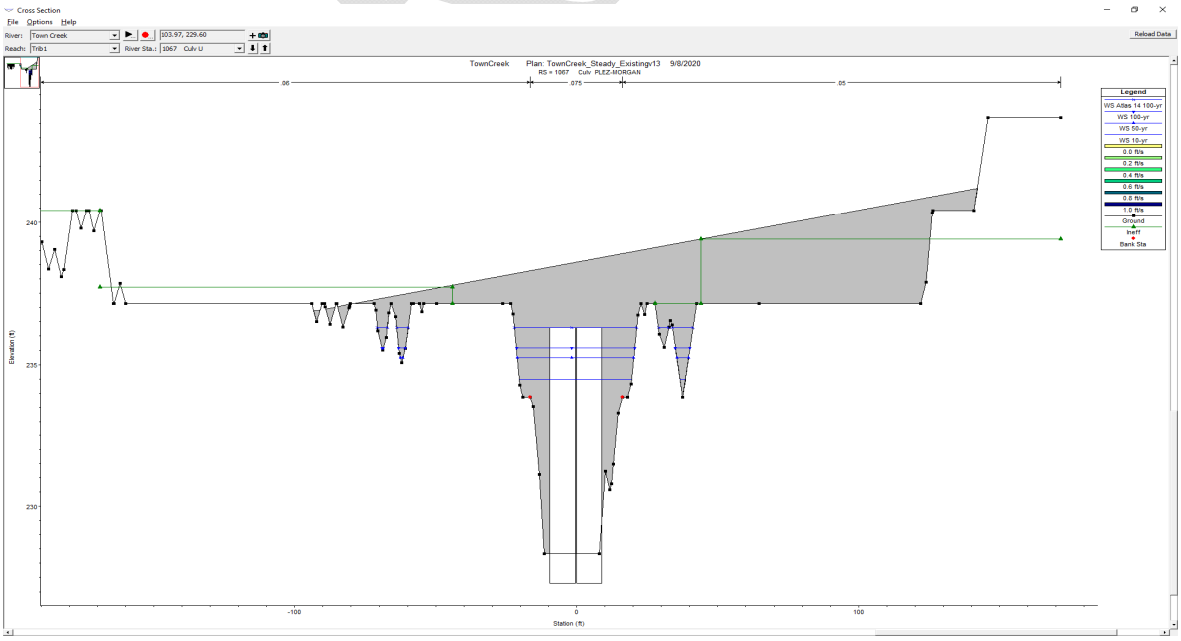


Table 3.4 contains a summary of inundation depths at the three Trib 1 crossings, for the 10-year, 100-year and Atlas 14 100-year storm events. WSELs presented in **Table 3.4** were obtained from the upstream face of each respective crossing. 50-year existing condition WSELs are provided in **Appendix D**. The deck elevation listed in **Table 3.4** is the lowest deck elevation input in the model.

Table 3.4 – 10-Yr, 100-Yr and Atlas 14 100-Yr Crossing Inundation Depths, Trib 1

Crossing	Station	Deck El (ft)	10-yr WSEL (ft)	10-yr Depth (ft)	100-yr WSEL (ft)	100-yr Depth (ft)	Atlas 14 100-yr WSEL (ft)	Atlas 14 100-yr Depth (ft)
MLK Drive	3454	247.44	248.49	1.05	248.86	1.42	249.15	1.71
FM 149	2224	242.78	243.33	0.55	243.69	0.91	243.94	1.16
Plez Morgan	1067	236.90	234.47	0.00	235.58	0.00	236.29	0.00

Table 3.5 summarizes upstream and downstream velocities, for the 10-year, 100-year and Atlas 14 100-year events, through the existing culverts at the three crossings along Trib 1. The results presented in **Table 3.5** indicate that 10-year velocities through FM 149 are high and have the potential to cause localized erosion. At MLK Drive, culvert velocities are less than 6 fps for all evaluated storm events. Existing condition 10-year and 100-year velocities through Plez Morgan are below 6 feet per second (fps) and should be non-erosive. Velocities for all evaluated events are greater than 7 fps at FM 149 which indicates potential for erosion at this crossing (and that the crossing is likely undersized).

Table 3.5 – 10-Yr, 100-Yr and Atlas 14 100-Yr Culvert Velocities, Trib 1

Crossing	Station	10-yr u/s V (fps)	10-yr d/s V (fps)	100-yr u/s V (fps)	100-yr d/s V (fps)	Atlas 14 100-yr u/s V (fps)	Atlas 14 100-yr d/s V (fps)
MLK Drive	3454	5.2	5.1	5.5	5.5	5.7	5.6
FM 149	2224	8.0	7.9	7.9	7.9	7.1	7.1
Plez Morgan	1067	4.0	3.7	5.4	5.1	7.1	7.1

3.2.3 Channel Velocity Results – Trib 1

Table 3.6 contains a summary of average channel velocities from just upstream of MLK Drive to the Town Creek confluence, along Trib 1. The results do not seem to indicate any particular areas of excessively high velocities, with the possible exceptions being the section immediately downstream of FM 149 (pre-Atlas 14 and Atlas 14 100-yr).

Table 3.6 – 10-Yr, 100-Yr and Atlas 14 100-Yr Channel Velocities Within Trib 1

XS	10-Year V (fps)	100-Year V (fps)	Atlas 14 100-V (fps)
3498	0.6	0.8	0.9
3454 – MLK Drive			
3396	1.2	1.3	1.4
3291	2.0	2.3	2.5
3187	1.9	2.2	2.4
3135	3.7	3.5	3.4
2959	2.5	2.6	2.7
2782	2.1	2.3	2.5
2709	2.3	2.7	3.1
2566	2.1	1.7	1.6
2465	3.7	5.3	6.0
2258	0.8	1.1	1.6
2224 – FM 149			
2181	4.5	6.6	9.0
2066	1.7	1.8	2.0
1943	4.9	2.4	2.7
1845	6.4	7.9	5.6

XS	10-Year V (fps)	100-Year V (fps)	Atlas 14 100-V (fps)
1740	5.5	6.5	7.3
1635	3.3	4.1	4.8
1568	3.5	4.4	5.0
1446	4.0	4.4	4.6
1388	5.0	5.5	5.8
1107	3.1	3.7	4.1
1067 – Plez Morgan			
1016	3.0	3.9	4.8
913	2.2	2.8	3.6
728	3.0	3.2	3.8
585	2.9	3.4	4.8
442	3.0	3.6	1.6
348	3.1	3.8	4.7
197	7.3	8.4	6.9

3.2.4 Water Surface Elevation Results – Town Creek d/s of Trib 1

Table 3.7 shows water surface elevations along Town Creek, from the Trib 1 confluence to just downstream of Buffalo Springs Drive, for the 10-year, 100-year and Atlas 14 100-year events. The results indicate that flows for all evaluated storm events are fully contained within the channel limits for this portion of Town Creek. Additionally, this portion of the study area is currently mostly undeveloped, so no existing structures appear to be inundated during the Atlas 14 100-year event.

Figure 3.6 shows a screenshot of the Atlas 14 100-year inundation within this portion of Town Creek. The shaded purple and turquoise areas in **Figure 3.6** represent the FEMA effective 100-year and 500-year floodplain boundaries, while the yellow arrow indicates the flow direction. The FEMA effective floodplain upstream of Buffalo Springs Drive is significantly

wider than the inundation results determined for this study. As stated previously, the FEMA effective floodplain reflects an outdated condition where the existing drop structure (which was washed out in 2016) was still in place. Town Creek cross sections as well as the effective 100-year and Atlas 14 100-year inundations are depicted on **Exhibit 3C**. Existing condition Town Creek HEC-RAS output is provided in **Appendix D**.

Figure 3.6 – Atlas 14 100-Year Inundation Limits – Town Creek d/s of Trib 1

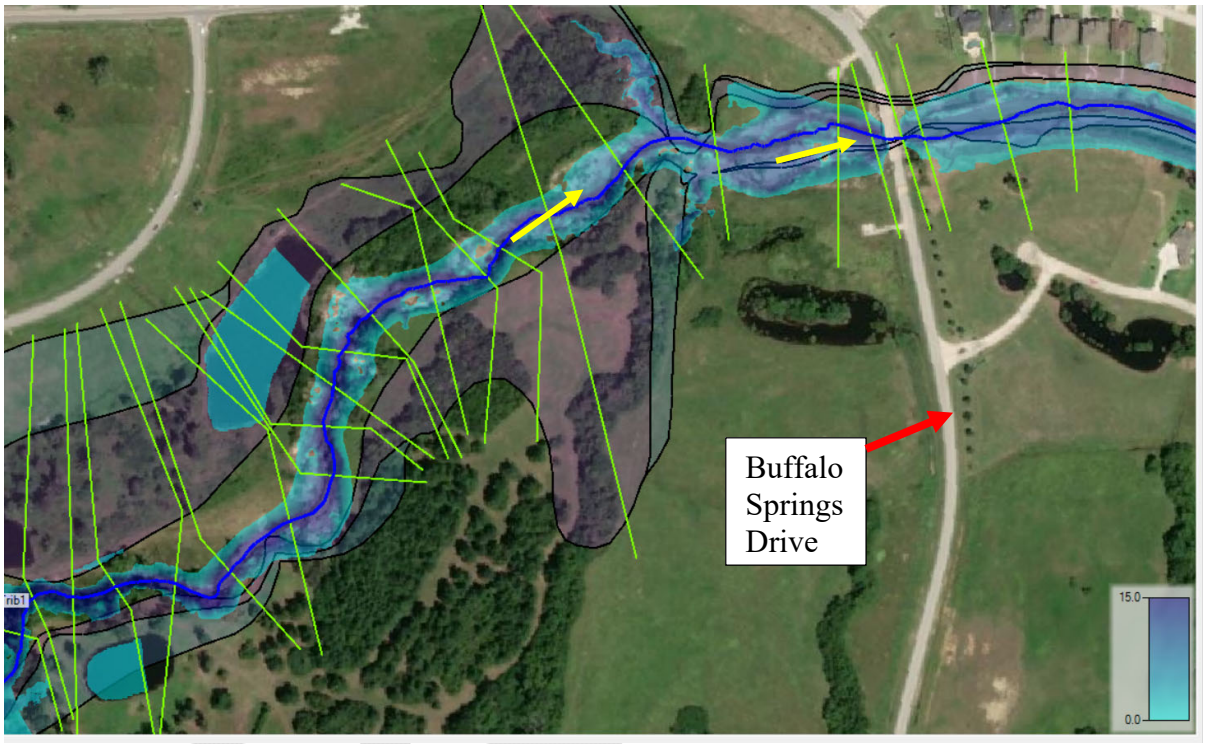


Table 3.7 – 10-Yr, 100-Yr and Atlas 14 100-Yr Town Creek WSELs d/s of Trib 1

XS	10-Year WSEL (ft)	100-Year WSEL (ft)	Atlas 14 100-Year WSEL (ft)
3921	224.07	226.76	228.68
3815	223.68	226.32	228.16
3703	223.16	225.69	227.42
3551	222.44	224.84	226.46
3367	222.08	224.36	225.97
3167	221.68	223.94	225.60

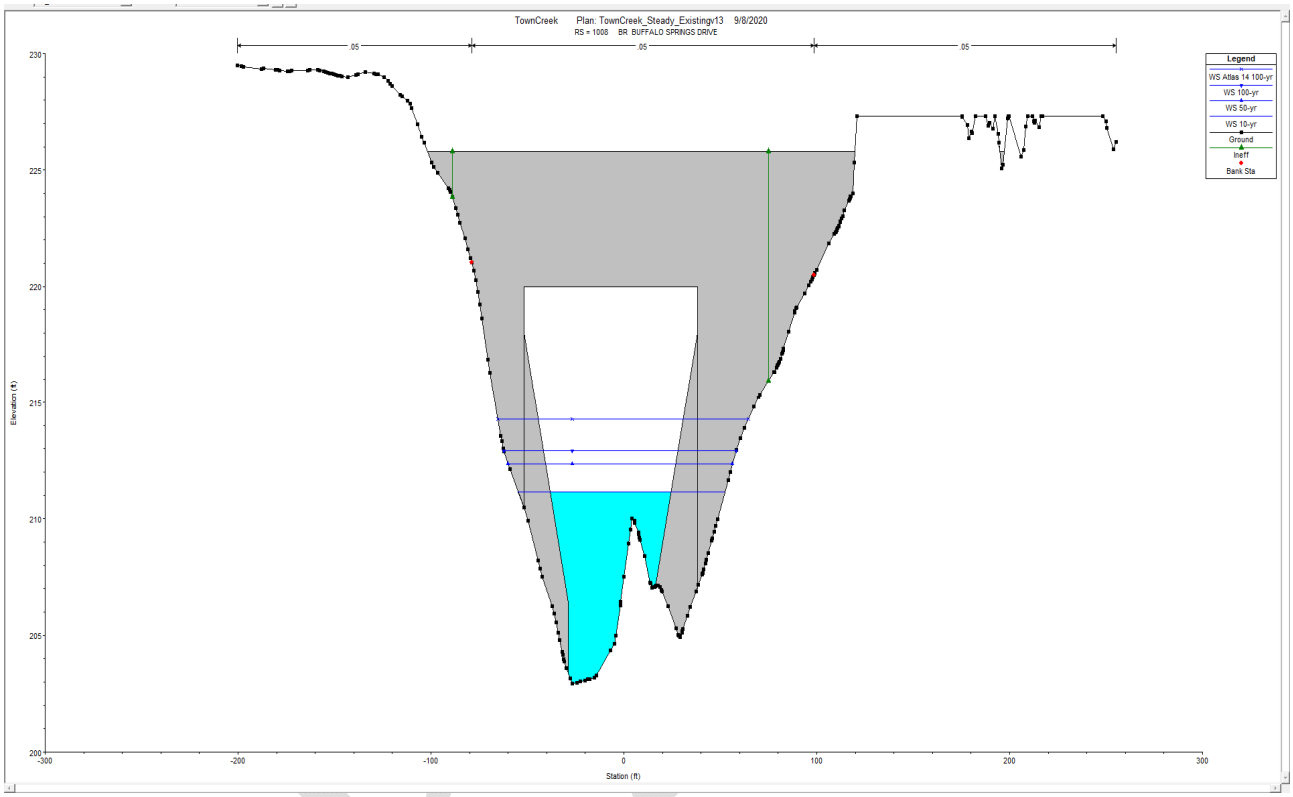
XS	10-Year WSEL (ft)	100-Year WSEL (ft)	Atlas 14 100-Year WSEL (ft)
2996	221.49	223.70	225.34
2867	221.08	223.13	224.67
2762	220.87	222.90	224.44
2665	220.69	222.69	224.23
2534	220.40	222.35	223.89
2362	219.60	221.23	222.67
2219	218.04	220.20	221.84
2135	217.32	219.33	220.90
1983	216.88	218.85	220.41
1746	215.38	217.64	219.38
1481	214.67	217.03	218.83
1147	214.23	216.68	218.53
1060	213.99	216.41	218.25
1008 – Buffalo Springs Drive			
984	210.57	212.11	213.67
927	210.46	212.01	213.44
721	210.00	211.70	213.04
541	209.60	211.27	212.63
17	208.38	209.95	211.34

3.2.5 Bridge Inundation and Velocity Results – Town Creek

The existing condition results indicate that the low chord (elevation 220′) of the existing Buffalo Springs Drive bridge is significantly above the Atlas 14 100-year WSEL and therefore

the bridge appears to have sufficient capacity to convey Atlas 14 100-year flows. **Figure 3.5** shows the cross section at the upstream face of the Buffalo Springs Drive bridge.

Figure 3.5 – Buffalo Springs Drive Bridge Upstream Face



Per the as-built plans of the recent (January 2018) bridge repair, riprap appears to have been placed along the channel bottom through the bridge. Concrete slope paving was also placed as part of the January 2018 improvements. **Table 3.8** contains a summary of upstream and downstream velocities through the Buffalo Springs Drive bridge, for the 10-year, 100-year and Atlas 14 100-year events. The results presented in **Table 3.8** indicate significant velocities through the bridge for the evaluated storm events.

Table 3.8 – 10-Yr, 100-Yr and Atlas 14 100-Yr Buffalo Springs Drive Velocities

Crossing	Station	10-yr u/s V (fps)	10-yr d/s V (fps)	100-yr u/s V (fps)	100-yr d/s V (fps)	Atlas 14 100-yr u/s V (fps)	Atlas 14 100-yr d/s V (fps)
Buffalo Springs Drive	1008	8.2	7.9	10.0	9.0	11.3	10.4

Table 3.9 shows velocities within Town Creek, downstream of Trib 1 for all evaluated storm events. Average 10-year, 100-year and Atlas 14 100-year channel velocities along this reach are 5.5 fps, 6.4 fps and 6.9 fps, respectively.

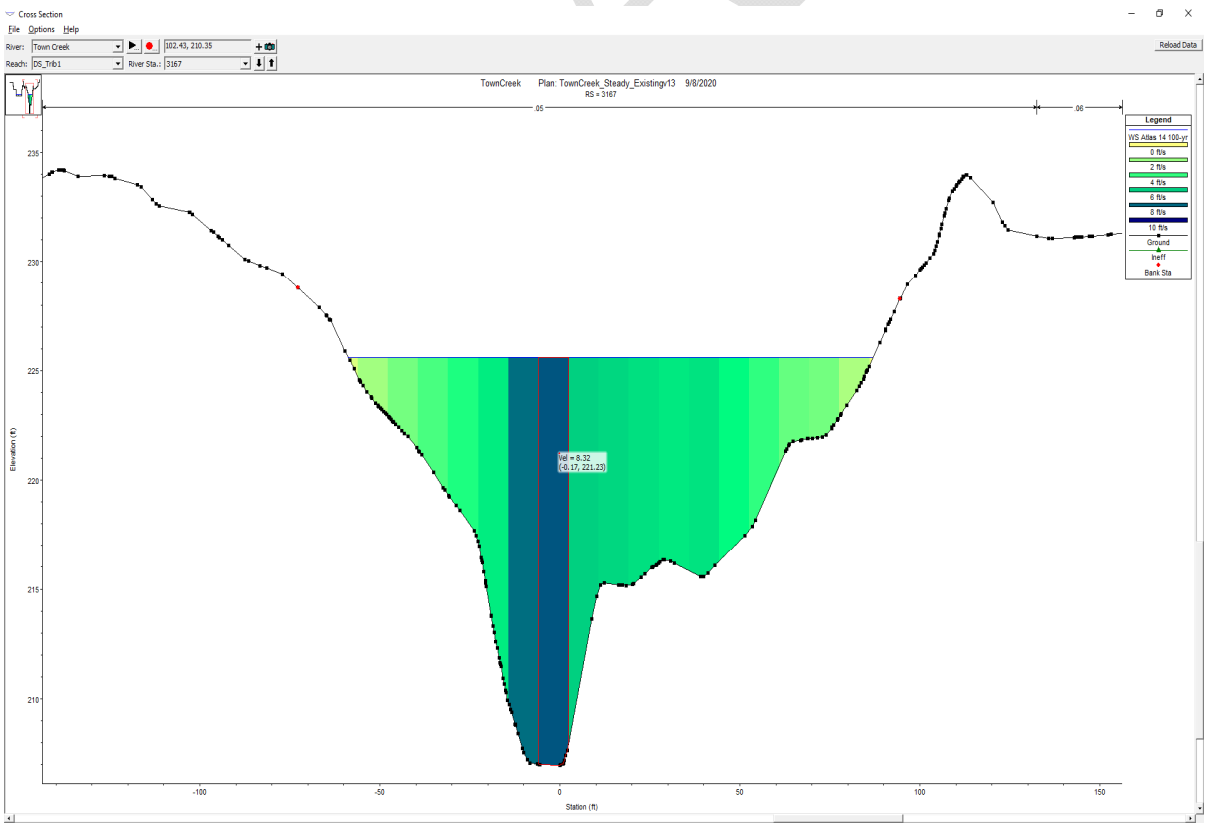
Table 3.9 – 10-Yr, 100-Yr and Atlas 14 100-Yr Channel Velocities Within Trib 1

XS	10-Year V (fps)	100-Year V (fps)	Atlas 14 100-V (fps)
3921	6.5	7.7	8.5
3815	5.2	6.3	7.2
3703	5.4	6.6	7.5
3551	5.4	6.6	7.4
3367	4.6	5.7	6.3
3167	4.9	5.4	5.7
2996	4.0	4.7	5.2
2867	5.3	6.4	7.0
2762	5.0	5.9	6.4
2665	4.7	5.5	6.0
2534	4.7	5.5	5.8
2362	6.2	7.5	8.1
2219	8.2	7.8	7.8
2135	7.5	8.6	9.1
1983	5.7	6.8	7.4
1746	7.3	7.4	7.5
1481	4.7	5.2	5.6
1147	3.5	3.9	4.2
1060	4.3	4.8	5.2

XS	10-Year V (fps)	100-Year V (fps)	Atlas 14 100-V (fps)
1008 – Buffalo Springs Drive			
984	8.1	9.5	10.0
927	6.4	7.8	8.3
721	5.1	5.6	5.9
541	4.7	5.6	6.1
17	5.1	6.1	6.6

While average channel velocities do not appear to stand out as excessive for any of the events, velocity varies within each cross section. For instance, at cross section 3367 the average Atlas 14 100-year velocity is 6.3 fps. However, as shown in **Figure 3.6**, velocities at the center of the channel are above 8.0 fps (indicated by the color blue).

Figure 3.6 – Atlas 14 100-Year Velocity Distribution at Cross Section 3167



3.3 Analysis of Existing Condition Results

The existing condition hydraulic analysis results indicate the following:

- The existing culvert at FM 149 (2-54″ RCPs) is overtopped even during the 10-year storm event. The undersized culvert, along with the low conveyance due to heavy tree/brush cover upstream of FM 149 poses a significant flood risk to existing structures located near FM 149 and MLK Drive, many of which have previously flooded. Reducing the flood hazard in this area should be a high priority since existing homes/structures are at high risk. Potential improvements include increasing the conveyance capacity of the FM 149 crossing and clearing some of the brush/trees from the channel and overbank area of Trib 1 upstream of FM 149. Erosion protection, if not already in place at FM 149, should also be provided due to high velocities.

- The survey elevations and LiDAR elevations indicate that there is significant erosion along both Town Creek and Trib 1, within the vicinity of the confluence. The model shows a 17-foot difference in channel flowline elevation between Trib 1 and Town Creek, and a 13-foot difference in channel flowline along Town Creek, between the reaches upstream and downstream of the confluence. If left unchecked, this erosion will continue to make its way upstream along both Town Creek and Trib 1, potentially undermining existing roadway crossings at Plez Morgan and Lone Star Parkway. Erosion/Grade control structures at these locations should be high priority improvement projects.

- The existing crossings at MLK Drive, Plez Morgan and Buffalo Springs Drive all appear to have sufficient capacity to adequately convey Atlas 14 100-year flows. MLK Drive is partially overtopped during the 10-year event, but this is a function of the roadway profile elevation rather than an undersized culvert. No conveyance improvements are recommended at MLK Drive, Plez Morgan or Buffalo Springs Drive.

- The reach of Town Creek between the Trib 1 confluence and Buffalo Springs Drive appears to fully convey Atlas 14 100-year flows. No drainage or conveyance related improvements are recommended within this reach.

- The Buffalo Springs Drive bridge appears to experience extremely high velocities (in excess of 8.0 fps), during the 10-year, 100-year and Atlas 14 100-year storm event. The as-built plans and field investigation indicate that there are existing erosion protection measures in place (riprap and slope paving). However, it is recommended that the riprap specified on the as-built plans be reevaluated based on the velocities documented in this study.

Section 4: Proposed Alternatives

Based on the results of the existing condition analysis, four improvement projects were proposed. The proposed projects were utilized to develop two different alternatives for this analysis. The proposed improvements associated with the proposed recommended alternative are shown on **Exhibit 4**. For the purposes of this study, two overall alternatives were developed as described below.

- Alternative 1 – Includes Projects 1, 2 and 3
- Alternative 2 – Includes Projects 2, 3 and 4

The existing flood hazard within the vicinity of FM 149 was determined to be a result of both the lack of capacity at FM 149, along with heavy brush/tree cover located further upstream within both the channel and overbanks. Because of this determination, the capacity improvement and clearing projects were grouped together as single alternatives. The proposed improvements generally target the portion of Trib 1 between MLK Drive and FM 149 since existing structures within that area (along MLK Drive and Simonton Street) have recently flooded.

4.1 Project 1 – Proposed Culvert Improvements at FM 149 Crossing of Trib 1

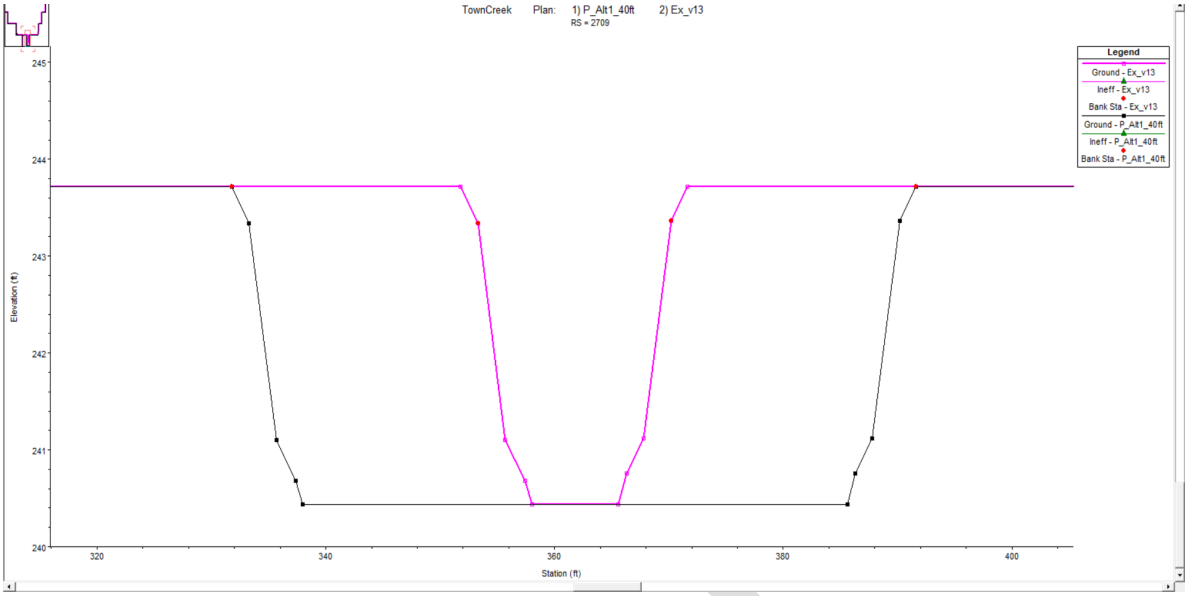
This project consists of removing and replacing the existing dual 54″ RCPs at FM 149 with dual 10′x4′ reinforced box culverts (RCBs). This project significantly increases the flow area of the FM 149 culverts, from approximately 31 square feet to 80 square feet. Culverts with a height of four feet are proposed at this location based on the height of the existing culverts and cover limitations at the FM 149 crossing.

4.2 Project 2 – Channel Improvements and Clearing Along Trib 1 u/s of FM 149

Project 2 consists of channel improvements and clearing and removing the existing heavy tree cover and brush from the main channel and portions of the overbank areas upstream of FM 149, from approximately Trib 1 cross section 2958.7 to cross section 2258. At the upstream end of the proposed improvements (cross section 2958.7), the channel is proposed to be widened by a total of 20 feet. At the next section downstream (2782.4) and all the way down to cross section 2258, the channel is proposed to be widened by a total of 40 feet. The overall footprint of clearing and channel improvements is approximately one acre.

Project 2 will greatly improve the conveyance capacity of the Trib 1 reach between MLK Drive and FM 149. The existing channel slope and side slopes are proposed to be maintained, but this may be altered if necessary, during the design phase. **Exhibit 4** shows the proposed footprint of the clearing and channel improvements associated with Project 2. **Figure 4.1** contains a comparison of existing (pink line) and proposed (black lines) channel geometry at cross section 2709.

Figure 4.1 – Comparison of Existing and Proposed Geometry, Cross Section 2709



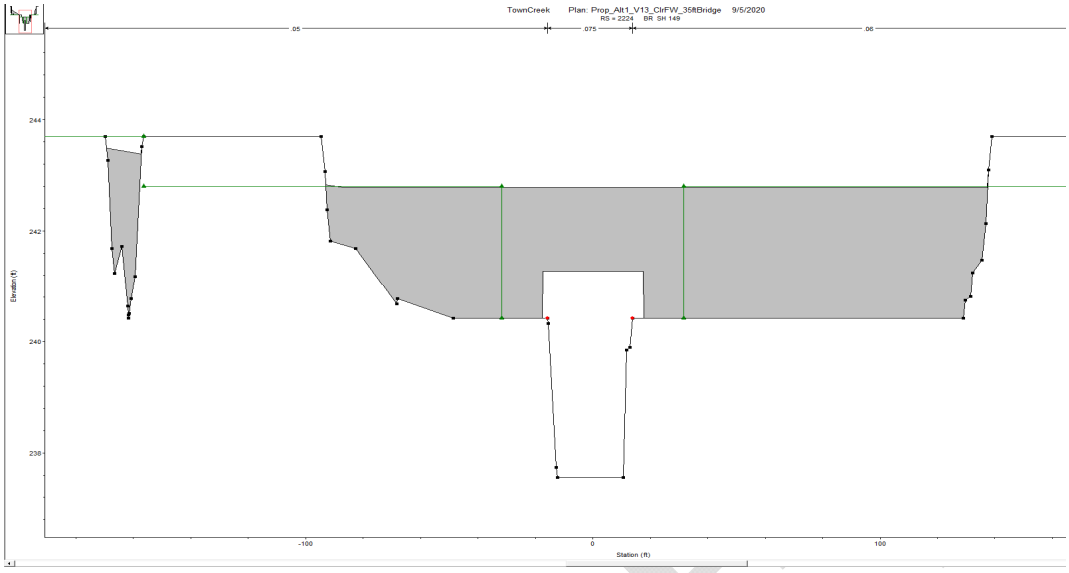
4.3 Project 3 – Proposed Detention Pond

The improvements associated with Alternatives 1 and 2 will reduce WSELs along Trib 1 upstream of FM 149, resulting in a loss of upstream storage volume and potential adverse flow and WSEL impacts downstream of FM 149 along Trib 1 and Town Creek. In order to mitigate potential adverse impacts downstream of FM 149, a proposed detention pond is recommended immediately downstream of FM 149. The location of the pond is anticipated to remain the same between Alternatives 1 and 2, however the required provided detention volume (and therefore the footprint) will likely differ between the two alternatives.

4.4 Project 4 – Proposed Bridge at FM 149 Crossing of Trib 1

This project consists of removing and replacing the existing dual 54″ RCPs at FM 149 with a single-span 35-foot bridge. The existing Trib 1 channel top width upstream of FM 149 appears to be approximately 30 feet, so the proposed bridge will span the channel. The proposed low chord elevation was estimated to be set 1.5 feet below the roadway elevation. **Figure 4.2** contains a plot of the upstream cross section of the proposed FM 149 bridge.

Figure 4.2 – Proposed 35-Foot Bridge at FM 149 Crossing of Trib 1



4.5 Other Evaluated Improvements – Alternative 3

Alternative 3 consists of proposed projects 2 and 3 described above, but also includes the addition of two extra 54″ RCPs at the FM 149 crossing of Trib 1, bringing the total number of culverts to four, under proposed conditions. The results of this analysis showed that adding these two additional culverts did not prevent FM 149 from being overtopped during the 10-year storm event, while Alternatives 1 and 2 both do. WSEL reductions upstream of FM 149 for all evaluated storm events are also less under Alternative 3 relative to Alternatives 1 and 2. For these reasons, Alternative 3 is not recommended and its results are not documented in **Section 5**. **Appendix E** contains a detailed comparison of existing and proposed Alternative 3 WSELs along Trib 1, for all evaluated storm events.

4.6 Additional Recommended Projects – Erosion Control Structures

As documented in **Section 1.2.3**, there is significant erosion along both Trib 1 and Town Creek which could potentially put existing crossings (Plez Morgan along Trib 1 and Lone Star Parkway along Town Creek) in danger of being undermined. Therefore, the following erosion related improvements are recommended as part of a separate project.

- It is highly recommended to construct an erosion control structure along Trib 1 to prevent existing headcutting from further making its way upstream and potentially undermining Plez Morgan. Based on recent field visits, the headcutting/erosion has made its way upstream along Trib 1 but has not yet reached Plez Morgan.

- Similar to the above recommendation, it is highly recommended to construct an erosion control structure along Town Creek to prevent existing headcutting from further making its way upstream and potentially undermining Lone Star Parkway.

Based on field visits and topographic survey data, the erosion/headcutting is present along Town Creek, upstream of the Trib 1 confluence but has not yet reached Lone Star Parkway.

These recommended erosion control projects were not evaluated as part of this hydraulic analysis.

Section 5: Proposed Analysis and Results

This section will document the results of the existing and proposed (both Alternative 1 and Alternative 2) hydraulic analysis and provide the following information.

- Comparison of existing and proposed WSELs along Trib 1, particularly between FM 149 and MLK Drive.
- Comparison of existing and proposed inundations at the Trib 1 crossing of FM 149.
- Comparison of peak flows at hydrologic junctions along Trib 1 and Town Creek.
- Comparison of existing and proposed volumes along Trib 1.

5.1 Existing and Proposed WSEL Comparison, Trib 1

Table 5.1 contains a comparison of existing and proposed Alternative 1 10-year, 100-year and Atlas 14 (A14) WSELs along Trib 1 between MLK Drive (station 3454) and FM 149 (station 2224). **Table 5.2** contains a similar comparison for proposed Alternative 2. A full comparison of existing and proposed WSELs along the entire length of Trib 1, including 50-year WSELs, is provided in **Appendix E**. Proposed condition HEC-RAS output for both alternatives is provided in **Appendix F**. The results presented in **Table 5.1** indicate the following:

- Average 10-year, 100-year and Atlas 14 100-year WSEL reductions from the upstream end of the Alternative 1 improvements (cross section 2958.7) to FM 149 are approximately 1.4′, 1.0′ and 0.8′, respectively. The existing structures which have previously flooded are located downstream of cross section 2958.7 (refer to **Exhibit 4**), so the results indicate that WSELs will be significantly reduced in their vicinity for all evaluated storm events.
- The proposed Alternative 1 improvements result in maximum 10-year, 100-year and Atlas 14 100-year WSEL reductions of approximately 2.0′, 1.7′ and 1.5′, which occur at cross section 2782.4, respectively.
- The WSEL reductions upstream of cross section 2958.7 are considerably less significant than the WSEL reductions presented above. However, as stated previously, the primary objective of this analysis was to identify proposed improvements to help reduce the flood risk for the existing structures located just upstream of FM 149. No existing structures are located within the overbank of Trib 1 upstream of cross section 2958.7.

The results presented in **Table 5.2** indicate the following:

- Average 10-year, 100-year and Atlas 14 100-year WSEL reductions from the upstream end of the Alternative 2 improvements (cross section 2958.7) to FM 149 are approximately 1.7′, 1.1′ and 0.8′, respectively. On average, WSELs for all evaluated storm events are reduced by approximately 0.2′ more under proposed Alternative 2 than proposed Alternative 1. The proposed bridge configuration provides more flow area than the improved culverts, which results in lower WSELs along this portion of Trib 1.

- The proposed Alternative 2 improvements result in maximum 10-year, 100-year and Atlas 14 100-year WSEL reductions of approximately 2.2′, 1.8′ and 1.6′, which occur at cross sections 2709 (10-year) and 2782.4, respectively.

Table 5.1 – Comparison of Existing and Proposed Alt 1 WSELs, Trib 1

XS	Ex 10-Yr WSEL (ft)	PropAlt1 10-Yr WSEL (ft)	Diff (Prop-Ex) (ft)	Ex 100-Yr WSEL (ft)	PropAlt1 100-Yr WSEL (ft)	Diff (Prop-Ex) (ft)	Ex A14 100-Year WSEL (ft)	PropAlt1 A14 100-Yr WSEL (ft)	Diff (Prop-Ex) (ft)
3396	247.86	247.87	0.01	248.17	248.14	-0.03	248.43	248.41	-0.02
3291	247.73	247.73	0.00	248.02	247.98	-0.04	248.28	248.24	-0.04
3187	247.64	247.64	0.00	247.90	247.85	-0.05	248.16	248.11	-0.05
3135	247.46	247.35	-0.11	247.76	247.65	-0.11	248.04	247.96	-0.08
2958.7	246.51	244.59	-1.92	246.93	245.38	-1.55	247.28	245.95	-1.33
2782.4	245.34	243.22	-2.12	245.76	244.01	-1.75	246.12	244.57	-1.55
2709	244.77	242.61	-2.16	245.08	243.43	-1.65	245.37	243.94	-1.43
2566	244.12	242.33	-1.79	244.54	243.20	-1.34	244.89	243.63	-1.26
2465	243.35	242.24	-1.11	243.69	243.11	-0.58	244.11	243.52	-0.59
2258	243.33	242.16	-1.17	243.69	243.10	-0.59	243.94	243.50	-0.44

Table 5.2 – Comparison of Existing and Proposed Alt 2 WSELs, Trib 1

XS	Ex 10-Yr WSEL (ft)	PropAlt2 10-Yr WSEL (ft)	Diff (Prop-Ex) (ft)	Ex 100-Yr WSEL (ft)	PropAlt2 100-Yr WSEL (ft)	Diff (Prop-Ex) (ft)	Ex A14 100-Year WSEL (ft)	PropAlt2 A14 100-Yr WSEL (ft)	Diff (Prop-Ex) (ft)
3396	247.86	247.86	0.00	248.17	248.16	-0.01	248.43	248.42	-0.01
3291	247.73	247.73	0.00	248.02	248.01	-0.01	248.28	248.26	-0.02
3187	247.64	247.64	0.00	247.90	247.90	0.00	248.16	248.13	-0.03
3135	247.46	247.47	0.01	247.76	247.75	-0.01	248.04	247.99	-0.05
2958.7	246.51	246.11	-0.40	246.93	246.33	-0.60	247.28	246.50	-0.78
2782.4	245.34	244.10	-1.24	245.76	244.78	-0.98	246.12	245.00	-1.12
2709	244.77	243.82	-0.95	245.08	244.60	-0.48	245.37	244.70	-0.67
2566	244.12	243.07	-1.05	244.54	243.67	-0.87	244.89	244.42	-0.47
2465	243.35	242.73	-0.62	243.69	243.07	-0.62	244.11	243.36	-0.75
2258	243.33	242.12	-1.21	243.69	243.12	-0.57	243.94	243.52	-0.42

5.2 FM 149 Inundation Results

Table 5.3 contains a summary of existing and proposed 10-year, 50-year, 100-year and Atlas 14 100-year WSELs and inundation depths at the FM 149 crossing of Trib 1 (at station 3454). WSELs at the other crossings analyzed within the study area were not significantly changed as a result of the proposed improvements, which is why results for other crossings are not presented. The results presented in **Table 5.3** indicate the following:

- With the proposed improvements in place, the results indicate that the 10-year storm event will no longer overtop FM 149 under both proposed alternatives.

- The results indicate that FM 149 will likely still be overtopped during the 50-year, 100-year and Atlas 14 100-year storm events. However, inundation depths for all three of these events are significantly reduced under proposed conditions. Existing 50-year, 100-year and Atlas 14 100-year WSELs are reduced by approximately 0.5′,

0.4′ and 0.3′ under Alternative 1. Under Alternative 2, 50-year, 100-year and Atlas 14 100-year WSELs are reduced by approximately 0.7′, 0.6′ and 0.4′, respectively.

- The results therefore indicate that FM 149 inundations will be more significantly reduced under Alternative 2. However, both proposed alternatives provide at least a 10-year level of service for the FM 149 crossing of Trib 1.

Table 5.3 – 10-Yr, 100-Yr and Atlas 14 100-Yr FM 149 Inundation Depths, Trib 1

Condition	Deck El (ft)	10-yr WSEL (ft)	10-yr Depth (ft)	50-yr WSEL (ft)	50-yr Depth (ft)	100-yr WSEL (ft)	100-yr Depth (ft)	Atlas 14 100-yr WSEL (ft)	Atlas 14 100-yr Depth (ft)
Existing	242.78	243.33	0.55	243.60	0.82	243.69	0.91	243.94	1.16
Prop Alt 1	242.78	241.56	0.00	243.15	0.37	243.11	0.54	243.67	0.89
Prop Alt 2	242.78	241.60	0.00	242.87	0.09	243.10	0.32	243.50	0.72

5.3 Storage Volume and Downstream Impact Analysis

As documented in **Section 5.1**, existing condition WSELs between MLK Drive and FM 149 along Trib 1 are reduced under proposed conditions, for all evaluated storm events. These WSEL reductions reduce the flood hazard risk of the existing structures located upstream of FM 149, but they also reduce the amount of floodplain storage which could potentially result in adverse hydrologic (peak flows) and hydraulic (WSELs) downstream of FM 149. **Table 5.4** contains a comparison of existing, Alternative 1 and Alternative 2 storage-discharge curves for the 'Trib1_Reach2' reach, which represents the portion of Trib 1 between cross section 3396 (1st section d/s of MLK Drive) and cross section 197 (downstream most cross section along Trib 1). The discharges in the table were obtained by scaling the Atlas 14 100-year flow (1108.7 cfs) by a number of ratios ranging from 0.1 (110.87 cfs) to 1.5 (1663.05 cfs).

The results presented in **Table 5.4** indicate that proposed Alternative 1 and Alternative 2 Atlas 14 100-year volumes are approximately 5.0 acre-feet and 5.9 acre-feet less than existing condition volumes within reach Trib1_Reach2. Proposed Alternative 2 reduces WSELs upstream of FM 149 more significantly than proposed Alternative 1, which results in less volume within the reach. In order to prevent adverse impacts to Trib 1 downstream of FM 149, a proposed detention pond is recommended to offset the loss in volume which occurs upstream of FM 149. The minimum amount of Atlas 14 100-year detention volume that is recommended to be provided as part of proposed Alternatives 1 and 2 are 7.3 acre-feet and 7.6 acre-feet, respectively.

Table 5.4 – Existing and Proposed Storage-Discharge Cuvres, Trib1_Reach2

Discharge (cfs)	Existing Storage (ac-ft)	Alt 1 Storage (ac-ft)	Alt 2 Storage (ac-ft)	Alt 1 - Ex (ac-ft)	Alt 2 - Ex (ac-ft)
0.00	0.00	0	0	0.00	0.00
110.87	6.82	4.82	4.93	-2.00	-1.89
221.74	13.36	10.51	10.65	-2.85	-2.71
332.61	18.32	14.44	14.33	-3.88	-3.99
554.35	26.46	21.46	20.93	-5.00	-5.53
665.22	30.79	25.11	24.80	-5.68	-5.99
886.96	40.61	33.39	33.20	-7.22	-7.41
1108.70*	47.31	40.04	39.73	-7.27	-7.58
1330.44	54.80	47.34	46.60	-7.46	-8.20
1663.05	64.10	57.10	56.78	-7.00	-7.32

***Approximate Atlas 14 100-yr Peak Flow at MLK Drive**

Proposed condition HEC-HMS models were developed for Alternatives 1 and 2, in order to determine potential peak flow impacts downstream of FM 149 along Trib 1 as well as along Town Creek. Proposed condition HEC-HMS output is provided in **Appendix B**. The only difference between the existing and proposed HEC-HMS models is that the Trib1_Reach2 storage-discharge curve was modified based on the information presented in **Table 5.4**. **Table 5.5** contains a comparison of existing and proposed Alternative 1 10-year, 100-year and Atlas 14 100-year peak flows at the hydrologic junctions (reference **Exhibit 2**) located downstream of FM 149. A comparison at these same HEC-HMS junctions which includes the 50-year results (for both Alternative 1 and Alternative 2) is provided in **Appendix E**.

The results presented in **Table 5.5** indicate the following:

- Peak flows are slightly increased at Trib1_JCT2 for all evaluated events, with flow increases ranging from 2.4 cfs to 22.4 cfs. The percent increases which occur under proposed (Alternative 1) conditions are approximately 2.4%, 2.7% and 0.2% for the 10-year, 100-year and Atlas 14 100-year events, respectively. The largest increase occurs during the 100-year storm event, with the smallest increase occurring during the Atlas 14 100-year storm event. The proposed Alternative 2 flow increases at

Trib1_JCT2 are slightly larger than the increases which occur under proposed Alternative 1.

- Peak flows were not increased under proposed conditions along Town Creek (TC_JCT1 and 1146_JCT1) for any of the evaluated storm events, except during the 100-year and Atlas 14 100-year events at junction 1146_JCT1. These increases are approximately 0.01% and 0.004% and should not be considered significant. The peak flow along Town Creek occurs 1 to 3 hours later (varies by storm event) than the peak flow at junction Trib1_JCT2, so the proposed Alternative 1 improvements do not have a significant or adverse impact to peak flows along Town Creek.

Table 5.5 – Existing and Proposed Alternative 1 Peak Flow Comparison, d/s of FM 149

HMS Junction ID	Ex 10-yr Q (cfs)	Prop Alt1 10-yr Q (cfs)	Diff (Prop-Ex) (cfs)	Ex 100-yr Q (cfs)	Prop Alt1 100-yr Q (cfs)	Diff (Prop-Ex) (cfs)	Ex A14 100-yr Q (cfs)	Prop Alt1 A14 100-yr Q (cfs)	Diff (Prop-Ex) (cfs)
Trib1_JCT2	525.6	538.4	12.8	824.2	846.6	22.4	1173.5	1175.9	2.4
TC_JCT1	3360.9	3359.2	-1.7	5227.2	5223.8	-3.4	6858.9	6858.7	-0.2
1146_JCT1	3568.0	3567.5	-0.5	5594.0	5594.7	0.7	7442.8	7443.1	0.3

Table 5.6 contains a comparison of existing and proposed Alternative 1 10-year, 100-year and Atlas 14 100-year peak flows at the hydrologic junctions (reference **Exhibit 2**) located downstream of FM 149. The results presented in **Table 5.6** were similar to results presented in **Table 5.5** and indicate the following:

- Peak flows are slightly increased at Trib1_JCT2 for all evaluated events, with flow increases ranging from 3.0 cfs to 27.4 cfs. The percent increases which occur under proposed (Alternative 1) conditions are approximately 2.3%, 3.3% and 0.3% for the 10-year, 100-year and Atlas 14 100-year events, respectively. The largest increase occurs during the 100-year storm event, with the smallest increase occurring during the Atlas 14 100-year storm event.

- Peak flows were not increased under proposed conditions along Town Creek (TC_JCT1 and 1146_JCT1) for any of the evaluated storm events, except during the 100-year and Atlas 14 100-year events at junction 1146_JCT1. These increases are approximately 0.01% and 0.001% and should not be considered significant.

Table 5.6 – Existing and Proposed Alternative 2 Peak Flow Comparison, d/s of FM 149

HMS Junction ID	Ex 10-yr Q (cfs)	Prop Alt2 10-yr Q (cfs)	Diff (Prop-Ex) (cfs)	Ex 100-yr Q (cfs)	Prop Alt2 100-yr Q (cfs)	Diff (Prop-Ex) (cfs)	Ex A14 100-yr Q (cfs)	Prop Alt2 A14 100-yr Q (cfs)	Diff (Prop-Ex) (cfs)
Trib1_JCT2	525.6	537.8	12.2	824.2	851.6	27.4	1173.5	1176.5	3.0
TC_JCT1	3360.9	3358.4	-2.5	5227.2	5224.1	-3.1	6858.9	6858.0	-0.9
1146_JCT1	3568	3567.1	-0.9	5594	5594.7	0.7	7442.8	7442.9	0.1

In HEC-RAS, peak flows were adjusted (reference **Table 3.1** for flow change locations) based on the results of the proposed HEC-HMS analysis. As shown in **Table 5.5** and **Table 5.6**, peak flows were slightly increased for all evaluated events. These slight flow increases appear to result in impacts typically ranging from 0.01 feet to 0.09 feet (all events) along Trib 1 between the downstream side of FM 149 and the confluence. **Appendix E** contains a detailed WSEL comparison for all evaluated events, along the entire length of Trib 1.

The proposed detention pond located downstream of FM 149 will mitigate any flow increases associated with the proposed improvements upstream of FM 149 and will ensure no adverse impact to Trib 1. The proposed detention pond footprint for the recommended alternative is shown on **Exhibit 4**. Modeling of the detention basin and its outfall structure is anticipated to be performed whenever the detailed design phase occurs and was not performed as part of this study. This study identified the need for a proposed detention basin, along with its general location and minimum required volume.

5.4 Proposed Results Summary

The results of the proposed condition hydraulic analysis indicate that both proposed alternatives will significantly reduce existing Trib 1 WSELs, between MLK Drive and FM 149. Alternative 1 reduces 100-year and Atlas 14 100-year WSELs by approximately 1.0′ and 0.8′, while Alternative 2 reduces 100-year and Atlas 14 100-year WSELs by approximately 1.1′ and 0.8′. Overall, Alternative 2 provides a slightly greater reduction in WSELs within Trib 1 upstream of FM 149 which is a result of more flow area being provided by the proposed bridge when compared to the proposed dual 10′x4′ RCBs.

Both proposed alternatives provide a 10-year level of service for FM 149, which should help significantly with access and mobility in the area during storm events. Existing 50-year, 100-year and Atlas 14 100-year WSELs are reduced by approximately 0.5′, 0.4′ and 0.3′ under Alternative 1. Under Alternative 2, 50-year, 100-year and Atlas 14 100-year WSELs are reduced by approximately 0.7′, 0.6′ and 0.4′, respectively.

Both proposed alternatives result in slight peak flow increases along Trib 1 downstream of FM 149, with Alternative 2 producing larger increases. Neither proposed alternative results in significant peak flow increases along Town Creek. In order to mitigate potential adverse impacts along Trib 1, a proposed detention pond located downstream of FM 149 is recommended for both alternatives. The minimum required Atlas 14 100-year detention volume associated with the Alternative 1 and Alternative 2 ponds is 7.3 acre-feet and 7.6 acre-feet, respectively.

All proposed Alternative 1 improvements are shown on **Exhibit 4**.

Section 6: Preliminary Cost Estimate

Preliminary costs, including 20% contingency, for the both proposed alternatives are provided in **Table 6.1** below. The detailed construction cost estimate for each of the alternatives is provided in **Appendix G**. The preliminary costs also factor in land acquisition costs for the proposed detention basin which is recommended under both alternatives. Montgomery County Appraisal District (MCAD) 2020 assessed values were utilized to estimate land values. A brief description of what proposed improvements are included with each alternative is also provided below. The proposed improvements are described in detail in **Section 4**. Cost estimates were not provided for the recommended erosion control measures.

Alternative 1

- Project 1 – Remove and replace existing culverts at FM 149 with 2-10′x4′ RCBs.
- Project 2 – Clearing and Channel Improvements Along Trib 1 between MLK Drive and FM 149.
- Project 3 – Construct a proposed detention basin (minimum of 7.3 acre-feet) to offset potential adverse flow and WSEL impacts along Trib 1 downstream of FM 149.

Alternative 2

- Project 2 – Clearing and Channel Improvements Along Trib 1 between MLK Drive and FM 149.
- Project 3 – Construct a proposed detention basin (minimum of 7.6 acre-feet) to offset potential adverse flow and WSEL impacts along Trib 1 downstream of FM 149.
- Project 4 – Remove and replace existing culverts at FM 149 with 35-foot single span bridge.

Table 6.1 – Preliminary Cost of Proposed Evaluated Improvements

Alternative	Preliminary Construction Cost, $
1	1,046,100
2	1,198,700

Section 7: Recommendations and Conclusions

7.1 Recommendations

Based on the results of the hydraulic analysis documented in **Section 5**, along with the preliminary cost estimate presented in **Section 6**, proposed Alternative 1 is the recommended alternative. Both Alternative 1 and Alternative 2 significantly reduce WSELs along Trib 1 upstream of FM 149 and provide a 10-year level of service for the FM 149 crossing. However, Alternative 2 is approximately $150,000 more than Alternative 1, which is a significant amount. Alternative 1 meets project objectives at a lower cost. Therefore, the following improvements are recommended based on the results of this analysis.

- **Project 1** - Remove the existing dual 54″ RCPs at the FM 149 crossing of Trib 1 and replace them with dual 10′x4′ RCBs. The results indicate that this proposed improvement will provide a 10-year level of service for the FM 149 crossing of Trib 1, which currently is overtopped during the 10-year storm event.

- **Project 2** - Widen the existing Trib 1 channel upstream of FM 149, between cross sections 2958.7 and 2258 (approximately 700 linear feet). At the very upstream end of the improvements, the channel will be widened by a total of 20 feet, but for a majority of the reach the channel will be widened by an average of 40 feet. The overall footprint of the clearing and channel improvements is approximately one acre. Existing brush and tree cover will be removed within the limits of the channel improvements in order to further improve conveyance capacity of the channel. The existing channel slope and side slopes will be maintained under proposed conditions, but this may be altered if necessary, during the design phase. The footprint of the proposed channel improvements and clearing is shown on **Exhibit 4** and comprises approximately one acre.

- **Project 3** - Construct a proposed detention pond along Trib 1, immediately downstream of FM 149, in order to mitigate any potential flow and WSEL impacts along Trib 1, downstream of FM 149. The proposed detention pond will have a minimum Atlas 14 100-year volume of 7.3 acre-feet and its proposed footprint is shown on **Exhibit 4**. Final modeling and design of the pond will occur during the detailed design phase.

In addition to the above recommendations, which are entirely related to reducing the flood hazard risk along Trib 1 upstream of FM 149, the following erosion related improvements are recommended as part of a separate project.

- It is highly recommended to construct an erosion control structure along Trib 1 to prevent existing headcutting from further making its way upstream and potentially undermining Plez Morgan. Based on recent field visits, the headcutting/erosion has made its way upstream along Trib 1 but has not yet reached Plez Morgan.

- Similar to the above recommendation, it is highly recommended to construct an erosion control structure along Town Creek to prevent existing headcutting from further making its way upstream and potentially undermining Lone Star Parkway. Based on field visits and topographic survey data, the erosion/headcutting is present along Town Creek, upstream of the Trib 1 confluence but has not yet reached Lone Star Parkway.

- The Buffalo Springs Drive bridge appears to experience extremely high velocities (in excess of 8.0 fps), during the 10-year, 100-year and Atlas 14 100-year storm event. The as-built plans and field investigation indicate that there are existing erosion protection measures in place (riprap and slope paving). However, it is recommended that the riprap specified on the as-built plans be reevaluated based on the velocities documented in this study.

7.2 Conclusions

The objectives of this analysis were to evaluate existing flood hazard conditions along Trib 1 and Town Creek, identify flood and erosion "problem areas" and potential CIPs to reduce the flood hazard (specifically along Trib 1 upstream of FM 149) and erosion hazard risk and to develop preliminary costs and design concepts for the recommended CIPs. The following conclusions were determined from the hydrologic and hydraulic analysis prepared for this study:

- The results of the study indicated that the existing FM 149 crossing of Trib 1 was overtopped during the 10-year event and the Trib 1 floodplain between MLK Drive and FM 149 was significantly wider than other reaches along Trib 1. These results indicated that the reach along Trib 1 between FM 149 and MLK Drive had the most significant flood risk within the study area, which was consistent with recent significant storm events that resulted in structural flooding in this area (residential area upstream of FM 149).

- The existing flood hazard along Trib 1 between FM 149 and MLK Drive appears to have two primary sources: the existing FM 149 crossing being undersized and the lack of conveyance in the main channel and overbank of Trib 1 due to heavy tree cover and brush. Therefore, the proposed improvements were recommended to address both issues in order to significantly reduce the existing flood hazard.

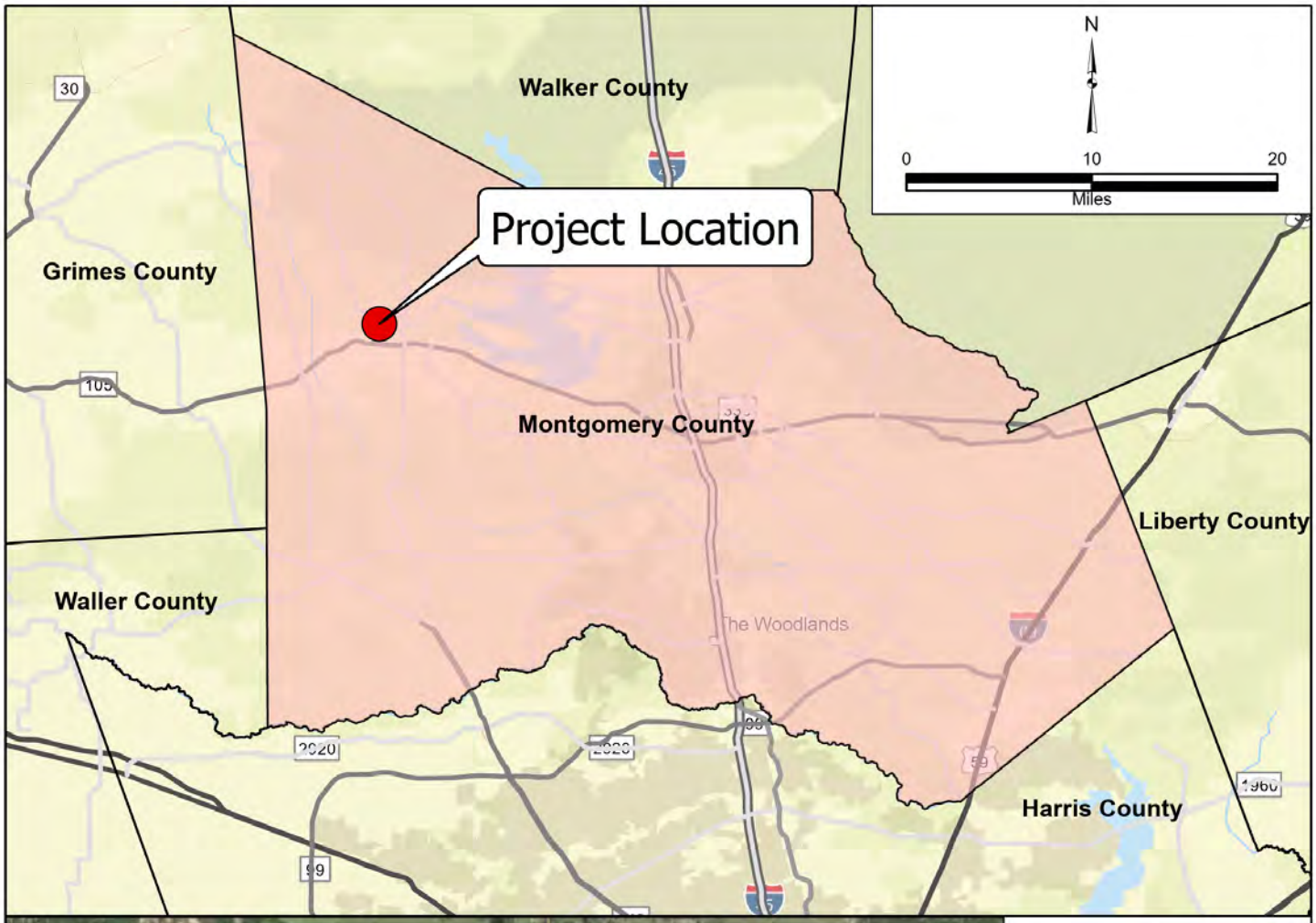
- The existing crossings at Plez Morgan (Trib 1) and Buffalo Springs Drive (Town Creek) appear to have sufficient capacity to convey Atlas 14 100-year flows and are not recommended to be improved or modified. The existing MLK Drive culvert along Trib 1 appears to have sufficient capacity to convey Atlas 14 100-year flows, but the roadway is partially overtopped even during the 10-year event due to the significant variation in roadway profile. The partial overtopping of MLK Drive does not appear to impact any existing structures. MLK Drive is not recommended to be modified under proposed conditions.

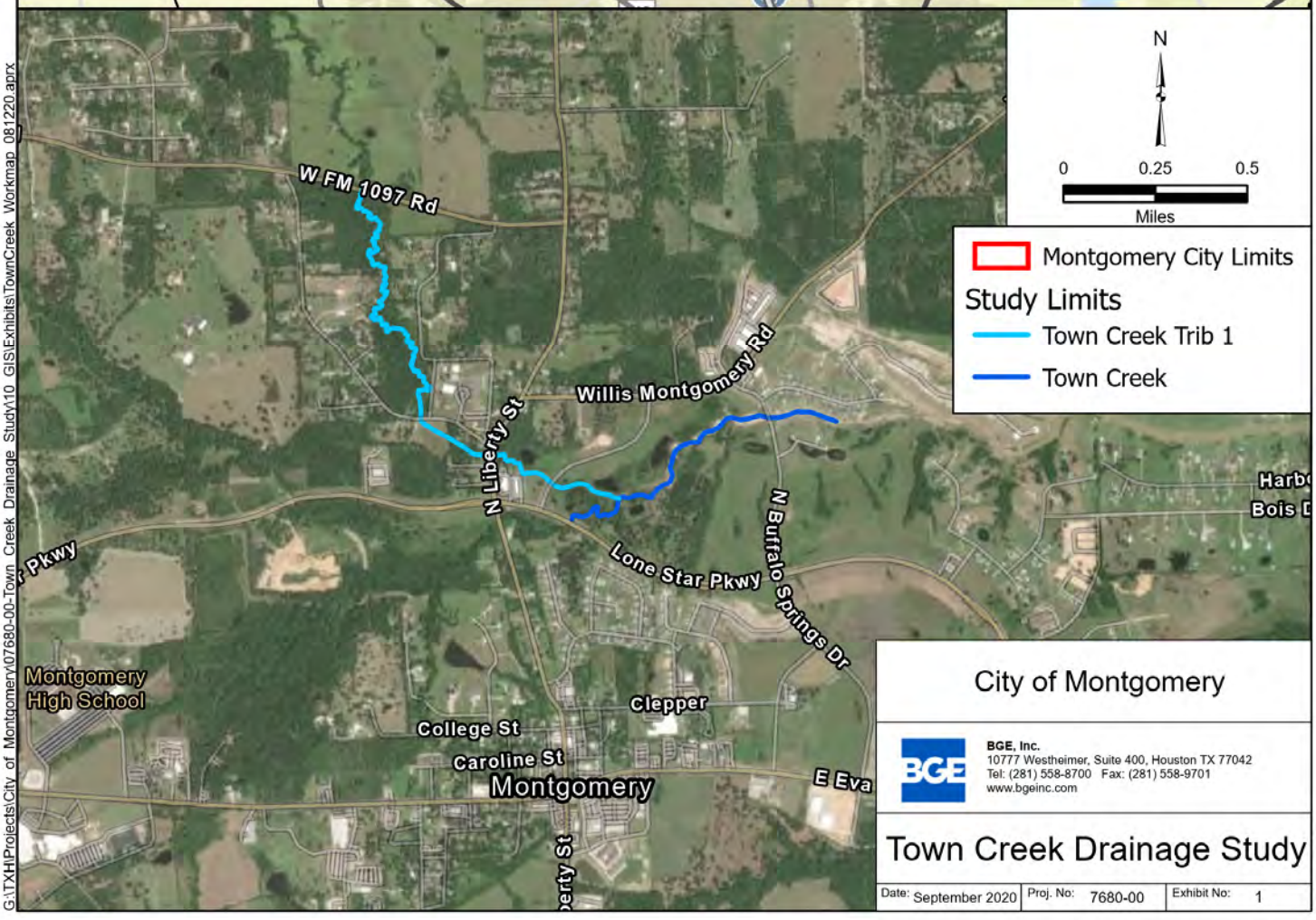
- Along Trib 1 downstream of FM 149, no existing structures appear to be inundated even during the Atlas 14 100-year storm event. Downstream of Plez Morgan to the confluence with Town Creek, Trib 1 appears to generally contain Atlas 14 100-year flows within channel banks and no existing structures are located within this reach.

- The portion of Town Creek from the Trib 1 confluence to Buffalo Springs Drive (and beyond) appears to fully convey Atlas 14 100-year peak flows. No improvements are recommended along Town Creek downstream of Trib 1.

With the recommended improvements in place, it can be concluded that the existing flood hazard within the Town Creek watershed, particularly along Trib 1 between MLK Drive and FM 149, will be significantly reduced for storm events up to and including the Atlas 14 100-year event.

Exhibits





City of Montgomery

BGE, Inc.
10777 Westheimer, Suite 400, Houston TX 77042
Tel: (281) 558-8700 Fax: (281) 558-9701
www.bgeinc.com

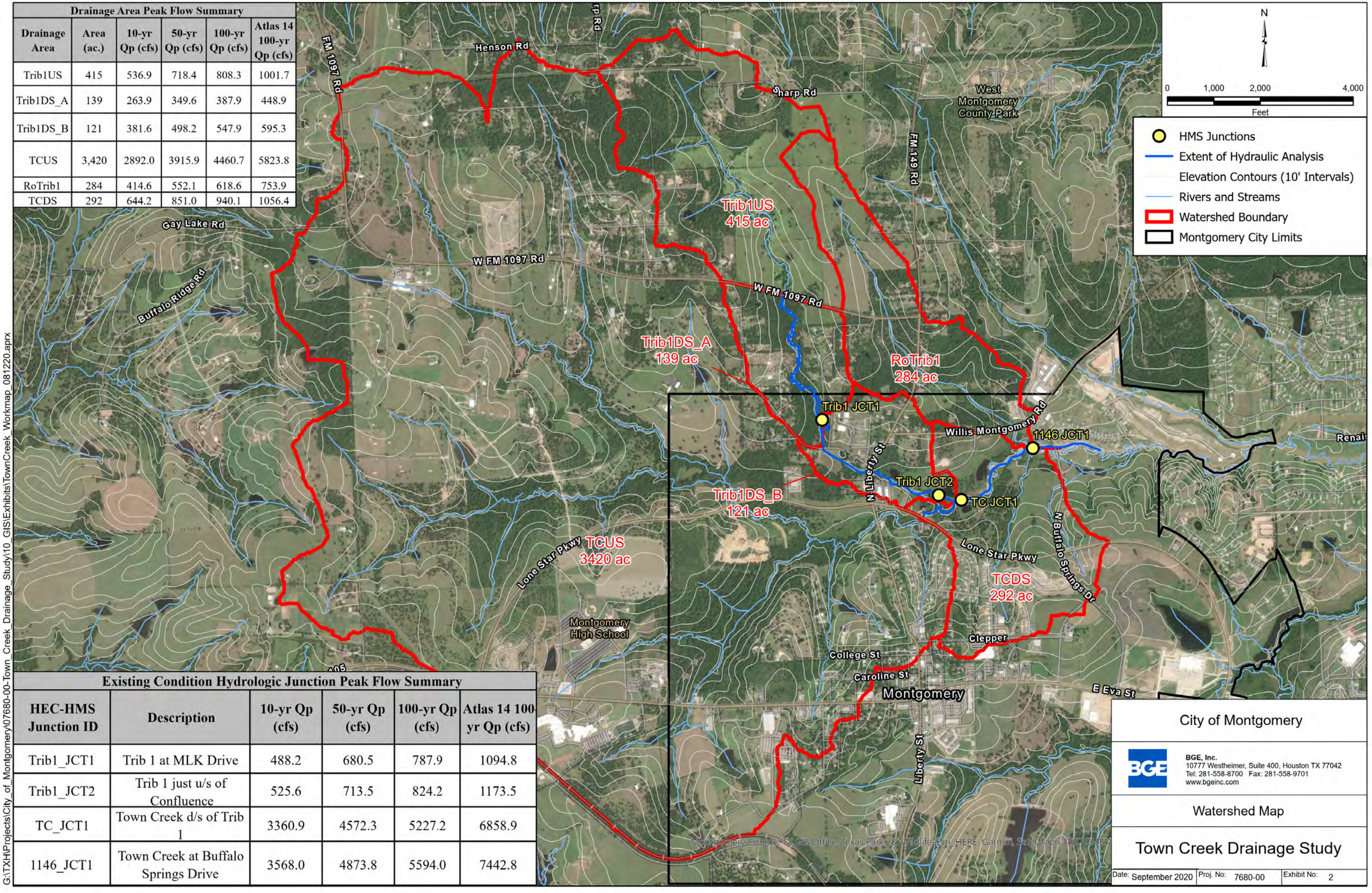
Town Creek Drainage Study

Date:	Proj. No:	Exhibit No:
September 2020	7680-00	1

G:\TXH\Projects\City of Montgomery\07680-00-Town Creek Drainage Study\10 GIS\Exhibits\TownCreek Workmap 081220.aprx

Drainage Area Peak Flow Summary

Drainage Area	Area (ac.)	10-yr Qp (cfs)	50-yr Qp (cfs)	100-yr Qp (cfs)	Atlas 14 100-yr Qp (cfs)
Trib1US	415	536.9	718.4	808.3	1001.7
Trib1DS_A	139	263.9	349.6	387.9	448.9
Trib1DS_B	121	381.6	498.2	547.9	595.3
TCUS	3,420	2892.0	3915.9	4460.7	5823.8
RoTrib1	284	414.6	552.1	618.6	753.9
TCDS	292	644.2	851.0	940.1	1056.4



Existing Condition Hydrologic Junction Peak Flow Summary

HEC-HMS Junction ID	Description	10-yr Qp (cfs)	50-yr Qp (cfs)	100-yr Qp (cfs)	Atlas 14 100-yr Qp (cfs)
Trib1_JCT1	Trib 1 at MLK Drive	488.2	680.5	787.9	1094.8
Trib1_JCT2	Trib 1 just u/s of Confluence	525.6	713.5	824.2	1173.5
TC_JCT1	Town Creek d/s of Trib 1	3360.9	4572.3	5227.2	6858.9
1146_JCT1	Town Creek at Buffalo Springs Drive	3568.0	4873.8	5594.0	7442.8

City of Montgomery

BGE, Inc.
10777 Westheimer, Suite 400, Houston TX 77042
Tel: 281-558-8700 Fax: 281-558-9701
www.bgeinc.com

Watershed Map

Town Creek Drainage Study

Date: September 2020 | Proj. No: 7680-00 | Exhibit No: 2

G:\TX\H\Projects\City_of_Montgomery\07680-00-Town_Creek_Drainage_Study\10_GIS\Exhibits\TownCreek_Workmap_081220.aprx

N

0 150 300 600

Feet

Stream

HEC-RAS Cross Sections

Inundation Boundary (Atlas14 100-yr)

Inundation Boundary (100-yr)

FEMA Effective Floodplain

Floodway

AE

X

Note: Inundation boundaries are based on existing condition HEC-RAS results. Effective boundaries are not intended to be revised as a result of this study.

FM 1097

W FM 1097 Rd

1097

Mystric Rd

Town Creek Trib 1

Dr Martin Luther King Jr Dr

Baja Rd

Homecoming Park

Montgomery Intermediate

149

N Liberty St

Dr Martin Luther King Dr
1-108" Steel Pipe

Town Creek Trib 1

Town Creek

Simonton St

FM 149
2- 54" RCPs

Lonestar Community Development Center

Lone Star Pkwy

Lone Star Pkwy

Lone Star Pkwy

City of Montgomery	
BGE, Inc. 10777 Westheimer, Suite 400, Houston TX 77042 Tel: 281-558-8700 Fax: 281-558-9701 www.bgeinc.com	
HEC-RAS XS Layout (1 of 3)	
Town Creek Drainage Study	
Date: September 2020	Proj. No: 7680-00 / Exhibit No: 3a

G:\TXH\Projects\City of Montgomery\07680-00-Town Creek Drainage Study\10 GIS\Exhibits\TownCreek_Workmap_081220.aprx

Note: Inundation boundaries are based on existing condition HEC-RAS results. Effective boundaries are not intended to be revised as a result of this study.

N

0 150 300 600
Feet

Stream
HEC-RAS Cross Sections
Inundation Boundary (Atlas14 100-yr)
Inundation Boundary (100-yr)

FEMA Effective Floodplain
Floodway
AE
X

Homecoming Park
Montgomery Intermediate
Dr Martin Luther King Dr
1-108" Steel Pipe
FM 149 Rd
2- 54" RCPs
Plez Morgan Dr
2- 9'x9' RCBs
Town Creek Trib 1
Town Creek
Town Creek

5206 5114 5019 4939 4808 4694 4554 4405 4303 4194 3930 3808 3654.35 3593.5 3532.7 3396 3291.40 3186.81 3135 2958.70 2782.40 2709 2566 2465 2328 2281 2066 1948 1845 1740 1635 1568 1446 1388 1107 1016 913 728 585 442 348 197 4284 4419 4205 4011 4699 4573 4863 4986 1746 1534 2665 2764 2996 2867 3167 3367 3551 3703 3815 3921 2362 2419 2135 1983 1481

City of Montgomery		
BGE, Inc. 10777 Westheimer, Suite 400, Houston TX 77042 Tel: 281-558-8700 Fax: 281-558-9701 www.bgeinc.com		
HEC-RAS XS Layout (2 of 3)		
Town Creek Drainage Study		
Date: September 2020	Proj. No: 7680-00	Exhibit No: 3b

G:\TXH\Projects\City of Montgomery\07680-00-Town Creek Drainage Study\10 GIS\Exhibits\TownCreek Workmap_081220.aprx

Note: Inundation boundaries are based on existing condition HEC-RAS results. Effective boundaries are not intended to be revised as a result of this study.

N

0 150 300 600
Feet

Stream
HEC-RAS Cross Sections
Inundation Boundary (Atlas14 100-yr)
Inundation Boundary (100-yr)

FEMA Effective Floodplain
Floodway
AE
X

FM 149 Rd
Thomas St
Summit Park Dr
Willis Montgomery Rd
1097
Waterstone Dr
N Buffalo Springs Dr
Plez Morgan Dr
Town Creek
Town Creek Trib 1
Jan Dr

Plez Morgan Dr
2- 9'x9' RCBs

N Buffalo Springs Dr
90-ft Single Span Bridge

1746 1481 1147 1060 964 927 721 541
2362 2219 2135 1983 2534 2665 2764 2996 2867 3167 3367 3551 3703 3815 3921
1568 1107 1016 913 585 442 348 197 4205 4011 4419 4573 4699 4863 4986 4284

City of Montgomery

BGE, Inc.
10777 Westheimer, Suite 400, Houston TX 77042
Tel: 281-558-8700 Fax: 281-558-9701
www.bgeinc.com

HEC-RAS XS Layout (3 of 3)

Town Creek Drainage Study

Date: September 2020 | Proj. No: 7680-00 | Exhibit No: 3c

G:\TXH\Projects\City of Montgomery\07680-00-Town Creek Drainage Study\10 GIS\Exhibits\TownCreek_Workmap_081220.aprx

Note: Inundation boundaries are based on existing condition HEC-RAS results. Effective boundaries are not intended to be revised as a result of this study.

N

0 35 70 140
Feet

Project 2 Area (0.98 acres)
Stream
HEC-RAS Cross Sections
Project 3 - Proposed Detention Pond

Project 3 - Proposed Detention Pond
Footprint Area = 3.0 Acres
Minimum Required Atlas 14 100-Yr
Detention Volume = 7.3 ac-ft

Project 2 - Proposed Channel Improvement and Clearing

Project 1 - Replace Existing 2-54" RCPs with 2-10'x4' RCBs

3654.35
3593.5
3532.7
3498
3396
3291.40
3186.81
3135
2958.70
2782.40
2709
2566
2465
2258
2181
2066
1943
1845
1740
1635
1568
1446
1388
107

Town Creek
Dr Martin Luther King Jr Dr
Simonton St
N Liberty St

City of Montgomery

BGE, Inc.
10777 Westheimer, Suite 400, Houston TX 77042
Tel: 281-558-8700 Fax: 281-558-9701
www.bgeinc.com

Proposed Alternative 1 Improvements

Town Creek Drainage Study

Date:	Proj. No:	Exhibit No:
September 2020	7680-00	4

G:\TXH\Projects\City of Montgomery\07680-00-Town Creek Drainage Study\10 GIS\Exhibits\TownCreek_Workmap_081220.aprx

Appendix A

FEMA Effective Data for Town Creek and Trib 1

TABLE 2 – SUMMARY OF DISCHARGES (CONTINUED)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq.miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
TOWN CREEK Continued					
At FM 149	5.17	1,759	3,376	4,285	6,864
At Cross Section E	4.75	1,788	3,429	4,352	6,969
At Cross Section F	3.15	1,287	2,471	3,137	5,024
At Cross Section G	1.05	619	1,178	1,491	2,378
At Cross Section H	0.42	279	528	667	1,063
TOWN CREEK TRIBUTARY NO. 1					
At FM 149	0.93	399	767	974	1,561
At FM 1097	0.58	331	634	803	1,284
At Cross Section H	0.33	210	399	504	804
TOWN CREEK TRIBUTARY NO. 2					
At Cross Section A	1.06	573	1,098	1,392	2,226
At Cross Section B	0.42	277	526	665	1,059
TRIBUTARY TO SAM BELL GULLY DIVERSION CHANNEL					
At mouth[6]	1.5	684	--[7]	971	1,177
WALNUT CREEK					
At Cross Section A	75.51	2,794	7,524	10,566	19,921
At Cross Section H	72.29	2,769	7,521	10,579	20,003
At Walnut Creek Drive	65.66	2,615	7,162	10,102	19,170
At Cross Section N	61.33	2,577	7,157	10,124	19,282
At Cross Section O	50.57	2,231	6,446	9,206	17,784
At Cross Section P	49.87	2,235	6,482	9,271	17,929
At Nichols Sawmill Road	44.07	2,091	6,164	8,848	17,212
At Cross Section T	43.74	2,121	6,288	9,033	17,589
At Cross Section Z	38.38	2,101	6,463	9,330	18,237
WALNUT CREEK TRIBUTARY NO. 1					
At Butera Drive	1.72	160	594	887	1,816
At Cross Section C	1.03	92	346	521	1,078
At Cross Section E	0.63	73	269	400	813
WATERHOLE BRANCH					
At Cross Section A	4.35	1,204	2,726	3,723	5,146
At Cross Section D	3.87	1,152	2,626	3,613	5,004

[6] Discharge data provided by the USACE

[7] Not Computed

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
Town Creek								
A	4,283	85	1,394	3.3	210.9	210.9	211.6	0.7
B	7,677	123	1,110	4.5	233.8	233.8	234.5	0.7
C	9,882	156	1,290	3.3	240.3	240.3	241.3	1.0
D	9,984	265	1,764	2.4	241.8	241.8	242.8	1.0
E	11,933	468	2,360	1.8	243.1	243.1	244.1	1.0
F	15,768	288	1,244	2.6	250.9	250.9	251.9	1.0
G	19,218	111	490	3.1	263.6	263.6	264.6	1.0
H	22,483	95	329	2.0	281.3	281.3	282.3	1.0

[1] Feet above mouth

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTGOMERY COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

TOWN CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
Town Creek Tributary No.1								
A	1,990	60	116	8.4	242.2	242.2	243.2	0.0
B	2,064	224	795	1.3	243.8	243.8	244.8	1.0
C	3,138	343	646	1.5	246.8	246.8	247.8	1.0
D	3,198	351	1,134	0.8	249.0	249.0	250.0	1.0
E	5,253	101	439	2.1	261.2	261.2	262.2	1.0
F	7,015	78	437	1.8	268.9	268.9	269.9	1.0
G	7,226	170	1,304	0.6	272.8	272.8	273.8	1.0
H	10,530	81	293	1.7	289.1	289.1	290.1	1.0

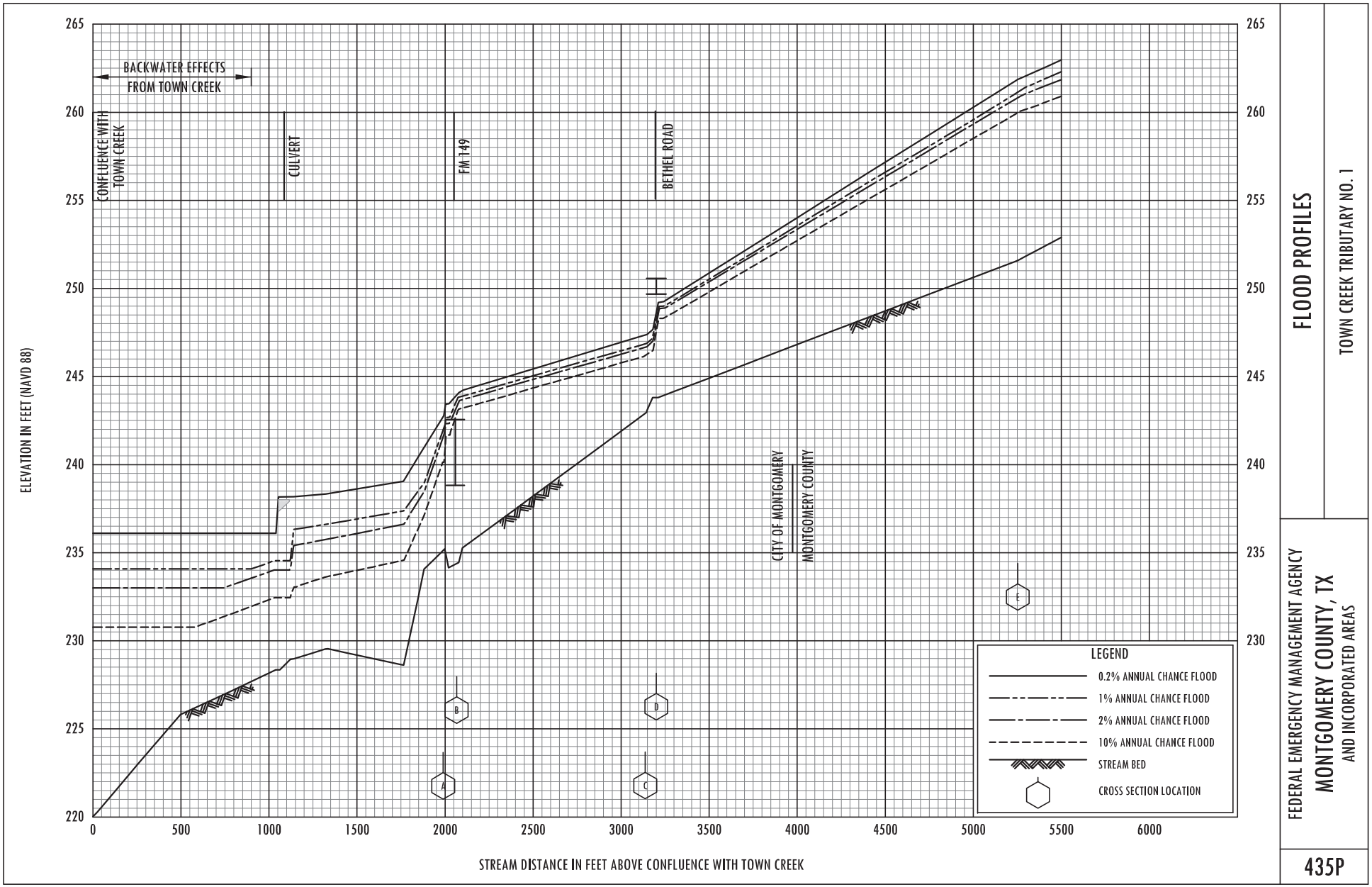
[1] Feet above mouth

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTGOMERY COUNTY, TEXAS AND INCORPORATED AREAS

FLOODWAY DATA

TOWN CREEK TRIBUTARY NO. 1



FLOOD PROFILES

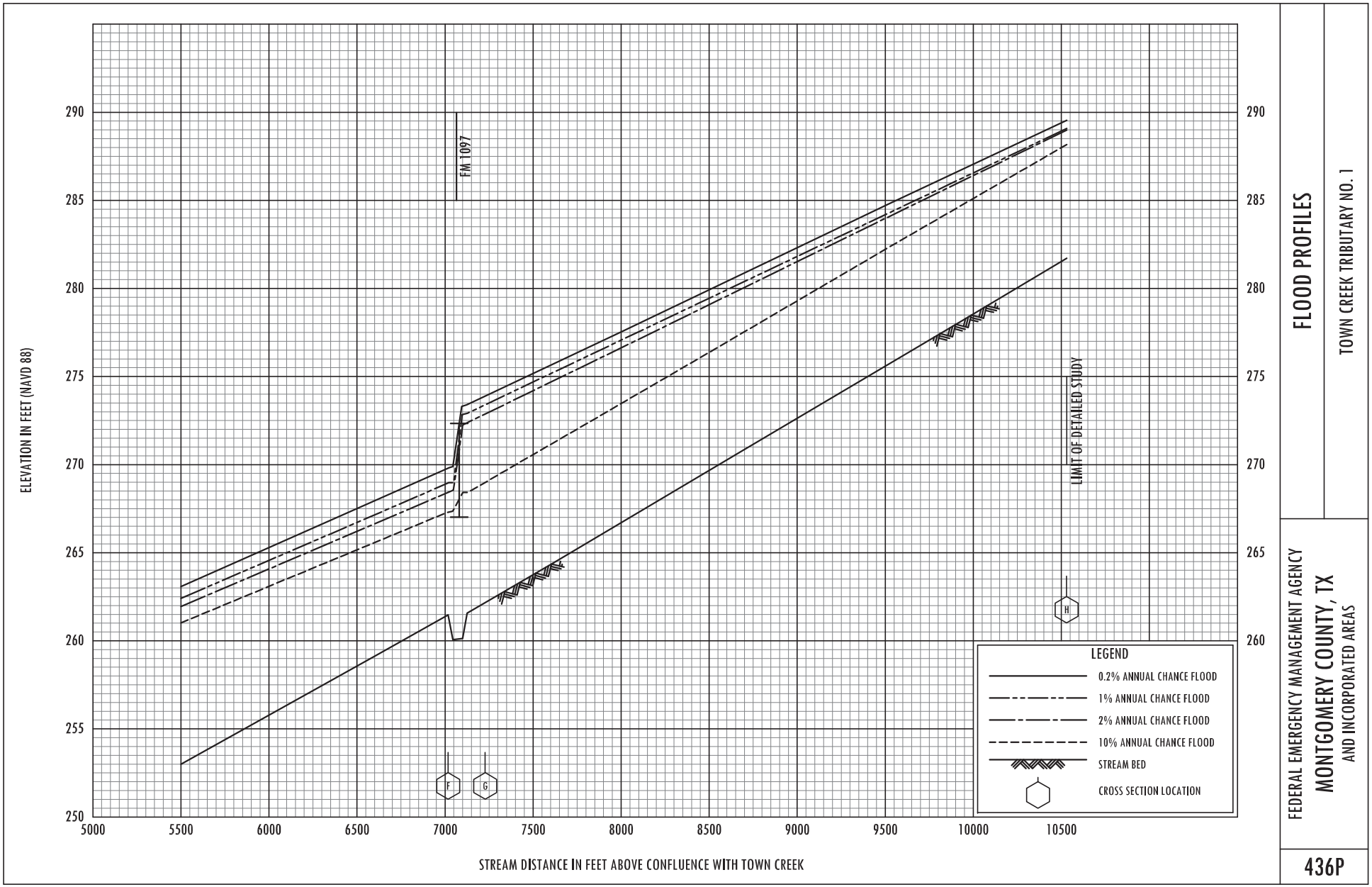
TOWN CREEK TRIBUTARY NO. 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, TX

AND INCORPORATED AREAS

435P



FLOOD PROFILES

TOWN CREEK TRIBUTARY NO. 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, TX

AND INCORPORATED AREAS

436P

Appendix B

Field Visit Photographs and Record Drawings

Appendix B – Site Visit Photos

Upstream side of 108” steel pipe at MLK Drive

Appendix B – Site Visit Photos

Upstream side of 2-54” RCPs at FM 149

Upstream side of Plez Morgan, facing downstream

Appendix B – Site Visit Photos

Downstream side of Plez Morgan, facing upstream

Trib 1 channel and overbank downstream of Plez Morgan

Appendix B – Site Visit Photos

Existing pond in left overbank of Trib 1, near confluence with Town Creek

Appendix B – Site Visit Photos

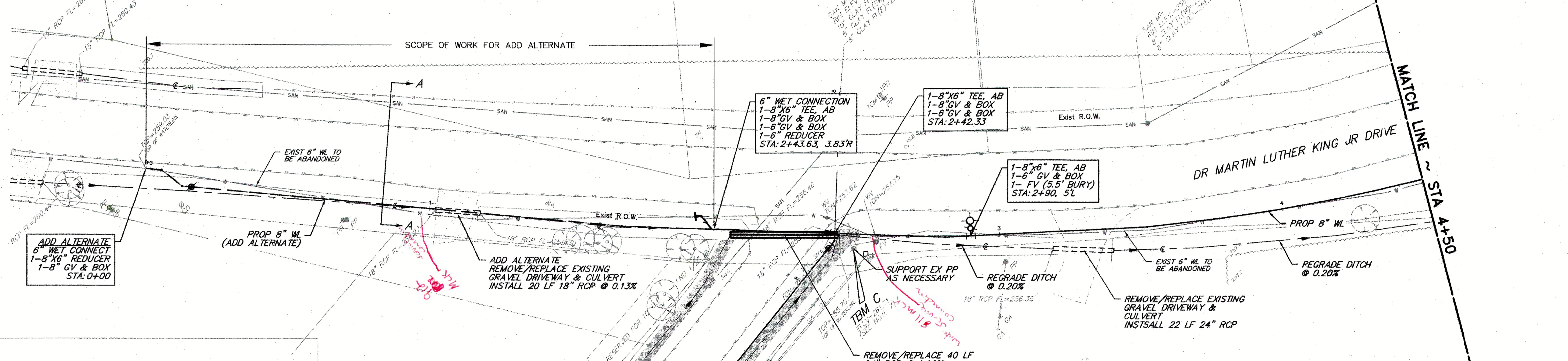
Erosion near Trib 1 and Town Creek confluence

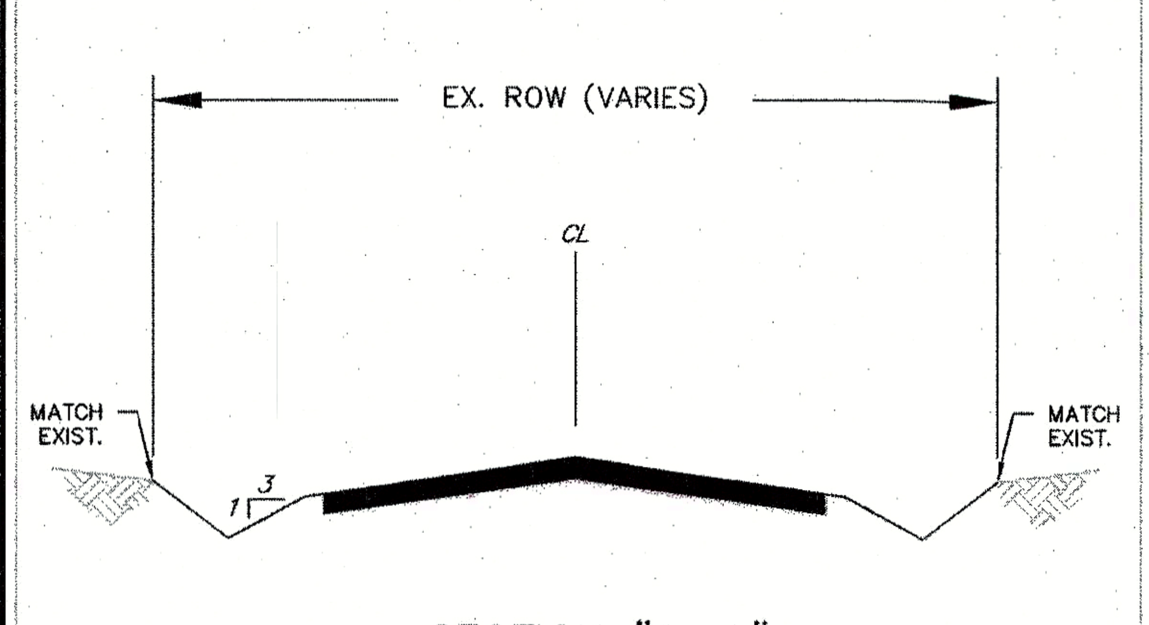
Appendix B – Site Visit Photos

Upstream side of Buffalo Springs Drive, facing upstream

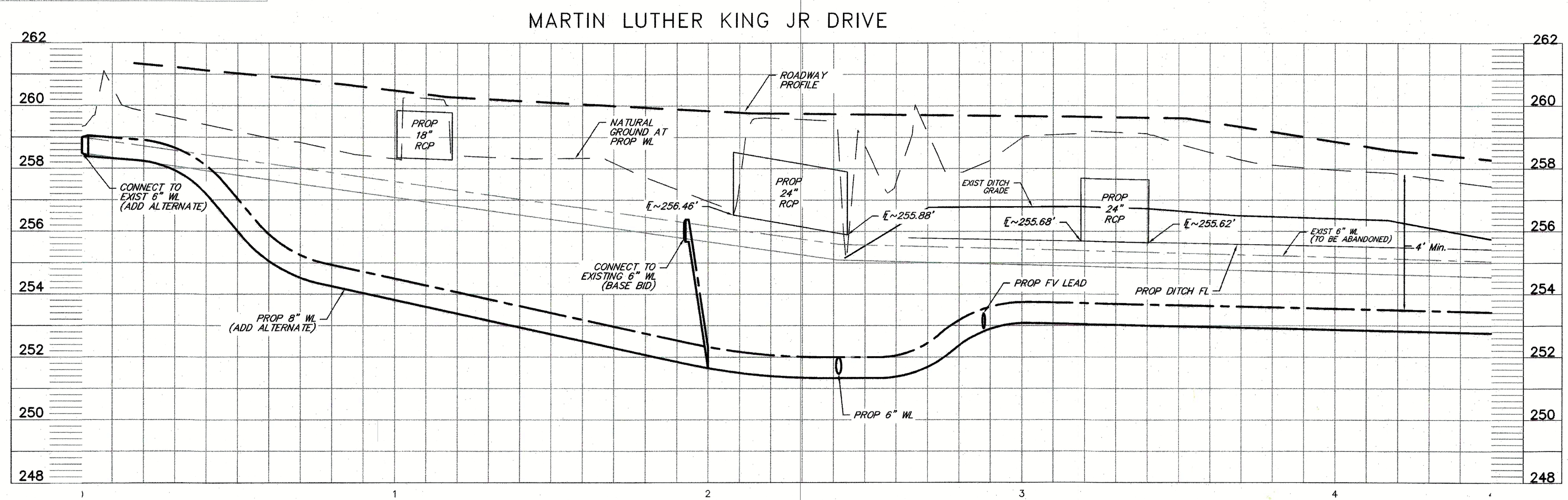
Downstream side of Buffalo Springs Drive, facing downstream

NOTE:
1. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL WATER SERVICES CONNECTING TO THE EXISTING WATERLINE AND ENSURE THAT ALL EXISTING SERVICES ARE CONNECTED TO THE PROPOSED WATERLINE.
2. CONTRACTOR SHALL MAINTAIN SERVICE TO ALL CONNECTIONS THROUGHOUT CONSTRUCTION.
3. CONTRACTOR SHALL COORDINATE WITH PRIVATE UTILITY OWNER TO SUPPORT POWER POLES AS REQUIRED (NO SEPARATE PAY).
4. CONTRACTOR TO REMOVE AND REPLACE EXISTING FENCE, AS NEEDED (NO SEPARATE PAY).
5. CONTRACTOR SHALL FILL WITH CEMENT STABILIZED SAND, OR ENGINEERS APPROVED EQUAL, IN AREAS THAT EXISTING ASPHALT IS REMOVED.
6. CONTRACTOR SHALL COORDINATE WITH PUBLIC WORKS DEPARTMENT AT LEAST 72 BUSINESS HOURS PRIOR TO ANY TREE REMOVAL THROUGHOUT PROJECT.





SECTION "A-A"
N.T.S



BENCH MARK
ELEVATIONS SHOWN HEREON ARE BASED ON CITY OF MONTGOMERY CONTROL-MONUMENT #4 BEING A 6 FOOT BY 5/8" IRON REBAR IN CONCRETE WITH A 3 INCH BRASS DISK WITH A PUNCH HOLE IN CENTER LOCATED IN THE SOUTH RIGHT-OF-WAY OF LONESTAR PARKWAY +/- 4300' WEST OF THE INTERSTECTION OF FM 149 AND LONESTAR PARKWAY.

ELEV.: = 285.97 NAVD88 (2009 ADJ.)

T.B.M A
A SCRIBED SQUARE ON A CONCRETE HEADWALL. LOCATED ON THE WEST SIDE OF FM 149 AND THE NORTH RIGHT-OF-WAY OF DR. MARTIN LUTHER KING JR. DRIVE AND FURTHER SHOWN HERON.
ELEV. = 243.57 NAVD88 (2009 ADJ.)

T.B.M. B
A RAILROAD SPIKE IN THE SOUTH FACE OF A POWER POLE. LOCATED IN THE NORTHERN RIGHT-OF-WAY OF DR. MARTIN LUTHER KING JR. DRIVE +/- 115 EAST OF A PRIVATE DRIVE ALONG THE WEST SIDE OF MONTGOMERY INTERMEDIATE SCHOOL AND FURTHER SHOWN HERON.

ELEV. = 248.96 NAVD88 (2009 ADJ.)

T.B.M C
A RAILROAD SPIKE IN THE NORTH FACE OF A POWER POLE. LOCATED IN THE SOUTH RIGHT-OF-WAY AT THE INTERSECTION OF BAJA ROAD AND DR. MARTIN LUTHER KING JR. DRIVE AND FURTHER SHOWN HERON.

ELEV. = 261.71 NAVD88 (2009 ADJ.)

T.B.M D
A RAILROAD SPIKE IN THE NORTH FACE OF A POWER POLE. LOCATED IN THE SOUTHWEST RIGHT-OF-WAY OF BAJA ROAD, +/- 125 FEET SOUTH OF THE DEAD-END OF THE ROAD AND FURTHER SHOWN HERON.

ELEV.= 259.45 NAVD88 (2009 ADJ.)

0 20' 40'

CITY OF MONTGOMERY, TEXAS

Chris Roznovsky 9/19/18

Chris Roznovsky, P.E.
City of Montgomery, City Engineer
Signature Valid for One (1) Year
Date

NO.	DATE	REVISIONS	APP.

CITY OF MONTGOMERY
MONTGOMERY COUNTY, TEXAS

WATER AND DRAINAGE IMPROVEMENTS ON MARTIN LUTHER KING JR. DRIVE AND BAJA ROAD

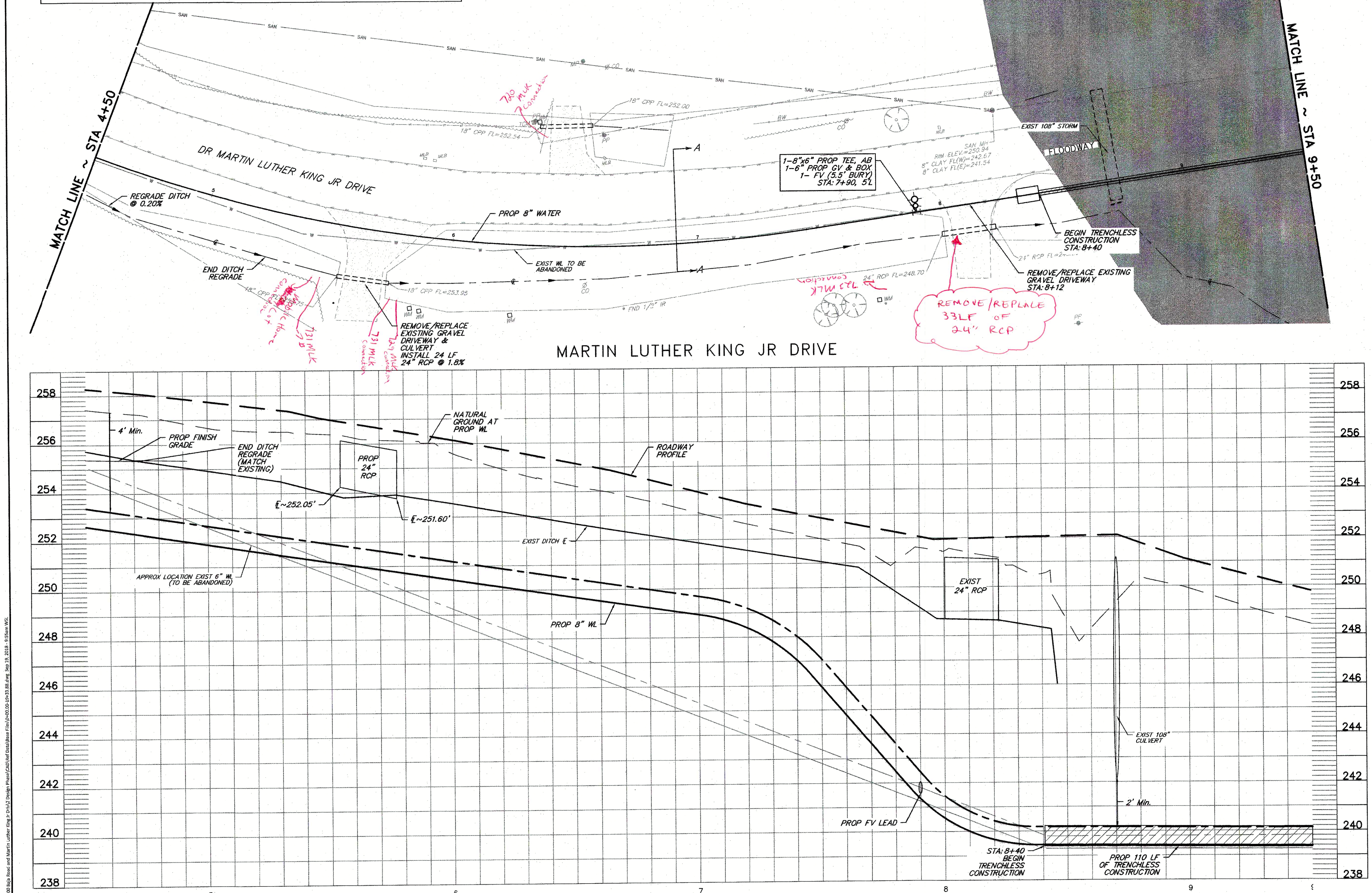
MLK P&P 1

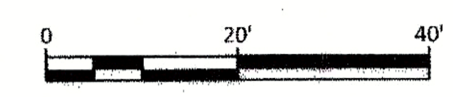
JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
1575 Sawdust Road, Suite 400 The Woodlands, Texas 77380
281.363.4039

SCALE: 1" = 20' DGN. BY: RMC
DATE: September 2018 DWN. BY: RMC
JOB NO. W5841-0037-00 DWG. NO. --
SUBMITTED: #### SURV. BY: JC

STATE OF TEXAS
NATHANIEL E. JACKSON
116804
LICENSED
PROFESSIONAL ENGINEER
9/19/18

NOTE:
1. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL WATER SERVICES CONNECTING TO THE EXISTING WATERLINE AND ENSURE THAT ALL EXISTING SERVICES ARE CONNECTED TO THE PROPOSED WATERLINE.
2. CONTRACTOR SHALL MAINTAIN SERVICE TO ALL CONNECTIONS THROUGHOUT CONSTRUCTION.
3. CONTRACTOR SHALL COORDINATE WITH PRIVATE UTILITY OWNER TO SUPPORT POWER POLES AS REQUIRED (NO SEPARATE PAY).
4. CONTRACTOR TO REMOVE AND REPLACE EXISTING FENCE, AS NEEDED (NO SEPARATE PAY).
5. CONTRACTOR SHALL FILL WITH CEMENT STABILIZED SAND, OR ENGINEERS APPROVED EQUAL, IN AREAS THAT EXISTING ASPHALT IS REMOVED.





BENCH MARK
ELEVATIONS SHOWN HEREON ARE BASED ON CITY OF MONTGOMERY CONTROL-MONUMENT #4 BEING A 6 FOOT BY 5/8" IRON REBAR IN CONCRETE WITH A 3 INCH BRASS DISK WITH A PUNCH HOLE IN CENTER LOCATED IN THE SOUTH RIGHT-OF-WAY OF LONESTAR PARKWAY +/- 4300' WEST OF THE INTERSTECTION OF FM 149 AND LONESTAR PARKWAY.

ELEV.: = 285.97 NAVD88 (2009 ADJ.)

T.B.M A
A SCRIBED SQUARE ON A CONCRETE HEADWALL. LOCATED ON THE WEST SIDE OF FM 149 AND THE NORTH RIGHT-OF-WAY OF DR. MARTIN LUTHER KING JR. DRIVE AND FURTHER SHOWN HERON.
ELEV. = 243.57 NAVD88 (2009 ADJ.)

T.B.M. B
A RAILROAD SPIKE IN THE SOUTH FACE OF A POWER POLE. LOCATED IN THE NORTHERN RIGHT-OF-WAY OF DR. MARTIN LUTHER KING JR. DRIVE +/- 115 EAST OF A PRIVATE DRIVE ALONG THE WEST SIDE OF MONTGOMERY INTERMEDIATE SCHOOL AND FURTHER SHOWN HERON.

ELEV. = 248.96 NAVD88 (2009 ADJ.)

T.B.M C
A RAILROAD SPIKE IN THE NORTH FACE OF A POWER POLE. LOCATED IN THE SOUTH RIGHT-OF-WAY AT THE INTERSECTION OF BAJA ROAD AND DR. MARTIN LUTHER KING JR. DRIVE AND FURTHER SHOWN HERON.

ELEV. = 261.71 NAVD88 (2009 ADJ.)

T.B.M D
A RAILROAD SPIKE IN THE NORTH FACE OF A POWER POLE. LOCATED IN THE SOUTHWEST RIGHT-OF-WAY OF BAJA ROAD, +/- 125 FEET SOUTH OF THE DEAD-END OF THE ROAD AND FURTHER SHOWN HERON.

ELEV.= 259.45 NAVD88 (2009 ADJ.)

CITY OF MONTGOMERY, TEXAS

Chris Roznovsky 9/19/18

Chris Roznovsky, P.E.
City of Montgomery, City Engineer
Signature Valid for One (1) Year
Date

NO.	DATE	REVISIONS	APP.

CITY OF MONTGOMERY
MONTGOMERY COUNTY, TEXAS

WATER AND DRAINAGE IMPROVEMENTS ON MARTIN LUTHER KING JR. DRIVE AND BAJA ROAD

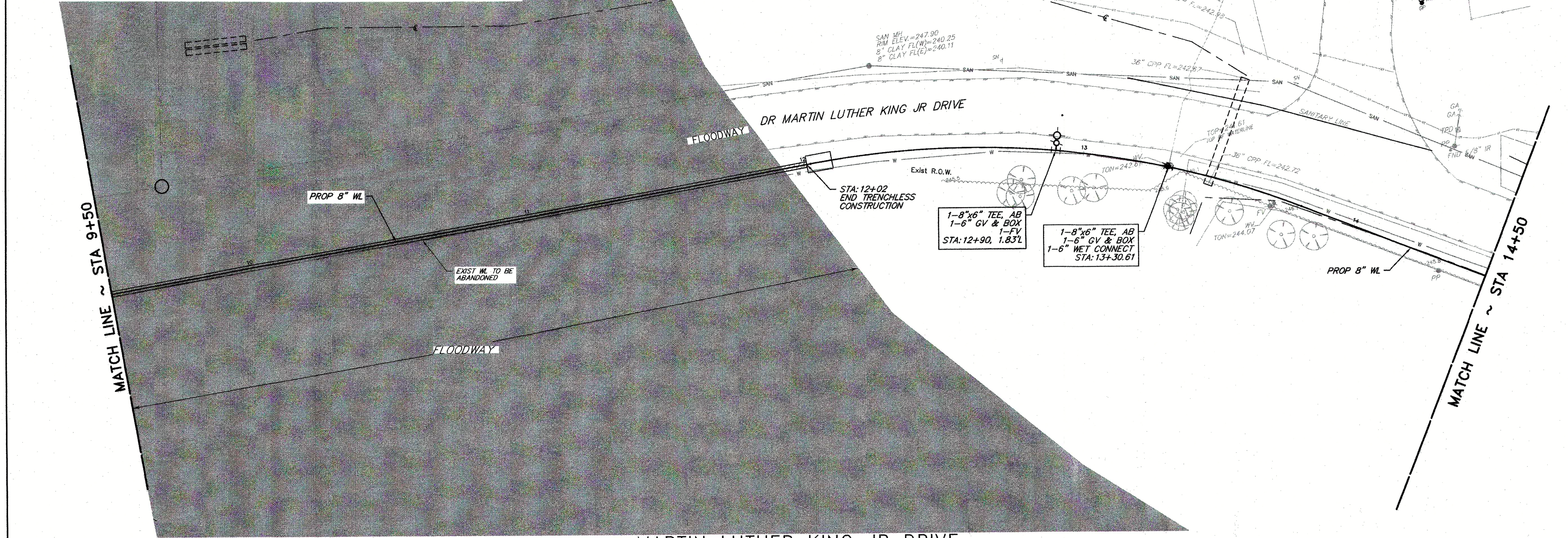
MLK P&P 2

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
1575 Sawdust Road, Suite 400 The Woodlands, Texas 77380
281.363.4039

SCALE: 1" = 20' DGN. BY: RMC
DATE: September 2018 DWN. BY: RMC
JOB NO. W5841-0037-00 DWG. NO. --
SUBMITTED: #### SURV. BY: JC

STATE OF TEXAS
NATHANIEL E. JACKSON
116304
LICENSED PROFESSIONAL ENGINEER
09/19/18

NOTE:
1. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL WATER SERVICES CONNECTING TO THE EXISTING WATERLINE AND ENSURE THAT ALL EXISTING SERVICES ARE CONNECTED TO THE PROPOSED WATERLINE.
2. CONTRACTOR SHALL MAINTAIN SERVICE TO ALL CONNECTIONS THROUGHOUT CONSTRUCTION.
3. CONTRACTOR SHALL COORDINATE WITH PRIVATE UTILITY OWNER TO SUPPORT POWER POLES AS REQUIRED (NO SEPARATE PAY).
4. CONTRACTOR TO REMOVE AND REPLACE EXISTING FENCE, AS NEEDED (NO SEPARATE PAY).
5. CONTRACTOR SHALL FILL WITH CEMENT STABILIZED SAND, OR ENGINEERS APPROVED EQUAL, IN AREAS THAT EXISTING ASPHALT IS REMOVED.



BENCH MARK
ELEVATIONS SHOWN HEREON ARE BASED ON CITY OF MONTGOMERY CONTROL-MONUMENT #4 BEING A 6 FOOT BY 5/8" IRON REBAR IN CONCRETE WITH A 3 INCH BRASS DISK WITH A PUNCH HOLE IN CENTER LOCATED IN THE SOUTH RIGHT-OF-WAY OF LONESTAR PARKWAY +/- 4300' WEST OF THE INTERSECTION OF FM 149 AND LONESTAR PARKWAY.

ELEV.: = 285.97 NAVD88 (2009 ADJ.)

T.B.M. A
A SCRIBED SQUARE ON A CONCRETE HEADWALL. LOCATED ON THE WEST SIDE OF FM 149 AND THE NORTH RIGHT-OF-WAY OF DR. MARTIN LUTHER KING JR. DRIVE AND FURTHER SHOWN HERON.
ELEV. = 243.57 NAVD88 (2009 ADJ.)

T.B.M. B
A RAILROAD SPIKE IN THE SOUTH FACE OF A POWER POLE. LOCATED IN THE NORTHERN RIGHT-OF-WAY OF DR. MARTIN LUTHER KING JR. DRIVE +/- 115 EAST OF A PRIVATE DRIVE ALONG THE WEST SIDE OF MONTGOMERY INTERMEDIATE SCHOOL AND FURTHER SHOWN HERON.

ELEV. = 248.96 NAVD88 (2009 ADJ.)

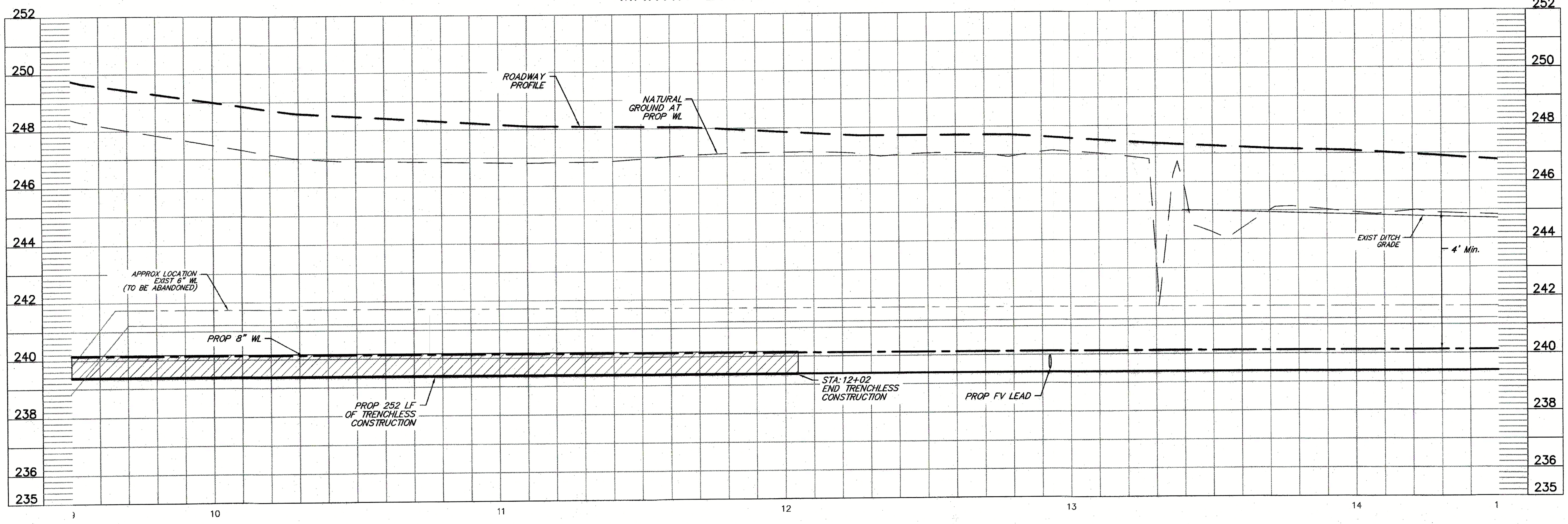
T.B.M. C
A RAILROAD SPIKE IN THE NORTH FACE OF A POWER POLE. LOCATED IN THE SOUTH RIGHT-OF-WAY AT THE INTERSECTION OF BAJA ROAD AND DR. MARTIN LUTHER KING JR. DRIVE AND FURTHER SHOWN HERON.

ELEV. = 261.71 NAVD88 (2009 ADJ.)

T.B.M. D
A RAILROAD SPIKE IN THE NORTH FACE OF A POWER POLE. LOCATED IN THE SOUTHWEST RIGHT-OF-WAY OF BAJA ROAD, +/- 125 FEET SOUTH OF THE DEAD-END OF THE ROAD AND FURTHER SHOWN HERON.

ELEV.= 259.45 NAVD88 (2009 ADJ.)

MARTIN LUTHER KING JR DRIVE



CITY OF MONTGOMERY, TEXAS

Chris Roznovsky 9/19/18

Chris Roznovsky, P.E.
City of Montgomery, City Engineer
Signature Valid for One (1) Year
Date

NO.	DATE	REVISIONS	APP.

CITY OF MONTGOMERY
MONTGOMERY COUNTY, TEXAS

WATER AND DRAINAGE IMPROVEMENTS ON MARTIN LUTHER KING JR. DRIVE AND BAJA ROAD

MLK P&P 3

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
1575 Sawdust Road, Suite 400 The Woodlands, Texas 77380
281.363.4039

SCALE: 1" = 20' DGN. BY: RMC
DATE: September 2018 DWN. BY: RMC
JOB NO. W5841-0037-00 DWG. NO. --
SUBMITTED: #### SURV. BY: JC

STATE OF TEXAS
NATHANIEL E. JACKSON
116904
LICENSED PROFESSIONAL ENGINEER
09/19/18

8 OF 10

8/29/2010

RECORD DRAWING

Klotz Associates, Inc. has prepared this Record Drawing to show changes made during construction and recorded on a print of the contract drawing by the Construction Contractor. The information submitted by the Contractor has been posted on the Record Drawing as attested by the signature below.

DAVID C. BALMOS, P.E. 8/27/2010

0 20 40 60

GRAPHIC SCALE IN FEET
HORIZ. 1" = 40'
VERT. 1" = 4'

CITY OF MONTGOMERY, TX

klotz associates

1160 Dairy Ashford, Suite 500
Houston, TX 77079
T 281.589.7257 F 281.589.7309
houston.office@klotz.com
Texas PE Firm Reg. # F-929

PLAN & PROFILE
STA 11+00 TO 20+00

SHEET 1 OF 3

Klotz Project No	
Drawn By	Checked By
Scale	Date 8/29/2010
DWG No	Sheet 4 Of 21

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

AMENDING PLAT OF WATERSTONE ON LAKE CONROE SECTION ONE Cab. Z, Sht 1356 MCMR

RESTRICTED RESERVE "C"

TOWN CREEK FLOW

BUFFALO CROSSING Cab. Z, Sht. 1642 MCMR

Prop Water Line (By Others) Contractor Responsible For Coordination with Waterline Contractor

Prop 12" WL (By Others) Contractor Responsible For Coordination with Waterline Contractor

Transition From Proposed Concrete Bulkhead To Existing Wood Bulkhead

Prop 4' Wide by 4' Thick Concrete Rip-Rap Toe

Prop Extra Depth Type "C" MH (See Sheet 8)

Prop Concrete Bulkhead (See Detail Sheets 21 & 22)

Grade Back to Existing Ground

Prop Extra Depth Type "C" MH (See Sheet 7)

Regrade Roadside Ditch (See Sheet 8)

Regrade Roadside Ditch (See Sheet 7)

25' UE & DE Cab. Z, Sht 1642 MCMR

25' BL & UE Cab. Z, Sht 1356 MCMR

EAST ROW

3'x2' RCB

54" RCP

54" Outfall (See Sheet 7)

54" Outfall (See Sheet 7)

54" RCP

Remove and Dispose of Metal Guard Rail

Proposed 2" HMAC Paving (See Detail Sheet 20)

BUFFALO SPRINGS DRIVE (100' ROW)

PT: 2+72.60

Concrete Approach Slabs (See Detail Sheets 20 & 22)

31.50 cu ft

Proposed 2" HMAC Asphalt Paving (See Detail Sheet 20)

36" RCP

Volume under bridge behind wall
51.75*14*22=15,939 cuft

*.037037 (cu ft to cy)
=590.33cy

Remove and Dispose of Metal Guard Rail

Prop Grade No. 2 Riprap TOP EL. 194.00' (See Detail Sheets 21 & 25)

Prop Concrete Bulkhead (See Detail Sheets 21 & 22)

WEST ROW

Regrade Roadside Ditch (See Sheet 8)

Prop Type "C" MH (See Sheet 8)

Prop Type "B" Weep Hole (See Detail Sheet 24)

Prop 4' Wide by 4' Thick Concrete Rip-Rap Toe

Transition From Proposed Concrete Bulkhead To Existing Wood Bulkhead

Prop 30' DE

Prop Type "B" Weep Hole (See Detail Sheet 24)

Remove & Replace ~123 LF 6" PVC Force Main w/ Proposed 6" Force Main (See Sheets 7 & 10)

Lift Station Fee Tract CF No. 2008-079560 MCOPRRP

Prop Type "C" MH (See Sheet 7)

Regrade Roadside Ditch (See Sheet 7)

RESTRICTED RESERVE "D"

AMENDING PLAT OF WATERSTONE ON LAKE CONROE SECTION ONE Cab. Z, Sht 1356 MCMR

20' UE CF No. 2008-079562 MCOPRRP

Drainage Easement Cab. Z, Sht 1356 MCMR

TOWN CREEK FLOW

VRE INVESTMENTS ... 599.11 PG. 1450 MCMR

31942+31595 = 63537 cu ft
x 0.037037
=2,353.22 cy (Contract amount in cy 1298 based on conversion below)
/ 0.59 (*see below)
=3,988.51 ton required (

Pulled from submittal
Density 125lbs per cu ft
27 cu ft in a cy
125x27 = 3,375 lbs cy
2000lbs in a ton
2000/3375 = 0.59 cy per ton

Original contract amount 2,200 ton(1298cy based on density above)
Net adjustment required
~3,988.51-2,200
=1788.51 ton @ $65 = $116,253.04

BENCH MARK
ELEVATIONS SHOWN HEREON ARE BASED ON CITY OF MONTGOMERY BENCHMARK NO. 1, A BRASS DISK STAMPED "MCL3" LOCATED ON THE SOUTH LINE OF FM 105, 1,020 FEET WEST OF LONE STAR PARKWAY.

ELEVATION = 239.70' (NAVD88, GEOD 09)

TBM "A"
TEMPORARY BENCHMARK A BEING A SQUARE CUT ON TOP OF CONCRETE CULVERT HEADWALL ON THE WEST SIDE OF BUFFALO SPRINGS DRIVE LOCATED ON THE NORTH SIDE OF THE GRAVEL DRIVE ENTRANCE TO A LIFT STATION ±340 FEET NORTH OF BUFFALO CROSSING DRIVE.

ELEVATION = 226.32' (NAVD88, GEOD 09)

TBM "B"
TEMPORARY BENCHMARK B BEING A RAIL ROAD SPIKE IN THE EAST SIDE OF A POWER POLE LOCATED AT THE NORTHWEST QUADRANT AT THE INTERSECTION OF BUFFALO SPRINGS DRIVE AND TOWN CREEK.

ELEVATION = 229.11' (NAVD88, GEOD 09)

100-YEAR FLOODPLAIN
ACCORDING TO MAP NO. 48339C0200G OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY'S FLOOD INSURANCE RATE MAPS FOR CITY OF MONTGOMERY, TEXAS, DATED AUGUST 18, 2014, THE SUBJECT TRACT IS SITUATED WITHIN FLOOD ZONE AE AND THE FLOODWAY. THIS FLOOD STATEMENT DOES NOT IMPLY THAT THE PROPERTY OR STRUCTURES THEREON WILL BE FREE FROM FLOODING OR FLOOD DAMAGE. ON RARE OCCASIONS FLOODS CAN AND WILL OCCUR AND FLOOD HEIGHTS MAY BE INCREASED BY MAN-MADE OR NATURAL CAUSES. THIS FLOOD STATEMENT SHALL NOT CREATE LIABILITY ON THE PART OF THE SURVEYOR.

LEGEND

- CONCRETE PAVEMENT
- ASPHALT PAVEMENT
- CUT
- FILL
- GRADE NO. 1 RIPRAP
- 6" SLOPE PAVING
- CONTROL JOINT
- CONSTRUCTION JOINT
- *SEE SHEET 2 FOR FULL LEGEND

0 5 10 20 40 60
SCALE: 1" = 20'

CITY OF MONTGOMERY, TEXAS
Ed Shackelford, P.E.
City of Montgomery, City Engineer
Signature Valid for One (1) Year
01/02/18 DATE

NO.	DATE	REVISIONS	APP.
	12/14/17	ISSUED FOR CONSTRUCTION	CWK
1	11/06/17	REV. PER ADD. NO. 4	CWK

CITY OF MONTGOMERY
MONTGOMERY COUNTY, TEXAS

BUFFALO SPRINGS DRIVE BRIDGE EMBANKMENT REPAIR

PROPOSED SITE PLAN

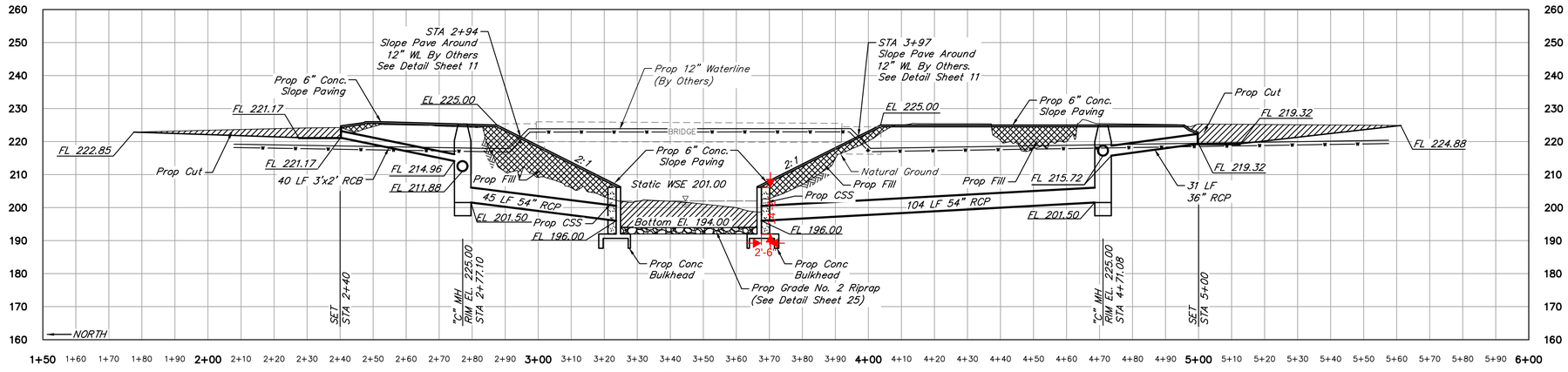
JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: 1"=20' DGN. BY: SLC
DATE: DECEMBER 2017 DWN. BY: SLC
JOB NO. W5841-0025-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

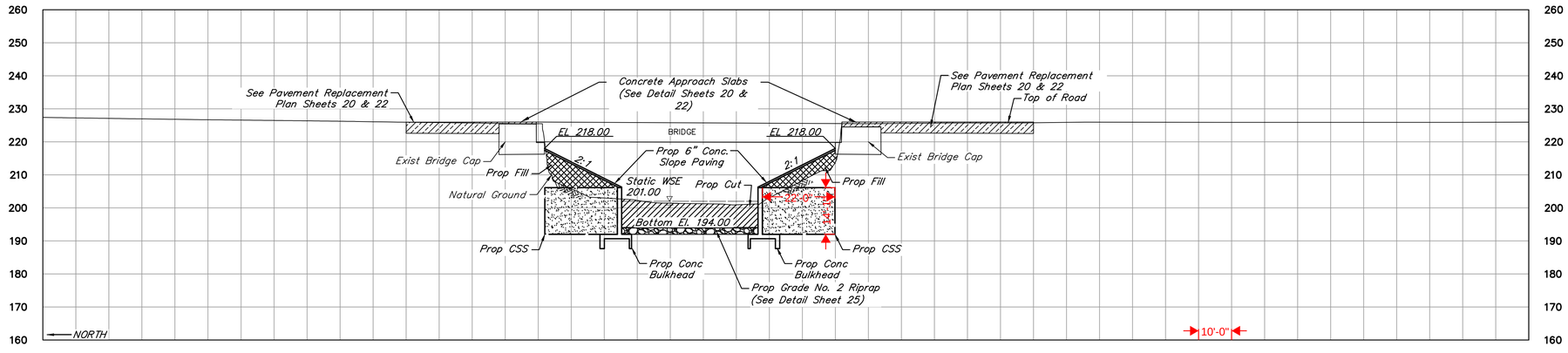
STATE OF TEXAS
CRAIG W. KALKOMEY
106040
LICENSED PROFESSIONAL ENGINEER
11/4/18

K:\W5841\W5841-0025-00 Buffalo Springs Bridge Embankment Rehab\2 Design Phase\CAD\PLANS\PNP.dwg Dec 13,2017 - 4:30pm SLC

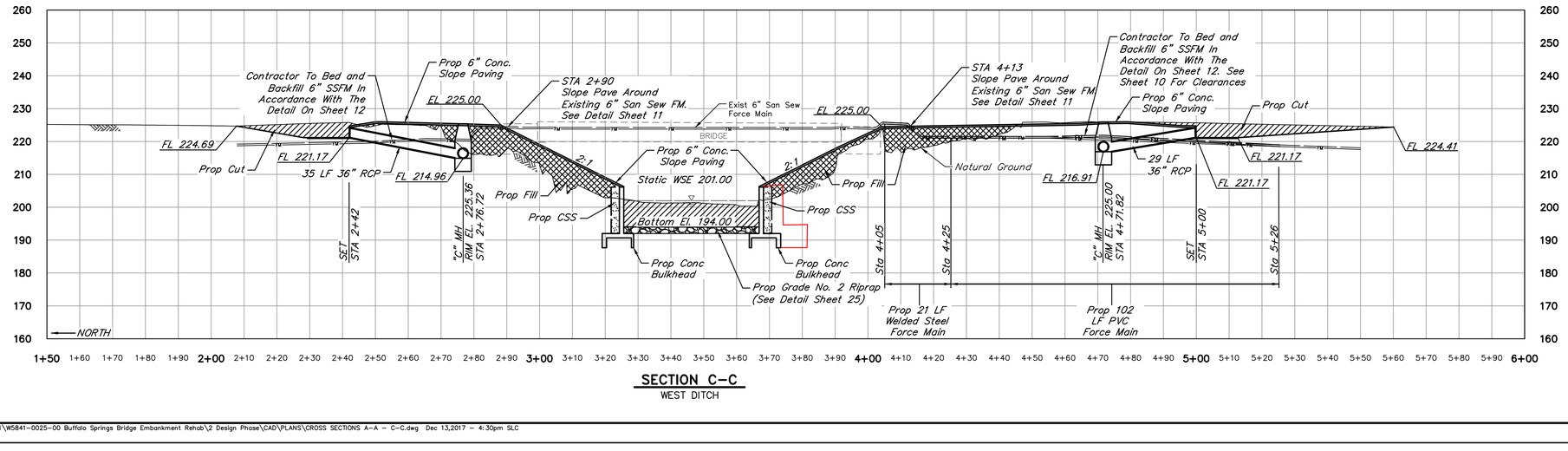
0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS



SECTION A–A
EAST DITCH



SECTION B–B
ROAD CL



SECTION C–C
WEST DITCH

Fill Notes:

1. All Cement Stabilized Sand Backfill for Embankment shall by 1.5 Sack per the Geotechnical Report.
2. All other embankment backfill shall be select fill meeting the following requirements:

A. CL USCS Classification
B. LL < 49
C. 15 <= PI <= 30
D. 60 to 85 Percent Passing No. 200 Sieve

3. All fill shall be placed as shown in minimum 6" loose lifts and compacted to 95% proctor density at −3% to +5% moisture content as per AASHTO Test Method T−99.
4. All areas below and adjacent to fill shall be demucked and clean of debris and vegetation and scarified to a minimum depth of 6 inches and filled as directed.

LEGEND

- CUT
- FILL
- GRADE NO. 1 RIPRAP
- CEMENT STABILIZED SAND
- 6" SLOPE PAVING

0 5 10 20 40 60
SCALE: 1" = 20'

CITY OF MONTGOMERY, TEXAS

Ed Shackelford, P.E. — 01/02/18 DATE
City of Montgomery, City Engineer
Signature Valid for One (1) Year

NO.	DATE	REVISIONS	APP.
	12/14/17	ISSUED FOR CONSTRUCTION	CWK
1	11/06/17	REV. PER ADD. NO. 4	CWK

CITY OF MONTGOMERY
MONTGOMERY COUNTY, TEXAS

BUFFALO SPRINGS DRIVE BRIDGE
EMBANKMENT REPAIR

CROSS SECTIONS
A–A – C–C

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: 1"=20' H, 1"=20' V — DGN. BY: SLC
DATE: DECEMBER 2017 — DWN. BY: SLC
JOB NO. W5841−0025−00 — DWG. NO.
SUBMITTED: — SURV. BY:
F.B. NO.

STATE OF TEXAS
CRAIG W. KALKOMEY
106040
LICENSED PROFESSIONAL ENGINEER
11/4/18

K:\W5841\W5841−0025−00 Buffalo Springs Bridge Embankment Rehab\2 Design Phase\CAD\PLANS\CROSS SECTIONS A−A − C−C.dwg Dec 13,2017 − 4:30pm SLC

Appendix C

Hydrologic Calculations and HEC-HMS Output

Appendix C - Tc Calculations

	Overall Basin	Sheet Flow (From TR-55, Page 3-3)							Shallow Concentrated Flow (From TR-55, Page 3-3)							Sewer			Channel Flow															
D.A	Area (acre)	High Elev (ft)	Low Elev (ft)	Reach Length (ft)	Slope (ft/ft)	n	2yr, 24-hr Rainfall Depth (in)	T_t (hr)	High Elev (ft)	Low Elev (ft)	Reach Length (ft)	Slope (ft/ft)	Paved / Unpaved	V (ft/sec)	T_t (hr)	Reach Length (ft)	V (ft/sec)	T_t (hr)	Reach Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (ft/ft)	n	Side Slope (s:1)	b (bottom) (ft)	d (depth) (ft)	Area (sf)	WP (ft)	R	V (ft/sec)	T_t (hr)	Total Reach Length (ft)	Total T_c (hr)	Total Calculated T_c (min)	T_c Used (min)
Exisitng																																		
Trib1US	414.62	324.8	321.5	100	0.033	0.150	4.84	0.11	321.5	305.1	1568	0.010	Unpaved	1.65	0.26				7080	305.1	272.3	0.005	0.150							3.00	0.66	8748	1.03	61.7	61.7
Trib1DS_A	139.29																		5174	272.3	246.1	0.005	0.150							3.00	0.48	5174	0.48	28.7	28.7
Trib1DS_B	120.77																		3496	246.1	229.7	0.005	0.150							3.00	0.32	3496	0.32	19.4	19.4
RoTrib1	283.86	318.3	315.0	100	0.033	0.150	4.84	0.11	315.0	295.3	1842	0.011	Unpaved	1.67	0.31				8786.1	295.3	203.4	0.010	0.150							3.00	0.81	10728	1.23	73.8	73.8
TCDS	292.10	305.1	301.9	100	0.033	0.150	4.84	0.11	301.9	255.9	1642	0.028	Unpaved	2.70	0.17				3368.1	255.9	157.8	0.029	0.150							3.00	0.31	5110	0.59	35.4	35.4
TCUS	3419.99	334.7	331.4	100	0.033	0.150	4.84	0.11	331.4	311.7	1049	0.019	Unpaved	2.21	0.13				22947	311.7	226.4	0.004	0.150							3.00	2.12	24096	2.37	141.9	141.9

Appendix C - Storage Coefficient (R) Calculations

D.A	S	So	%Imp	L	Tc	n	TC+R	Tc Clark's Hydrograph	R Clark's Hydrograph	Area	
	S (ft/mi)	So (ft/mi)		L (mi)	Tc (hr)			(hr)	(hr)	(acre)	(sqmi)
Exisitng											
Trib1US	36.240	119.2306	0.14	1.66	1.03	0.108455	4.434725474	3.499	0.94	414.62	0.647844
Trib1DS_A	26.592	164.7986	0.22	0.99	0.48	0.1	2.715185597	2.287	0.43	139.29	0.217641
Trib1DS_B	25.000	114.2788	0.40	0.66	0.32	0.073674	1.180066216	0.923	0.26	120.77	0.188703
RoTrib1	44.298	161.057	0.20	2.03	1.23	0.105738	3.905105685	3.275	0.63	283.86	0.443531
TCDS	88.383	150.5738	0.25	0.97	0.59	0.124546	2.158615755	1.786	0.37	292.10	0.456406
TCUS	19.728	77.55661	0.21	4.56	2.37	0.095896	7.572576846	5.438	2.14	3419.99	5.343734

Appendix C - SVSQ Input Data for HEC-HMS

EXISTING CONDITION

Trib 1 - Reach 1 (9237 to 3498)

9237 VOLUME (AC-FT)	3498 VOLUME (AC-FT)	DIFFERENCE (AC-FT)
23.88	7.46	16.42
44.28	14.41	29.87
63.05	19.82	43.23
94.17	28.74	65.43
108.46	33.4	75.06
130.79	43.83	86.96
152.67	51.71	100.96
173.71	61.71	112
203.02	74.12	128.9

HMS INPUT	
VOLUME (AC-FT)	Q (CFS)
0	0
16.42	100.17
29.87	200.34
43.23	300.51
65.43	500.85
75.06	601.02
86.96	801.36
100.96	1001.7
112	1202.04
128.9	1502.55

Trib 1 - Reach 2 (3498 to 348)

3498 VOLUME (AC-FT)	348 VOLUME (AC-FT)	DIFFERENCE (AC-FT)
7.46	0.64	6.82
14.41	1.05	13.36
19.82	1.5	18.32
28.74	2.28	26.46
33.4	2.61	30.79
43.83	3.22	40.61
51.71	4.4	47.31
61.71	6.91	54.8
74.12	10.02	64.1

HMS INPUT	
VOLUME (AC-FT)	**Q (CFS)**
0	0
6.82	110.87
13.36	221.74
18.32	332.61
26.46	554.35
30.79	665.22
40.61	886.96
47.31	1108.7
54.8	1330.44
64.1	1663.05

Town Creek (TC Reach 1)

3921 VOLUME (AC-FT)	1060 VOLUME (AC-FT)	DIFFERENCE (AC-FT)
21.14	5.7	15.44
32.91	8.67	24.24
43.35	11.64	31.71
60.89	16.5	44.39
68.67	18.5	50.17
84.02	22.52	61.5
101.2	26.72	74.48
119	30.26	88.74
145.93	35.8	110.13

HMS INPUT	
VOLUME (AC-FT)	Q (CFS)
0	0
15.44	685.64
24.24	1371.28
31.71	2056.92
44.39	3428.2
50.17	4113.84
61.5	5485.12
74.48	6856.4
88.74	8227.68
110.13	10284.6

PROPOSED ALTERNATIVE 1

Trib 1 - Reach 1 (9237 to 3498)

9237 VOLUME (AC-FT)	3498 VOLUME (AC-FT)	DIFFERENCE (AC-FT)
21.79	5.46	16.33
41.45	11.56	29.89
59.19	15.95	43.24
89.17	23.74	65.43
102.78	27.72	75.06
123.56	36.61	86.95
145.41	44.44	100.97
166.27	54.26	112.01
196.02	67.12	128.9

HMS INPUT	
VOLUME (AC-FT)	Q (CFS)
0	0
16.33	100.17
29.89	200.34
43.24	300.51
65.43	500.85
75.06	601.02
86.95	801.36
100.97	1001.7
112.01	1202.04
128.90	1502.55

Trib 1 - Reach 2 (3498 to 348)

3498 VOLUME (AC-FT)	348 VOLUME (AC-FT)	DIFFERENCE (AC-FT)
5.46	0.64	4.82
11.56	1.05	10.51
15.95	1.51	14.44
23.74	2.28	21.46
27.72	2.61	25.11
36.61	3.22	33.39
44.44	4.4	40.04
54.26	6.92	47.34
67.12	10.02	57.1

HMS INPUT		
VOLUME (AC-FT)	Q (CFS)	
0	0	0
4.82	110.87	-2
10.51	221.74	-2.85
14.44	332.61	-3.88
21.46	554.35	-5
25.11	665.22	-5.68
33.39	886.96	-7.22
40.04	1108.7	-7.27
47.34	1330.44	-7.46
57.1	1663.05	-7

Town Creek (TC Reach 1)

3921 VOLUME (AC-FT)	1060 VOLUME (AC-FT)	DIFFERENCE (AC-FT)
21.14	5.7	15.44
32.91	8.67	24.24
43.35	11.64	31.71
60.89	16.5	44.39
68.67	18.5	50.17
84.02	22.52	61.5
101.21	26.72	74.49
119.01	30.27	88.74
145.94	35.8	110.14

HMS INPUT	
VOLUME (AC-FT)	Q (CFS)
0	0
15.44	685.64
24.24	1371.28
31.71	2056.92
44.39	3428.2
50.17	4113.84
61.5	5485.12
74.49	6856.4
88.74	8227.68
110.14	10284.6

Appendix C - SVSQ Input Data for HEC-HMS

PROPOSED ALTERNATIVE 2

Trib 1 - Reach 1 (9237 to 3498)

9237 VOLUME (AC-FT)	3498 VOLUME (AC-FT)	DIFFERENCE (AC-FT)
21.9	5.57	16.33
41.59	11.7	29.89
59.08	15.84	43.24
88.65	23.21	65.44
102.47	27.41	75.06
123.38	36.42	86.96
145.1	44.13	100.97
165.53	53.52	112.01
195.69	66.8	128.89

HMS INPUT	
VOLUME (AC-FT)	Q (CFS)
0	0
16.33	100.17
29.89	200.34
43.24	300.51
65.44	500.85
75.06	601.02
86.96	801.36
100.97	1001.7
112.01	1202.04
128.89	1502.55

Trib 1 - Reach 2 (3498 to 348)

3498 VOLUME (AC-FT)	348 VOLUME (AC-FT)	DIFFERENCE (AC-FT)
5.57	0.64	4.93
11.7	1.05	10.65
15.84	1.51	14.33
23.21	2.28	20.93
27.41	2.61	24.8
36.42	3.22	33.2
44.13	4.4	39.73
53.52	6.92	46.6
66.8	10.02	56.78

HMS INPUT		
VOLUME (AC-FT)	Q (CFS)	
0	0	0
4.93	110.87	-1.89
10.65	221.74	-2.71
14.33	332.61	-3.99
20.93	554.35	-5.53
24.8	665.22	-5.99
33.2	886.96	-7.41
39.73	1108.7	-7.58
46.6	1330.44	-8.2
56.78	1663.05	-7.32

Town Creek (TC Reach 1)

3921 VOLUME (AC-FT)	1060 VOLUME (AC-FT)	DIFFERENCE (AC-FT)
21.14	5.7	15.44
32.91	8.67	24.24
43.35	11.64	31.71
60.89	16.5	44.39
68.67	18.5	50.17
84.02	22.52	61.5
101.21	26.72	74.49
119.01	30.27	88.74
145.94	35.8	110.14

HMS INPUT	
VOLUME (AC-FT)	Q (CFS)
0	0
15.44	685.64
24.24	1371.28
31.71	2056.92
44.39	3428.2
50.17	4113.84
61.5	5485.12
74.49	6856.4
88.74	8227.68
110.14	10284.6

7.3 ac-ft alt 1
7.6 ac-ft alt 2
6.8 ac-ft alt 3

Project: TownCreek Simulation Run: 10yr

Start of Run: 01Jan2020, 00:00 Basin Model: TownCreek_Existing
End of Run: 04Jan2020, 00:00 Meteorologic Model: 10-yr
Compute Time: 09Sep2020, 11:39:59 Control Specifications: Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	2892.0	01Jan2020, 20:15	5.89
Trib1US	0.647844	536.9	01Jan2020, 18:30	5.70
Trib1_Reach1	0.647844	415.7	01Jan2020, 19:35	5.70
Trib1DS_A	0.217641	263.9	01Jan2020, 17:30	5.92
Trib1_JCT1	0.865485	488.2	01Jan2020, 18:10	5.75
Trib1_Reach2	0.865485	472.8	01Jan2020, 19:15	5.75
Trib1DS_B	0.188703	381.6	01Jan2020, 16:40	6.42
Trib1_JCT2	1.054188	525.6	01Jan2020, 16:45	5.87
TC_JCT1	6.397922	3360.9	01Jan2020, 20:05	5.89
TC_Reach1	6.397922	3357.9	01Jan2020, 20:15	5.89
TCDS	0.456406	644.2	01Jan2020, 17:15	6.00
RoTrib1	0.443531	414.6	01Jan2020, 18:10	5.86
1146_JCT1	7.297859	3568.0	01Jan2020, 19:55	5.89

Project: TownCreek Simulation Run: 50yr

Start of Run: 01Jan2020, 00:00 Basin Model: TownCreek_Existing
End of Run: 04Jan2020, 00:00 Meteorologic Model: 50yr
Compute Time: 08Sep2020, 09:11:16 Control Specifications: Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	3915.9	01Jan2020, 20:15	8.14
Trib1US	0.647844	718.4	01Jan2020, 18:30	7.93
Trib1_Reach1	0.647844	576.9	01Jan2020, 19:30	7.93
Trib1DS_A	0.217641	349.6	01Jan2020, 17:30	8.17
Trib1_JCT1	0.865485	680.5	01Jan2020, 18:10	7.99
Trib1_Reach2	0.865485	659.4	01Jan2020, 19:15	7.99
Trib1DS_B	0.188703	498.2	01Jan2020, 16:40	8.72
Trib1_JCT2	1.054188	713.5	01Jan2020, 16:50	8.12
TC_JCT1	6.397922	4572.3	01Jan2020, 20:05	8.14
TC_Reach1	6.397922	4568.4	01Jan2020, 20:10	8.14
TCDS	0.456406	851.0	01Jan2020, 17:15	8.26
RoTrib1	0.443531	552.1	01Jan2020, 18:10	8.11
1146_JCT1	7.297859	4873.8	01Jan2020, 19:55	8.14

Project: TownCreek Simulation Run: 1% Atlas 14

Start of Run: 01Jan2020, 00:00 Basin Model: TownCreek_Existing
End of Run: 04Jan2020, 00:00 Meteorologic Model: Atlas14_100-yr
Compute Time: 09Sep2020, 11:39:29 Control Specifications: Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	5823.8	01Jan2020, 20:15	13.15
Trib1US	0.647844	1001.7	01Jan2020, 18:30	12.89
Trib1_Reach1	0.647844	896.6	01Jan2020, 19:20	12.89
Trib1DS_A	0.217641	448.9	01Jan2020, 17:30	13.19
Trib1_JCT1	0.865485	1094.8	01Jan2020, 18:35	12.96
Trib1_Reach2	0.865485	1076.3	01Jan2020, 19:10	12.96
Trib1DS_B	0.188703	595.3	01Jan2020, 16:40	13.86
Trib1_JCT2	1.054188	1173.5	01Jan2020, 19:00	13.12
TC_JCT1	6.397922	6858.9	01Jan2020, 20:00	13.14
TC_Reach1	6.397922	6852.1	01Jan2020, 20:05	13.14
TCDS	0.456406	1056.4	01Jan2020, 17:15	13.30
RoTrib1	0.443531	753.9	01Jan2020, 18:10	13.11
1146_JCT1	7.297859	7442.8	01Jan2020, 19:45	13.15

Project: TownCreek Simulation Run: 1% Atlas 14

Start of Run: 01Jan2020, 00:00 Basin Model: TownCreek_Existing
End of Run: 04Jan2020, 00:00 Meteorologic Model: Atlas14_100-yr
Compute Time: 09Sep2020, 11:39:29 Control Specifications: Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	5823.8	01Jan2020, 20:15	13.15
Trib1US	0.647844	1001.7	01Jan2020, 18:30	12.89
Trib1_Reach1	0.647844	896.6	01Jan2020, 19:20	12.89
Trib1DS_A	0.217641	448.9	01Jan2020, 17:30	13.19
Trib1_JCT1	0.865485	1094.8	01Jan2020, 18:35	12.96
Trib1_Reach2	0.865485	1076.3	01Jan2020, 19:10	12.96
Trib1DS_B	0.188703	595.3	01Jan2020, 16:40	13.86
Trib1_JCT2	1.054188	1173.5	01Jan2020, 19:00	13.12
TC_JCT1	6.397922	6858.9	01Jan2020, 20:00	13.14
TC_Reach1	6.397922	6852.1	01Jan2020, 20:05	13.14
TCDS	0.456406	1056.4	01Jan2020, 17:15	13.30
RoTrib1	0.443531	753.9	01Jan2020, 18:10	13.11
1146_JCT1	7.297859	7442.8	01Jan2020, 19:45	13.15

Project: TownCreek Simulation Run: P_Alt1_50%

Start of Run:	01Jan2020, 00:00	Basin Model:	TownCreek_
End of Run:	04Jan2020, 00:00	Meteorologic Model:	2-yr
Compute Time:	16Sep2020, 11:39:29	Control Specifications:	Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
TCUS	5.343734	1689.5	01Jan2020, 20:2
Trib1US	0.647844	323.8	01Jan2020, 18:3
Trib1_Reach1	0.647844	234.0	01Jan2020, 19:4
Trib1DS_A	0.217641	167.2	01Jan2020, 17:3
Trib1_JCT1	0.865485	277.1	01Jan2020, 18:1
Trib1_Reach2	0.865485	260.7	01Jan2020, 19:2
Trib1DS_B	0.188703	265.8	01Jan2020, 16:4
Trib1_JCT2	1.054188	339.7	01Jan2020, 16:4
TC_JCT1	6.397922	1946.5	01Jan2020, 20:1
TC_Reach1	6.397922	1943.6	01Jan2020, 20:2
TCDS	0.456406	418.8	01Jan2020, 17:1
RoTrib1	0.443531	254.7	01Jan2020, 18:1
1146_JCT1	7.297859	2044.3	01Jan2020, 20:0

Project: TownCreek Simulation Run: P_Alt1_10%

Start of Run:	01Jan2020, 00:00	Basin Model:	TownCreek_Prop
End of Run:	04Jan2020, 00:00	Meteorologic Model:	10-yr
Compute Time:	16Sep2020, 11:39:43	Control Specifications:	Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	2892.0	01Jan2020, 20:15	5.89
Trib1US	0.647844	536.9	01Jan2020, 18:30	5.70
Trib1_Reach1	0.647844	415.7	01Jan2020, 19:35	5.70
Trib1DS_A	0.217641	263.9	01Jan2020, 17:30	5.92
Trib1_JCT1	0.865485	488.0	01Jan2020, 18:10	5.75
Trib1_Reach2	0.865485	474.5	01Jan2020, 19:05	5.75
Trib1DS_B	0.188703	381.6	01Jan2020, 16:40	6.42
Trib1_JCT2	1.054188	538.4	01Jan2020, 16:45	5.87
TC_JCT1	6.397922	3359.2	01Jan2020, 20:05	5.89
TC_Reach1	6.397922	3355.9	01Jan2020, 20:15	5.89
TCDS	0.456406	644.2	01Jan2020, 17:15	6.00
RoTrib1	0.443531	414.6	01Jan2020, 18:10	5.86
1146_JCT1	7.297859	3567.5	01Jan2020, 19:55	5.89

Project: TownCreek Simulation Run: P_Alt1_2%

Start of Run:	01Jan2020, 00:00	Basin Model:	TownCreek_Prop
End of Run:	04Jan2020, 00:00	Meteorologic Model:	50yr
Compute Time:	16Sep2020, 11:39:47	Control Specifications:	Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	3915.9	01Jan2020, 20:15	8.14
Trib1US	0.647844	718.4	01Jan2020, 18:30	7.93
Trib1_Reach1	0.647844	576.8	01Jan2020, 19:30	7.93
Trib1DS_A	0.217641	349.6	01Jan2020, 17:30	8.17
Trib1_JCT1	0.865485	680.3	01Jan2020, 18:10	7.99
Trib1_Reach2	0.865485	661.9	01Jan2020, 19:10	7.99
Trib1DS_B	0.188703	498.2	01Jan2020, 16:40	8.72
Trib1_JCT2	1.054188	733.8	01Jan2020, 16:50	8.12
TC_JCT1	6.397922	4569.2	01Jan2020, 20:05	8.14
TC_Reach1	6.397922	4565.4	01Jan2020, 20:10	8.14
TCDS	0.456406	851.0	01Jan2020, 17:15	8.26
RoTrib1	0.443531	552.1	01Jan2020, 18:10	8.11
1146_JCT1	7.297859	4872.7	01Jan2020, 19:55	8.14

Project: TownCreek Simulation Run: P_Alt1_1%

Start of Run:	01Jan2020, 00:00	Basin Model:	TownCreek_Prop
End of Run:	04Jan2020, 00:00	Meteorologic Model:	Effective_100-yr
Compute Time:	16Sep2020, 11:39:38	Control Specifications:	Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	4460.7	01Jan2020, 20:15	9.57
Trib1US	0.647844	808.3	01Jan2020, 18:30	9.34
Trib1_Reach1	0.647844	682.7	01Jan2020, 19:25	9.34
Trib1DS_A	0.217641	387.9	01Jan2020, 17:30	9.60
Trib1_JCT1	0.865485	787.8	01Jan2020, 19:10	9.40
Trib1_Reach2	0.865485	778.1	01Jan2020, 19:25	9.40
Trib1DS_B	0.188703	547.9	01Jan2020, 16:40	10.19
Trib1_JCT2	1.054188	846.6	01Jan2020, 16:50	9.54
TC_JCT1	6.397922	5223.8	01Jan2020, 20:00	9.56
TC_Reach1	6.397922	5219.5	01Jan2020, 20:10	9.56
TCDS	0.456406	940.1	01Jan2020, 17:15	9.70
RoTrib1	0.443531	618.6	01Jan2020, 18:10	9.53
1146_JCT1	7.297859	5594.7	01Jan2020, 19:50	9.57

Project: TownCreek Simulation Run: P_Alt1_A14_1%

Start of Run:	01Jan2020, 00:00	Basin Model:	TownCreek_Prop
End of Run:	04Jan2020, 00:00	Meteorologic Model:	Atlas14_100-yr
Compute Time:	16Sep2020, 11:39:54	Control Specifications:	Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	5823.8	01Jan2020, 20:15	13.15
Trib1US	0.647844	1001.7	01Jan2020, 18:30	12.89
Trib1_Reach1	0.647844	896.5	01Jan2020, 19:20	12.89
Trib1DS_A	0.217641	448.9	01Jan2020, 17:30	13.19
Trib1_JCT1	0.865485	1094.8	01Jan2020, 18:35	12.96
Trib1_Reach2	0.865485	1077.8	01Jan2020, 19:10	12.96
Trib1DS_B	0.188703	595.3	01Jan2020, 16:40	13.86
Trib1_JCT2	1.054188	1175.9	01Jan2020, 19:00	13.12
TC_JCT1	6.397922	6858.7	01Jan2020, 20:00	13.14
TC_Reach1	6.397922	6852.0	01Jan2020, 20:05	13.14
TCDS	0.456406	1056.4	01Jan2020, 17:15	13.30
RoTrib1	0.443531	753.9	01Jan2020, 18:10	13.11
1146_JCT1	7.297859	7443.1	01Jan2020, 19:45	13.15

Project: TownCreek Simulation Run: P_ALT2_A14_1%

Start of Run:	01Jan2020, 00:00	Basin Model:	TownCreek_PropAlt2
End of Run:	04Jan2020, 00:00	Meteorologic Model:	Atlas14_100-yr
Compute Time:	16Sep2020, 11:43:44	Control Specifications:	Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	5823.8	01Jan2020, 20:15	13.15
Trib1US	0.647844	1001.7	01Jan2020, 18:30	12.89
Trib1_Reach1	0.647844	896.5	01Jan2020, 19:20	12.89
Trib1DS_A	0.217641	448.9	01Jan2020, 17:30	13.19
Trib1_JCT1	0.865485	1094.7	01Jan2020, 18:35	12.96
Trib1_Reach2	0.865485	1078.2	01Jan2020, 19:10	12.96
Trib1DS_B	0.188703	595.3	01Jan2020, 16:40	13.86
Trib1_JCT2	1.054188	1176.5	01Jan2020, 19:00	13.12
TC_JCT1	6.397922	6858.0	01Jan2020, 20:00	13.14
TC_Reach1	6.397922	6851.3	01Jan2020, 20:05	13.14
TCDS	0.456406	1056.4	01Jan2020, 17:15	13.30
RoTrib1	0.443531	753.9	01Jan2020, 18:10	13.11
1146_JCT1	7.297859	7442.9	01Jan2020, 19:45	13.15

Project: TownCreek Simulation Run: P_ALT2_1%

Start of Run:	01Jan2020, 00:00	Basin Model:	TownCreek_PropAlt2
End of Run:	04Jan2020, 00:00	Meteorologic Model:	Effective_100-yr
Compute Time:	16Sep2020, 11:43:14	Control Specifications:	Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	4460.7	01Jan2020, 20:15	9.57
Trib1US	0.647844	808.3	01Jan2020, 18:30	9.34
Trib1_Reach1	0.647844	682.6	01Jan2020, 19:25	9.34
Trib1DS_A	0.217641	387.9	01Jan2020, 17:30	9.60
Trib1_JCT1	0.865485	787.8	01Jan2020, 19:10	9.40
Trib1_Reach2	0.865485	777.8	01Jan2020, 19:25	9.40
Trib1DS_B	0.188703	547.9	01Jan2020, 16:40	10.19
Trib1_JCT2	1.054188	851.6	01Jan2020, 16:50	9.54
TC_JCT1	6.397922	5224.1	01Jan2020, 20:00	9.56
TC_Reach1	6.397922	5219.9	01Jan2020, 20:10	9.56
TCDS	0.456406	940.1	01Jan2020, 17:15	9.70
RoTrib1	0.443531	618.6	01Jan2020, 18:10	9.53
1146_JCT1	7.297859	5594.7	01Jan2020, 19:50	9.57

Project: TownCreek Simulation Run: P_ALT2_2%

Start of Run:	01Jan2020, 00:00	Basin Model:	TownCreek_PropAlt2
End of Run:	04Jan2020, 00:00	Meteorologic Model:	50yr
Compute Time:	16Sep2020, 11:43:31	Control Specifications:	Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	3915.9	01Jan2020, 20:15	8.14
Trib1US	0.647844	718.4	01Jan2020, 18:30	7.93
Trib1_Reach1	0.647844	576.8	01Jan2020, 19:30	7.93
Trib1DS_A	0.217641	349.6	01Jan2020, 17:30	8.17
Trib1_JCT1	0.865485	680.3	01Jan2020, 18:10	7.99
Trib1_Reach2	0.865485	661.5	01Jan2020, 19:10	7.99
Trib1DS_B	0.188703	498.2	01Jan2020, 16:40	8.72
Trib1_JCT2	1.054188	735.7	01Jan2020, 16:50	8.12
TC_JCT1	6.397922	4570.3	01Jan2020, 20:05	8.14
TC_Reach1	6.397922	4566.5	01Jan2020, 20:10	8.14
TCDS	0.456406	851.0	01Jan2020, 17:15	8.26
RoTrib1	0.443531	552.1	01Jan2020, 18:10	8.11
1146_JCT1	7.297859	4873.2	01Jan2020, 19:55	8.14

Project: TownCreek Simulation Run: P_ALT2_10%

Start of Run:	01Jan2020, 00:00	Basin Model:	TownCreek_PropAlt2
End of Run:	04Jan2020, 00:00	Meteorologic Model:	10-yr
Compute Time:	16Sep2020, 11:43:26	Control Specifications:	Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	2892.0	01Jan2020, 20:15	5.89
Trib1US	0.647844	536.9	01Jan2020, 18:30	5.70
Trib1_Reach1	0.647844	415.6	01Jan2020, 19:35	5.70
Trib1DS_A	0.217641	263.9	01Jan2020, 17:30	5.92
Trib1_JCT1	0.865485	488.0	01Jan2020, 18:10	5.75
Trib1_Reach2	0.865485	475.1	01Jan2020, 18:55	5.75
Trib1DS_B	0.188703	381.6	01Jan2020, 16:40	6.42
Trib1_JCT2	1.054188	537.8	01Jan2020, 16:45	5.87
TC_JCT1	6.397922	3358.4	01Jan2020, 20:05	5.89
TC_Reach1	6.397922	3355.0	01Jan2020, 20:15	5.89
TCDS	0.456406	644.2	01Jan2020, 17:15	6.00
RoTrib1	0.443531	414.6	01Jan2020, 18:10	5.86
1146_JCT1	7.297859	3567.1	01Jan2020, 19:55	5.89

Project: TownCreek Simulation Run: P_ALT2_50%

Start of Run:	01Jan2020, 00:00	Basin Model:	TownCreek_PropAlt2
End of Run:	04Jan2020, 00:00	Meteorologic Model:	2-yr
Compute Time:	16Sep2020, 11:43:36	Control Specifications:	Control 5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
TCUS	5.343734	1689.5	01Jan2020, 20:20	3.13
Trib1US	0.647844	323.8	01Jan2020, 18:30	2.98
Trib1_Reach1	0.647844	234.0	01Jan2020, 19:40	2.98
Trib1DS_A	0.217641	167.2	01Jan2020, 17:30	3.16
Trib1_JCT1	0.865485	277.1	01Jan2020, 18:10	3.03
Trib1_Reach2	0.865485	261.0	01Jan2020, 18:50	3.03
Trib1DS_B	0.188703	265.8	01Jan2020, 16:40	3.54
Trib1_JCT2	1.054188	338.9	01Jan2020, 16:45	3.12
TC_JCT1	6.397922	1946.1	01Jan2020, 20:10	3.13
TC_Reach1	6.397922	1943.2	01Jan2020, 20:20	3.13
TCDS	0.456406	418.8	01Jan2020, 17:15	3.22
RoTrib1	0.443531	254.7	01Jan2020, 18:15	3.11
1146_JCT1	7.297859	2044.2	01Jan2020, 20:00	3.14

Appendix C - Existing and Proposed Flows and Flow Change Locations

EXISTING

RS	Pre-Atlas 2	Pre-Atlas 10	Pre-Atlas 50	Pre-Atlas 100	Atlas 14 100-yr
9237	323.8	536.9	718.4	808.3	1001.7
3498	277.1	488.2	680.5	787.9	1094.8
2385	294.8	501.3	692.1	800.6	1122
1388	310.9	513.3	702.6	812.2	1148
348	327.6	525.6	713.5	824.2	1173.5
4986	1689.5	2892	3915.9	4460.7	5823.8
3921	1947.7	3360.9	4572.3	5227.2	6858.9
1147	2044.2	3568	4873.8	5594.0	7442.8

ALT 1 - BASED ON CLEARING FLOODWAY EACH SIDE OF CHANNEL

RS	Pre-Atlas 2	Pre-Atlas 10	Pre-Atlas 50	Pre-Atlas 100	Atlas 14 100-yr
9237	323.8	536.9	718.4	808.3	1001.7
3498	277.1	488	680.3	787.8	1094.8
2385	299.0	505.6	699.0	808.4	1123
1388	319.0	521.8	716.1	827.2	1149
348	339.7	538.4	733.8	846.6	1175.9
4986	1689.5	2892	3915.9	4460.7	5823.8
3921	1946.5	3359.2	4569.2	5223.8	6858.7
1147	2044.3	3567.5	4872.7	5594.7	7443.1

ALT 2- BASED ON CLEARING FW EACH SIDE OF CHANNEL, 20-ft averageBW channel

RS	Pre-Atlas 2	Pre-Atlas 10	Pre-Atlas 50	Pre-Atlas 100	Atlas 14 100-yr
9237	323.8	536.9	718.4	808.3	1001.7
3498	277.1	488	680.3	787.8	1094.7
2385	298.7	505.4	699.7	810.1	1123
1388	318.5	521.4	717.4	830.5	1150
348	338.9	537.8	735.7	851.6	1176.5
4986	1689.5	2892	3915.9	4460.7	5823.8
3921	1946.1	3358.4	4570.3	5224.1	6858
1147	2044.2	3567.1	4873.2	5594.7	7442.9

red indicates interpolated values

Appendix D

Existing Condition HEC-RAS Output

HEC-RAS Plan: Ex_v13

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)	
Trib1	9237	10-yr	536.90	266.30	269.54	269.54	270.61	0.121350	8.3	64.64	30.58	1.01
Trib1	9237	50-yr	718.40	266.30	270.40	270.40	270.72	0.035213	5.4	254.99	399.46	0.57
Trib1	9237	100-yr	808.30	266.30	270.46	270.46	270.79	0.037260	5.6	278.24	399.59	0.59
Trib1	9237	Atlas 14 100-yr	1001.70	266.30	270.60	270.60	270.93	0.038000	5.9	333.97	399.89	0.60
Trib1	9163	10-yr	536.90	262.50	268.75		268.79	0.003365	2.3	372.60	154.52	0.18
Trib1	9163	50-yr	718.40	262.50	269.23		269.28	0.003482	2.5	447.80	155.61	0.19
Trib1	9163	100-yr	808.30	262.50	269.42		269.48	0.003620	2.6	478.00	156.15	0.19
Trib1	9163	Atlas 14 100-yr	1001.70	262.50	269.81		269.88	0.003921	2.8	538.90	159.79	0.20
Trib1	9126	10-yr	536.90	260.11	268.69		268.71	0.001442	1.6	580.03	248.03	0.12
Trib1	9126	50-yr	718.40	260.11	269.17		269.19	0.001472	1.7	700.88	249.00	0.12
Trib1	9126	100-yr	808.30	260.11	269.36		269.39	0.001524	1.7	748.91	249.39	0.12
Trib1	9126	Atlas 14 100-yr	1001.70	260.11	269.75		269.78	0.001617	1.9	845.03	250.16	0.13
Trib1	9067	10-yr	536.90	260.11	268.56		268.60	0.002543	2.0	425.91	184.25	0.15
Trib1	9067	50-yr	718.40	260.11	269.04		269.08	0.002635	2.2	514.88	185.21	0.16
Trib1	9067	100-yr	808.30	260.11	269.23		269.27	0.002752	2.3	549.51	185.59	0.16
Trib1	9067	Atlas 14 100-yr	1001.70	260.11	269.60		269.66	0.002958	2.5	619.02	186.33	0.17
Trib1	8988	10-yr	536.90	260.11	268.41	265.52	268.43	0.001729	1.7	573.76	283.34	0.13
Trib1	8988	50-yr	718.40	260.11	268.90	266.17	268.92	0.001641	1.7	711.93	284.35	0.13
Trib1	8988	100-yr	808.30	260.11	269.08	267.05	269.10	0.001679	1.8	764.05	284.73	0.13
Trib1	8988	Atlas 14 100-yr	1001.70	260.11	269.45	266.84	269.47	0.001739	1.9	869.04	285.49	0.13
Trib1	8896	10-yr	536.90	260.11	268.27	265.21	268.29	0.001740	1.7	553.07	252.25	0.13
Trib1	8896	50-yr	718.40	260.11	268.76	265.94	268.79	0.001708	1.8	677.48	253.22	0.13
Trib1	8896	100-yr	808.30	260.11	268.94	266.26	268.97	0.001777	1.8	722.82	253.57	0.13
Trib1	8896	Atlas 14 100-yr	1001.70	260.11	269.30	266.84	269.33	0.001894	2.0	814.50	254.30	0.14
Trib1	8854	10-yr	536.90	260.11	268.16	265.10	268.20	0.002569	2.0	451.82	225.96	0.16
Trib1	8854	50-yr	718.40	260.11	268.65	265.70	268.69	0.002467	2.1	564.12	227.82	0.16
Trib1	8854	100-yr	808.30	260.11	268.83	265.97	268.87	0.002563	2.1	603.87	228.37	0.16
Trib1	8854	Atlas 14 100-yr	1001.70	260.11	269.18	266.84	269.23	0.002718	2.3	684.69	229.67	0.17
Trib1	8790	10-yr	536.90	260.11	268.00	263.98	268.04	0.002768	2.2	443.24	239.39	0.15
Trib1	8790	50-yr	718.40	260.11	268.50	264.76	268.54	0.002576	2.2	565.24	240.38	0.15
Trib1	8790	100-yr	808.30	260.11	268.67	265.12	268.72	0.002679	2.3	605.98	240.71	0.15
Trib1	8790	Atlas 14 100-yr	1001.70	260.11	269.02	265.81	269.07	0.002835	2.4	689.36	241.54	0.16
Trib1	8689	10-yr	536.90	260.11	267.69		267.74	0.003070	2.6	453.20	272.94	0.18
Trib1	8689	50-yr	718.40	260.11	268.25		268.29	0.002479	2.4	605.46	274.02	0.16
Trib1	8689	100-yr	808.30	260.11	268.41		268.45	0.002562	2.5	649.65	274.33	0.17
Trib1	8689	Atlas 14 100-yr	1001.70	260.11	268.75		268.79	0.002663	2.6	741.68	274.97	0.17
Trib1	8636	10-yr	536.90	260.11	267.54		267.59	0.003233	2.5	431.70	245.08	0.18
Trib1	8636	50-yr	718.40	260.11	268.13		268.16	0.002613	2.4	574.97	246.18	0.16
Trib1	8636	100-yr	808.30	260.11	268.28		268.32	0.002746	2.5	613.10	246.47	0.17
Trib1	8636	Atlas 14 100-yr	1001.70	260.11	268.61		268.65	0.002930	2.7	693.47	247.14	0.17
Trib1	8556	10-yr	536.90	260.11	267.26	264.39	267.32	0.003488	2.7	428.95	328.02	0.19
Trib1	8556	50-yr	718.40	260.11	267.94	264.82	267.98	0.002205	2.3	652.59	330.61	0.16
Trib1	8556	100-yr	808.30	260.11	268.08	265.01	268.12	0.002301	2.4	701.04	331.99	0.16
Trib1	8556	Atlas 14 100-yr	1001.70	260.11	268.40	265.40	268.44	0.002383	2.5	806.64	332.93	0.17
Trib1	8492	10-yr	536.90	260.11	267.02		267.11	0.003385	2.7	353.20	288.25	0.19
Trib1	8492	50-yr	718.40	260.11	267.79		267.84	0.002240	2.4	574.84	291.15	0.16
Trib1	8492	100-yr	808.30	260.11	267.93		267.98	0.002411	2.5	614.63	291.45	0.17
Trib1	8492	Atlas 14 100-yr	1001.70	260.11	268.23		268.29	0.002621	2.7	704.24	292.12	0.18
Trib1	8442	10-yr	536.90	260.11	266.64		266.84	0.008649	4.0	167.80	43.13	0.30
Trib1	8442	50-yr	718.40	260.11	267.56		267.67	0.005397	3.5	443.56	310.94	0.24
Trib1	8442	100-yr	808.30	260.11	267.68		267.80	0.005583	3.6	483.62	311.19	0.25
Trib1	8442	Atlas 14 100-yr	1001.70	260.11	268.00		268.10	0.005428	3.7	580.79	311.80	0.25
Trib1	8381	10-yr	536.90	259.83	266.19		266.36	0.007537	3.7	180.65	48.92	0.28
Trib1	8381	50-yr	718.40	259.83	266.69	264.41	267.13	0.015399	5.6	210.91	332.74	0.40
Trib1	8381	100-yr	808.30	259.83	267.14		267.38	0.009380	4.6	361.32	333.66	0.32
Trib1	8381	Atlas 14 100-yr	1001.70	259.83	267.59		267.75	0.007084	4.2	511.92	334.58	0.28
Trib1	8329	10-yr	536.90	257.36	266.00	264.04	266.05	0.003625	2.4	318.91	109.23	0.18
Trib1	8329	50-yr	718.40	257.36	266.48	264.32	266.55	0.004219	2.8	370.61	114.29	0.20
Trib1	8329	100-yr	808.30	257.36	266.70	264.45	266.86	0.009185	4.2	404.66	304.15	0.29
Trib1	8329	Atlas 14 100-yr	1001.70	257.36	267.30	264.68	267.39	0.005503	3.4	589.82	305.37	0.23
Trib1	8267	10-yr	536.90	256.83	265.85		265.88	0.002282	1.9	437.61	159.06	0.14
Trib1	8267	50-yr	718.40	256.83	266.32		266.36	0.002526	2.1	512.19	160.20	0.15

HEC-RAS Plan: Ex_v13 (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)	
Trib1	8267	100-yr	808.30	256.83	266.53		266.56	0.002641	2.2	545.06	160.84	0.15
Trib1	8267	Atlas 14 100-yr	1001.70	256.83	267.06		267.12	0.003971	2.8	699.42	333.87	0.19
Trib1	8201	10-yr	536.90	256.83	265.69		265.73	0.002883	2.1	401.12	156.35	0.15
Trib1	8201	50-yr	718.40	256.83	266.14		266.18	0.003228	2.3	472.07	159.83	0.16
Trib1	8201	100-yr	808.30	256.83	266.33		266.38	0.003435	2.4	503.43	162.79	0.16
Trib1	8201	Atlas 14 100-yr	1001.70	256.83	266.73		266.82	0.006214	3.4	579.74	333.18	0.22
Trib1	8148	10-yr	536.90	256.83	265.57		265.60	0.002339	2.0	434.65	172.22	0.15
Trib1	8148	50-yr	718.40	256.83	266.00		266.04	0.002610	2.2	509.98	173.13	0.16
Trib1	8148	100-yr	808.30	256.83	266.19		266.23	0.002747	2.3	542.48	173.66	0.16
Trib1	8148	Atlas 14 100-yr	1001.70	256.83	266.55		266.61	0.003023	2.5	605.81	174.83	0.17
Trib1	8116	10-yr	536.90	256.83	265.51		265.54	0.002008	1.8	486.66	199.96	0.13
Trib1	8116	50-yr	718.40	256.83	265.94		265.97	0.002202	2.0	573.16	200.83	0.14
Trib1	8116	100-yr	808.30	256.83	266.13		266.16	0.002302	2.1	610.36	201.21	0.15
Trib1	8116	Atlas 14 100-yr	1001.70	256.83	266.48		266.53	0.002507	2.2	682.65	201.93	0.15
Trib1	8079	10-yr	536.90	256.83	265.43	263.09	265.46	0.002354	1.9	470.23	202.50	0.14
Trib1	8079	50-yr	718.40	256.83	265.85	264.10	265.89	0.002529	2.0	556.45	203.36	0.15
Trib1	8079	100-yr	808.30	256.83	266.03	264.19	266.07	0.002627	2.1	593.36	203.73	0.15
Trib1	8079	Atlas 14 100-yr	1001.70	256.83	266.39	264.34	266.43	0.002834	2.3	664.99	204.44	0.16
Trib1	8027	10-yr	536.90	256.83	265.31		265.35	0.002110	2.0	431.01	177.78	0.14
Trib1	8027	50-yr	718.40	256.83	265.72		265.76	0.002461	2.3	503.85	178.61	0.16
Trib1	8027	100-yr	808.30	256.83	265.89		265.94	0.002632	2.4	534.82	178.96	0.16
Trib1	8027	Atlas 14 100-yr	1001.70	256.83	266.22		266.28	0.002979	2.6	594.77	179.73	0.18
Trib1	7977	10-yr	536.90	256.83	265.14		265.19	0.005123	2.6	337.54	165.18	0.20
Trib1	7977	50-yr	718.40	256.83	265.52		265.59	0.005779	2.9	402.95	176.11	0.22
Trib1	7977	100-yr	808.30	256.83	265.68		265.75	0.005960	3.0	431.87	176.75	0.22
Trib1	7977	Atlas 14 100-yr	1001.70	256.83	266.00		266.08	0.006355	3.2	487.61	177.77	0.23
Trib1	7925	10-yr	536.90	256.83	264.93		264.98	0.003424	2.4	379.94	191.10	0.18
Trib1	7925	50-yr	718.40	256.83	265.28		265.35	0.003926	2.6	448.01	192.00	0.19
Trib1	7925	100-yr	808.30	256.83	265.44		265.50	0.004164	2.8	477.30	192.38	0.20
Trib1	7925	Atlas 14 100-yr	1001.70	256.83	265.73		265.81	0.004660	3.0	533.28	193.11	0.21
Trib1	7851	10-yr	536.90	256.83	264.77		264.79	0.001907	1.8	600.91	372.25	0.13
Trib1	7851	50-yr	718.40	256.83	265.12		265.14	0.001982	1.9	730.31	373.09	0.14
Trib1	7851	100-yr	808.30	256.83	265.26		265.29	0.002033	2.0	785.46	373.45	0.14
Trib1	7851	Atlas 14 100-yr	1001.70	256.83	265.54		265.57	0.002160	2.1	890.06	374.13	0.14
Trib1	7803	10-yr	536.90	256.83	264.70		264.72	0.001228	1.4	617.50	399.17	0.11
Trib1	7803	50-yr	718.40	256.83	265.05		265.07	0.001204	1.5	756.01	400.07	0.11
Trib1	7803	100-yr	808.30	256.83	265.19		265.21	0.001213	1.5	814.67	400.41	0.11
Trib1	7803	Atlas 14 100-yr	1001.70	256.83	265.47		265.49	0.001254	1.6	925.41	400.96	0.11
Trib1	7688	10-yr	536.90	256.83	264.53		264.56	0.001694	1.6	535.41	385.38	0.12
Trib1	7688	50-yr	718.40	256.83	264.89		264.91	0.001537	1.6	673.29	387.68	0.11
Trib1	7688	100-yr	808.30	256.83	265.04		265.06	0.001514	1.6	730.67	387.98	0.11
Trib1	7688	Atlas 14 100-yr	1001.70	256.83	265.31		265.34	0.001526	1.6	836.87	390.14	0.12
Trib1	7637	10-yr	536.90	256.83	264.45		264.47	0.001485	1.6	525.90	382.17	0.12
Trib1	7637	50-yr	718.40	256.83	264.82		264.84	0.001342	1.6	665.65	382.92	0.12
Trib1	7637	100-yr	808.30	256.83	264.97		264.99	0.001325	1.6	722.76	383.23	0.12
Trib1	7637	Atlas 14 100-yr	1001.70	256.83	265.24		265.26	0.001342	1.7	827.24	383.79	0.12
Trib1	7588	10-yr	536.90	256.83	264.38		264.40	0.001892	1.7	497.55	386.54	0.13
Trib1	7588	50-yr	718.40	256.83	264.76		264.78	0.001622	1.6	643.53	387.69	0.13
Trib1	7588	100-yr	808.30	256.83	264.91		264.93	0.001582	1.7	702.12	387.99	0.12
Trib1	7588	Atlas 14 100-yr	1001.70	256.83	265.18		265.21	0.001577	1.7	808.18	388.53	0.13
Trib1	7494	10-yr	536.90	256.83	263.97	261.66	264.10	0.007090	3.7	325.01	332.80	0.27
Trib1	7494	50-yr	718.40	256.83	264.48		264.55	0.004507	3.1	493.34	334.36	0.22
Trib1	7494	100-yr	808.30	256.83	264.64		264.71	0.004249	3.1	548.83	334.97	0.21
Trib1	7494	Atlas 14 100-yr	1001.70	256.83	264.92		264.99	0.004141	3.1	642.85	336.00	0.21
Trib1	7365	10-yr	536.90	256.83	262.95		263.12	0.008366	3.3	164.63	39.46	0.28
Trib1	7365	50-yr	718.40	256.83	263.48	260.72	263.70	0.010460	3.8	214.27	354.51	0.32
Trib1	7365	100-yr	808.30	256.83	263.72		263.92	0.009542	3.8	298.60	354.99	0.31
Trib1	7365	Atlas 14 100-yr	1001.70	256.83	264.12		264.28	0.007801	3.6	440.90	355.81	0.28
Trib1	7293	10-yr	536.90	256.83	262.67		262.75	0.003027	3.0	308.70	105.71	0.23
Trib1	7293	50-yr	718.40	256.83	263.17		263.26	0.003430	3.4	361.47	106.74	0.25
Trib1	7293	100-yr	808.30	256.83	263.38		263.49	0.003618	3.5	384.61	107.18	0.26
Trib1	7293	Atlas 14 100-yr	1001.70	256.83	263.81		263.90	0.003314	3.5	556.19	410.69	0.25

HEC-RAS Plan: Ex_v13 (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)	
Trib1	7206	10-yr	536.90	256.83	262.33	259.92	262.45	0.003559	3.2	238.59	83.78	0.26
Trib1	7206	50-yr	718.40	256.83	262.74	260.81	262.91	0.004421	3.7	272.29	86.22	0.29
Trib1	7206	100-yr	808.30	256.83	262.92	260.97	263.10	0.004837	4.0	286.83	87.41	0.30
Trib1	7206	Atlas 14 100-yr	1001.70	256.83	263.28	261.29	263.51	0.005637	4.5	316.17	92.19	0.33
Trib1	7163	10-yr	536.90	256.72	262.19		262.28	0.003839	3.1	294.51	122.97	0.25
Trib1	7163	50-yr	718.40	256.72	262.60		262.70	0.004380	3.5	344.03	123.79	0.27
Trib1	7163	100-yr	808.30	256.72	262.77		262.88	0.004647	3.7	365.28	124.14	0.28
Trib1	7163	Atlas 14 100-yr	1001.70	256.72	263.11		263.25	0.005116	4.1	408.57	124.88	0.30
Trib1	7115	10-yr	536.90	253.54	262.01		262.10	0.003564	3.0	285.33	119.21	0.23
Trib1	7115	50-yr	718.40	253.54	262.37		262.49	0.004324	3.4	328.82	120.40	0.26
Trib1	7115	100-yr	808.30	253.54	262.53		262.65	0.004698	3.7	347.23	120.82	0.27
Trib1	7115	Atlas 14 100-yr	1001.70	253.54	262.84		262.99	0.005364	4.1	385.31	121.69	0.29
Trib1	7052	10-yr	536.90	253.54	261.92		261.96	0.001423	2.0	382.89	163.84	0.15
Trib1	7052	50-yr	718.40	253.54	262.26		262.32	0.001707	2.3	439.93	165.73	0.17
Trib1	7052	100-yr	808.30	253.54	262.41		262.47	0.001849	2.4	463.93	166.73	0.18
Trib1	7052	Atlas 14 100-yr	1001.70	253.54	262.71		262.79	0.002095	2.7	514.32	168.37	0.19
Trib1	6989	10-yr	536.90	253.54	261.79		261.85	0.002248	2.3	334.43	161.99	0.19
Trib1	6989	50-yr	718.40	253.54	262.12		262.19	0.002634	2.6	386.87	162.67	0.21
Trib1	6989	100-yr	808.30	253.54	262.25		262.33	0.002841	2.8	408.35	162.94	0.22
Trib1	6989	Atlas 14 100-yr	1001.70	253.54	262.53		262.63	0.003172	3.1	454.05	163.53	0.23
Trib1	6914	10-yr	536.90	253.54	261.72		261.74	0.000787	1.4	555.54	275.34	0.12
Trib1	6914	50-yr	718.40	253.54	262.04		262.06	0.000914	1.6	642.14	275.97	0.13
Trib1	6914	100-yr	808.30	253.54	262.16		262.19	0.000984	1.6	677.22	276.23	0.13
Trib1	6914	Atlas 14 100-yr	1001.70	253.54	262.44		262.47	0.001091	1.8	753.00	276.77	0.14
Trib1	6847	10-yr	536.90	253.54	261.66		261.69	0.001243	1.9	453.27	232.77	0.14
Trib1	6847	50-yr	718.40	253.54	261.96		262.00	0.001467	2.1	524.25	233.38	0.16
Trib1	6847	100-yr	808.30	253.54	262.09		262.13	0.001591	2.2	552.62	233.62	0.16
Trib1	6847	Atlas 14 100-yr	1001.70	253.54	262.35		262.40	0.001778	2.4	614.76	234.14	0.18
Trib1	6756	10-yr	536.90	253.54	261.58		261.60	0.000874	1.5	541.81	301.21	0.12
Trib1	6756	50-yr	718.40	253.54	261.88		261.90	0.001000	1.7	630.22	301.81	0.13
Trib1	6756	100-yr	808.30	253.54	261.99		262.02	0.001076	1.8	664.90	302.04	0.14
Trib1	6756	Atlas 14 100-yr	1001.70	253.54	262.25		262.28	0.001178	1.9	742.61	302.57	0.14
Trib1	6663	10-yr	536.90	253.54	261.46		261.49	0.001957	1.8	465.63	281.88	0.13
Trib1	6663	50-yr	718.40	253.54	261.73		261.77	0.002223	2.0	543.22	283.90	0.14
Trib1	6663	100-yr	808.30	253.54	261.83		261.88	0.002404	2.1	572.40	284.37	0.15
Trib1	6663	Atlas 14 100-yr	1001.70	253.54	262.08		262.13	0.002612	2.2	641.07	285.46	0.16
Trib1	6582	10-yr	536.90	253.54	261.24		261.27	0.003740	2.2	475.09	350.07	0.18
Trib1	6582	50-yr	718.40	253.54	261.48		261.53	0.004212	2.4	562.22	350.76	0.19
Trib1	6582	100-yr	808.30	253.54	261.57		261.61	0.004631	2.5	590.82	350.98	0.20
Trib1	6582	Atlas 14 100-yr	1001.70	253.54	261.79		261.84	0.004953	2.7	669.33	351.59	0.21
Trib1	6523	10-yr	536.90	253.54	261.07		261.10	0.002472	1.9	459.91	362.03	0.15
Trib1	6523	50-yr	718.40	253.54	261.29		261.33	0.002865	2.1	541.20	363.93	0.17
Trib1	6523	100-yr	808.30	253.54	261.35		261.39	0.003269	2.3	561.86	364.41	0.18
Trib1	6523	Atlas 14 100-yr	1001.70	253.54	261.55		261.61	0.003497	2.4	638.06	366.17	0.19
Trib1	6462	10-yr	536.90	253.54	260.97		261.00	0.001599	1.9	443.83	382.76	0.13
Trib1	6462	50-yr	718.40	253.54	261.18		261.22	0.001722	2.0	526.81	383.28	0.13
Trib1	6462	100-yr	808.30	253.54	261.23		261.27	0.001994	2.2	542.48	383.38	0.14
Trib1	6462	Atlas 14 100-yr	1001.70	253.54	261.43		261.48	0.002006	2.2	622.04	383.88	0.15
Trib1	6391	10-yr	536.90	253.54	260.39	258.79	260.69	0.017489	5.4	239.63	392.69	0.41
Trib1	6391	50-yr	718.40	253.54	260.48	259.43	260.86	0.024240	6.4	272.97	395.70	0.48
Trib1	6391	100-yr	808.30	253.54	260.69	259.73	260.92	0.016489	5.5	357.48	396.46	0.40
Trib1	6391	Atlas 14 100-yr	1001.70	253.54	261.05	260.33	261.17	0.010352	4.5	498.57	397.50	0.32
Trib1	6337	10-yr	536.90	253.54	259.96	257.12	260.12	0.005884	3.4	182.88	159.45	0.25
Trib1	6337	50-yr	718.40	253.54	260.25	257.66	260.32	0.003638	2.8	556.50	472.28	0.20
Trib1	6337	100-yr	808.30	253.54	260.44	257.87	260.50	0.003211	2.7	645.95	472.65	0.19
Trib1	6337	Atlas 14 100-yr	1001.70	253.54	260.84	258.29	260.88	0.002413	2.4	835.52	473.45	0.17
Trib1	6240	10-yr	536.90	253.54	258.53	257.72	259.01	0.029244	6.0	107.64	175.19	0.52
Trib1	6240	50-yr	718.40	253.54	258.75	258.17	259.47	0.041932	7.5	116.54	176.08	0.63
Trib1	6240	100-yr	808.30	253.54	258.82	258.39	259.69	0.049684	8.2	119.31	176.35	0.69
Trib1	6240	Atlas 14 100-yr	1001.70	253.54	258.89	258.79	260.16	0.070943	9.9	122.43	176.66	0.82
Trib1	6168	10-yr	536.90	253.54	258.62		258.63	0.001136	1.2	788.46	414.04	0.10

HEC-RAS Plan: Ex_v13 (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)	
Trib1	6168	50-yr	718.40	253.54	258.98		258.99	0.001167	1.3	940.90	415.34	0.11
Trib1	6168	100-yr	808.30	253.54	259.15		259.16	0.001184	1.4	1008.79	415.92	0.11
Trib1	6168	Atlas 14 100-yr	1001.70	253.54	259.48		259.49	0.001212	1.4	1146.29	417.48	0.11
Trib1	6073	10-yr	536.90	253.34	258.50		258.52	0.001630	1.5	680.74	379.48	0.12
Trib1	6073	50-yr	718.40	253.34	258.87		258.88	0.001628	1.5	819.94	380.19	0.12
Trib1	6073	100-yr	808.30	253.34	259.03		259.05	0.001637	1.6	881.65	380.53	0.13
Trib1	6073	Atlas 14 100-yr	1001.70	253.34	259.36		259.38	0.001646	1.6	1006.74	381.21	0.13
Trib1	6008	10-yr	536.90	251.43	258.41		258.42	0.001536	1.4	721.42	433.09	0.12
Trib1	6008	50-yr	718.40	251.43	258.78		258.79	0.001474	1.5	882.14	436.75	0.11
Trib1	6008	100-yr	808.30	251.43	258.94		258.96	0.001461	1.5	953.38	438.37	0.11
Trib1	6008	Atlas 14 100-yr	1001.70	251.43	259.27		259.29	0.001431	1.5	1098.36	441.63	0.11
Trib1	5887	10-yr	536.90	250.58	258.10		258.14	0.003672	2.1	484.61	330.19	0.18
Trib1	5887	50-yr	718.40	250.58	258.49		258.52	0.003285	2.1	613.60	331.06	0.17
Trib1	5887	100-yr	808.30	250.58	258.66		258.69	0.003204	2.1	668.82	331.43	0.17
Trib1	5887	Atlas 14 100-yr	1001.70	250.58	259.00		259.03	0.003059	2.1	780.62	332.17	0.17
Trib1	5802	10-yr	536.90	250.26	257.98	253.56	258.00	0.000955	1.3	736.65	382.36	0.09
Trib1	5802	50-yr	718.40	250.26	258.37	254.26	258.39	0.001052	1.4	884.89	383.30	0.10
Trib1	5802	100-yr	808.30	250.26	258.54	254.57	258.55	0.001100	1.5	948.03	383.70	0.10
Trib1	5802	Atlas 14 100-yr	1001.70	250.26	258.87	255.18	258.89	0.001176	1.6	1076.70	384.88	0.10
Trib1	5713	10-yr	536.90	250.26	257.91	255.53	257.92	0.000732	1.2	739.13	336.41	0.08
Trib1	5713	50-yr	718.40	250.26	258.29	256.09	258.30	0.000860	1.4	865.69	337.21	0.09
Trib1	5713	100-yr	808.30	250.26	258.45	256.32	258.46	0.000922	1.4	919.35	337.55	0.09
Trib1	5713	Atlas 14 100-yr	1001.70	250.26	258.77	256.83	258.79	0.001028	1.5	1029.30	338.25	0.10
Trib1	5582	10-yr	536.90	250.26	257.80	255.32	257.82	0.001521	1.7	570.66	342.80	0.12
Trib1	5582	50-yr	718.40	250.26	258.16	255.91	258.18	0.001669	1.9	694.53	343.60	0.13
Trib1	5582	100-yr	808.30	250.26	258.31	256.17	258.33	0.001746	2.0	746.64	343.93	0.13
Trib1	5582	Atlas 14 100-yr	1001.70	250.26	258.62	256.67	258.65	0.001855	2.1	854.60	344.62	0.14
Trib1	5507	10-yr	536.90	250.26	257.66	254.92	257.68	0.002340	1.7	578.47	383.72	0.14
Trib1	5507	50-yr	718.40	250.26	258.02	255.64	258.04	0.002299	1.8	716.07	386.28	0.14
Trib1	5507	100-yr	808.30	250.26	258.17	255.95	258.19	0.002327	1.8	773.29	387.31	0.14
Trib1	5507	Atlas 14 100-yr	1001.70	250.26	258.48	256.91	258.50	0.002325	1.9	893.56	388.85	0.14
Trib1	5429	10-yr	536.90	250.26	257.24	255.91	257.34	0.009886	3.8	275.03	361.37	0.30
Trib1	5429	50-yr	718.40	250.26	257.66	256.53	257.74	0.007293	3.5	430.95	363.97	0.26
Trib1	5429	100-yr	808.30	250.26	257.82	257.05	257.89	0.006838	3.4	488.86	364.47	0.25
Trib1	5429	Atlas 14 100-yr	1001.70	250.26	258.16	257.20	258.22	0.005886	3.3	611.85	365.53	0.24
Trib1	5319	10-yr	536.90	250.26	256.51	254.56	256.59	0.005089	2.8	245.81	90.08	0.22
Trib1	5319	50-yr	718.40	250.26	257.04	254.84	257.12	0.004738	2.9	372.82	364.40	0.22
Trib1	5319	100-yr	808.30	250.26	257.21	254.97	257.28	0.004825	3.0	433.73	365.11	0.22
Trib1	5319	Atlas 14 100-yr	1001.70	250.26	257.63	255.22	257.69	0.004258	3.0	586.48	366.13	0.21
Trib1	5281	10-yr	536.90	250.26	256.00	254.69	256.22	0.015515	4.5	159.59	181.22	0.38
Trib1	5281	50-yr	718.40	250.26	256.44	255.05	256.73	0.017957	5.2	185.11	183.91	0.42
Trib1	5281	100-yr	808.30	250.26	256.51	255.22	256.86	0.021293	5.7	189.28	184.72	0.45
Trib1	5281	Atlas 14 100-yr	1001.70	250.26	256.82	255.54	257.26	0.024925	6.4	207.77	189.29	0.50
Trib1	5206	10-yr	536.90	250.26	255.77		255.79	0.002355	1.8	483.81	205.10	0.15
Trib1	5206	50-yr	718.40	250.26	256.23		256.25	0.002395	1.9	578.51	206.10	0.15
Trib1	5206	100-yr	808.30	250.26	256.25		256.28	0.002964	2.1	582.68	206.14	0.17
Trib1	5206	Atlas 14 100-yr	1001.70	250.26	256.56		256.60	0.003254	2.3	647.63	208.60	0.18
Trib1	5114	10-yr	536.90	250.26	255.57		255.58	0.001795	1.3	614.93	294.74	0.12
Trib1	5114	50-yr	718.40	250.26	256.04		256.05	0.001662	1.4	753.27	295.62	0.12
Trib1	5114	100-yr	808.30	250.26	256.00		256.02	0.002197	1.6	743.28	295.56	0.14
Trib1	5114	Atlas 14 100-yr	1001.70	250.26	256.30		256.32	0.002352	1.7	830.39	296.11	0.14
Trib1	5019	10-yr	536.90	250.26	255.42		255.44	0.001518	1.4	652.10	323.41	0.12
Trib1	5019	50-yr	718.40	250.26	255.90		255.92	0.001387	1.5	808.00	324.33	0.12
Trib1	5019	100-yr	808.30	250.26	255.82		255.84	0.001955	1.7	781.02	324.17	0.14
Trib1	5019	Atlas 14 100-yr	1001.70	250.26	256.10		256.13	0.002117	1.9	872.12	324.71	0.15
Trib1	4939	10-yr	536.90	250.26	255.29		255.30	0.001645	1.4	675.13	369.50	0.12
Trib1	4939	50-yr	718.40	250.26	255.78		255.80	0.001373	1.4	859.95	371.57	0.12
Trib1	4939	100-yr	808.30	250.26	255.64		255.66	0.002124	1.7	807.41	371.13	0.14
Trib1	4939	Atlas 14 100-yr	1001.70	250.26	255.91		255.93	0.002249	1.8	907.41	371.85	0.15
Trib1	4808	10-yr	536.90	250.19	255.01		255.03	0.002745	1.8	568.84	361.04	0.16
Trib1	4808	50-yr	718.40	250.19	255.58		255.60	0.001877	1.6	773.22	362.42	0.13
Trib1	4808	100-yr	808.30	250.19	255.28		255.31	0.003838	2.2	664.30	361.69	0.19

HEC-RAS Plan: Ex_v13 (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)	
Trib1	4808	Atlas 14 100-yr	1001.70	250.19	255.53		255.57	0.003915	2.3	756.32	362.31	0.19
Trib1	4738	10-yr	536.90	246.98	254.81		254.84	0.003031	2.1	515.62	349.26	0.16
Trib1	4738	50-yr	718.40	246.98	255.45		255.47	0.001926	1.8	739.92	352.92	0.13
Trib1	4738	100-yr	808.30	246.98	254.95		255.01	0.005326	2.8	564.97	351.24	0.21
Trib1	4738	Atlas 14 100-yr	1001.70	246.98	255.20		255.26	0.005417	2.9	653.19	352.25	0.22
Trib1	4694	10-yr	536.90	246.84	254.71	252.32	254.73	0.001952	1.6	629.08	377.55	0.13
Trib1	4694	50-yr	718.40	246.84	255.38	253.05	255.40	0.001256	1.4	883.63	378.96	0.11
Trib1	4694	100-yr	808.30	246.84	254.75	253.81	254.79	0.004127	2.4	644.23	377.64	0.19
Trib1	4694	Atlas 14 100-yr	1001.70	246.84	254.99	253.72	255.04	0.004254	2.5	736.70	378.15	0.19
Trib1	4554	10-yr	536.90	246.38	254.55	252.96	254.56	0.000830	1.0	871.21	421.61	0.08
Trib1	4554	50-yr	718.40	246.38	255.27	253.54	255.28	0.000583	0.9	1177.15	423.01	0.07
Trib1	4554	100-yr	808.30	246.38	254.30	253.54	254.32	0.002784	1.7	765.14	421.12	0.15
Trib1	4554	Atlas 14 100-yr	1001.70	246.38	254.51	253.54	254.53	0.003064	1.9	854.60	421.53	0.15
Trib1	4405	10-yr	536.90	245.89	252.77	252.77	254.03	0.133714	10.0	63.39	160.75	0.92
Trib1	4405	50-yr	718.40	245.89	253.34	253.34	254.84	0.133466	11.0	77.82	166.64	0.94
Trib1	4405	100-yr	808.30	245.89	253.54	253.54	253.60	0.011985	3.4	506.52	455.60	0.28
Trib1	4405	Atlas 14 100-yr	1001.70	245.89	253.68	253.54	253.75	0.013142	3.6	569.12	459.44	0.30
Trib1	4303	10-yr	536.90	245.56	252.54		252.54	0.000687	1.0	890.37	371.21	0.08
Trib1	4303	50-yr	718.40	245.56	252.89		252.90	0.000792	1.1	1022.11	371.93	0.08
Trib1	4303	100-yr	808.30	245.56	253.08		253.09	0.000812	1.2	1091.87	372.32	0.08
Trib1	4303	Atlas 14 100-yr	1001.70	245.56	253.49		253.50	0.000819	1.2	1244.19	373.44	0.09
Trib1	4194	10-yr	536.90	245.20	252.46		252.47	0.000749	1.1	852.94	362.89	0.08
Trib1	4194	50-yr	718.40	245.20	252.80		252.81	0.000874	1.2	977.36	363.63	0.09
Trib1	4194	100-yr	808.30	245.20	252.99		253.00	0.000897	1.3	1044.79	364.58	0.09
Trib1	4194	Atlas 14 100-yr	1001.70	245.20	253.40		253.41	0.000902	1.3	1193.95	366.67	0.09
Trib1	3930	10-yr	536.90	244.33	252.28		252.29	0.000646	1.0	836.66	380.32	0.07
Trib1	3930	50-yr	718.40	244.33	252.60		252.61	0.000762	1.2	955.61	381.22	0.08
Trib1	3930	100-yr	808.30	244.33	252.78		252.79	0.000773	1.2	1024.93	381.74	0.08
Trib1	3930	Atlas 14 100-yr	1001.70	244.33	253.19		253.20	0.000757	1.2	1181.60	386.21	0.08
Trib1	3808	10-yr	536.90	243.93	252.16		252.18	0.001279	1.5	673.12	317.97	0.10
Trib1	3808	50-yr	718.40	243.93	252.45		252.47	0.001563	1.7	764.98	319.25	0.11
Trib1	3808	100-yr	808.30	243.93	252.63		252.65	0.001589	1.7	822.33	320.05	0.12
Trib1	3808	Atlas 14 100-yr	1001.70	243.93	253.04		253.07	0.001545	1.8	954.67	322.18	0.12
Trib1	3654.35	10-yr	536.90	243.43	251.77		251.78	0.001960	1.4	695.25	440.51	0.10
Trib1	3654.35	50-yr	718.40	243.43	251.97		251.99	0.002422	1.6	782.80	441.46	0.12
Trib1	3654.35	100-yr	808.30	243.43	252.17		252.18	0.002200	1.6	869.65	442.41	0.11
Trib1	3654.35	Atlas 14 100-yr	1001.70	243.43	252.64		252.66	0.001691	1.5	1080.18	444.68	0.10
Trib1	3593.5	10-yr	536.90	243.35	249.68	249.68	251.02	0.140327	9.3	57.84	33.99	1.00
Trib1	3593.5	50-yr	718.40	243.35	250.41	250.41	251.20	0.079774	7.9	186.83	604.20	0.77
Trib1	3593.5	100-yr	808.30	243.35	250.41	250.41	251.41	0.100990	8.9	186.83	604.20	0.87
Trib1	3593.5	Atlas 14 100-yr	1001.70	243.35	250.41	250.41	251.94	0.155098	11.0	186.83	604.20	1.08
Trib1	3532.7	10-yr	536.90	243.00	248.57		248.59	0.004748	1.7	450.80	278.60	0.18
Trib1	3532.7	50-yr	718.40	243.00	248.84		248.87	0.005179	1.8	526.14	280.22	0.19
Trib1	3532.7	100-yr	808.30	243.00	248.96		248.99	0.005395	1.9	559.03	280.92	0.19
Trib1	3532.7	Atlas 14 100-yr	1001.70	243.00	249.26		249.30	0.005265	1.9	643.66	282.83	0.19
Trib1	3498	10-yr	488.20	242.92	248.49	247.35	248.51	0.000696	0.6	532.67	475.70	0.07
Trib1	3498	50-yr	680.50	242.92	248.75	247.44	248.77	0.000804	0.7	622.15	476.23	0.07
Trib1	3498	100-yr	787.90	242.92	248.86	247.50	248.89	0.000883	0.8	660.22	476.45	0.08
Trib1	3498	Atlas 14 100-yr	1094.80	242.92	249.15	247.64	249.19	0.001069	0.9	759.15	477.03	0.09
Trib1	3454		Culvert									
Trib1	3396	10-yr	488.20	242.92	247.86	247.28	247.89	0.000375	1.2	386.33	505.89	0.11
Trib1	3396	50-yr	680.50	242.92	248.06	247.36	248.10	0.000400	1.3	464.87	506.49	0.12
Trib1	3396	100-yr	787.90	242.92	248.17	247.40	248.20	0.000409	1.3	505.19	506.80	0.12
Trib1	3396	Atlas 14 100-yr	1094.80	242.92	248.43	247.52	248.48	0.000425	1.4	612.40	512.37	0.13
Trib1	3291.40	10-yr	488.20	242.70	247.73		247.75	0.000869	2.0	558.34	546.27	0.21
Trib1	3291.40	50-yr	680.50	242.70	247.92		247.94	0.001004	2.2	660.85	547.22	0.23
Trib1	3291.40	100-yr	787.90	242.70	248.02		248.05	0.001053	2.3	714.71	547.63	0.24
Trib1	3291.40	Atlas 14 100-yr	1094.80	242.70	248.28		248.32	0.001132	2.5	859.57	548.70	0.25
Trib1	3186.81	10-yr	488.20	242.65	247.64	247.08	247.65	0.001111	1.9	539.94	549.63	0.19
Trib1	3186.81	50-yr	680.50	242.65	247.81	247.11	247.83	0.001296	2.1	634.43	550.12	0.20
Trib1	3186.81	100-yr	787.90	242.65	247.90	247.11	247.93	0.001354	2.2	685.66	550.30	0.21

HEC-RAS Plan: Ex_v13 (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)	
Trib1	3186.81	Atlas 14 100-yr	1094.80	242.65	248.16	247.11	248.19	0.001422	2.4	827.03	550.83	0.22
Trib1	3135	10-yr	488.20	242.58	247.46	247.35	247.55	0.003018	3.7	341.60	561.38	0.39
Trib1	3135	50-yr	680.50	242.58	247.66	247.44	247.73	0.002610	3.6	452.15	563.11	0.37
Trib1	3135	100-yr	787.90	242.58	247.76	247.48	247.83	0.002421	3.5	510.49	563.40	0.36
Trib1	3135	Atlas 14 100-yr	1094.80	242.58	248.04	247.59	248.10	0.002024	3.4	666.89	564.19	0.33
Trib1	2958.70	10-yr	488.20	241.69	246.51	246.06	246.56	0.003567	2.5	395.28	386.34	0.24
Trib1	2958.70	50-yr	680.50	241.69	246.79	246.18	246.84	0.003408	2.6	501.18	388.08	0.23
Trib1	2958.70	100-yr	787.90	241.69	246.93	246.24	246.98	0.003343	2.6	554.93	389.14	0.23
Trib1	2958.70	Atlas 14 100-yr	1094.80	241.69	247.28	246.38	247.34	0.003226	2.7	735.19	531.14	0.23
Trib1	2782.40	10-yr	488.20	240.81	245.34	244.37	245.37	0.004395	2.1	429.24	347.48	0.20
Trib1	2782.40	50-yr	680.50	240.81	245.62	244.81	245.66	0.004592	2.2	526.51	348.17	0.21
Trib1	2782.40	100-yr	787.90	240.81	245.76	244.88	245.80	0.004685	2.3	575.02	348.52	0.21
Trib1	2782.40	Atlas 14 100-yr	1094.80	240.81	246.12	245.02	246.16	0.004921	2.5	698.04	349.39	0.22
Trib1	2709	10-yr	488.20	240.44	244.77	244.14	244.80	0.004684	2.3	421.11	342.68	0.21
Trib1	2709	50-yr	680.50	240.44	244.98	244.27	245.02	0.005730	2.6	492.09	343.10	0.23
Trib1	2709	100-yr	787.90	240.44	245.08	244.34	245.13	0.006158	2.7	529.35	343.32	0.24
Trib1	2709	Atlas 14 100-yr	1094.80	240.44	245.37	244.49	245.44	0.006994	3.1	628.89	343.89	0.26
Trib1	2566	10-yr	488.20	239.53	244.12		244.15	0.004427	2.1	375.11	440.32	0.20
Trib1	2566	50-yr	680.50	239.53	244.40		244.44	0.002994	1.8	502.23	441.19	0.16
Trib1	2566	100-yr	787.90	239.53	244.54		244.57	0.002642	1.7	562.25	441.47	0.16
Trib1	2566	Atlas 14 100-yr	1094.80	239.53	244.89		244.93	0.002090	1.6	715.17	442.16	0.14
Trib1	2465	10-yr	501.30	238.88	243.35		243.49	0.009895	3.7	185.39	64.75	0.32
Trib1	2465	50-yr	692.10	238.88	243.60		243.83	0.014662	4.7	202.36	66.10	0.40
Trib1	2465	100-yr	800.60	238.88	243.69	242.18	243.98	0.018174	5.3	207.82	66.53	0.44
Trib1	2465	Atlas 14 100-yr	1122.00	238.88	244.11		244.41	0.020611	6.0	356.47	374.95	0.48
Trib1	2258	10-yr	501.30	237.56	243.33	239.95	243.34	0.000180	0.8	709.24	248.90	0.06
Trib1	2258	50-yr	692.10	237.56	243.60	240.50	243.61	0.000261	1.0	771.49	252.09	0.07
Trib1	2258	100-yr	800.60	237.56	243.69	240.78	243.70	0.000321	1.1	791.69	253.34	0.08
Trib1	2258	Atlas 14 100-yr	1122.00	237.56	243.94	241.52	243.97	0.000658	1.6	1011.47	756.41	0.11
Trib1	2224		Culvert									
Trib1	2181	10-yr	501.30	237.14	241.64	239.98	241.95	0.009622	4.5	111.42	209.15	0.41
Trib1	2181	50-yr	692.10	237.14	241.84	240.47	242.38	0.015320	5.9	117.60	210.30	0.52
Trib1	2181	100-yr	800.60	237.14	241.96	240.74	242.64	0.018608	6.6	121.07	210.95	0.58
Trib1	2181	Atlas 14 100-yr	1122.00	237.14	242.09	241.44	243.34	0.032900	9.0	124.95	211.67	0.78
Trib1	2066	10-yr	501.30	233.86	241.40		241.42	0.001689	1.7	455.88	392.68	0.14
Trib1	2066	50-yr	692.10	233.86	241.62		241.65	0.001915	1.9	542.20	393.32	0.15
Trib1	2066	100-yr	800.60	233.86	241.84		241.88	0.001595	1.8	631.99	393.79	0.14
Trib1	2066	Atlas 14 100-yr	1122.00	233.86	242.14		242.19	0.001819	2.0	750.75	394.50	0.15
Trib1	1943	10-yr	501.30	233.26	240.65	238.39	240.97	0.011645	4.9	190.26	476.99	0.40
Trib1	1943	50-yr	692.10	233.26	241.27		241.34	0.003646	3.0	484.50	478.30	0.23
Trib1	1943	100-yr	800.60	233.26	241.61		241.65	0.002175	2.4	650.58	479.05	0.18
Trib1	1943	Atlas 14 100-yr	1122.00	233.26	241.89		241.94	0.002489	2.7	782.11	479.63	0.19
Trib1	1845	10-yr	501.30	232.78	238.98		239.60	0.017002	6.4	84.99	23.16	0.51
Trib1	1845	50-yr	692.10	232.78	239.79		240.60	0.018699	7.4	104.32	24.86	0.54
Trib1	1845	100-yr	800.60	232.78	240.19		241.10	0.019568	7.9	114.40	25.90	0.56
Trib1	1845	Atlas 14 100-yr	1122.00	232.78	241.25	239.64	241.53	0.007731	5.6	467.39	418.04	0.36
Trib1	1740	10-yr	501.30	232.26	237.31	235.62	237.79	0.016229	5.5	91.76	78.02	0.49
Trib1	1740	50-yr	692.10	232.26	238.13	236.31	238.71	0.015697	6.2	116.90	86.98	0.50
Trib1	1740	100-yr	800.60	232.26	238.53	236.66	239.16	0.015636	6.5	129.56	89.86	0.50
Trib1	1740	Atlas 14 100-yr	1122.00	232.26	239.55	237.77	240.34	0.015640	7.3	163.60	97.26	0.52
Trib1	1635	10-yr	501.30	231.75	237.08	234.02	237.25	0.001915	3.3	152.31	32.12	0.27
Trib1	1635	50-yr	692.10	231.75	237.91	234.55	238.13	0.002097	3.8	187.76	462.55	0.29
Trib1	1635	100-yr	800.60	231.75	238.31	234.83	238.56	0.002184	4.1	205.83	471.79	0.30
Trib1	1635	Atlas 14 100-yr	1122.00	231.75	239.35	235.59	239.69	0.002387	4.8	254.30	488.40	0.32
Trib1	1568	10-yr	501.30	231.42	236.91	233.85	237.11	0.002257	3.5	142.02	29.81	0.29
Trib1	1568	50-yr	692.10	231.42	237.71	234.42	237.97	0.002541	4.1	175.64	274.08	0.31
Trib1	1568	100-yr	800.60	231.42	238.11	234.73	238.40	0.002616	4.4	194.92	280.10	0.32
Trib1	1568	Atlas 14 100-yr	1122.00	231.42	239.15	235.54	239.51	0.002741	5.0	247.07	301.95	0.33
Trib1	1446	10-yr	501.30	230.58	236.46	234.98	236.71	0.004803	4.0	126.03	41.53	0.40
Trib1	1446	50-yr	692.10	230.58	237.28	235.41	237.57	0.004281	4.3	163.52	166.05	0.39
Trib1	1446	100-yr	800.60	230.58	237.71	235.64	238.01	0.003868	4.4	191.38	179.79	0.38

HEC-RAS Plan: Ex_v13 (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)	
Trib1	1446	Atlas 14 100-yr	1122.00	230.58	238.82	236.25	239.14	0.003113	4.6	265.68	200.46	0.35
Trib1	1388	10-yr	513.30	230.54	235.93	234.76	236.33	0.008367	5.0	102.28	33.98	0.51
Trib1	1388	50-yr	702.60	230.54	236.79	235.25	237.23	0.007210	5.3	132.14	35.70	0.49
Trib1	1388	100-yr	812.20	230.54	237.22	235.50	237.69	0.006823	5.5	149.24	120.71	0.48
Trib1	1388	Atlas 14 100-yr	1148.00	230.54	238.37	236.23	238.88	0.005475	5.8	211.50	153.42	0.45
Trib1	1107	10-yr	513.30	228.33	234.69	231.07	234.84	0.003355	3.1	171.28	42.77	0.24
Trib1	1107	50-yr	702.60	228.33	235.62	231.65	235.80	0.003437	3.5	209.41	50.71	0.25
Trib1	1107	100-yr	812.20	228.33	236.06	231.95	236.27	0.003540	3.7	228.28	58.89	0.26
Trib1	1107	Atlas 14 100-yr	1148.00	228.33	237.36	232.78	237.60	0.003409	4.1	317.07	291.11	0.26
Trib1	1067		Culvert									
Trib1	1016	10-yr	513.30	227.80	234.49	230.43	234.63	0.003998	3.0	168.42	37.99	0.25
Trib1	1016	50-yr	702.60	227.80	235.26	231.03	235.46	0.004391	3.6	198.56	39.54	0.27
Trib1	1016	100-yr	812.20	227.80	235.60	231.37	235.83	0.004745	3.9	212.21	40.17	0.29
Trib1	1016	Atlas 14 100-yr	1148.00	227.80	236.34	232.29	236.69	0.006229	4.8	243.33	45.55	0.34
Trib1	913	10-yr	513.30	227.62	234.23		234.31	0.002034	2.2	230.96	51.57	0.19
Trib1	913	50-yr	702.60	227.62	234.98		235.08	0.002371	2.6	270.14	53.12	0.20
Trib1	913	100-yr	812.20	227.62	235.30		235.42	0.002637	2.8	287.14	53.78	0.22
Trib1	913	Atlas 14 100-yr	1148.00	227.62	235.92		236.12	0.003769	3.6	321.14	55.08	0.26
Trib1	728	10-yr	513.30	227.30	233.61		233.75	0.004818	3.0	171.51	46.77	0.28
Trib1	728	50-yr	702.60	227.30	234.34		234.49	0.004380	3.2	268.52	177.39	0.27
Trib1	728	100-yr	812.20	227.30	234.68		234.82	0.004003	3.2	328.02	178.15	0.26
Trib1	728	Atlas 14 100-yr	1148.00	227.30	235.14		235.32	0.004852	3.8	410.38	179.13	0.29
Trib1	585	10-yr	513.30	227.30	232.94		233.07	0.004468	2.9	174.70	49.62	0.28
Trib1	585	50-yr	702.60	227.30	233.67		233.84	0.004666	3.3	211.57	51.23	0.29
Trib1	585	100-yr	812.20	227.30	234.04		234.21	0.004456	3.4	272.93	293.49	0.28
Trib1	585	Atlas 14 100-yr	1148.00	227.30	234.04	231.88	234.39	0.008830	4.8	274.73	293.55	0.40
Trib1	442	10-yr	513.30	227.30	232.26	229.59	232.40	0.004944	3.0	171.45	140.97	0.29
Trib1	442	50-yr	702.60	227.30	232.95	230.11	233.13	0.005255	3.4	207.96	145.32	0.30
Trib1	442	100-yr	812.20	227.30	233.31	230.42	233.51	0.005347	3.6	227.44	147.01	0.31
Trib1	442	Atlas 14 100-yr	1148.00	227.30	233.93	231.24	234.00	0.000918	1.6	584.29	477.22	0.13
Trib1	348	10-yr	525.60	227.30	231.76	229.32	231.91	0.005169	3.1	167.42	199.49	0.30
Trib1	348	50-yr	713.50	227.30	232.40	229.76	232.60	0.005657	3.6	198.47	203.36	0.31
Trib1	348	100-yr	824.20	227.30	232.74	230.02	232.96	0.005922	3.8	214.96	205.35	0.32
Trib1	348	Atlas 14 100-yr	1173.50	227.30	233.45	230.85	233.79	0.007553	4.7	250.62	209.80	0.37
Trib1	197	10-yr	525.60	227.30	229.07	229.07	229.90	0.070626	7.3	71.71	43.08	1.00
Trib1	197	50-yr	713.50	227.30	229.45	229.45	230.47	0.067060	8.1	88.24	43.87	1.01
Trib1	197	100-yr	824.20	227.30	229.67	229.67	230.77	0.064218	8.4	97.95	44.33	1.00
Trib1	197	Atlas 14 100-yr	1173.50	227.30	231.18	230.27	231.91	0.022773	6.9	175.20	264.23	0.64
TC_Main	4986	10-yr	2892.00	224.01	235.97	233.49	236.06	0.002147	3.4	1275.80	474.26	0.20
TC_Main	4986	50-yr	3915.90	224.01	236.45	234.89	236.56	0.002371	3.7	1499.81	476.84	0.21
TC_Main	4986	100-yr	4460.70	224.01	236.68	235.01	236.81	0.002472	3.8	1606.81	478.98	0.22
TC_Main	4986	Atlas 14 100-yr	5823.80	224.01	237.20	235.26	237.37	0.003351	4.6	1886.65	610.34	0.26
TC_Main	4863	10-yr	2892.00	224.01	235.89	232.73	235.94	0.000476	1.9	1936.57	589.38	0.10
TC_Main	4863	50-yr	3915.90	224.01	236.35	233.86	236.42	0.000613	2.3	2208.14	590.46	0.12
TC_Main	4863	100-yr	4460.70	224.01	236.57	233.86	236.65	0.000679	2.4	2338.18	590.97	0.13
TC_Main	4863	Atlas 14 100-yr	5823.80	224.01	237.07	233.96	237.17	0.000825	2.7	2635.07	592.47	0.14
TC_Main	4699	10-yr	2892.00	224.01	235.80	233.86	235.85	0.000591	1.8	1866.30	641.05	0.10
TC_Main	4699	50-yr	3915.90	224.01	236.24	233.87	236.31	0.000757	2.1	2145.00	641.92	0.12
TC_Main	4699	100-yr	4460.70	224.01	236.45	233.96	236.53	0.000836	2.3	2278.25	642.34	0.13
TC_Main	4699	Atlas 14 100-yr	5823.80	224.01	236.92	234.27	237.02	0.001014	2.6	2582.80	644.83	0.14
TC_Main	4573	10-yr	2892.00	224.01	235.71	232.08	235.76	0.000990	2.9	2053.83	789.52	0.15
TC_Main	4573	50-yr	3915.90	224.01	236.12	233.04	236.19	0.001173	3.2	2382.81	790.38	0.17
TC_Main	4573	100-yr	4460.70	224.01	236.32	234.60	236.39	0.001257	3.4	2540.35	790.79	0.18
TC_Main	4573	Atlas 14 100-yr	5823.80	224.01	236.78	234.30	236.86	0.001430	3.7	2901.50	791.73	0.19
TC_Main	4419	10-yr	2892.00	224.01	235.44	234.49	235.52	0.002256	3.7	1883.93	927.55	0.22
TC_Main	4419	50-yr	3915.90	224.01	235.81	234.74	235.91	0.002589	4.1	2236.10	928.59	0.23
TC_Main	4419	100-yr	4460.70	224.01	236.00	234.86	236.10	0.002729	4.2	2406.63	929.10	0.24
TC_Main	4419	Atlas 14 100-yr	5823.80	224.01	236.43	235.10	236.54	0.002981	4.5	2803.81	930.08	0.25
TC_Main	4284	10-yr	2892.00	224.01	234.84	232.75	235.09	0.005092	5.5	1361.14	899.19	0.32
TC_Main	4284	50-yr	3915.90	224.01	235.12	234.08	235.41	0.006357	6.2	1606.35	900.55	0.36
TC_Main	4284	100-yr	4460.70	224.01	235.28	234.87	235.57	0.006638	6.4	1753.52	901.21	0.37

HEC-RAS Plan: Ex_v13 (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)	
TC_Main	4284	Atlas 14 100-yr	5823.80	224.01	235.71	235.12	235.99	0.006681	6.7	2142.30	902.95	0.37
TC_Main	4205	10-yr	2892.00	224.01	234.52	232.98	234.71	0.004465	5.1	1209.27	922.70	0.30
TC_Main	4205	50-yr	3915.90	224.01	234.62	233.86	234.90	0.006763	6.3	1301.68	922.89	0.37
TC_Main	4205	100-yr	4460.70	224.01	234.83	234.52	235.08	0.005929	6.0	1504.25	923.31	0.35
TC_Main	4205	Atlas 14 100-yr	5823.80	224.01	235.36	234.71	235.55	0.004483	5.4	1991.52	924.33	0.31
TC_Main	4011	10-yr	2892.00	223.09	229.83	229.83	232.27	0.080471	14.4	264.16	178.32	1.13
TC_Main	4011	50-yr	3915.90	223.09	231.05	231.05	232.37	0.033694	10.7	444.14	187.04	0.76
TC_Main	4011	100-yr	4460.70	223.09	231.29	231.29	232.73	0.034599	11.2	479.99	188.96	0.77
TC_Main	4011	Atlas 14 100-yr	5823.80	223.09	231.84	231.84	233.57	0.035651	12.0	564.47	191.87	0.80
DS_Trib1	3921	10-yr	3360.90	210.12	224.07	219.16	224.72	0.006941	6.5	519.16	58.07	0.38
DS_Trib1	3921	50-yr	4572.30	210.12	225.87	220.48	226.70	0.007548	7.3	626.28	61.28	0.40
DS_Trib1	3921	100-yr	5227.20	210.12	226.76	221.12	227.67	0.007818	7.7	681.50	63.25	0.41
DS_Trib1	3921	Atlas 14 100-yr	6858.90	210.12	228.68	222.56	229.80	0.008688	8.5	809.40	70.03	0.44
DS_Trib1	3815	10-yr	3360.90	208.80	223.68	217.24	224.10	0.004093	5.2	646.05	66.34	0.29
DS_Trib1	3815	50-yr	4572.30	208.80	225.45	218.46	226.00	0.004611	6.0	764.30	67.72	0.31
DS_Trib1	3815	100-yr	5227.20	208.80	226.32	219.07	226.94	0.004842	6.3	823.65	68.42	0.32
DS_Trib1	3815	Atlas 14 100-yr	6858.90	208.80	228.16	220.42	228.97	0.005723	7.2	954.15	78.24	0.35
DS_Trib1	3703	10-yr	3360.90	207.79	223.16	216.37	223.62	0.004518	5.4	623.24	66.05	0.31
DS_Trib1	3703	50-yr	4572.30	207.79	224.85	217.79	225.45	0.005143	6.2	736.90	68.74	0.33
DS_Trib1	3703	100-yr	5227.20	207.79	225.69	218.48	226.37	0.005398	6.6	795.08	74.84	0.34
DS_Trib1	3703	Atlas 14 100-yr	6858.90	207.79	227.42	220.13	228.29	0.006215	7.5	918.23	217.33	0.37
DS_Trib1	3551	10-yr	3360.90	207.82	222.44	215.64	222.90	0.004928	5.4	618.58	70.52	0.32
DS_Trib1	3551	50-yr	4572.30	207.82	224.03	217.06	224.63	0.005700	6.2	734.98	76.09	0.35
DS_Trib1	3551	100-yr	5227.20	207.82	224.84	218.01	225.50	0.005965	6.6	797.61	78.92	0.36
DS_Trib1	3551	Atlas 14 100-yr	6858.90	207.82	226.46	219.55	227.31	0.006683	7.4	929.44	83.39	0.39
DS_Trib1	3367	10-yr	3360.90	207.31	222.08	214.91	222.41	0.001441	4.6	725.10	79.70	0.27
DS_Trib1	3367	50-yr	4572.30	207.31	223.60	216.18	224.05	0.001739	5.4	851.46	86.28	0.30
DS_Trib1	3367	100-yr	5227.20	207.31	224.36	216.80	224.86	0.002026	5.7	920.13	96.62	0.32
DS_Trib1	3367	Atlas 14 100-yr	6858.90	207.31	225.97	218.25	226.59	0.002157	6.3	1088.26	110.64	0.34
DS_Trib1	3167	10-yr	3360.90	206.97	221.68	217.21	222.05	0.002375	4.9	691.74	104.64	0.33
DS_Trib1	3167	50-yr	4572.30	206.97	223.20	218.25	223.62	0.002613	5.2	872.93	128.10	0.35
DS_Trib1	3167	100-yr	5227.20	206.97	223.94	218.75	224.39	0.002567	5.4	970.39	134.97	0.35
DS_Trib1	3167	Atlas 14 100-yr	6858.90	206.97	225.60	219.84	226.10	0.002381	5.7	1204.39	327.91	0.35
DS_Trib1	2996	10-yr	3360.90	207.09	221.49	215.14	221.74	0.001150	4.0	844.13	112.42	0.26
DS_Trib1	2996	50-yr	4572.30	207.09	222.97	216.43	223.28	0.001306	4.5	1016.03	120.07	0.27
DS_Trib1	2996	100-yr	5227.20	207.09	223.70	216.96	224.04	0.001379	4.7	1105.52	126.40	0.28
DS_Trib1	2996	Atlas 14 100-yr	6858.90	207.09	225.34	218.13	225.76	0.001523	5.2	1327.41	374.57	0.30
DS_Trib1	2867	10-yr	3360.90	207.15	221.08	215.11	221.52	0.002314	5.3	635.09	83.24	0.34
DS_Trib1	2867	50-yr	4572.30	207.15	222.45	216.51	223.02	0.002713	6.1	754.95	91.14	0.37
DS_Trib1	2867	100-yr	5227.20	207.15	223.13	217.22	223.77	0.002875	6.4	818.09	95.24	0.38
DS_Trib1	2867	Atlas 14 100-yr	6858.90	207.15	224.67	218.87	225.44	0.003314	7.0	975.75	349.99	0.42
DS_Trib1	2762	10-yr	3360.90	207.57	220.87	216.01	221.26	0.002295	5.0	673.37	97.95	0.34
DS_Trib1	2762	50-yr	4572.30	207.57	222.23	217.22	222.72	0.002579	5.6	813.06	107.73	0.36
DS_Trib1	2762	100-yr	5227.20	207.57	222.90	217.81	223.44	0.002714	5.9	887.63	113.31	0.37
DS_Trib1	2762	Atlas 14 100-yr	6858.90	207.57	224.44	218.98	225.08	0.002843	6.4	1071.93	312.61	0.38
DS_Trib1	2665	10-yr	3360.90	206.87	220.69	214.90	221.03	0.002160	4.7	718.95	105.13	0.32
DS_Trib1	2665	50-yr	4572.30	206.87	222.03	216.69	222.46	0.002450	5.3	866.55	115.46	0.34
DS_Trib1	2665	100-yr	5227.20	206.87	222.69	217.24	223.17	0.002568	5.5	945.36	121.50	0.35
DS_Trib1	2665	Atlas 14 100-yr	6858.90	206.87	224.23	218.44	224.78	0.002774	6.0	1145.40	309.85	0.37
DS_Trib1	2534	10-yr	3360.90	207.38	220.40	215.10	220.74	0.002226	4.7	715.53	110.63	0.33
DS_Trib1	2534	50-yr	4572.30	207.38	221.69	216.26	222.12	0.002689	5.3	869.66	130.51	0.36
DS_Trib1	2534	100-yr	5227.20	207.38	222.35	216.80	222.82	0.002780	5.5	958.82	139.51	0.37
DS_Trib1	2534	Atlas 14 100-yr	6858.90	207.38	223.89	217.99	224.41	0.002747	5.8	1189.80	158.13	0.37
DS_Trib1	2362	10-yr	3360.90	207.19	219.60		220.19	0.004419	6.2	543.35	85.93	0.43
DS_Trib1	2362	50-yr	4572.30	207.19	220.66		221.45	0.005383	7.2	638.62	94.11	0.48
DS_Trib1	2362	100-yr	5227.20	207.19	221.23		222.11	0.005754	7.5	693.79	99.86	0.50
DS_Trib1	2362	Atlas 14 100-yr	6858.90	207.19	222.67		223.68	0.006231	8.1	851.72	119.30	0.53
DS_Trib1	2219	10-yr	3360.90	210.53	218.04		219.08	0.015132	8.2	410.35	116.34	0.77
DS_Trib1	2219	50-yr	4572.30	210.53	219.49		220.44	0.009307	7.9	582.31	121.73	0.63
DS_Trib1	2219	100-yr	5227.20	210.53	220.20		221.15	0.007853	7.8	670.81	124.71	0.59
DS_Trib1	2219	Atlas 14 100-yr	6858.90	210.53	221.84		222.78	0.006052	7.8	882.73	135.66	0.54

HEC-RAS Plan: Ex_v13 (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)	
DS_Trib1	2135	10-yr	3360.90	206.78	217.32		218.21	0.006849	7.5	445.42	74.42	0.54
DS_Trib1	2135	50-yr	4572.30	206.78	218.66		219.73	0.007348	8.3	551.22	83.46	0.57
DS_Trib1	2135	100-yr	5227.20	206.78	219.33		220.48	0.007481	8.6	608.38	88.26	0.58
DS_Trib1	2135	Atlas 14 100-yr	6858.90	206.78	220.90		222.18	0.007420	9.1	756.86	100.21	0.58
DS_Trib1	1983	10-yr	3360.90	204.92	216.88	213.37	217.38	0.003374	5.7	590.09	89.67	0.39
DS_Trib1	1983	50-yr	4572.30	204.92	218.20	214.34	218.84	0.003648	6.4	711.18	94.06	0.41
DS_Trib1	1983	100-yr	5227.20	204.92	218.85	214.79	219.56	0.003754	6.8	773.53	96.31	0.42
DS_Trib1	1983	Atlas 14 100-yr	6858.90	204.92	220.41	215.88	221.26	0.003857	7.4	927.29	101.31	0.43
DS_Trib1	1746	10-yr	3360.90	205.47	215.38	213.88	216.15	0.008566	7.3	489.73	108.40	0.59
DS_Trib1	1746	50-yr	4572.30	205.47	216.91	214.68	217.68	0.006668	7.3	661.33	116.86	0.54
DS_Trib1	1746	100-yr	5227.20	205.47	217.64	215.08	218.44	0.006104	7.4	748.97	120.85	0.52
DS_Trib1	1746	Atlas 14 100-yr	6858.90	205.47	219.38	215.98	220.20	0.005148	7.5	967.69	131.65	0.49
DS_Trib1	1481	10-yr	3360.90	204.91	214.67		215.01	0.002175	4.7	717.37	110.30	0.32
DS_Trib1	1481	50-yr	4572.30	204.91	216.25		216.65	0.002145	5.1	901.27	121.22	0.33
DS_Trib1	1481	100-yr	5227.20	204.91	217.03		217.46	0.002065	5.2	996.56	123.47	0.33
DS_Trib1	1481	Atlas 14 100-yr	6858.90	204.91	218.83		219.32	0.001915	5.6	1223.76	128.62	0.32
DS_Trib1	1147	10-yr	3568.00	203.47	214.23		214.42	0.001279	3.5	1021.54	165.50	0.25
DS_Trib1	1147	50-yr	4873.80	203.47	215.87		216.09	0.001158	3.7	1301.14	175.92	0.24
DS_Trib1	1147	100-yr	5594.00	203.47	216.68		216.91	0.001116	3.9	1445.04	180.84	0.24
DS_Trib1	1147	Atlas 14 100-yr	7442.80	203.47	218.53		218.80	0.001042	4.2	1789.69	190.78	0.24
DS_Trib1	1060	10-yr	3568.00	202.94	213.99	209.60	214.28	0.001869	4.3	823.12	127.64	0.30
DS_Trib1	1060	50-yr	4873.80	202.94	215.61	210.52	215.95	0.001815	4.7	1040.42	140.50	0.30
DS_Trib1	1060	100-yr	5594.00	202.94	216.41	210.96	216.78	0.001754	4.8	1155.33	148.12	0.30
DS_Trib1	1060	Atlas 14 100-yr	7442.80	202.94	218.25	211.97	218.67	0.001598	5.2	1424.15	159.02	0.30
DS_Trib1	1008		Bridge									
DS_Trib1	984	10-yr	3568.00	202.44	210.57	209.08	211.58	0.009804	8.1	442.94	97.56	0.65
DS_Trib1	984	50-yr	4873.80	202.44	211.59	210.19	212.86	0.009873	9.0	538.76	101.71	0.67
DS_Trib1	984	100-yr	5594.00	202.44	212.11	210.64	213.51	0.009842	9.5	588.82	103.61	0.68
DS_Trib1	984	Atlas 14 100-yr	7442.80	202.44	213.67	211.68	215.23	0.008447	10.0	743.07	110.03	0.65
DS_Trib1	927	10-yr	3568.00	200.16	210.46		211.09	0.003287	6.4	558.24	99.75	0.48
DS_Trib1	927	50-yr	4873.80	200.16	211.48		212.32	0.003651	7.4	661.58	102.96	0.51
DS_Trib1	927	100-yr	5594.00	200.16	212.01		212.95	0.003812	7.8	716.49	105.47	0.53
DS_Trib1	927	Atlas 14 100-yr	7442.80	200.16	213.44		214.52	0.008061	8.3	892.17	215.83	0.72
DS_Trib1	721	10-yr	3568.00	204.34	210.00		210.40	0.002848	5.1	706.08	164.72	0.43
DS_Trib1	721	50-yr	4873.80	204.34	211.09		211.55	0.002851	5.5	889.33	183.97	0.44
DS_Trib1	721	100-yr	5594.00	204.34	211.70		212.18	0.002551	5.6	1002.34	185.24	0.42
DS_Trib1	721	Atlas 14 100-yr	7442.80	204.34	213.04		213.59	0.002210	5.9	1251.78	188.01	0.41
DS_Trib1	541	10-yr	3568.00	201.06	209.60		209.95	0.002014	4.7	752.35	145.58	0.37
DS_Trib1	541	50-yr	4873.80	201.06	210.67		211.11	0.002059	5.4	908.03	147.71	0.38
DS_Trib1	541	100-yr	5594.00	201.06	211.27		211.75	0.002245	5.6	1003.25	165.32	0.40
DS_Trib1	541	Atlas 14 100-yr	7442.80	201.06	212.63		213.20	0.002074	6.1	1229.85	168.06	0.39
DS_Trib1	17	10-yr	3568.00	201.06	208.38	205.84	208.79	0.002460	5.1	693.75	143.34	0.41
DS_Trib1	17	50-yr	4873.80	201.06	209.42	206.53	209.94	0.002460	5.8	843.95	145.90	0.42
DS_Trib1	17	100-yr	5594.00	201.06	209.95	206.91	210.52	0.002461	6.1	921.15	147.43	0.43
DS_Trib1	17	Atlas 14 100-yr	7442.80	201.06	211.34	207.87	212.01	0.002462	6.6	1134.96	161.57	0.44

Appendix E

Detailed WSEL Comparison Along Trib 1

Appendix E - Detailed WSEL Comparison Along Trib 1, Existing vs Proposed Alt 1

Station	Existing 10-yr WSEL (ft)	Alt 1 (40') Prop 10-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 50-yr WSEL (ft)	Alt 1 (40') Prop 50-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 100-yr WSEL (ft)	Alt 1 (40') Prop 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing Atlas 14 100-yr WSEL (ft)	Alt 1 (40') Prop A14 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)
9237	269.54	269.54	0.00	270.40	270.40	0.00	270.46	270.46	0.00	270.60	270.60	0.00
9163	268.75	268.75	0.00	269.23	269.23	0.00	269.42	269.42	0.00	269.81	269.81	0.00
9126	268.69	268.69	0.00	269.17	269.17	0.00	269.36	269.36	0.00	269.75	269.75	0.00
9067	268.56	268.56	0.00	269.04	269.04	0.00	269.23	269.23	0.00	269.60	269.60	0.00
8988	268.41	268.41	0.00	268.90	268.90	0.00	269.08	269.08	0.00	269.45	269.45	0.00
8896	268.27	268.27	0.00	268.76	268.76	0.00	268.94	268.94	0.00	269.30	269.30	0.00
8854	268.16	268.16	0.00	268.65	268.65	0.00	268.83	268.83	0.00	269.18	269.18	0.00
8790	268.00	268.00	0.00	268.50	268.50	0.00	268.67	268.67	0.00	269.02	269.02	0.00
8689	267.69	267.69	0.00	268.25	268.25	0.00	268.41	268.41	0.00	268.75	268.75	0.00
8636	267.54	267.54	0.00	268.13	268.13	0.00	268.28	268.28	0.00	268.61	268.61	0.00
8556	267.26	267.26	0.00	267.94	267.94	0.00	268.08	268.08	0.00	268.40	268.40	0.00
8492	267.02	267.02	0.00	267.79	267.79	0.00	267.93	267.93	0.00	268.23	268.23	0.00
8442	266.64	266.64	0.00	267.56	267.56	0.00	267.68	267.68	0.00	268.00	268.00	0.00
8381	266.19	266.19	0.00	266.69	266.69	0.00	267.14	267.14	0.00	267.59	267.59	0.00
8329	266.00	266.00	0.00	266.48	266.48	0.00	266.70	266.70	0.00	267.30	267.30	0.00
8267	265.85	265.85	0.00	266.32	266.32	0.00	266.53	266.53	0.00	267.06	267.06	0.00
8201	265.69	265.69	0.00	266.14	266.14	0.00	266.33	266.33	0.00	266.73	266.73	0.00
8148	265.57	265.57	0.00	266.00	266.00	0.00	266.19	266.19	0.00	266.55	266.55	0.00
8116	265.51	265.51	0.00	265.94	265.94	0.00	266.13	266.13	0.00	266.48	266.48	0.00
8079	265.43	265.43	0.00	265.85	265.85	0.00	266.03	266.03	0.00	266.39	266.39	0.00
8027	265.31	265.31	0.00	265.72	265.72	0.00	265.89	265.89	0.00	266.22	266.22	0.00
7977	265.14	265.14	0.00	265.52	265.52	0.00	265.68	265.68	0.00	266.00	266.00	0.00
7925	264.93	264.93	0.00	265.28	265.28	0.00	265.44	265.44	0.00	265.73	265.73	0.00
7851	264.77	264.77	0.00	265.12	265.12	0.00	265.26	265.26	0.00	265.54	265.54	0.00
7803	264.70	264.70	0.00	265.05	265.05	0.00	265.19	265.19	0.00	265.47	265.47	0.00
7688	264.53	264.53	0.00	264.89	264.89	0.00	265.04	265.04	0.00	265.31	265.31	0.00
7637	264.45	264.45	0.00	264.82	264.82	0.00	264.97	264.97	0.00	265.24	265.24	0.00
7588	264.38	264.38	0.00	264.76	264.76	0.00	264.91	264.91	0.00	265.18	265.18	0.00
7494	263.97	263.97	0.00	264.48	264.48	0.00	264.64	264.64	0.00	264.92	264.92	0.00
7365	262.95	262.95	0.00	263.48	263.48	0.00	263.72	263.72	0.00	264.12	264.12	0.00
7293	262.67	262.67	0.00	263.17	263.17	0.00	263.38	263.38	0.00	263.81	263.81	0.00
7206	262.33	262.33	0.00	262.74	262.74	0.00	262.92	262.92	0.00	263.28	263.28	0.00
7163	262.19	262.19	0.00	262.60	262.60	0.00	262.77	262.77	0.00	263.11	263.11	0.00
7115	262.01	262.01	0.00	262.37	262.37	0.00	262.53	262.53	0.00	262.84	262.84	0.00
7052	261.92	261.92	0.00	262.26	262.26	0.00	262.41	262.41	0.00	262.71	262.71	0.00
6989	261.79	261.79	0.00	262.12	262.12	0.00	262.25	262.25	0.00	262.53	262.53	0.00
6914	261.72	261.72	0.00	262.04	262.04	0.00	262.16	262.16	0.00	262.44	262.44	0.00
6847	261.66	261.66	0.00	261.96	261.96	0.00	262.09	262.09	0.00	262.35	262.35	0.00
6756	261.58	261.58	0.00	261.88	261.88	0.00	261.99	261.99	0.00	262.25	262.25	0.00
6663	261.46	261.46	0.00	261.73	261.73	0.00	261.83	261.83	0.00	262.08	262.08	0.00
6582	261.24	261.24	0.00	261.48	261.48	0.00	261.57	261.57	0.00	261.79	261.79	0.00
6523	261.07	261.07	0.00	261.29	261.29	0.00	261.35	261.35	0.00	261.55	261.55	0.00
6462	260.97	260.97	0.00	261.18	261.18	0.00	261.23	261.23	0.00	261.43	261.43	0.00

Appendix E - Detailed WSEL Comparison Along Trib 1, Existing vs Proposed Alt 1

Station	Existing 10-yr WSEL (ft)	Alt 1 (40') Prop 10-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 50-yr WSEL (ft)	Alt 1 (40') Prop 50-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 100-yr WSEL (ft)	Alt 1 (40') Prop 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing Atlas 14 100-yr WSEL (ft)	Alt 1 (40') Prop A14 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)
6391	260.39	260.39	0.00	260.48	260.48	0.00	260.69	260.69	0.00	261.05	261.05	0.00
6337	259.96	259.96	0.00	260.25	260.25	0.00	260.44	260.44	0.00	260.84	260.84	0.00
6240	258.53	258.53	0.00	258.75	258.75	0.00	258.82	258.82	0.00	258.89	258.89	0.00
6168	258.62	258.62	0.00	258.98	258.98	0.00	259.15	259.15	0.00	259.48	259.48	0.00
6073	258.50	258.50	0.00	258.87	258.87	0.00	259.03	259.03	0.00	259.36	259.36	0.00
6008	258.41	258.41	0.00	258.78	258.78	0.00	258.94	258.94	0.00	259.27	259.27	0.00
5887	258.10	258.10	0.00	258.49	258.49	0.00	258.66	258.66	0.00	259.00	259.00	0.00
5802	257.98	257.98	0.00	258.37	258.37	0.00	258.54	258.54	0.00	258.87	258.87	0.00
5713	257.91	257.91	0.00	258.29	258.29	0.00	258.45	258.45	0.00	258.77	258.77	0.00
5582	257.80	257.80	0.00	258.16	258.16	0.00	258.31	258.31	0.00	258.62	258.62	0.00
5507	257.66	257.66	0.00	258.02	258.02	0.00	258.17	258.17	0.00	258.48	258.48	0.00
5429	257.24	257.24	0.00	257.66	257.66	0.00	257.82	257.82	0.00	258.16	258.16	0.00
5319	256.51	256.51	0.00	257.04	257.04	0.00	257.21	257.21	0.00	257.63	257.63	0.00
5281	256.00	256.00	0.00	256.44	256.44	0.00	256.51	256.51	0.00	256.82	256.82	0.00
5206	255.77	255.77	0.00	256.23	256.23	0.00	256.25	256.25	0.00	256.56	256.56	0.00
5114	255.57	255.57	0.00	256.04	256.04	0.00	256.00	256.00	0.00	256.30	256.30	0.00
5019	255.42	255.42	0.00	255.90	255.90	0.00	255.82	255.82	0.00	256.10	256.10	0.00
4939	255.29	255.29	0.00	255.78	255.78	0.00	255.64	255.64	0.00	255.91	255.91	0.00
4808	255.01	255.01	0.00	255.58	255.58	0.00	255.28	255.28	0.00	255.53	255.53	0.00
4738	254.81	254.81	0.00	255.45	255.45	0.00	254.95	254.95	0.00	255.20	255.20	0.00
4694	254.71	254.71	0.00	255.38	255.38	0.00	254.75	254.75	0.00	254.99	254.99	0.00
4554	254.55	254.55	0.00	255.27	255.27	0.00	254.30	254.30	0.00	254.51	254.51	0.00
4405	252.77	252.77	0.00	253.34	253.34	0.00	253.54	253.54	0.00	253.68	253.68	0.00
4303	252.54	252.54	0.00	252.89	252.89	0.00	253.08	253.08	0.00	253.49	253.49	0.00
4194	252.46	252.46	0.00	252.80	252.80	0.00	252.99	252.99	0.00	253.40	253.40	0.00
3930	252.28	252.28	0.00	252.60	252.60	0.00	252.78	252.78	0.00	253.19	253.19	0.00
3808	252.16	252.16	0.00	252.45	252.45	0.00	252.63	252.63	0.00	253.04	253.04	0.00
3654.35	251.77	251.77	0.00	251.97	251.97	0.00	252.17	252.17	0.00	252.64	252.64	0.00
3593.5	249.68	249.68	0.00	250.41	250.41	0.00	250.41	250.41	0.00	250.41	250.41	0.00
3532.7	248.57	248.57	0.00	248.84	248.82	-0.02	248.96	248.96	0.00	249.26	249.25	-0.01
3498	248.49	248.49	0.00	248.75	248.72	-0.03	248.86	248.86	0.00	249.15	249.15	0.00
3454			0.00			0.00			0.00			0.00
3396	247.86	247.87	0.01	248.06	248.04	-0.02	248.17	248.14	-0.03	248.43	248.41	-0.02
3291.4	247.73	247.73	0.00	247.92	247.89	-0.03	248.02	247.98	-0.04	248.28	248.25	-0.03
3186.81	247.64	247.64	0.00	247.81	247.77	-0.04	247.90	247.85	-0.05	248.16	248.11	-0.05
3135	247.46	247.35	-0.11	247.66	247.51	-0.15	247.76	247.65	-0.11	248.04	247.96	-0.08
2958.7	246.51	244.56	-1.95	246.79	245.10	-1.69	246.93	245.38	-1.55	247.28	245.93	-1.35
2782.4	245.34	243.36	-1.98	245.62	243.84	-1.78	245.76	244.08	-1.68	246.12	244.60	-1.52
2709	244.77	242.95	-1.82	244.98	243.39	-1.59	245.08	243.59	-1.49	245.37	244.11	-1.26
2566	244.12	242.81	-1.31	244.40	243.22	-1.18	244.54	243.40	-1.14	244.89	243.75	-1.14
2465	243.35	242.76	-0.59	243.60	243.16	-0.44	243.69	243.33	-0.36	244.11	243.68	-0.43
2258	243.33	242.66	-0.67	243.60	243.15	-0.45	243.69	243.32	-0.37	243.94	243.67	-0.27
2224			0.00			0.00			0.00			0.00

Appendix E - Detailed WSEL Comparison Along Trib 1, Existing vs Proposed Alt 1

Station	Existing 10-yr WSEL (ft)	Alt 1 (40') Prop 10-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 50-yr WSEL (ft)	Alt 1 (40') Prop 50-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 100-yr WSEL (ft)	Alt 1 (40') Prop 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing Atlas 14 100-yr WSEL (ft)	Alt 1 (40') Prop A14 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)
2181	241.64	241.66	0.02	241.84	241.90	0.06	241.96	242.04	0.08	242.09	242.27	0.18
2066	241.40	241.40	0.00	241.62	241.63	0.01	241.84	241.86	0.02	242.14	242.15	0.01
1943	240.65	240.67	0.02	241.27	241.29	0.02	241.61	241.64	0.03	241.89	241.89	0.00
1845	238.98	239.00	0.02	239.79	239.81	0.02	240.19	240.21	0.02	241.25	241.26	0.01
1740	237.31	237.35	0.04	238.13	238.17	0.04	238.53	238.57	0.04	239.55	239.56	0.01
1635	237.08	237.12	0.04	237.91	237.95	0.04	238.31	238.35	0.04	239.35	239.35	0.00
1568	236.91	236.95	0.04	237.71	237.76	0.05	238.11	238.15	0.04	239.15	239.15	0.00
1446	236.46	236.50	0.04	237.28	237.34	0.06	237.71	237.77	0.06	238.82	238.83	0.01
1388	235.93	235.98	0.05	236.79	236.85	0.06	237.22	237.28	0.06	238.37	238.37	0.00
1107	234.69	234.74	0.05	235.62	235.68	0.06	236.06	236.12	0.06	237.36	237.36	0.00
1067			0.00			0.00			0.00			0.00
1016	234.49	234.53	0.04	235.26	235.31	0.05	235.60	235.65	0.05	236.34	236.34	0.00
913	234.23	234.27	0.04	234.98	235.03	0.05	235.30	235.33	0.03	235.92	235.92	0.00
728	233.61	233.65	0.04	234.34	234.40	0.06	234.68	234.72	0.04	235.14	235.14	0.00
585	232.94	232.99	0.05	233.67	233.73	0.06	234.04	234.10	0.06	234.04	234.05	0.01
442	232.26	232.31	0.05	232.95	233.02	0.07	233.31	233.38	0.07	233.93	233.93	0.00
348	231.76	231.81	0.05	232.40	232.46	0.06	232.74	232.80	0.06	233.45	233.45	0.00
197	229.07	229.10	0.03	229.45	229.49	0.04	229.67	229.71	0.04	231.18	231.18	0.00

Appendix E - Detailed WSEL Comparison Along Trib 1, Existing vs Proposed Alt 2

Station	Existing 10-yr WSEL (ft)	Alt 2 Prop 10-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 50-yr WSEL (ft)	Alt 2 Prop 50-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 100-yr WSEL (ft)	Alt 2 Prop 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing Atlas 14 100-yr WSEL (ft)	Alt 2 Prop A14 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)
9237	269.54	269.54	0.00	270.40	270.40	0.00	270.46	270.46	0.00	270.60	270.60	0.00
9163	268.75	268.75	0.00	269.23	269.23	0.00	269.42	269.42	0.00	269.81	269.81	0.00
9126	268.69	268.69	0.00	269.17	269.17	0.00	269.36	269.36	0.00	269.75	269.75	0.00
9067	268.56	268.56	0.00	269.04	269.04	0.00	269.23	269.23	0.00	269.60	269.60	0.00
8988	268.41	268.41	0.00	268.90	268.90	0.00	269.08	269.08	0.00	269.45	269.45	0.00
8896	268.27	268.27	0.00	268.76	268.76	0.00	268.94	268.94	0.00	269.30	269.30	0.00
8854	268.16	268.16	0.00	268.65	268.65	0.00	268.83	268.83	0.00	269.18	269.18	0.00
8790	268.00	268.00	0.00	268.50	268.50	0.00	268.67	268.67	0.00	269.02	269.02	0.00
8689	267.69	267.69	0.00	268.25	268.25	0.00	268.41	268.41	0.00	268.75	268.75	0.00
8636	267.54	267.54	0.00	268.13	268.13	0.00	268.28	268.28	0.00	268.61	268.61	0.00
8556	267.26	267.26	0.00	267.94	267.94	0.00	268.08	268.08	0.00	268.40	268.40	0.00
8492	267.02	267.02	0.00	267.79	267.79	0.00	267.93	267.93	0.00	268.23	268.23	0.00
8442	266.64	266.64	0.00	267.56	267.56	0.00	267.68	267.68	0.00	268.00	268.00	0.00
8381	266.19	266.19	0.00	266.69	266.69	0.00	267.14	267.14	0.00	267.59	267.59	0.00
8329	266.00	266.00	0.00	266.48	266.48	0.00	266.70	266.70	0.00	267.30	267.30	0.00
8267	265.85	265.85	0.00	266.32	266.32	0.00	266.53	266.53	0.00	267.06	267.06	0.00
8201	265.69	265.69	0.00	266.14	266.14	0.00	266.33	266.33	0.00	266.73	266.73	0.00
8148	265.57	265.57	0.00	266.00	266.00	0.00	266.19	266.19	0.00	266.55	266.55	0.00
8116	265.51	265.51	0.00	265.94	265.94	0.00	266.13	266.13	0.00	266.48	266.48	0.00
8079	265.43	265.43	0.00	265.85	265.85	0.00	266.03	266.03	0.00	266.39	266.39	0.00
8027	265.31	265.31	0.00	265.72	265.72	0.00	265.89	265.89	0.00	266.22	266.22	0.00
7977	265.14	265.14	0.00	265.52	265.52	0.00	265.68	265.68	0.00	266.00	266.00	0.00
7925	264.93	264.93	0.00	265.28	265.28	0.00	265.44	265.44	0.00	265.73	265.73	0.00
7851	264.77	264.77	0.00	265.12	265.12	0.00	265.26	265.26	0.00	265.54	265.54	0.00
7803	264.70	264.70	0.00	265.05	265.05	0.00	265.19	265.19	0.00	265.47	265.47	0.00
7688	264.53	264.53	0.00	264.89	264.89	0.00	265.04	265.04	0.00	265.31	265.31	0.00
7637	264.45	264.45	0.00	264.82	264.82	0.00	264.97	264.97	0.00	265.24	265.24	0.00
7588	264.38	264.38	0.00	264.76	264.76	0.00	264.91	264.91	0.00	265.18	265.18	0.00
7494	263.97	263.97	0.00	264.48	264.48	0.00	264.64	264.64	0.00	264.92	264.92	0.00
7365	262.95	262.95	0.00	263.48	263.48	0.00	263.72	263.72	0.00	264.12	264.12	0.00
7293	262.67	262.67	0.00	263.17	263.17	0.00	263.38	263.38	0.00	263.81	263.81	0.00
7206	262.33	262.33	0.00	262.74	262.74	0.00	262.92	262.92	0.00	263.28	263.28	0.00
7163	262.19	262.19	0.00	262.60	262.60	0.00	262.77	262.77	0.00	263.11	263.11	0.00
7115	262.01	262.01	0.00	262.37	262.37	0.00	262.53	262.53	0.00	262.84	262.84	0.00
7052	261.92	261.92	0.00	262.26	262.26	0.00	262.41	262.41	0.00	262.71	262.71	0.00
6989	261.79	261.79	0.00	262.12	262.12	0.00	262.25	262.25	0.00	262.53	262.53	0.00
6914	261.72	261.72	0.00	262.04	262.04	0.00	262.16	262.16	0.00	262.44	262.44	0.00
6847	261.66	261.66	0.00	261.96	261.96	0.00	262.09	262.09	0.00	262.35	262.35	0.00
6756	261.58	261.58	0.00	261.88	261.88	0.00	261.99	261.99	0.00	262.25	262.25	0.00
6663	261.46	261.46	0.00	261.73	261.73	0.00	261.83	261.83	0.00	262.08	262.08	0.00
6582	261.24	261.24	0.00	261.48	261.48	0.00	261.57	261.57	0.00	261.79	261.79	0.00
6523	261.07	261.07	0.00	261.29	261.29	0.00	261.35	261.35	0.00	261.55	261.55	0.00
6462	260.97	260.97	0.00	261.18	261.18	0.00	261.23	261.23	0.00	261.43	261.43	0.00

Appendix E - Detailed WSEL Comparison Along Trib 1, Existing vs Proposed Alt 2

Station	Existing 10-yr WSEL (ft)	Alt 2 Prop 10-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 50-yr WSEL (ft)	Alt 2 Prop 50-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 100-yr WSEL (ft)	Alt 2 Prop 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing Atlas 14 100-yr WSEL (ft)	Alt 2 Prop A14 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)
6391	260.39	260.39	0.00	260.48	260.48	0.00	260.69	260.69	0.00	261.05	261.05	0.00
6337	259.96	259.96	0.00	260.25	260.25	0.00	260.44	260.44	0.00	260.84	260.84	0.00
6240	258.53	258.53	0.00	258.75	258.75	0.00	258.82	258.82	0.00	258.89	258.89	0.00
6168	258.62	258.62	0.00	258.98	258.98	0.00	259.15	259.15	0.00	259.48	259.48	0.00
6073	258.50	258.50	0.00	258.87	258.87	0.00	259.03	259.03	0.00	259.36	259.36	0.00
6008	258.41	258.41	0.00	258.78	258.78	0.00	258.94	258.94	0.00	259.27	259.27	0.00
5887	258.10	258.10	0.00	258.49	258.49	0.00	258.66	258.66	0.00	259.00	259.00	0.00
5802	257.98	257.98	0.00	258.37	258.37	0.00	258.54	258.54	0.00	258.87	258.87	0.00
5713	257.91	257.91	0.00	258.29	258.29	0.00	258.45	258.45	0.00	258.77	258.77	0.00
5582	257.80	257.80	0.00	258.16	258.16	0.00	258.31	258.31	0.00	258.62	258.62	0.00
5507	257.66	257.66	0.00	258.02	258.02	0.00	258.17	258.17	0.00	258.48	258.48	0.00
5429	257.24	257.24	0.00	257.66	257.66	0.00	257.82	257.82	0.00	258.16	258.16	0.00
5319	256.51	256.51	0.00	257.04	257.04	0.00	257.21	257.21	0.00	257.63	257.63	0.00
5281	256.00	256.00	0.00	256.44	256.44	0.00	256.51	256.51	0.00	256.82	256.82	0.00
5206	255.77	255.77	0.00	256.23	256.23	0.00	256.25	256.25	0.00	256.56	256.56	0.00
5114	255.57	255.57	0.00	256.04	256.04	0.00	256.00	256.00	0.00	256.30	256.30	0.00
5019	255.42	255.42	0.00	255.90	255.90	0.00	255.82	255.82	0.00	256.10	256.10	0.00
4939	255.29	255.29	0.00	255.78	255.78	0.00	255.64	255.64	0.00	255.91	255.91	0.00
4808	255.01	255.01	0.00	255.58	255.58	0.00	255.28	255.28	0.00	255.53	255.53	0.00
4738	254.81	254.81	0.00	255.45	255.45	0.00	254.95	254.95	0.00	255.20	255.20	0.00
4694	254.71	254.71	0.00	255.38	255.38	0.00	254.75	254.75	0.00	254.99	254.99	0.00
4554	254.55	254.55	0.00	255.27	255.27	0.00	254.30	254.30	0.00	254.51	254.51	0.00
4405	252.77	252.77	0.00	253.34	253.34	0.00	253.54	253.54	0.00	253.68	253.68	0.00
4303	252.54	252.54	0.00	252.89	252.89	0.00	253.08	253.08	0.00	253.49	253.49	0.00
4194	252.46	252.46	0.00	252.80	252.80	0.00	252.99	252.99	0.00	253.40	253.40	0.00
3930	252.28	252.28	0.00	252.60	252.60	0.00	252.78	252.78	0.00	253.19	253.19	0.00
3808	252.16	252.16	0.00	252.45	252.45	0.00	252.63	252.63	0.00	253.04	253.04	0.00
3654.35	251.77	251.77	0.00	251.97	251.97	0.00	252.17	252.17	0.00	252.64	252.64	0.00
3593.5	249.68	249.68	0.00	250.41	250.41	0.00	250.41	250.41	0.00	250.41	250.41	0.00
3532.7	248.57	248.57	0.00	248.84	248.82	-0.02	248.96	248.96	0.00	249.26	249.26	0.00
3498	248.49	248.49	0.00	248.75	248.72	-0.03	248.86	248.86	0.00	249.15	249.16	0.01
3454			0.00			0.00			0.00			0.00
3396	247.86	247.87	0.01	248.06	248.04	-0.02	248.17	248.14	-0.03	248.43	248.41	-0.02
3291.4	247.73	247.73	0.00	247.92	247.89	-0.03	248.02	247.98	-0.04	248.28	248.24	-0.04
3186.81	247.64	247.64	0.00	247.81	247.77	-0.04	247.90	247.85	-0.05	248.16	248.11	-0.05
3135	247.46	247.35	-0.11	247.66	247.51	-0.15	247.76	247.65	-0.11	248.04	247.96	-0.08
2958.7	246.51	244.59	-1.92	246.79	245.11	-1.68	246.93	245.38	-1.55	247.28	245.95	-1.33
2782.4	245.34	243.22	-2.12	245.62	243.76	-1.86	245.76	244.01	-1.75	246.12	244.57	-1.55
2709	244.77	242.61	-2.16	244.98	243.20	-1.78	245.08	243.43	-1.65	245.37	243.94	-1.43
2566	244.12	242.33	-1.79	244.40	242.97	-1.43	244.54	243.20	-1.34	244.89	243.63	-1.26
2465	243.35	242.24	-1.11	243.60	242.89	-0.71	243.69	243.11	-0.58	244.11	243.52	-0.59
2258	243.33	242.16	-1.17	243.60	242.87	-0.73	243.69	243.10	-0.59	243.94	243.50	-0.44
2224			0.00			0.00			0.00			0.00

Appendix E - Detailed WSEL Comparison Along Trib 1, Existing vs Proposed Alt 2

Station	Existing 10-yr WSEL (ft)	Alt 2 Prop 10-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 50-yr WSEL (ft)	Alt 2 Prop 50-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 100-yr WSEL (ft)	Alt 2 Prop 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing Atlas 14 100-yr WSEL (ft)	Alt 2 Prop A14 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)
2181	241.64	241.66	0.02	241.84	241.91	0.07	241.96	242.08	0.12	242.09	242.34	0.25
2066	241.40	241.40	0.00	241.62	241.63	0.01	241.84	241.87	0.03	242.14	242.15	0.01
1943	240.65	240.67	0.02	241.27	241.29	0.02	241.61	241.64	0.03	241.89	241.89	0.00
1845	238.98	239.00	0.02	239.79	239.82	0.03	240.19	240.22	0.03	241.25	241.26	0.01
1740	237.31	237.34	0.03	238.13	238.18	0.05	238.53	238.58	0.05	239.55	239.56	0.01
1635	237.08	237.11	0.03	237.91	237.96	0.05	238.31	238.36	0.05	239.35	239.35	0.00
1568	236.91	236.95	0.04	237.71	237.76	0.05	238.11	238.16	0.05	239.15	239.15	0.00
1446	236.46	236.50	0.04	237.28	237.35	0.07	237.71	237.78	0.07	238.82	238.83	0.01
1388	235.93	235.97	0.04	236.79	236.85	0.06	237.22	237.29	0.07	238.37	238.38	0.01
1107	234.69	234.74	0.05	235.62	235.69	0.07	236.06	236.13	0.07	237.36	237.37	0.01
1067			0.00			0.00			0.00			0.00
1016	234.49	234.53	0.04	235.26	235.32	0.06	235.60	235.65	0.05	236.34	236.34	0.00
913	234.23	234.27	0.04	234.98	235.03	0.05	235.30	235.34	0.04	235.92	235.93	0.01
728	233.61	233.65	0.04	234.34	234.40	0.06	234.68	234.72	0.04	235.14	235.14	0.00
585	232.94	232.99	0.05	233.67	233.74	0.07	234.04	234.11	0.07	234.04	234.05	0.01
442	232.26	232.31	0.05	232.95	233.02	0.07	233.31	233.40	0.09	233.93	233.94	0.01
348	231.76	231.80	0.04	232.40	232.47	0.07	232.74	232.82	0.08	233.45	233.45	0.00
197	229.07	229.10	0.03	229.45	229.50	0.05	229.67	229.72	0.05	231.18	231.17	-0.01

Appendix E - Detailed WSEL Comparison Along Trib 1, Existing vs Proposed Alt 3

Station	Existing 2-yr WSEL (ft)	Alt 3 Prop 2-yr WSEL (ft)	Difference (Alt1-Ex) (ft)	Existing 10-yr WSEL (ft)	Alt 3 Prop 10-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 50-yr WSEL (ft)	Alt 3 Prop 50-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 100-yr WSEL (ft)	Alt 3 Prop 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing Atlas 14 100-yr WSEL (ft)	Alt 3 Prop A14 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)
9237	268.80	268.80	0.00	269.54	269.54	0.00	270.40	270.40	0.00	270.46	270.46	0.00	270.60	270.60	0.00
9163	268.02	268.02	0.00	268.75	268.75	0.00	269.23	269.23	0.00	269.42	269.42	0.00	269.81	269.81	0.00
9126	267.95	267.95	0.00	268.69	268.69	0.00	269.17	269.17	0.00	269.36	269.36	0.00	269.75	269.75	0.00
9067	267.83	267.83	0.00	268.56	268.56	0.00	269.04	269.04	0.00	269.23	269.23	0.00	269.60	269.60	0.00
8988	267.65	267.65	0.00	268.41	268.41	0.00	268.90	268.90	0.00	269.08	269.08	0.00	269.45	269.45	0.00
8896	267.46	267.46	0.00	268.27	268.27	0.00	268.76	268.76	0.00	268.94	268.94	0.00	269.30	269.30	0.00
8854	267.32	267.32	0.00	268.16	268.16	0.00	268.65	268.65	0.00	268.83	268.83	0.00	269.18	269.18	0.00
8790	267.04	267.04	0.00	268.00	268.00	0.00	268.50	268.50	0.00	268.67	268.67	0.00	269.02	269.02	0.00
8689	266.62	266.62	0.00	267.69	267.69	0.00	268.25	268.25	0.00	268.41	268.41	0.00	268.75	268.75	0.00
8636	266.48	266.48	0.00	267.54	267.54	0.00	268.13	268.13	0.00	268.28	268.28	0.00	268.61	268.61	0.00
8556	266.17	266.17	0.00	267.26	267.26	0.00	267.94	267.94	0.00	268.08	268.08	0.00	268.40	268.40	0.00
8492	266.02	266.02	0.00	267.02	267.02	0.00	267.79	267.79	0.00	267.93	267.93	0.00	268.23	268.23	0.00
8442	265.76	265.76	0.00	266.64	266.64	0.00	267.56	267.56	0.00	267.68	267.68	0.00	268.00	268.00	0.00
8381	265.44	265.44	0.00	266.19	266.19	0.00	266.69	266.69	0.00	267.14	267.14	0.00	267.59	267.59	0.00
8329	265.29	265.29	0.00	266.00	266.00	0.00	266.48	266.48	0.00	266.70	266.70	0.00	267.30	267.30	0.00
8267	265.16	265.16	0.00	265.85	265.85	0.00	266.32	266.32	0.00	266.53	266.53	0.00	267.06	267.06	0.00
8201	265.03	265.03	0.00	265.69	265.69	0.00	266.14	266.14	0.00	266.33	266.33	0.00	266.73	266.73	0.00
8148	264.92	264.92	0.00	265.57	265.57	0.00	266.00	266.00	0.00	266.19	266.19	0.00	266.55	266.55	0.00
8116	264.87	264.87	0.00	265.51	265.51	0.00	265.94	265.94	0.00	266.13	266.13	0.00	266.48	266.48	0.00
8079	264.80	264.80	0.00	265.43	265.43	0.00	265.85	265.85	0.00	266.03	266.03	0.00	266.39	266.39	0.00
8027	264.70	264.70	0.00	265.31	265.31	0.00	265.72	265.72	0.00	265.89	265.89	0.00	266.22	266.22	0.00
7977	264.56	264.56	0.00	265.14	265.14	0.00	265.52	265.52	0.00	265.68	265.68	0.00	266.00	266.00	0.00
7925	264.39	264.39	0.00	264.93	264.93	0.00	265.28	265.28	0.00	265.44	265.44	0.00	265.73	265.73	0.00
7851	264.24	264.24	0.00	264.77	264.77	0.00	265.12	265.12	0.00	265.26	265.26	0.00	265.54	265.54	0.00
7803	264.17	264.17	0.00	264.70	264.70	0.00	265.05	265.05	0.00	265.19	265.19	0.00	265.47	265.47	0.00
7688	263.93	263.93	0.00	264.53	264.53	0.00	264.89	264.89	0.00	265.04	265.04	0.00	265.31	265.31	0.00
7637	263.79	263.79	0.00	264.45	264.45	0.00	264.82	264.82	0.00	264.97	264.97	0.00	265.24	265.24	0.00
7588	263.60	263.60	0.00	264.38	264.38	0.00	264.76	264.76	0.00	264.91	264.91	0.00	265.18	265.18	0.00
7494	262.98	262.98	0.00	263.97	263.97	0.00	264.48	264.48	0.00	264.64	264.64	0.00	264.92	264.92	0.00
7365	262.16	262.16	0.00	262.95	262.95	0.00	263.48	263.48	0.00	263.72	263.72	0.00	264.12	264.12	0.00
7293	261.93	261.93	0.00	262.67	262.67	0.00	263.17	263.17	0.00	263.38	263.38	0.00	263.81	263.81	0.00
7206	261.69	261.69	0.00	262.33	262.33	0.00	262.74	262.74	0.00	262.92	262.92	0.00	263.28	263.28	0.00
7163	261.58	261.58	0.00	262.19	262.19	0.00	262.60	262.60	0.00	262.77	262.77	0.00	263.11	263.11	0.00
7115	261.44	261.44	0.00	262.01	262.01	0.00	262.37	262.37	0.00	262.53	262.53	0.00	262.84	262.84	0.00
7052	261.37	261.37	0.00	261.92	261.92	0.00	262.26	262.26	0.00	262.41	262.41	0.00	262.71	262.71	0.00
6989	261.27	261.27	0.00	261.79	261.79	0.00	262.12	262.12	0.00	262.25	262.25	0.00	262.53	262.53	0.00
6914	261.21	261.21	0.00	261.72	261.72	0.00	262.04	262.04	0.00	262.16	262.16	0.00	262.44	262.44	0.00
6847	261.16	261.16	0.00	261.66	261.66	0.00	261.96	261.96	0.00	262.09	262.09	0.00	262.35	262.35	0.00
6756	261.09	261.09	0.00	261.58	261.58	0.00	261.88	261.88	0.00	261.99	261.99	0.00	262.25	262.25	0.00
6663	260.97	260.97	0.00	261.46	261.46	0.00	261.73	261.73	0.00	261.83	261.83	0.00	262.08	262.08	0.00
6582	260.74	260.74	0.00	261.24	261.24	0.00	261.48	261.48	0.00	261.57	261.57	0.00	261.79	261.79	0.00
6523	260.55	260.55	0.00	261.07	261.07	0.00	261.29	261.29	0.00	261.35	261.35	0.00	261.55	261.55	0.00
6462	260.21	260.21	0.00	260.97	260.97	0.00	261.18	261.18	0.00	261.23	261.23	0.00	261.43	261.43	0.00

Appendix E - Detailed WSEL Comparison Along Trib 1, Existing vs Proposed Alt 3

Station	Existing 2-yr WSEL (ft)	Alt 3 Prop 2-yr WSEL (ft)	Difference (Alt1-Ex) (ft)	Existing 10-yr WSEL (ft)	Alt 3 Prop 10-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 50-yr WSEL (ft)	Alt 3 Prop 50-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 100-yr WSEL (ft)	Alt 3 Prop 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing Atlas 14 100-yr WSEL (ft)	Alt 3 Prop A14 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)
6391	259.29	259.29	0.00	260.39	260.39	0.00	260.48	260.48	0.00	260.69	260.69	0.00	261.05	261.05	0.00
6337	259.03	259.03	0.00	259.96	259.96	0.00	260.25	260.25	0.00	260.44	260.44	0.00	260.84	260.84	0.00
6240	258.15	258.15	0.00	258.53	258.53	0.00	258.75	258.75	0.00	258.82	258.82	0.00	258.89	258.89	0.00
6168	258.11	258.11	0.00	258.62	258.62	0.00	258.98	258.98	0.00	259.15	259.15	0.00	259.48	259.48	0.00
6073	258.00	258.00	0.00	258.50	258.50	0.00	258.87	258.87	0.00	259.03	259.03	0.00	259.36	259.36	0.00
6008	257.90	257.90	0.00	258.41	258.41	0.00	258.78	258.78	0.00	258.94	258.94	0.00	259.27	259.27	0.00
5887	257.55	257.55	0.00	258.10	258.10	0.00	258.49	258.49	0.00	258.66	258.66	0.00	259.00	259.00	0.00
5802	257.45	257.45	0.00	257.98	257.98	0.00	258.37	258.37	0.00	258.54	258.54	0.00	258.87	258.87	0.00
5713	257.40	257.40	0.00	257.91	257.91	0.00	258.29	258.29	0.00	258.45	258.45	0.00	258.77	258.77	0.00
5582	257.31	257.31	0.00	257.80	257.80	0.00	258.16	258.16	0.00	258.31	258.31	0.00	258.62	258.62	0.00
5507	257.19	257.19	0.00	257.66	257.66	0.00	258.02	258.02	0.00	258.17	258.17	0.00	258.48	258.48	0.00
5429	256.42	256.42	0.00	257.24	257.24	0.00	257.66	257.66	0.00	257.82	257.82	0.00	258.16	258.16	0.00
5319	255.77	255.77	0.00	256.51	256.51	0.00	257.04	257.04	0.00	257.21	257.21	0.00	257.63	257.63	0.00
5281	255.42	255.42	0.00	256.00	256.00	0.00	256.44	256.44	0.00	256.51	256.51	0.00	256.82	256.82	0.00
5206	255.21	255.21	0.00	255.77	255.77	0.00	256.23	256.23	0.00	256.25	256.25	0.00	256.56	256.56	0.00
5114	255.03	255.03	0.00	255.57	255.57	0.00	256.04	256.04	0.00	256.00	256.00	0.00	256.30	256.30	0.00
5019	254.89	254.89	0.00	255.42	255.42	0.00	255.90	255.90	0.00	255.82	255.82	0.00	256.10	256.10	0.00
4939	254.76	254.76	0.00	255.29	255.29	0.00	255.78	255.78	0.00	255.64	255.64	0.00	255.91	255.91	0.00
4808	254.45	254.45	0.00	255.01	255.01	0.00	255.58	255.58	0.00	255.28	255.28	0.00	255.53	255.53	0.00
4738	254.12	254.12	0.00	254.81	254.81	0.00	255.45	255.45	0.00	254.95	254.95	0.00	255.20	255.20	0.00
4694	253.95	253.95	0.00	254.71	254.71	0.00	255.38	255.38	0.00	254.75	254.75	0.00	254.99	254.99	0.00
4554	253.66	253.66	0.00	254.55	254.55	0.00	255.27	255.27	0.00	254.30	254.30	0.00	254.51	254.51	0.00
4405	251.91	251.91	0.00	252.77	252.77	0.00	253.34	253.34	0.00	253.54	253.54	0.00	253.68	253.68	0.00
4303	251.92	251.92	0.00	252.54	252.54	0.00	252.89	252.89	0.00	253.08	253.08	0.00	253.49	253.49	0.00
4194	251.85	251.85	0.00	252.46	252.46	0.00	252.80	252.80	0.00	252.99	252.99	0.00	253.40	253.40	0.00
3930	251.69	251.69	0.00	252.28	252.28	0.00	252.60	252.60	0.00	252.78	252.78	0.00	253.19	253.19	0.00
3808	251.58	251.58	0.00	252.16	252.16	0.00	252.45	252.45	0.00	252.63	252.63	0.00	253.04	253.04	0.00
3654.35	251.08	251.08	0.00	251.77	251.77	0.00	251.97	251.97	0.00	252.17	252.17	0.00	252.64	252.64	0.00
3593.5	248.81	248.81	0.00	249.68	249.68	0.00	250.41	250.41	0.00	250.41	250.41	0.00	250.41	250.41	0.00
3532.7	248.18	248.18	0.00	248.57	248.57	0.00	248.84	248.84	0.00	248.96	248.96	0.00	249.26	249.26	0.00
3498	248.11	248.12	0.01	248.49	248.49	0.00	248.75	248.75	0.00	248.86	248.87	0.01	249.15	249.16	0.01
3454			0.00			0.00			0.00			0.00			0.00
3396	247.61	247.62	0.01	247.86	247.88	0.02	248.06	248.09	0.03	248.17	248.19	0.02	248.43	248.43	0.00
3291.4	247.50	247.53	0.03	247.73	247.76	0.03	247.92	247.96	0.04	248.02	248.05	0.03	248.28	248.28	0.00
3186.81	247.44	247.47	0.03	247.64	247.67	0.03	247.81	247.86	0.05	247.90	247.94	0.04	248.16	248.15	-0.01
3135	247.20	247.39	0.19	247.46	247.56	0.10	247.66	247.75	0.09	247.76	247.83	0.07	248.04	248.02	-0.02
2958.7	246.15	244.96	-1.19	246.51	246.06	-0.45	246.79	246.18	-0.61	246.93	246.28	-0.65	247.28	246.69	-0.59
2782.4	244.94	242.61	-2.33	245.34	243.47	-1.87	245.62	243.92	-1.70	245.76	244.14	-1.62	246.12	244.61	-1.51
2709	244.21	242.17	-2.04	244.77	243.15	-1.62	244.98	243.52	-1.46	245.08	243.69	-1.39	245.37	244.15	-1.22
2566	243.47	242.01	-1.46	244.12	243.04	-1.08	244.40	243.38	-1.02	244.54	243.52	-1.02	244.89	243.84	-1.05
2465	243.00	241.97	-1.03	243.35	243.00	-0.35	243.60	243.33	-0.27	243.69	243.46	-0.23	244.11	243.75	-0.36
2258	242.99	241.90	-1.09	243.33	243.00	-0.33	243.60	243.32	-0.28	243.69	243.45	-0.24	243.94	243.73	-0.21
2224			0.00			0.00			0.00			0.00			0.00

Appendix E - Detailed WSEL Comparison Along Trib 1, Existing vs Proposed Alt 3

Station	Existing 2-yr WSEL (ft)	Alt 3 Prop 2-yr WSEL (ft)	Difference (Alt1-Ex) (ft)	Existing 10-yr WSEL (ft)	Alt 3 Prop 10-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 50-yr WSEL (ft)	Alt 3 Prop 50-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing 100-yr WSEL (ft)	Alt 3 Prop 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)	Existing Atlas 14 100-yr WSEL (ft)	Alt 3 Prop A14 100-yr WSEL (ft)	Difference (Prop-Ex) (ft)
2181	241.26	241.25	-0.01	241.64	241.66	0.02	241.84	241.90	0.06	241.96	242.04	0.08	242.09	242.27	0.18
2066	240.64	240.66	0.02	241.40	241.40	0.00	241.62	241.63	0.01	241.84	241.86	0.02	242.14	242.15	0.01
1943	239.26	239.29	0.03	240.65	240.67	0.02	241.27	241.29	0.02	241.61	241.63	0.02	241.89	241.89	0.00
1845	237.74	237.76	0.02	238.98	239.01	0.03	239.79	239.82	0.03	240.19	240.21	0.02	241.25	241.26	0.01
1740	236.17	236.20	0.03	237.31	237.35	0.04	238.13	238.18	0.05	238.53	238.56	0.03	239.55	239.56	0.01
1635	235.98	236.01	0.03	237.08	237.12	0.04	237.91	237.95	0.04	238.31	238.34	0.03	239.35	239.36	0.01
1568	235.87	235.90	0.03	236.91	236.95	0.04	237.71	237.76	0.05	238.11	238.14	0.03	239.15	239.15	0.00
1446	235.45	235.49	0.04	236.46	236.51	0.05	237.28	237.34	0.06	237.71	237.76	0.05	238.82	238.83	0.01
1388	234.74	234.79	0.05	235.93	235.98	0.05	236.79	236.85	0.06	237.22	237.27	0.05	238.37	238.38	0.01
1107	233.27	233.32	0.05	234.69	234.75	0.06	235.62	235.68	0.06	236.06	236.11	0.05	237.36	237.37	0.01
1067			0.00			0.00			0.00			0.00			0.00
1016	233.19	233.24	0.05	234.49	234.54	0.05	235.26	235.31	0.05	235.60	235.64	0.04	236.34	236.34	0.00
913	233.04	233.08	0.04	234.23	234.28	0.05	234.98	235.03	0.05	235.30	235.33	0.03	235.92	235.93	0.01
728	232.61	232.65	0.04	233.61	233.66	0.05	234.34	234.40	0.06	234.68	234.71	0.03	235.14	235.14	0.00
585	231.96	232.01	0.05	232.94	232.99	0.05	233.67	233.73	0.06	234.04	234.08	0.04	234.04	234.06	0.02
442	231.36	231.41	0.05	232.26	232.32	0.06	232.95	233.02	0.07	233.31	233.36	0.05	233.93	233.94	0.01
348	230.94	230.98	0.04	231.76	231.81	0.05	232.40	232.46	0.06	232.74	232.79	0.05	233.45	233.46	0.01
197	228.61	228.63	0.02	229.07	229.10	0.03	229.45	229.50	0.05	229.67	229.70	0.03	231.18	231.17	-0.01

Appendix F

Proposed Alternative 1 and 2 HEC-RAS Output

HEC-RAS Plan: P_Alt1_40ft

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)	
Trib1	9237	10-yr	536.90	266.30	269.54	269.54	270.61	0.121350	8.3	64.64	30.58	1.01
Trib1	9237	50-yr	718.40	266.30	270.40	270.40	270.72	0.035213	5.4	254.99	399.46	0.57
Trib1	9237	100-yr	808.30	266.30	270.46	270.46	270.79	0.037260	5.6	278.24	399.59	0.59
Trib1	9237	Atlas 14 100-yr	1001.70	266.30	270.60	270.60	270.93	0.038000	5.9	333.97	399.89	0.60
Trib1	9163	10-yr	536.90	262.50	268.75		268.79	0.003365	2.3	372.60	154.52	0.18
Trib1	9163	50-yr	718.40	262.50	269.23		269.28	0.003482	2.5	447.80	155.61	0.19
Trib1	9163	100-yr	808.30	262.50	269.42		269.48	0.003620	2.6	478.00	156.15	0.19
Trib1	9163	Atlas 14 100-yr	1001.70	262.50	269.81		269.88	0.003921	2.8	538.90	159.79	0.20
Trib1	9126	10-yr	536.90	260.11	268.69		268.71	0.001442	1.6	580.03	248.03	0.12
Trib1	9126	50-yr	718.40	260.11	269.17		269.19	0.001472	1.7	700.88	249.00	0.12
Trib1	9126	100-yr	808.30	260.11	269.36		269.39	0.001524	1.7	748.91	249.39	0.12
Trib1	9126	Atlas 14 100-yr	1001.70	260.11	269.75		269.78	0.001617	1.9	845.03	250.16	0.13
Trib1	9067	10-yr	536.90	260.11	268.56		268.60	0.002543	2.0	425.91	184.25	0.15
Trib1	9067	50-yr	718.40	260.11	269.04		269.08	0.002635	2.2	514.88	185.21	0.16
Trib1	9067	100-yr	808.30	260.11	269.23		269.27	0.002752	2.3	549.51	185.59	0.16
Trib1	9067	Atlas 14 100-yr	1001.70	260.11	269.60		269.66	0.002958	2.5	619.02	186.33	0.17
Trib1	8988	10-yr	536.90	260.11	268.41	265.52	268.43	0.001729	1.7	573.76	283.34	0.13
Trib1	8988	50-yr	718.40	260.11	268.90	266.17	268.92	0.001641	1.7	711.93	284.35	0.13
Trib1	8988	100-yr	808.30	260.11	269.08	267.05	269.10	0.001679	1.8	764.05	284.73	0.13
Trib1	8988	Atlas 14 100-yr	1001.70	260.11	269.45	266.84	269.47	0.001739	1.9	869.04	285.49	0.13
Trib1	8896	10-yr	536.90	260.11	268.27	265.21	268.29	0.001740	1.7	553.07	252.25	0.13
Trib1	8896	50-yr	718.40	260.11	268.76	265.94	268.79	0.001708	1.8	677.48	253.22	0.13
Trib1	8896	100-yr	808.30	260.11	268.94	266.26	268.97	0.001777	1.8	722.82	253.57	0.13
Trib1	8896	Atlas 14 100-yr	1001.70	260.11	269.30	266.84	269.33	0.001894	2.0	814.50	254.30	0.14
Trib1	8854	10-yr	536.90	260.11	268.16	265.10	268.20	0.002569	2.0	451.82	225.96	0.16
Trib1	8854	50-yr	718.40	260.11	268.65	265.70	268.69	0.002467	2.1	564.12	227.82	0.16
Trib1	8854	100-yr	808.30	260.11	268.83	265.97	268.87	0.002563	2.1	603.87	228.37	0.16
Trib1	8854	Atlas 14 100-yr	1001.70	260.11	269.18	266.84	269.23	0.002718	2.3	684.69	229.67	0.17
Trib1	8790	10-yr	536.90	260.11	268.00	263.98	268.04	0.002768	2.2	443.24	239.39	0.15
Trib1	8790	50-yr	718.40	260.11	268.50	264.76	268.54	0.002576	2.2	565.24	240.38	0.15
Trib1	8790	100-yr	808.30	260.11	268.67	265.12	268.72	0.002679	2.3	605.98	240.71	0.15
Trib1	8790	Atlas 14 100-yr	1001.70	260.11	269.02	265.81	269.07	0.002835	2.4	689.36	241.54	0.16
Trib1	8689	10-yr	536.90	260.11	267.69		267.74	0.003070	2.6	453.20	272.94	0.18
Trib1	8689	50-yr	718.40	260.11	268.25		268.29	0.002479	2.4	605.46	274.02	0.16
Trib1	8689	100-yr	808.30	260.11	268.41		268.45	0.002562	2.5	649.65	274.33	0.17
Trib1	8689	Atlas 14 100-yr	1001.70	260.11	268.75		268.79	0.002663	2.6	741.68	274.97	0.17
Trib1	8636	10-yr	536.90	260.11	267.54		267.59	0.003233	2.5	431.70	245.08	0.18
Trib1	8636	50-yr	718.40	260.11	268.13		268.16	0.002613	2.4	574.97	246.18	0.16
Trib1	8636	100-yr	808.30	260.11	268.28		268.32	0.002746	2.5	613.10	246.47	0.17
Trib1	8636	Atlas 14 100-yr	1001.70	260.11	268.61		268.65	0.002930	2.7	693.47	247.14	0.17
Trib1	8556	10-yr	536.90	260.11	267.26	264.39	267.32	0.003488	2.7	428.95	328.02	0.19
Trib1	8556	50-yr	718.40	260.11	267.94	264.82	267.98	0.002205	2.3	652.59	330.61	0.16
Trib1	8556	100-yr	808.30	260.11	268.08	265.01	268.12	0.002301	2.4	701.04	331.99	0.16
Trib1	8556	Atlas 14 100-yr	1001.70	260.11	268.40	265.40	268.44	0.002383	2.5	806.64	332.93	0.17
Trib1	8492	10-yr	536.90	260.11	267.02		267.11	0.003385	2.7	353.20	288.25	0.19
Trib1	8492	50-yr	718.40	260.11	267.79		267.84	0.002240	2.4	574.84	291.15	0.16
Trib1	8492	100-yr	808.30	260.11	267.93		267.98	0.002411	2.5	614.63	291.45	0.17
Trib1	8492	Atlas 14 100-yr	1001.70	260.11	268.23		268.29	0.002621	2.7	704.24	292.12	0.18
Trib1	8442	10-yr	536.90	260.11	266.64		266.84	0.008649	4.0	167.80	43.13	0.30
Trib1	8442	50-yr	718.40	260.11	267.56		267.67	0.005397	3.5	443.56	310.94	0.24
Trib1	8442	100-yr	808.30	260.11	267.68		267.80	0.005583	3.6	483.62	311.19	0.25
Trib1	8442	Atlas 14 100-yr	1001.70	260.11	268.00		268.10	0.005428	3.7	580.79	311.80	0.25
Trib1	8381	10-yr	536.90	259.83	266.19		266.36	0.007537	3.7	180.65	48.92	0.28
Trib1	8381	50-yr	718.40	259.83	266.69	264.41	267.13	0.015399	5.6	210.91	332.74	0.40
Trib1	8381	100-yr	808.30	259.83	267.14		267.38	0.009380	4.6	361.32	333.66	0.32
Trib1	8381	Atlas 14 100-yr	1001.70	259.83	267.59		267.75	0.007084	4.2	511.92	334.58	0.28
Trib1	8329	10-yr	536.90	257.36	266.00	264.04	266.05	0.003625	2.4	318.91	109.23	0.18
Trib1	8329	50-yr	718.40	257.36	266.48	264.32	266.55	0.004219	2.8	370.61	114.29	0.20
Trib1	8329	100-yr	808.30	257.36	266.70	264.45	266.86	0.009185	4.2	404.66	304.15	0.29
Trib1	8329	Atlas 14 100-yr	1001.70	257.36	267.30	264.68	267.39	0.005503	3.4	589.82	305.37	0.23
Trib1	8267	10-yr	536.90	256.83	265.85		265.88	0.002282	1.9	437.61	159.06	0.14
Trib1	8267	50-yr	718.40	256.83	266.32		266.36	0.002526	2.1	512.19	160.20	0.15

HEC-RAS Plan: P_Alt1_40ft (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)	
Trib1	8267	100-yr	808.30	256.83	266.53		266.56	0.002641	2.2	545.06	160.84	0.15
Trib1	8267	Atlas 14 100-yr	1001.70	256.83	267.06		267.12	0.003971	2.8	699.42	333.87	0.19
Trib1	8201	10-yr	536.90	256.83	265.69		265.73	0.002883	2.1	401.12	156.35	0.15
Trib1	8201	50-yr	718.40	256.83	266.14		266.18	0.003228	2.3	472.07	159.83	0.16
Trib1	8201	100-yr	808.30	256.83	266.33		266.38	0.003435	2.4	503.43	162.79	0.16
Trib1	8201	Atlas 14 100-yr	1001.70	256.83	266.73		266.82	0.006214	3.4	579.74	333.18	0.22
Trib1	8148	10-yr	536.90	256.83	265.57		265.60	0.002339	2.0	434.65	172.22	0.15
Trib1	8148	50-yr	718.40	256.83	266.00		266.04	0.002610	2.2	509.98	173.13	0.16
Trib1	8148	100-yr	808.30	256.83	266.19		266.23	0.002747	2.3	542.48	173.66	0.16
Trib1	8148	Atlas 14 100-yr	1001.70	256.83	266.55		266.61	0.003023	2.5	605.81	174.83	0.17
Trib1	8116	10-yr	536.90	256.83	265.51		265.54	0.002008	1.8	486.66	199.96	0.13
Trib1	8116	50-yr	718.40	256.83	265.94		265.97	0.002202	2.0	573.16	200.83	0.14
Trib1	8116	100-yr	808.30	256.83	266.13		266.16	0.002302	2.1	610.36	201.21	0.15
Trib1	8116	Atlas 14 100-yr	1001.70	256.83	266.48		266.53	0.002507	2.2	682.65	201.93	0.15
Trib1	8079	10-yr	536.90	256.83	265.43	263.09	265.46	0.002354	1.9	470.23	202.50	0.14
Trib1	8079	50-yr	718.40	256.83	265.85	264.10	265.89	0.002529	2.0	556.45	203.36	0.15
Trib1	8079	100-yr	808.30	256.83	266.03	264.19	266.07	0.002627	2.1	593.36	203.73	0.15
Trib1	8079	Atlas 14 100-yr	1001.70	256.83	266.39	264.34	266.43	0.002834	2.3	664.99	204.44	0.16
Trib1	8027	10-yr	536.90	256.83	265.31		265.35	0.002110	2.0	431.01	177.78	0.14
Trib1	8027	50-yr	718.40	256.83	265.72		265.76	0.002461	2.3	503.85	178.61	0.16
Trib1	8027	100-yr	808.30	256.83	265.89		265.94	0.002632	2.4	534.82	178.96	0.16
Trib1	8027	Atlas 14 100-yr	1001.70	256.83	266.22		266.28	0.002979	2.6	594.77	179.73	0.18
Trib1	7977	10-yr	536.90	256.83	265.14		265.19	0.005123	2.6	337.54	165.18	0.20
Trib1	7977	50-yr	718.40	256.83	265.52		265.59	0.005779	2.9	402.95	176.11	0.22
Trib1	7977	100-yr	808.30	256.83	265.68		265.75	0.005960	3.0	431.87	176.75	0.22
Trib1	7977	Atlas 14 100-yr	1001.70	256.83	266.00		266.08	0.006355	3.2	487.61	177.77	0.23
Trib1	7925	10-yr	536.90	256.83	264.93		264.98	0.003424	2.4	379.94	191.10	0.18
Trib1	7925	50-yr	718.40	256.83	265.28		265.35	0.003926	2.6	448.01	192.00	0.19
Trib1	7925	100-yr	808.30	256.83	265.44		265.50	0.004164	2.8	477.30	192.38	0.20
Trib1	7925	Atlas 14 100-yr	1001.70	256.83	265.73		265.81	0.004660	3.0	533.28	193.11	0.21
Trib1	7851	10-yr	536.90	256.83	264.77		264.79	0.001907	1.8	600.91	372.25	0.13
Trib1	7851	50-yr	718.40	256.83	265.12		265.14	0.001982	1.9	730.31	373.09	0.14
Trib1	7851	100-yr	808.30	256.83	265.26		265.29	0.002033	2.0	785.46	373.45	0.14
Trib1	7851	Atlas 14 100-yr	1001.70	256.83	265.54		265.57	0.002160	2.1	890.06	374.13	0.14
Trib1	7803	10-yr	536.90	256.83	264.70		264.72	0.001228	1.4	617.50	399.17	0.11
Trib1	7803	50-yr	718.40	256.83	265.05		265.07	0.001204	1.5	756.01	400.07	0.11
Trib1	7803	100-yr	808.30	256.83	265.19		265.21	0.001213	1.5	814.67	400.41	0.11
Trib1	7803	Atlas 14 100-yr	1001.70	256.83	265.47		265.49	0.001254	1.6	925.41	400.96	0.11
Trib1	7688	10-yr	536.90	256.83	264.53		264.56	0.001694	1.6	535.41	385.38	0.12
Trib1	7688	50-yr	718.40	256.83	264.89		264.91	0.001537	1.6	673.29	387.68	0.11
Trib1	7688	100-yr	808.30	256.83	265.04		265.06	0.001514	1.6	730.67	387.98	0.11
Trib1	7688	Atlas 14 100-yr	1001.70	256.83	265.31		265.34	0.001526	1.6	836.87	390.14	0.12
Trib1	7637	10-yr	536.90	256.83	264.45		264.47	0.001485	1.6	525.90	382.17	0.12
Trib1	7637	50-yr	718.40	256.83	264.82		264.84	0.001342	1.6	665.65	382.92	0.12
Trib1	7637	100-yr	808.30	256.83	264.97		264.99	0.001325	1.6	722.76	383.23	0.12
Trib1	7637	Atlas 14 100-yr	1001.70	256.83	265.24		265.26	0.001342	1.7	827.24	383.79	0.12
Trib1	7588	10-yr	536.90	256.83	264.38		264.40	0.001892	1.7	497.55	386.54	0.13
Trib1	7588	50-yr	718.40	256.83	264.76		264.78	0.001622	1.6	643.53	387.69	0.13
Trib1	7588	100-yr	808.30	256.83	264.91		264.93	0.001582	1.7	702.12	387.99	0.12
Trib1	7588	Atlas 14 100-yr	1001.70	256.83	265.18		265.21	0.001577	1.7	808.18	388.53	0.13
Trib1	7494	10-yr	536.90	256.83	263.97	261.66	264.10	0.007090	3.7	325.01	332.80	0.27
Trib1	7494	50-yr	718.40	256.83	264.48		264.55	0.004507	3.1	493.34	334.36	0.22
Trib1	7494	100-yr	808.30	256.83	264.64		264.71	0.004249	3.1	548.83	334.97	0.21
Trib1	7494	Atlas 14 100-yr	1001.70	256.83	264.92		264.99	0.004141	3.1	642.85	336.00	0.21
Trib1	7365	10-yr	536.90	256.83	262.95		263.12	0.008366	3.3	164.63	39.46	0.28
Trib1	7365	50-yr	718.40	256.83	263.48	260.72	263.70	0.010460	3.8	214.27	354.51	0.32
Trib1	7365	100-yr	808.30	256.83	263.72		263.92	0.009542	3.8	298.60	354.99	0.31
Trib1	7365	Atlas 14 100-yr	1001.70	256.83	264.12		264.28	0.007801	3.6	440.90	355.81	0.28
Trib1	7293	10-yr	536.90	256.83	262.67		262.75	0.003027	3.0	308.70	105.71	0.23
Trib1	7293	50-yr	718.40	256.83	263.17		263.26	0.003430	3.4	361.47	106.74	0.25
Trib1	7293	100-yr	808.30	256.83	263.38		263.49	0.003618	3.5	384.61	107.18	0.26
Trib1	7293	Atlas 14 100-yr	1001.70	256.83	263.81		263.90	0.003314	3.5	556.19	410.69	0.25

HEC-RAS Plan: P_Alt1_40ft (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)	
Trib1	7206	10-yr	536.90	256.83	262.33	259.92	262.45	0.003559	3.2	238.59	83.78	0.26
Trib1	7206	50-yr	718.40	256.83	262.74	260.81	262.91	0.004421	3.7	272.29	86.22	0.29
Trib1	7206	100-yr	808.30	256.83	262.92	260.97	263.10	0.004837	4.0	286.83	87.41	0.30
Trib1	7206	Atlas 14 100-yr	1001.70	256.83	263.28	261.29	263.51	0.005637	4.5	316.17	92.19	0.33
Trib1	7163	10-yr	536.90	256.72	262.19		262.28	0.003839	3.1	294.51	122.97	0.25
Trib1	7163	50-yr	718.40	256.72	262.60		262.70	0.004380	3.5	344.03	123.79	0.27
Trib1	7163	100-yr	808.30	256.72	262.77		262.88	0.004647	3.7	365.28	124.14	0.28
Trib1	7163	Atlas 14 100-yr	1001.70	256.72	263.11		263.25	0.005116	4.1	408.57	124.88	0.30
Trib1	7115	10-yr	536.90	253.54	262.01		262.10	0.003564	3.0	285.33	119.21	0.23
Trib1	7115	50-yr	718.40	253.54	262.37		262.49	0.004324	3.4	328.82	120.40	0.26
Trib1	7115	100-yr	808.30	253.54	262.53		262.65	0.004698	3.7	347.23	120.82	0.27
Trib1	7115	Atlas 14 100-yr	1001.70	253.54	262.84		262.99	0.005364	4.1	385.31	121.69	0.29
Trib1	7052	10-yr	536.90	253.54	261.92		261.96	0.001423	2.0	382.89	163.84	0.15
Trib1	7052	50-yr	718.40	253.54	262.26		262.32	0.001707	2.3	439.93	165.73	0.17
Trib1	7052	100-yr	808.30	253.54	262.41		262.47	0.001849	2.4	463.93	166.73	0.18
Trib1	7052	Atlas 14 100-yr	1001.70	253.54	262.71		262.79	0.002095	2.7	514.32	168.37	0.19
Trib1	6989	10-yr	536.90	253.54	261.79		261.85	0.002248	2.3	334.43	161.99	0.19
Trib1	6989	50-yr	718.40	253.54	262.12		262.19	0.002634	2.6	386.87	162.67	0.21
Trib1	6989	100-yr	808.30	253.54	262.25		262.33	0.002841	2.8	408.35	162.94	0.22
Trib1	6989	Atlas 14 100-yr	1001.70	253.54	262.53		262.63	0.003172	3.1	454.05	163.53	0.23
Trib1	6914	10-yr	536.90	253.54	261.72		261.74	0.000787	1.4	555.54	275.34	0.12
Trib1	6914	50-yr	718.40	253.54	262.04		262.06	0.000914	1.6	642.14	275.97	0.13
Trib1	6914	100-yr	808.30	253.54	262.16		262.19	0.000984	1.6	677.22	276.23	0.13
Trib1	6914	Atlas 14 100-yr	1001.70	253.54	262.44		262.47	0.001091	1.8	753.00	276.77	0.14
Trib1	6847	10-yr	536.90	253.54	261.66		261.69	0.001243	1.9	453.27	232.77	0.14
Trib1	6847	50-yr	718.40	253.54	261.96		262.00	0.001467	2.1	524.25	233.38	0.16
Trib1	6847	100-yr	808.30	253.54	262.09		262.13	0.001591	2.2	552.62	233.62	0.16
Trib1	6847	Atlas 14 100-yr	1001.70	253.54	262.35		262.40	0.001778	2.4	614.76	234.14	0.18
Trib1	6756	10-yr	536.90	253.54	261.58		261.60	0.000874	1.5	541.81	301.21	0.12
Trib1	6756	50-yr	718.40	253.54	261.88		261.90	0.001000	1.7	630.22	301.81	0.13
Trib1	6756	100-yr	808.30	253.54	261.99		262.02	0.001076	1.8	664.90	302.04	0.14
Trib1	6756	Atlas 14 100-yr	1001.70	253.54	262.25		262.28	0.001178	1.9	742.61	302.57	0.14
Trib1	6663	10-yr	536.90	253.54	261.46		261.49	0.001957	1.8	465.63	281.88	0.13
Trib1	6663	50-yr	718.40	253.54	261.73		261.77	0.002223	2.0	543.22	283.90	0.14
Trib1	6663	100-yr	808.30	253.54	261.83		261.88	0.002404	2.1	572.40	284.37	0.15
Trib1	6663	Atlas 14 100-yr	1001.70	253.54	262.08		262.13	0.002612	2.2	641.07	285.46	0.16
Trib1	6582	10-yr	536.90	253.54	261.24		261.27	0.003740	2.2	475.09	350.07	0.18
Trib1	6582	50-yr	718.40	253.54	261.48		261.53	0.004212	2.4	562.22	350.76	0.19
Trib1	6582	100-yr	808.30	253.54	261.57		261.61	0.004631	2.5	590.82	350.98	0.20
Trib1	6582	Atlas 14 100-yr	1001.70	253.54	261.79		261.84	0.004953	2.7	669.33	351.59	0.21
Trib1	6523	10-yr	536.90	253.54	261.07		261.10	0.002472	1.9	459.91	362.03	0.15
Trib1	6523	50-yr	718.40	253.54	261.29		261.33	0.002865	2.1	541.20	363.93	0.17
Trib1	6523	100-yr	808.30	253.54	261.35		261.39	0.003269	2.3	561.86	364.41	0.18
Trib1	6523	Atlas 14 100-yr	1001.70	253.54	261.55		261.61	0.003497	2.4	638.06	366.17	0.19
Trib1	6462	10-yr	536.90	253.54	260.97		261.00	0.001599	1.9	443.83	382.76	0.13
Trib1	6462	50-yr	718.40	253.54	261.18		261.22	0.001722	2.0	526.81	383.28	0.13
Trib1	6462	100-yr	808.30	253.54	261.23		261.27	0.001994	2.2	542.48	383.38	0.14
Trib1	6462	Atlas 14 100-yr	1001.70	253.54	261.43		261.48	0.002006	2.2	622.04	383.88	0.15
Trib1	6391	10-yr	536.90	253.54	260.39	258.79	260.69	0.017489	5.4	239.63	392.69	0.41
Trib1	6391	50-yr	718.40	253.54	260.48	259.43	260.86	0.024240	6.4	272.97	395.70	0.48
Trib1	6391	100-yr	808.30	253.54	260.69	259.73	260.92	0.016489	5.5	357.48	396.46	0.40
Trib1	6391	Atlas 14 100-yr	1001.70	253.54	261.05	260.33	261.17	0.010352	4.5	498.57	397.50	0.32
Trib1	6337	10-yr	536.90	253.54	259.96	257.12	260.12	0.005884	3.4	182.88	159.45	0.25
Trib1	6337	50-yr	718.40	253.54	260.25	257.66	260.32	0.003638	2.8	556.50	472.28	0.20
Trib1	6337	100-yr	808.30	253.54	260.44	257.87	260.50	0.003211	2.7	645.95	472.65	0.19
Trib1	6337	Atlas 14 100-yr	1001.70	253.54	260.84	258.29	260.88	0.002413	2.4	835.52	473.45	0.17
Trib1	6240	10-yr	536.90	253.54	258.53	257.72	259.01	0.029244	6.0	107.64	175.19	0.52
Trib1	6240	50-yr	718.40	253.54	258.75	258.17	259.47	0.041932	7.5	116.54	176.08	0.63
Trib1	6240	100-yr	808.30	253.54	258.82	258.39	259.69	0.049684	8.2	119.31	176.35	0.69
Trib1	6240	Atlas 14 100-yr	1001.70	253.54	258.89	258.79	260.16	0.070943	9.9	122.43	176.66	0.82
Trib1	6168	10-yr	536.90	253.54	258.62		258.63	0.001136	1.2	788.46	414.04	0.10

HEC-RAS Plan: P_Alt1_40ft (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)	
Trib1	6168	50-yr	718.40	253.54	258.98		258.99	0.001167	1.3	940.90	415.34	0.11
Trib1	6168	100-yr	808.30	253.54	259.15		259.16	0.001184	1.4	1008.79	415.92	0.11
Trib1	6168	Atlas 14 100-yr	1001.70	253.54	259.48		259.49	0.001212	1.4	1146.29	417.48	0.11
Trib1	6073	10-yr	536.90	253.34	258.50		258.52	0.001630	1.5	680.74	379.48	0.12
Trib1	6073	50-yr	718.40	253.34	258.87		258.88	0.001628	1.5	819.94	380.19	0.12
Trib1	6073	100-yr	808.30	253.34	259.03		259.05	0.001637	1.6	881.65	380.53	0.13
Trib1	6073	Atlas 14 100-yr	1001.70	253.34	259.36		259.38	0.001646	1.6	1006.74	381.21	0.13
Trib1	6008	10-yr	536.90	251.43	258.41		258.42	0.001536	1.4	721.42	433.09	0.12
Trib1	6008	50-yr	718.40	251.43	258.78		258.79	0.001474	1.5	882.14	436.75	0.11
Trib1	6008	100-yr	808.30	251.43	258.94		258.96	0.001461	1.5	953.38	438.37	0.11
Trib1	6008	Atlas 14 100-yr	1001.70	251.43	259.27		259.29	0.001431	1.5	1098.36	441.63	0.11
Trib1	5887	10-yr	536.90	250.58	258.10		258.14	0.003672	2.1	484.61	330.19	0.18
Trib1	5887	50-yr	718.40	250.58	258.49		258.52	0.003285	2.1	613.60	331.06	0.17
Trib1	5887	100-yr	808.30	250.58	258.66		258.69	0.003204	2.1	668.82	331.43	0.17
Trib1	5887	Atlas 14 100-yr	1001.70	250.58	259.00		259.03	0.003059	2.1	780.62	332.17	0.17
Trib1	5802	10-yr	536.90	250.26	257.98	253.56	258.00	0.000955	1.3	736.65	382.36	0.09
Trib1	5802	50-yr	718.40	250.26	258.37	254.26	258.39	0.001052	1.4	884.89	383.30	0.10
Trib1	5802	100-yr	808.30	250.26	258.54	254.57	258.55	0.001100	1.5	948.03	383.70	0.10
Trib1	5802	Atlas 14 100-yr	1001.70	250.26	258.87	255.18	258.89	0.001176	1.6	1076.70	384.88	0.10
Trib1	5713	10-yr	536.90	250.26	257.91	255.53	257.92	0.000732	1.2	739.13	336.41	0.08
Trib1	5713	50-yr	718.40	250.26	258.29	256.09	258.30	0.000860	1.4	865.69	337.21	0.09
Trib1	5713	100-yr	808.30	250.26	258.45	256.32	258.46	0.000922	1.4	919.35	337.55	0.09
Trib1	5713	Atlas 14 100-yr	1001.70	250.26	258.77	256.83	258.79	0.001028	1.5	1029.30	338.25	0.10
Trib1	5582	10-yr	536.90	250.26	257.80	255.32	257.82	0.001521	1.7	570.66	342.80	0.12
Trib1	5582	50-yr	718.40	250.26	258.16	255.91	258.18	0.001669	1.9	694.53	343.60	0.13
Trib1	5582	100-yr	808.30	250.26	258.31	256.17	258.33	0.001746	2.0	746.64	343.93	0.13
Trib1	5582	Atlas 14 100-yr	1001.70	250.26	258.62	256.67	258.65	0.001855	2.1	854.60	344.62	0.14
Trib1	5507	10-yr	536.90	250.26	257.66	254.92	257.68	0.002340	1.7	578.47	383.72	0.14
Trib1	5507	50-yr	718.40	250.26	258.02	255.64	258.04	0.002299	1.8	716.07	386.28	0.14
Trib1	5507	100-yr	808.30	250.26	258.17	255.95	258.19	0.002327	1.8	773.29	387.31	0.14
Trib1	5507	Atlas 14 100-yr	1001.70	250.26	258.48	256.91	258.50	0.002325	1.9	893.56	388.85	0.14
Trib1	5429	10-yr	536.90	250.26	257.24	255.91	257.34	0.009886	3.8	275.03	361.37	0.30
Trib1	5429	50-yr	718.40	250.26	257.66	256.53	257.74	0.007293	3.5	430.95	363.97	0.26
Trib1	5429	100-yr	808.30	250.26	257.82	257.05	257.89	0.006838	3.4	488.86	364.47	0.25
Trib1	5429	Atlas 14 100-yr	1001.70	250.26	258.16	257.20	258.22	0.005886	3.3	611.85	365.53	0.24
Trib1	5319	10-yr	536.90	250.26	256.51	254.56	256.59	0.005089	2.8	245.81	90.08	0.22
Trib1	5319	50-yr	718.40	250.26	257.04	254.84	257.12	0.004738	2.9	372.82	364.40	0.22
Trib1	5319	100-yr	808.30	250.26	257.21	254.97	257.28	0.004825	3.0	433.73	365.11	0.22
Trib1	5319	Atlas 14 100-yr	1001.70	250.26	257.63	255.22	257.69	0.004258	3.0	586.48	366.13	0.21
Trib1	5281	10-yr	536.90	250.26	256.00	254.69	256.22	0.015515	4.5	159.59	181.22	0.38
Trib1	5281	50-yr	718.40	250.26	256.44	255.05	256.73	0.017957	5.2	185.11	183.91	0.42
Trib1	5281	100-yr	808.30	250.26	256.51	255.22	256.86	0.021293	5.7	189.28	184.72	0.45
Trib1	5281	Atlas 14 100-yr	1001.70	250.26	256.82	255.54	257.26	0.024925	6.4	207.77	189.29	0.50
Trib1	5206	10-yr	536.90	250.26	255.77		255.79	0.002355	1.8	483.81	205.10	0.15
Trib1	5206	50-yr	718.40	250.26	256.23		256.25	0.002395	1.9	578.51	206.10	0.15
Trib1	5206	100-yr	808.30	250.26	256.25		256.28	0.002964	2.1	582.68	206.14	0.17
Trib1	5206	Atlas 14 100-yr	1001.70	250.26	256.56		256.60	0.003254	2.3	647.63	208.60	0.18
Trib1	5114	10-yr	536.90	250.26	255.57		255.58	0.001795	1.3	614.93	294.74	0.12
Trib1	5114	50-yr	718.40	250.26	256.04		256.05	0.001662	1.4	753.27	295.62	0.12
Trib1	5114	100-yr	808.30	250.26	256.00		256.02	0.002197	1.6	743.28	295.56	0.14
Trib1	5114	Atlas 14 100-yr	1001.70	250.26	256.30		256.32	0.002352	1.7	830.39	296.11	0.14
Trib1	5019	10-yr	536.90	250.26	255.42		255.44	0.001518	1.4	652.10	323.41	0.12
Trib1	5019	50-yr	718.40	250.26	255.90		255.92	0.001387	1.5	808.00	324.33	0.12
Trib1	5019	100-yr	808.30	250.26	255.82		255.84	0.001955	1.7	781.02	324.17	0.14
Trib1	5019	Atlas 14 100-yr	1001.70	250.26	256.10		256.13	0.002117	1.9	872.12	324.71	0.15
Trib1	4939	10-yr	536.90	250.26	255.29		255.30	0.001645	1.4	675.13	369.50	0.12
Trib1	4939	50-yr	718.40	250.26	255.78		255.80	0.001373	1.4	859.95	371.57	0.12
Trib1	4939	100-yr	808.30	250.26	255.64		255.66	0.002124	1.7	807.41	371.13	0.14
Trib1	4939	Atlas 14 100-yr	1001.70	250.26	255.91		255.93	0.002249	1.8	907.41	371.85	0.15
Trib1	4808	10-yr	536.90	250.19	255.01		255.03	0.002745	1.8	568.84	361.04	0.16
Trib1	4808	50-yr	718.40	250.19	255.58		255.60	0.001877	1.6	773.22	362.42	0.13
Trib1	4808	100-yr	808.30	250.19	255.28		255.31	0.003838	2.2	664.30	361.69	0.19

HEC-RAS Plan: P_Alt1_40ft (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)	
Trib1	4808	Atlas 14 100-yr	1001.70	250.19	255.53		255.57	0.003915	2.3	756.32	362.31	0.19
Trib1	4738	10-yr	536.90	246.98	254.81		254.84	0.003031	2.1	515.62	349.26	0.16
Trib1	4738	50-yr	718.40	246.98	255.45		255.47	0.001926	1.8	739.92	352.92	0.13
Trib1	4738	100-yr	808.30	246.98	254.95		255.01	0.005326	2.8	564.97	351.24	0.21
Trib1	4738	Atlas 14 100-yr	1001.70	246.98	255.20		255.26	0.005417	2.9	653.19	352.25	0.22
Trib1	4694	10-yr	536.90	246.84	254.71	252.32	254.73	0.001952	1.6	629.08	377.55	0.13
Trib1	4694	50-yr	718.40	246.84	255.38	253.05	255.40	0.001256	1.4	883.63	378.96	0.11
Trib1	4694	100-yr	808.30	246.84	254.75	253.81	254.79	0.004127	2.4	644.23	377.64	0.19
Trib1	4694	Atlas 14 100-yr	1001.70	246.84	254.99	253.72	255.04	0.004254	2.5	736.70	378.15	0.19
Trib1	4554	10-yr	536.90	246.38	254.55	252.96	254.56	0.000830	1.0	871.21	421.61	0.08
Trib1	4554	50-yr	718.40	246.38	255.27	253.54	255.28	0.000583	0.9	1177.15	423.01	0.07
Trib1	4554	100-yr	808.30	246.38	254.30	253.54	254.32	0.002784	1.7	765.14	421.12	0.15
Trib1	4554	Atlas 14 100-yr	1001.70	246.38	254.51	253.54	254.53	0.003064	1.9	854.60	421.53	0.15
Trib1	4405	10-yr	536.90	245.89	252.77	252.77	254.03	0.133714	10.0	63.39	160.75	0.92
Trib1	4405	50-yr	718.40	245.89	253.34	253.34	254.84	0.133466	11.0	77.82	166.64	0.94
Trib1	4405	100-yr	808.30	245.89	253.54	253.54	253.60	0.011985	3.4	506.52	455.60	0.28
Trib1	4405	Atlas 14 100-yr	1001.70	245.89	253.68	253.54	253.75	0.013141	3.6	569.13	459.45	0.30
Trib1	4303	10-yr	536.90	245.56	252.54		252.54	0.000687	1.0	890.36	371.21	0.08
Trib1	4303	50-yr	718.40	245.56	252.89		252.90	0.000792	1.1	1022.04	371.93	0.08
Trib1	4303	100-yr	808.30	245.56	253.08		253.09	0.000812	1.2	1091.86	372.32	0.08
Trib1	4303	Atlas 14 100-yr	1001.70	245.56	253.49		253.50	0.000819	1.2	1244.20	373.44	0.09
Trib1	4194	10-yr	536.90	245.20	252.46		252.47	0.000749	1.1	852.94	362.89	0.08
Trib1	4194	50-yr	718.40	245.20	252.80		252.81	0.000874	1.2	977.28	363.63	0.09
Trib1	4194	100-yr	808.30	245.20	252.99		253.00	0.000897	1.3	1044.78	364.58	0.09
Trib1	4194	Atlas 14 100-yr	1001.70	245.20	253.40		253.41	0.000902	1.3	1193.96	366.67	0.09
Trib1	3930	10-yr	536.90	244.33	252.28		252.29	0.000646	1.0	836.65	380.32	0.07
Trib1	3930	50-yr	718.40	244.33	252.60		252.61	0.000762	1.2	955.51	381.22	0.08
Trib1	3930	100-yr	808.30	244.33	252.78		252.79	0.000773	1.2	1024.92	381.74	0.08
Trib1	3930	Atlas 14 100-yr	1001.70	244.33	253.19		253.20	0.000757	1.2	1181.61	386.21	0.08
Trib1	3808	10-yr	536.90	243.93	252.16		252.18	0.001279	1.5	673.12	317.97	0.10
Trib1	3808	50-yr	718.40	243.93	252.45		252.47	0.001563	1.7	764.87	319.25	0.11
Trib1	3808	100-yr	808.30	243.93	252.63		252.65	0.001589	1.7	822.31	320.04	0.12
Trib1	3808	Atlas 14 100-yr	1001.70	243.93	253.04		253.07	0.001545	1.8	954.69	322.18	0.12
Trib1	3654.35	10-yr	536.90	243.43	251.77		251.78	0.001960	1.4	695.24	440.51	0.10
Trib1	3654.35	50-yr	718.40	243.43	251.97		251.99	0.002425	1.6	782.49	441.46	0.12
Trib1	3654.35	100-yr	808.30	243.43	252.17		252.18	0.002200	1.6	869.62	442.41	0.11
Trib1	3654.35	Atlas 14 100-yr	1001.70	243.43	252.64		252.66	0.001691	1.5	1080.22	444.68	0.10
Trib1	3593.5	10-yr	536.90	243.35	249.68	249.68	251.02	0.140327	9.3	57.84	33.99	1.00
Trib1	3593.5	50-yr	718.40	243.35	250.41	250.41	251.20	0.079774	7.9	186.83	604.20	0.77
Trib1	3593.5	100-yr	808.30	243.35	250.41	250.41	251.41	0.100990	8.9	186.83	604.20	0.87
Trib1	3593.5	Atlas 14 100-yr	1001.70	243.35	250.41	250.41	251.94	0.155098	11.0	186.83	604.20	1.08
Trib1	3532.7	10-yr	536.90	243.00	248.57		248.59	0.004750	1.7	450.72	278.60	0.18
Trib1	3532.7	50-yr	718.40	243.00	248.82		248.85	0.005402	1.9	519.26	280.07	0.19
Trib1	3532.7	100-yr	808.30	243.00	248.96		248.99	0.005411	1.9	558.53	280.91	0.19
Trib1	3532.7	Atlas 14 100-yr	1001.70	243.00	249.25		249.29	0.005295	2.0	642.51	282.80	0.19
Trib1	3498	10-yr	488.00	242.92	248.49	247.35	248.51	0.000696	0.6	532.57	475.70	0.07
Trib1	3498	50-yr	680.30	242.92	248.72	247.44	248.74	0.000848	0.7	612.09	476.17	0.08
Trib1	3498	100-yr	787.80	242.92	248.86	247.50	248.88	0.000887	0.8	659.49	476.45	0.08
Trib1	3498	Atlas 14 100-yr	1094.80	242.92	249.15	247.64	249.18	0.001077	0.9	757.48	477.02	0.09
Trib1	3454		Culvert									
Trib1	3396	10-yr	488.00	242.92	247.87	247.28	247.89	0.000372	1.2	387.20	505.90	0.11
Trib1	3396	50-yr	680.30	242.92	248.04	247.36	248.08	0.000422	1.3	457.32	506.44	0.12
Trib1	3396	100-yr	787.80	242.92	248.14	247.40	248.18	0.000434	1.4	495.96	506.73	0.12
Trib1	3396	Atlas 14 100-yr	1094.80	242.92	248.41	247.52	248.46	0.000448	1.4	602.37	512.10	0.13
Trib1	3291.40	10-yr	488.00	242.70	247.73		247.76	0.000859	2.0	560.26	546.29	0.21
Trib1	3291.40	50-yr	680.30	242.70	247.89		247.92	0.001082	2.3	645.06	547.11	0.24
Trib1	3291.40	100-yr	787.80	242.70	247.98		248.01	0.001146	2.4	695.71	547.48	0.25
Trib1	3291.40	Atlas 14 100-yr	1094.80	242.70	248.25		248.28	0.001217	2.6	840.15	548.56	0.26
Trib1	3186.81	10-yr	488.00	242.65	247.64	247.08	247.66	0.001094	1.9	542.56	549.65	0.18
Trib1	3186.81	50-yr	680.30	242.65	247.77	247.11	247.79	0.001450	2.2	612.44	550.04	0.21
Trib1	3186.81	100-yr	787.80	242.65	247.85	247.11	247.88	0.001536	2.3	659.33	550.21	0.22

HEC-RAS Plan: P_Alt1_40ft (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)	
Trib1	3186.81	Atlas 14 100-yr	1094.80	242.65	248.11	247.11	248.14	0.001577	2.5	801.14	550.71	0.23
Trib1	3135	10-yr	488.00	242.58	247.35	247.35	247.51	0.005213	4.7	278.05	561.06	0.51
Trib1	3135	50-yr	680.30	242.58	247.51	247.44	247.64	0.004720	4.7	369.06	561.98	0.49
Trib1	3135	100-yr	787.80	242.58	247.65	247.48	247.75	0.003548	4.2	450.01	563.10	0.43
Trib1	3135	Atlas 14 100-yr	1094.80	242.58	247.96	247.59	248.04	0.002470	3.7	626.30	563.98	0.36
Trib1	2958.70	10-yr	488.00	241.69	244.56	243.88	245.08	0.007546	5.8	84.73	37.47	0.64
Trib1	2958.70	50-yr	680.30	241.69	245.10	244.38	245.77	0.008154	6.6	103.20	43.80	0.68
Trib1	2958.70	100-yr	787.80	241.69	245.38	244.63	246.13	0.008385	7.0	113.33	48.74	0.70
Trib1	2958.70	Atlas 14 100-yr	1094.80	241.69	245.93	245.30	246.74	0.007989	7.5	250.53	380.55	0.70
Trib1	2782.40	10-yr	488.00	240.81	243.36	242.27	243.57	0.003232	3.7	131.90	62.74	0.42
Trib1	2782.40	50-yr	680.30	240.81	243.84	242.62	244.13	0.003483	4.3	159.18	65.45	0.45
Trib1	2782.40	100-yr	787.80	240.81	244.08	242.80	244.41	0.003671	4.6	172.85	68.46	0.47
Trib1	2782.40	Atlas 14 100-yr	1094.80	240.81	244.60	243.27	244.99	0.003913	5.1	309.79	344.93	0.49
Trib1	2709	10-yr	488.00	240.44	242.95	241.87	243.16	0.003207	3.7	132.97	63.75	0.42
Trib1	2709	50-yr	680.30	240.44	243.39	242.22	243.68	0.003658	4.3	157.63	66.52	0.46
Trib1	2709	100-yr	787.80	240.44	243.59	242.39	243.92	0.004037	4.7	168.88	69.05	0.49
Trib1	2709	Atlas 14 100-yr	1094.80	240.44	244.11	242.86	244.49	0.004026	5.2	325.57	340.71	0.50
Trib1	2566	10-yr	488.00	239.53	242.81		242.89	0.000985	2.4	273.28	102.71	0.24
Trib1	2566	50-yr	680.30	239.53	243.22		243.34	0.001265	2.9	316.07	105.17	0.28
Trib1	2566	100-yr	787.80	239.53	243.40		243.54	0.001446	3.2	334.52	106.46	0.30
Trib1	2566	Atlas 14 100-yr	1094.80	239.53	243.75		244.02	0.002384	4.3	383.01	436.63	0.39
Trib1	2465	10-yr	505.60	238.88	242.76		242.81	0.000503	1.8	304.80	99.73	0.18
Trib1	2465	50-yr	699.00	238.88	243.16		243.24	0.000667	2.2	345.10	102.17	0.20
Trib1	2465	100-yr	808.40	238.88	243.33		243.42	0.000791	2.4	362.19	104.66	0.22
Trib1	2465	Atlas 14 100-yr	1123.00	238.88	243.68		243.82	0.001140	3.1	399.28	106.49	0.27
Trib1	2258	10-yr	505.60	237.56	242.66	239.08	242.72	0.000361	2.1	242.02	244.29	0.16
Trib1	2258	50-yr	699.00	237.56	243.15	239.45	243.17	0.000128	1.3	781.18	247.33	0.10
Trib1	2258	100-yr	808.40	237.56	243.32	239.64	243.34	0.000150	1.4	819.32	248.72	0.10
Trib1	2258	Atlas 14 100-yr	1123.00	237.56	243.67	240.15	243.70	0.000220	1.8	901.28	253.04	0.13
Trib1	2224		Culvert									
Trib1	2181	10-yr	505.60	237.14	241.66	240.01	241.90	0.008147	4.0	130.24	209.27	0.37
Trib1	2181	50-yr	699.00	237.14	241.90	240.64	242.29	0.012180	5.1	140.56	210.60	0.46
Trib1	2181	100-yr	808.40	237.14	242.04	240.91	242.52	0.014093	5.6	146.97	211.43	0.50
Trib1	2181	Atlas 14 100-yr	1123.00	237.14	242.27	241.47	243.07	0.022046	7.3	156.72	212.69	0.63
Trib1	2066	10-yr	505.60	233.86	241.40		241.42	0.001715	1.8	456.16	392.68	0.14
Trib1	2066	50-yr	699.00	233.86	241.63		241.66	0.001900	1.9	547.16	393.34	0.15
Trib1	2066	100-yr	808.40	233.86	241.86		241.90	0.001567	1.8	639.51	393.83	0.14
Trib1	2066	Atlas 14 100-yr	1123.00	233.86	242.15		242.19	0.001820	2.0	751.09	394.50	0.15
Trib1	1943	10-yr	505.60	233.26	240.67	238.42	240.97	0.011234	4.9	198.69	477.03	0.40
Trib1	1943	50-yr	699.00	233.26	241.29		241.35	0.003518	3.0	494.96	478.35	0.23
Trib1	1943	100-yr	808.40	233.26	241.64		241.68	0.002100	2.4	663.03	479.10	0.18
Trib1	1943	Atlas 14 100-yr	1123.00	233.26	241.89		241.94	0.002490	2.7	782.51	479.63	0.19
Trib1	1845	10-yr	505.60	232.78	239.00		239.62	0.017042	6.4	85.46	23.21	0.51
Trib1	1845	50-yr	699.00	232.78	239.81		240.63	0.018747	7.5	104.99	24.92	0.54
Trib1	1845	100-yr	808.40	232.78	240.21		241.13	0.019616	8.0	115.13	25.98	0.56
Trib1	1845	Atlas 14 100-yr	1123.00	232.78	241.26	239.64	241.53	0.007706	5.5	468.44	418.04	0.36
Trib1	1740	10-yr	505.60	232.26	237.35	235.64	237.82	0.016063	5.5	92.69	80.48	0.49
Trib1	1740	50-yr	699.00	232.26	238.17	236.33	238.75	0.015530	6.2	118.15	87.27	0.50
Trib1	1740	100-yr	808.40	232.26	238.57	236.69	239.20	0.015497	6.5	130.84	90.15	0.50
Trib1	1740	Atlas 14 100-yr	1123.00	232.26	239.56	237.77	240.34	0.015642	7.3	163.70	97.28	0.52
Trib1	1635	10-yr	505.60	231.75	237.12	234.04	237.28	0.001909	3.3	153.36	32.17	0.27
Trib1	1635	50-yr	699.00	231.75	237.95	234.57	238.18	0.002081	3.8	189.69	463.29	0.29
Trib1	1635	100-yr	808.40	231.75	238.35	234.86	238.61	0.002170	4.1	207.78	472.52	0.29
Trib1	1635	Atlas 14 100-yr	1123.00	231.75	239.35	235.58	239.69	0.002388	4.8	254.43	488.47	0.32
Trib1	1568	10-yr	505.60	231.42	236.95	233.86	237.14	0.002251	3.5	143.00	29.87	0.28
Trib1	1568	50-yr	699.00	231.42	237.76	234.44	238.02	0.002514	4.1	177.83	274.94	0.31
Trib1	1568	100-yr	808.40	231.42	238.15	234.75	238.44	0.002591	4.4	197.13	280.74	0.32
Trib1	1568	Atlas 14 100-yr	1123.00	231.42	239.15	235.53	239.51	0.002741	5.0	247.22	302.01	0.33
Trib1	1446	10-yr	505.60	230.58	236.50	234.99	236.75	0.004688	4.0	127.73	41.62	0.40
Trib1	1446	50-yr	699.00	230.58	237.34	235.43	237.62	0.004136	4.3	167.21	168.49	0.39
Trib1	1446	100-yr	808.40	230.58	237.77	235.65	238.06	0.003751	4.4	195.13	181.00	0.37

HEC-RAS Plan: P_Alt1_40ft (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)	
Trib1	1446	Atlas 14 100-yr	1123.00	230.58	238.83	236.24	239.14	0.003112	4.6	265.88	200.58	0.35
Trib1	1388	10-yr	521.80	230.54	235.98	234.78	236.37	0.008284	5.0	103.73	34.07	0.51
Trib1	1388	50-yr	716.10	230.54	236.85	235.28	237.29	0.007154	5.3	134.17	35.81	0.49
Trib1	1388	100-yr	827.20	230.54	237.28	235.54	237.75	0.006757	5.5	152.14	122.71	0.48
Trib1	1388	Atlas 14 100-yr	1149.00	230.54	238.37	236.23	238.88	0.005472	5.8	211.67	153.48	0.45
Trib1	1107	10-yr	521.80	228.33	234.74	231.10	234.89	0.003348	3.1	173.30	43.02	0.24
Trib1	1107	50-yr	716.10	228.33	235.68	231.69	235.86	0.003443	3.5	211.96	51.86	0.25
Trib1	1107	100-yr	827.20	228.33	236.12	231.99	236.33	0.003558	3.7	230.69	59.71	0.26
Trib1	1107	Atlas 14 100-yr	1149.00	228.33	237.36	232.77	237.60	0.003406	4.1	317.43	291.23	0.26
Trib1	1067		Culvert									
Trib1	1016	10-yr	521.80	227.80	234.53	230.46	234.68	0.004000	3.1	170.10	38.10	0.25
Trib1	1016	50-yr	716.10	227.80	235.31	231.08	235.51	0.004422	3.6	200.49	39.63	0.27
Trib1	1016	100-yr	827.20	227.80	235.65	231.42	235.88	0.004801	3.9	213.87	40.25	0.29
Trib1	1016	Atlas 14 100-yr	1149.00	227.80	236.34	232.29	236.70	0.006233	4.8	243.42	45.56	0.34
Trib1	913	10-yr	521.80	227.62	234.27		234.35	0.002040	2.2	233.22	51.66	0.19
Trib1	913	50-yr	716.10	227.62	235.03		235.13	0.002396	2.6	272.61	53.22	0.20
Trib1	913	100-yr	827.20	227.62	235.33		235.46	0.002679	2.9	289.14	53.86	0.22
Trib1	913	Atlas 14 100-yr	1149.00	227.62	235.92		236.12	0.003772	3.6	321.24	55.08	0.26
Trib1	728	10-yr	521.80	227.30	233.65		233.79	0.004803	3.0	173.53	46.86	0.28
Trib1	728	50-yr	716.10	227.30	234.40		234.55	0.004280	3.2	278.06	177.51	0.27
Trib1	728	100-yr	827.20	227.30	234.72		234.86	0.003987	3.2	334.46	178.23	0.26
Trib1	728	Atlas 14 100-yr	1149.00	227.30	235.14		235.32	0.004854	3.8	410.61	179.13	0.29
Trib1	585	10-yr	521.80	227.30	232.99		233.12	0.004432	2.9	177.04	49.72	0.28
Trib1	585	50-yr	716.10	227.30	233.73		233.90	0.004644	3.3	214.58	51.36	0.29
Trib1	585	100-yr	827.20	227.30	234.10		234.26	0.004269	3.4	290.04	294.04	0.28
Trib1	585	Atlas 14 100-yr	1149.00	227.30	234.05	231.88	234.40	0.008770	4.8	276.62	293.61	0.40
Trib1	442	10-yr	521.80	227.30	232.31	229.62	232.45	0.004927	3.0	174.11	141.66	0.29
Trib1	442	50-yr	716.10	227.30	233.02	230.16	233.19	0.005182	3.4	211.53	145.64	0.30
Trib1	442	100-yr	827.20	227.30	233.38	230.47	233.58	0.005272	3.6	231.27	147.34	0.31
Trib1	442	Atlas 14 100-yr	1149.00	227.30	233.93	231.24	234.00	0.000913	1.6	587.51	477.27	0.13
Trib1	348	10-yr	538.40	227.30	231.81	229.36	231.96	0.005204	3.2	169.69	199.78	0.30
Trib1	348	50-yr	733.80	227.30	232.46	229.82	232.67	0.005711	3.6	201.53	203.73	0.32
Trib1	348	100-yr	846.60	227.30	232.80	230.06	233.04	0.005966	3.9	218.27	205.74	0.33
Trib1	348	Atlas 14 100-yr	1175.90	227.30	233.45	230.85	233.79	0.007554	4.7	250.95	209.85	0.37
Trib1	197	10-yr	538.40	227.30	229.10	229.10	229.95	0.070488	7.4	72.84	43.13	1.00
Trib1	197	50-yr	733.80	227.30	229.49	229.49	230.52	0.066306	8.1	90.13	43.96	1.00
Trib1	197	100-yr	846.60	227.30	229.71	229.71	230.83	0.064076	8.5	99.69	44.41	1.00
Trib1	197	Atlas 14 100-yr	1175.90	227.30	231.18	230.28	231.91	0.022945	6.9	174.99	264.22	0.64
TC_Main	4986	10-yr	2892.00	224.01	235.97	233.49	236.06	0.002147	3.4	1275.80	474.26	0.20
TC_Main	4986	50-yr	3915.90	224.01	236.45	234.89	236.56	0.002371	3.7	1499.81	476.84	0.21
TC_Main	4986	100-yr	4460.70	224.01	236.68	235.01	236.81	0.002472	3.8	1606.81	478.98	0.22
TC_Main	4986	Atlas 14 100-yr	5823.80	224.01	237.20	235.26	237.37	0.003351	4.6	1886.65	610.34	0.26
TC_Main	4863	10-yr	2892.00	224.01	235.89	232.73	235.94	0.000476	1.9	1936.57	589.38	0.10
TC_Main	4863	50-yr	3915.90	224.01	236.35	233.86	236.42	0.000613	2.3	2208.14	590.46	0.12
TC_Main	4863	100-yr	4460.70	224.01	236.57	233.86	236.65	0.000679	2.4	2338.18	590.97	0.13
TC_Main	4863	Atlas 14 100-yr	5823.80	224.01	237.07	233.96	237.17	0.000825	2.7	2635.07	592.47	0.14
TC_Main	4699	10-yr	2892.00	224.01	235.80	233.86	235.85	0.000591	1.8	1866.30	641.05	0.10
TC_Main	4699	50-yr	3915.90	224.01	236.24	233.87	236.31	0.000757	2.1	2145.00	641.92	0.12
TC_Main	4699	100-yr	4460.70	224.01	236.45	233.96	236.53	0.000836	2.3	2278.25	642.34	0.13
TC_Main	4699	Atlas 14 100-yr	5823.80	224.01	236.92	234.27	237.02	0.001014	2.6	2582.80	644.83	0.14
TC_Main	4573	10-yr	2892.00	224.01	235.71	232.08	235.76	0.000990	2.9	2053.83	789.52	0.15
TC_Main	4573	50-yr	3915.90	224.01	236.12	233.04	236.19	0.001173	3.2	2382.81	790.38	0.17
TC_Main	4573	100-yr	4460.70	224.01	236.32	234.60	236.39	0.001257	3.4	2540.35	790.79	0.18
TC_Main	4573	Atlas 14 100-yr	5823.80	224.01	236.78	234.30	236.86	0.001430	3.7	2901.50	791.73	0.19
TC_Main	4419	10-yr	2892.00	224.01	235.44	234.49	235.52	0.002256	3.7	1883.93	927.55	0.22
TC_Main	4419	50-yr	3915.90	224.01	235.81	234.74	235.91	0.002589	4.1	2236.10	928.59	0.23
TC_Main	4419	100-yr	4460.70	224.01	236.00	234.86	236.10	0.002729	4.2	2406.63	929.10	0.24
TC_Main	4419	Atlas 14 100-yr	5823.80	224.01	236.43	235.10	236.54	0.002981	4.5	2803.81	930.08	0.25
TC_Main	4284	10-yr	2892.00	224.01	234.84	232.75	235.09	0.005092	5.5	1361.14	899.19	0.32
TC_Main	4284	50-yr	3915.90	224.01	235.12	234.08	235.41	0.006357	6.2	1606.35	900.55	0.36
TC_Main	4284	100-yr	4460.70	224.01	235.28	234.87	235.57	0.006638	6.4	1753.52	901.21	0.37

HEC-RAS Plan: P_Alt1_40ft (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)	
TC_Main	4284	Atlas 14 100-yr	5823.80	224.01	235.71	235.12	235.99	0.006681	6.7	2142.30	902.95	0.37
TC_Main	4205	10-yr	2892.00	224.01	234.52	232.98	234.71	0.004465	5.1	1209.27	922.70	0.30
TC_Main	4205	50-yr	3915.90	224.01	234.62	233.86	234.90	0.006763	6.3	1301.68	922.89	0.37
TC_Main	4205	100-yr	4460.70	224.01	234.83	234.52	235.08	0.005929	6.0	1504.25	923.31	0.35
TC_Main	4205	Atlas 14 100-yr	5823.80	224.01	235.36	234.71	235.55	0.004483	5.4	1991.52	924.33	0.31
TC_Main	4011	10-yr	2892.00	223.09	229.83	229.83	232.27	0.080471	14.4	264.16	178.32	1.13
TC_Main	4011	50-yr	3915.90	223.09	231.05	231.05	232.37	0.033694	10.7	444.14	187.04	0.76
TC_Main	4011	100-yr	4460.70	223.09	231.29	231.29	232.73	0.034599	11.2	479.99	188.96	0.77
TC_Main	4011	Atlas 14 100-yr	5823.80	223.09	231.84	231.84	233.57	0.035651	12.0	564.47	191.87	0.80
DS_Trib1	3921	10-yr	3359.20	210.12	224.07	219.16	224.72	0.006940	6.5	519.00	58.06	0.38
DS_Trib1	3921	50-yr	4569.20	210.12	225.86	220.48	226.69	0.007546	7.3	626.02	61.27	0.40
DS_Trib1	3921	100-yr	5223.80	210.12	226.75	221.13	227.67	0.007816	7.7	681.23	63.24	0.41
DS_Trib1	3921	Atlas 14 100-yr	6858.70	210.12	228.68	222.56	229.80	0.008688	8.5	809.39	70.03	0.44
DS_Trib1	3815	10-yr	3359.20	208.80	223.68	217.24	224.10	0.004093	5.2	645.86	66.33	0.29
DS_Trib1	3815	50-yr	4569.20	208.80	225.44	218.46	226.00	0.004610	6.0	764.01	67.72	0.31
DS_Trib1	3815	100-yr	5223.80	208.80	226.31	219.07	226.94	0.004841	6.3	823.37	68.42	0.32
DS_Trib1	3815	Atlas 14 100-yr	6858.70	208.80	228.16	220.43	228.97	0.005723	7.2	954.13	78.24	0.35
DS_Trib1	3703	10-yr	3359.20	207.79	223.16	216.37	223.61	0.004518	5.4	623.06	66.05	0.31
DS_Trib1	3703	50-yr	4569.20	207.79	224.85	217.78	225.45	0.005141	6.2	736.63	68.70	0.33
DS_Trib1	3703	100-yr	5223.80	207.79	225.69	218.49	226.36	0.005396	6.6	794.80	74.82	0.34
DS_Trib1	3703	Atlas 14 100-yr	6858.70	207.79	227.42	220.12	228.29	0.006215	7.5	918.22	217.32	0.37
DS_Trib1	3551	10-yr	3359.20	207.82	222.44	215.64	222.90	0.004927	5.4	618.39	70.51	0.32
DS_Trib1	3551	50-yr	4569.20	207.82	224.02	217.06	224.63	0.005698	6.2	734.69	76.07	0.35
DS_Trib1	3551	100-yr	5223.80	207.82	224.83	218.01	225.50	0.005963	6.6	797.31	78.91	0.36
DS_Trib1	3551	Atlas 14 100-yr	6858.70	207.82	226.46	219.54	227.31	0.006683	7.4	929.43	83.39	0.39
DS_Trib1	3367	10-yr	3359.20	207.31	222.08	214.91	222.41	0.001440	4.6	724.90	79.69	0.27
DS_Trib1	3367	50-yr	4569.20	207.31	223.60	216.17	224.05	0.001739	5.4	851.15	86.26	0.30
DS_Trib1	3367	100-yr	5223.80	207.31	224.35	216.80	224.85	0.002025	5.7	919.78	96.59	0.32
DS_Trib1	3367	Atlas 14 100-yr	6858.70	207.31	225.97	218.25	226.59	0.002157	6.3	1088.25	110.64	0.34
DS_Trib1	3167	10-yr	3359.20	206.97	221.68	217.21	222.05	0.002375	4.9	691.48	104.61	0.33
DS_Trib1	3167	50-yr	4569.20	206.97	223.19	218.25	223.62	0.002613	5.2	872.46	128.06	0.35
DS_Trib1	3167	100-yr	5223.80	206.97	223.93	218.74	224.38	0.002567	5.4	969.91	134.94	0.35
DS_Trib1	3167	Atlas 14 100-yr	6858.70	206.97	225.60	219.85	226.10	0.002381	5.7	1204.36	327.91	0.35
DS_Trib1	2996	10-yr	3359.20	207.09	221.49	215.14	221.74	0.001150	4.0	843.86	112.40	0.26
DS_Trib1	2996	50-yr	4569.20	207.09	222.97	216.43	223.28	0.001305	4.5	1015.60	120.04	0.27
DS_Trib1	2996	100-yr	5223.80	207.09	223.69	216.95	224.04	0.001378	4.7	1105.07	126.37	0.28
DS_Trib1	2996	Atlas 14 100-yr	6858.70	207.09	225.34	218.13	225.76	0.001523	5.2	1327.38	374.56	0.30
DS_Trib1	2867	10-yr	3359.20	207.15	221.08	215.11	221.51	0.002313	5.3	634.89	83.23	0.34
DS_Trib1	2867	50-yr	4569.20	207.15	222.45	216.51	223.02	0.002712	6.1	754.64	91.12	0.37
DS_Trib1	2867	100-yr	5223.80	207.15	223.13	217.23	223.76	0.002874	6.4	817.78	95.22	0.38
DS_Trib1	2867	Atlas 14 100-yr	6858.70	207.15	224.67	218.88	225.44	0.003314	7.0	975.73	349.99	0.42
DS_Trib1	2762	10-yr	3359.20	207.57	220.87	216.01	221.26	0.002295	5.0	673.14	97.94	0.34
DS_Trib1	2762	50-yr	4569.20	207.57	222.23	217.22	222.72	0.002578	5.6	812.70	107.71	0.36
DS_Trib1	2762	100-yr	5223.80	207.57	222.90	217.79	223.44	0.002713	5.9	887.27	113.28	0.37
DS_Trib1	2762	Atlas 14 100-yr	6858.70	207.57	224.44	218.99	225.08	0.002843	6.4	1071.91	312.61	0.38
DS_Trib1	2665	10-yr	3359.20	206.87	220.69	214.90	221.03	0.002160	4.7	718.71	105.11	0.32
DS_Trib1	2665	50-yr	4569.20	206.87	222.03	216.68	222.46	0.002449	5.3	866.17	115.44	0.34
DS_Trib1	2665	100-yr	5223.80	206.87	222.69	217.23	223.17	0.002567	5.5	944.97	121.47	0.35
DS_Trib1	2665	Atlas 14 100-yr	6858.70	206.87	224.23	218.44	224.78	0.002774	6.0	1145.38	309.85	0.37
DS_Trib1	2534	10-yr	3359.20	207.38	220.40	215.09	220.74	0.002226	4.7	715.28	110.60	0.33
DS_Trib1	2534	50-yr	4569.20	207.38	221.69	216.26	222.12	0.002688	5.3	869.24	130.45	0.36
DS_Trib1	2534	100-yr	5223.80	207.38	222.35	216.80	222.81	0.002779	5.5	958.39	139.47	0.37
DS_Trib1	2534	Atlas 14 100-yr	6858.70	207.38	223.89	218.00	224.41	0.002747	5.8	1189.77	158.13	0.37
DS_Trib1	2362	10-yr	3359.20	207.19	219.60		220.19	0.004418	6.2	543.17	85.91	0.43
DS_Trib1	2362	50-yr	4569.20	207.19	220.65		221.45	0.005381	7.2	638.37	94.09	0.48
DS_Trib1	2362	100-yr	5223.80	207.19	221.22		222.10	0.005752	7.5	693.54	99.83	0.50
DS_Trib1	2362	Atlas 14 100-yr	6858.70	207.19	222.67		223.68	0.006231	8.1	851.70	119.30	0.53
DS_Trib1	2219	10-yr	3359.20	210.53	218.04		219.08	0.015146	8.2	410.10	116.33	0.77
DS_Trib1	2219	50-yr	4569.20	210.53	219.48		220.44	0.009316	7.9	581.89	121.71	0.63
DS_Trib1	2219	100-yr	5223.80	210.53	220.20		221.14	0.007854	7.8	670.49	124.70	0.59
DS_Trib1	2219	Atlas 14 100-yr	6858.70	210.53	221.84		222.78	0.006052	7.8	882.70	135.66	0.54

HEC-RAS Plan: P_Alt1_40ft (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)	
DS_Trib1	2135	10-yr	3359.20	206.78	217.32		218.21	0.006848	7.5	445.27	74.40	0.54
DS_Trib1	2135	50-yr	4569.20	206.78	218.66		219.73	0.007347	8.3	550.97	83.43	0.57
DS_Trib1	2135	100-yr	5223.80	206.78	219.33		220.48	0.007476	8.6	608.22	88.25	0.58
DS_Trib1	2135	Atlas 14 100-yr	6858.70	206.78	220.90		222.18	0.007420	9.1	756.83	100.21	0.58
DS_Trib1	1983	10-yr	3359.20	204.92	216.88	213.37	217.38	0.003374	5.7	589.90	89.67	0.39
DS_Trib1	1983	50-yr	4569.20	204.92	218.20	214.33	218.84	0.003648	6.4	710.89	94.05	0.41
DS_Trib1	1983	100-yr	5223.80	204.92	218.85	214.79	219.56	0.003751	6.8	773.40	96.30	0.42
DS_Trib1	1983	Atlas 14 100-yr	6858.70	204.92	220.41	215.87	221.26	0.003857	7.4	927.27	101.31	0.43
DS_Trib1	1746	10-yr	3359.20	205.47	215.38	213.88	216.15	0.008571	7.3	489.44	108.38	0.59
DS_Trib1	1746	50-yr	4569.20	205.47	216.90	214.67	217.68	0.006670	7.3	660.96	116.84	0.54
DS_Trib1	1746	100-yr	5223.80	205.47	217.65	215.07	218.43	0.006095	7.4	749.01	120.86	0.52
DS_Trib1	1746	Atlas 14 100-yr	6858.70	205.47	219.38	215.98	220.20	0.005148	7.5	967.65	131.65	0.49
DS_Trib1	1481	10-yr	3359.20	204.91	214.67		215.01	0.002175	4.7	717.05	110.27	0.32
DS_Trib1	1481	50-yr	4569.20	204.91	216.25		216.65	0.002144	5.1	900.88	121.21	0.33
DS_Trib1	1481	100-yr	5223.80	204.91	217.03		217.46	0.002061	5.2	996.76	123.48	0.33
DS_Trib1	1481	Atlas 14 100-yr	6858.70	204.91	218.83		219.32	0.001915	5.6	1223.72	128.62	0.32
DS_Trib1	1147	10-yr	3567.50	203.47	214.23		214.42	0.001281	3.5	1020.97	165.48	0.25
DS_Trib1	1147	50-yr	4872.70	203.47	215.87		216.09	0.001159	3.7	1300.50	175.90	0.24
DS_Trib1	1147	100-yr	5594.70	203.47	216.68		216.91	0.001116	3.9	1445.35	180.85	0.24
DS_Trib1	1147	Atlas 14 100-yr	7443.10	203.47	218.53		218.80	0.001042	4.2	1789.62	190.77	0.24
DS_Trib1	1060	10-yr	3567.50	202.94	213.98	209.60	214.27	0.001871	4.3	822.65	127.62	0.30
DS_Trib1	1060	50-yr	4872.70	202.94	215.61	210.52	215.95	0.001816	4.7	1039.88	140.46	0.30
DS_Trib1	1060	100-yr	5594.70	202.94	216.41	210.96	216.78	0.001753	4.8	1155.59	148.14	0.30
DS_Trib1	1060	Atlas 14 100-yr	7443.10	202.94	218.25	211.98	218.67	0.001598	5.2	1424.08	159.02	0.30
DS_Trib1	1008		Bridge									
DS_Trib1	984	10-yr	3567.50	202.44	210.57	209.08	211.58	0.009803	8.1	442.91	97.55	0.65
DS_Trib1	984	50-yr	4872.70	202.44	211.59	210.19	212.86	0.009872	9.0	538.69	101.71	0.67
DS_Trib1	984	100-yr	5594.70	202.44	212.11	210.64	213.51	0.009842	9.5	588.87	103.61	0.68
DS_Trib1	984	Atlas 14 100-yr	7443.10	202.44	213.67	211.69	215.23	0.008447	10.0	743.08	110.03	0.65
DS_Trib1	927	10-yr	3567.50	200.16	210.46		211.09	0.003287	6.4	558.20	99.75	0.48
DS_Trib1	927	50-yr	4872.70	200.16	211.48		212.32	0.003650	7.4	661.50	102.95	0.51
DS_Trib1	927	100-yr	5594.70	200.16	212.01		212.95	0.003813	7.8	716.53	105.47	0.53
DS_Trib1	927	Atlas 14 100-yr	7443.10	200.16	213.44		214.52	0.008061	8.3	892.20	215.83	0.72
DS_Trib1	721	10-yr	3567.50	204.34	210.00		210.40	0.002848	5.1	706.02	164.72	0.43
DS_Trib1	721	50-yr	4872.70	204.34	211.09		211.55	0.002851	5.5	889.18	183.97	0.44
DS_Trib1	721	100-yr	5594.70	204.34	211.70		212.18	0.002551	5.6	1002.44	185.24	0.42
DS_Trib1	721	Atlas 14 100-yr	7443.10	204.34	213.04		213.59	0.002210	5.9	1251.82	188.01	0.41
DS_Trib1	541	10-yr	3567.50	201.06	209.60		209.95	0.002014	4.7	752.29	145.58	0.37
DS_Trib1	541	50-yr	4872.70	201.06	210.67		211.11	0.002059	5.4	907.91	147.71	0.38
DS_Trib1	541	100-yr	5594.70	201.06	211.27		211.75	0.002245	5.6	1003.33	165.32	0.40
DS_Trib1	541	Atlas 14 100-yr	7443.10	201.06	212.63		213.20	0.002074	6.1	1229.88	168.06	0.39
DS_Trib1	17	10-yr	3567.50	201.06	208.38	205.84	208.79	0.002460	5.1	693.69	143.34	0.41
DS_Trib1	17	50-yr	4872.70	201.06	209.42	206.53	209.94	0.002460	5.8	843.83	145.89	0.42
DS_Trib1	17	100-yr	5594.70	201.06	209.95	206.91	210.52	0.002461	6.1	921.22	147.43	0.43
DS_Trib1	17	Atlas 14 100-yr	7443.10	201.06	211.34	207.87	212.01	0.002462	6.6	1134.99	161.57	0.44

HEC-RAS Plan: P_Alt2_Brg_40ft

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)	
Trib1	9237	10-yr	536.90	266.30	269.54	269.54	270.61	0.121350	8.3	64.64	30.58	1.01
Trib1	9237	50-yr	718.40	266.30	270.40	270.40	270.72	0.035213	5.4	254.99	399.46	0.57
Trib1	9237	100-yr	808.30	266.30	270.46	270.46	270.79	0.037260	5.6	278.24	399.59	0.59
Trib1	9237	Atlas 14 100-yr	1001.70	266.30	270.60	270.60	270.93	0.038000	5.9	333.97	399.89	0.60
Trib1	9163	10-yr	536.90	262.50	268.75		268.79	0.003365	2.3	372.60	154.52	0.18
Trib1	9163	50-yr	718.40	262.50	269.23		269.28	0.003482	2.5	447.80	155.61	0.19
Trib1	9163	100-yr	808.30	262.50	269.42		269.48	0.003620	2.6	478.00	156.15	0.19
Trib1	9163	Atlas 14 100-yr	1001.70	262.50	269.81		269.88	0.003921	2.8	538.90	159.79	0.20
Trib1	9126	10-yr	536.90	260.11	268.69		268.71	0.001442	1.6	580.03	248.03	0.12
Trib1	9126	50-yr	718.40	260.11	269.17		269.19	0.001472	1.7	700.88	249.00	0.12
Trib1	9126	100-yr	808.30	260.11	269.36		269.39	0.001524	1.7	748.91	249.39	0.12
Trib1	9126	Atlas 14 100-yr	1001.70	260.11	269.75		269.78	0.001617	1.9	845.03	250.16	0.13
Trib1	9067	10-yr	536.90	260.11	268.56		268.60	0.002543	2.0	425.91	184.25	0.15
Trib1	9067	50-yr	718.40	260.11	269.04		269.08	0.002635	2.2	514.88	185.21	0.16
Trib1	9067	100-yr	808.30	260.11	269.23		269.27	0.002752	2.3	549.51	185.59	0.16
Trib1	9067	Atlas 14 100-yr	1001.70	260.11	269.60		269.66	0.002958	2.5	619.02	186.33	0.17
Trib1	8988	10-yr	536.90	260.11	268.41	265.52	268.43	0.001729	1.7	573.76	283.34	0.13
Trib1	8988	50-yr	718.40	260.11	268.90	266.17	268.92	0.001641	1.7	711.93	284.35	0.13
Trib1	8988	100-yr	808.30	260.11	269.08	267.05	269.10	0.001679	1.8	764.05	284.73	0.13
Trib1	8988	Atlas 14 100-yr	1001.70	260.11	269.45	266.84	269.47	0.001739	1.9	869.04	285.49	0.13
Trib1	8896	10-yr	536.90	260.11	268.27	265.21	268.29	0.001740	1.7	553.07	252.25	0.13
Trib1	8896	50-yr	718.40	260.11	268.76	265.94	268.79	0.001708	1.8	677.48	253.22	0.13
Trib1	8896	100-yr	808.30	260.11	268.94	266.26	268.97	0.001777	1.8	722.82	253.57	0.13
Trib1	8896	Atlas 14 100-yr	1001.70	260.11	269.30	266.84	269.33	0.001894	2.0	814.50	254.30	0.14
Trib1	8854	10-yr	536.90	260.11	268.16	265.10	268.20	0.002569	2.0	451.82	225.96	0.16
Trib1	8854	50-yr	718.40	260.11	268.65	265.70	268.69	0.002467	2.1	564.12	227.82	0.16
Trib1	8854	100-yr	808.30	260.11	268.83	265.97	268.87	0.002563	2.1	603.87	228.37	0.16
Trib1	8854	Atlas 14 100-yr	1001.70	260.11	269.18	266.84	269.23	0.002718	2.3	684.69	229.67	0.17
Trib1	8790	10-yr	536.90	260.11	268.00	263.98	268.04	0.002768	2.2	443.24	239.39	0.15
Trib1	8790	50-yr	718.40	260.11	268.50	264.76	268.54	0.002576	2.2	565.24	240.38	0.15
Trib1	8790	100-yr	808.30	260.11	268.67	265.12	268.72	0.002679	2.3	605.98	240.71	0.15
Trib1	8790	Atlas 14 100-yr	1001.70	260.11	269.02	265.81	269.07	0.002835	2.4	689.36	241.54	0.16
Trib1	8689	10-yr	536.90	260.11	267.69		267.74	0.003070	2.6	453.20	272.94	0.18
Trib1	8689	50-yr	718.40	260.11	268.25		268.29	0.002479	2.4	605.46	274.02	0.16
Trib1	8689	100-yr	808.30	260.11	268.41		268.45	0.002562	2.5	649.65	274.33	0.17
Trib1	8689	Atlas 14 100-yr	1001.70	260.11	268.75		268.79	0.002663	2.6	741.68	274.97	0.17
Trib1	8636	10-yr	536.90	260.11	267.54		267.59	0.003233	2.5	431.70	245.08	0.18
Trib1	8636	50-yr	718.40	260.11	268.13		268.16	0.002613	2.4	574.97	246.18	0.16
Trib1	8636	100-yr	808.30	260.11	268.28		268.32	0.002746	2.5	613.10	246.47	0.17
Trib1	8636	Atlas 14 100-yr	1001.70	260.11	268.61		268.65	0.002930	2.7	693.47	247.14	0.17
Trib1	8556	10-yr	536.90	260.11	267.26	264.39	267.32	0.003488	2.7	428.95	328.02	0.19
Trib1	8556	50-yr	718.40	260.11	267.94	264.82	267.98	0.002205	2.3	652.59	330.61	0.16
Trib1	8556	100-yr	808.30	260.11	268.08	265.01	268.12	0.002301	2.4	701.04	331.99	0.16
Trib1	8556	Atlas 14 100-yr	1001.70	260.11	268.40	265.40	268.44	0.002383	2.5	806.64	332.93	0.17
Trib1	8492	10-yr	536.90	260.11	267.02		267.11	0.003385	2.7	353.20	288.25	0.19
Trib1	8492	50-yr	718.40	260.11	267.79		267.84	0.002240	2.4	574.84	291.15	0.16
Trib1	8492	100-yr	808.30	260.11	267.93		267.98	0.002411	2.5	614.63	291.45	0.17
Trib1	8492	Atlas 14 100-yr	1001.70	260.11	268.23		268.29	0.002621	2.7	704.24	292.12	0.18
Trib1	8442	10-yr	536.90	260.11	266.64		266.84	0.008649	4.0	167.80	43.13	0.30
Trib1	8442	50-yr	718.40	260.11	267.56		267.67	0.005397	3.5	443.56	310.94	0.24
Trib1	8442	100-yr	808.30	260.11	267.68		267.80	0.005583	3.6	483.62	311.19	0.25
Trib1	8442	Atlas 14 100-yr	1001.70	260.11	268.00		268.10	0.005428	3.7	580.79	311.80	0.25
Trib1	8381	10-yr	536.90	259.83	266.19		266.36	0.007537	3.7	180.65	48.92	0.28
Trib1	8381	50-yr	718.40	259.83	266.69	264.41	267.13	0.015399	5.6	210.91	332.74	0.40
Trib1	8381	100-yr	808.30	259.83	267.14		267.38	0.009380	4.6	361.32	333.66	0.32
Trib1	8381	Atlas 14 100-yr	1001.70	259.83	267.59		267.75	0.007084	4.2	511.92	334.58	0.28
Trib1	8329	10-yr	536.90	257.36	266.00	264.04	266.05	0.003625	2.4	318.91	109.23	0.18
Trib1	8329	50-yr	718.40	257.36	266.48	264.32	266.55	0.004219	2.8	370.61	114.29	0.20
Trib1	8329	100-yr	808.30	257.36	266.70	264.45	266.86	0.009185	4.2	404.66	304.15	0.29
Trib1	8329	Atlas 14 100-yr	1001.70	257.36	267.30	264.68	267.39	0.005503	3.4	589.82	305.37	0.23
Trib1	8267	10-yr	536.90	256.83	265.85		265.88	0.002282	1.9	437.61	159.06	0.14
Trib1	8267	50-yr	718.40	256.83	266.32		266.36	0.002526	2.1	512.19	160.20	0.15

HEC-RAS Plan: P_Alt2_Brg_40ft (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)	
Trib1	8267	100-yr	808.30	256.83	266.53		266.56	0.002641	2.2	545.06	160.84	0.15
Trib1	8267	Atlas 14 100-yr	1001.70	256.83	267.06		267.12	0.003971	2.8	699.42	333.87	0.19
Trib1	8201	10-yr	536.90	256.83	265.69		265.73	0.002883	2.1	401.12	156.35	0.15
Trib1	8201	50-yr	718.40	256.83	266.14		266.18	0.003228	2.3	472.07	159.83	0.16
Trib1	8201	100-yr	808.30	256.83	266.33		266.38	0.003435	2.4	503.43	162.79	0.16
Trib1	8201	Atlas 14 100-yr	1001.70	256.83	266.73		266.82	0.006214	3.4	579.74	333.18	0.22
Trib1	8148	10-yr	536.90	256.83	265.57		265.60	0.002339	2.0	434.65	172.22	0.15
Trib1	8148	50-yr	718.40	256.83	266.00		266.04	0.002610	2.2	509.98	173.13	0.16
Trib1	8148	100-yr	808.30	256.83	266.19		266.23	0.002747	2.3	542.48	173.66	0.16
Trib1	8148	Atlas 14 100-yr	1001.70	256.83	266.55		266.61	0.003023	2.5	605.81	174.83	0.17
Trib1	8116	10-yr	536.90	256.83	265.51		265.54	0.002008	1.8	486.66	199.96	0.13
Trib1	8116	50-yr	718.40	256.83	265.94		265.97	0.002202	2.0	573.16	200.83	0.14
Trib1	8116	100-yr	808.30	256.83	266.13		266.16	0.002302	2.1	610.36	201.21	0.15
Trib1	8116	Atlas 14 100-yr	1001.70	256.83	266.48		266.53	0.002507	2.2	682.65	201.93	0.15
Trib1	8079	10-yr	536.90	256.83	265.43	263.09	265.46	0.002354	1.9	470.23	202.50	0.14
Trib1	8079	50-yr	718.40	256.83	265.85	264.10	265.89	0.002529	2.0	556.45	203.36	0.15
Trib1	8079	100-yr	808.30	256.83	266.03	264.19	266.07	0.002627	2.1	593.36	203.73	0.15
Trib1	8079	Atlas 14 100-yr	1001.70	256.83	266.39	264.34	266.43	0.002834	2.3	664.99	204.44	0.16
Trib1	8027	10-yr	536.90	256.83	265.31		265.35	0.002110	2.0	431.01	177.78	0.14
Trib1	8027	50-yr	718.40	256.83	265.72		265.76	0.002461	2.3	503.85	178.61	0.16
Trib1	8027	100-yr	808.30	256.83	265.89		265.94	0.002632	2.4	534.82	178.96	0.16
Trib1	8027	Atlas 14 100-yr	1001.70	256.83	266.22		266.28	0.002979	2.6	594.77	179.73	0.18
Trib1	7977	10-yr	536.90	256.83	265.14		265.19	0.005123	2.6	337.54	165.18	0.20
Trib1	7977	50-yr	718.40	256.83	265.52		265.59	0.005779	2.9	402.95	176.11	0.22
Trib1	7977	100-yr	808.30	256.83	265.68		265.75	0.005960	3.0	431.87	176.75	0.22
Trib1	7977	Atlas 14 100-yr	1001.70	256.83	266.00		266.08	0.006355	3.2	487.61	177.77	0.23
Trib1	7925	10-yr	536.90	256.83	264.93		264.98	0.003424	2.4	379.94	191.10	0.18
Trib1	7925	50-yr	718.40	256.83	265.28		265.35	0.003926	2.6	448.01	192.00	0.19
Trib1	7925	100-yr	808.30	256.83	265.44		265.50	0.004164	2.8	477.30	192.38	0.20
Trib1	7925	Atlas 14 100-yr	1001.70	256.83	265.73		265.81	0.004660	3.0	533.28	193.11	0.21
Trib1	7851	10-yr	536.90	256.83	264.77		264.79	0.001907	1.8	600.91	372.25	0.13
Trib1	7851	50-yr	718.40	256.83	265.12		265.14	0.001982	1.9	730.31	373.09	0.14
Trib1	7851	100-yr	808.30	256.83	265.26		265.29	0.002033	2.0	785.46	373.45	0.14
Trib1	7851	Atlas 14 100-yr	1001.70	256.83	265.54		265.57	0.002160	2.1	890.06	374.13	0.14
Trib1	7803	10-yr	536.90	256.83	264.70		264.72	0.001228	1.4	617.50	399.17	0.11
Trib1	7803	50-yr	718.40	256.83	265.05		265.07	0.001204	1.5	756.01	400.07	0.11
Trib1	7803	100-yr	808.30	256.83	265.19		265.21	0.001213	1.5	814.67	400.41	0.11
Trib1	7803	Atlas 14 100-yr	1001.70	256.83	265.47		265.49	0.001254	1.6	925.41	400.96	0.11
Trib1	7688	10-yr	536.90	256.83	264.53		264.56	0.001694	1.6	535.41	385.38	0.12
Trib1	7688	50-yr	718.40	256.83	264.89		264.91	0.001537	1.6	673.29	387.68	0.11
Trib1	7688	100-yr	808.30	256.83	265.04		265.06	0.001514	1.6	730.67	387.98	0.11
Trib1	7688	Atlas 14 100-yr	1001.70	256.83	265.31		265.34	0.001526	1.6	836.87	390.14	0.12
Trib1	7637	10-yr	536.90	256.83	264.45		264.47	0.001485	1.6	525.90	382.17	0.12
Trib1	7637	50-yr	718.40	256.83	264.82		264.84	0.001342	1.6	665.65	382.92	0.12
Trib1	7637	100-yr	808.30	256.83	264.97		264.99	0.001325	1.6	722.76	383.23	0.12
Trib1	7637	Atlas 14 100-yr	1001.70	256.83	265.24		265.26	0.001342	1.7	827.24	383.79	0.12
Trib1	7588	10-yr	536.90	256.83	264.38		264.40	0.001892	1.7	497.55	386.54	0.13
Trib1	7588	50-yr	718.40	256.83	264.76		264.78	0.001622	1.6	643.53	387.69	0.13
Trib1	7588	100-yr	808.30	256.83	264.91		264.93	0.001582	1.7	702.12	387.99	0.12
Trib1	7588	Atlas 14 100-yr	1001.70	256.83	265.18		265.21	0.001577	1.7	808.18	388.53	0.13
Trib1	7494	10-yr	536.90	256.83	263.97	261.66	264.10	0.007090	3.7	325.01	332.80	0.27
Trib1	7494	50-yr	718.40	256.83	264.48		264.55	0.004507	3.1	493.34	334.36	0.22
Trib1	7494	100-yr	808.30	256.83	264.64		264.71	0.004249	3.1	548.83	334.97	0.21
Trib1	7494	Atlas 14 100-yr	1001.70	256.83	264.92		264.99	0.004141	3.1	642.85	336.00	0.21
Trib1	7365	10-yr	536.90	256.83	262.95		263.12	0.008366	3.3	164.63	39.46	0.28
Trib1	7365	50-yr	718.40	256.83	263.48	260.72	263.70	0.010460	3.8	214.27	354.51	0.32
Trib1	7365	100-yr	808.30	256.83	263.72		263.92	0.009542	3.8	298.60	354.99	0.31
Trib1	7365	Atlas 14 100-yr	1001.70	256.83	264.12		264.28	0.007801	3.6	440.90	355.81	0.28
Trib1	7293	10-yr	536.90	256.83	262.67		262.75	0.003027	3.0	308.70	105.71	0.23
Trib1	7293	50-yr	718.40	256.83	263.17		263.26	0.003430	3.4	361.47	106.74	0.25
Trib1	7293	100-yr	808.30	256.83	263.38		263.49	0.003618	3.5	384.61	107.18	0.26
Trib1	7293	Atlas 14 100-yr	1001.70	256.83	263.81		263.90	0.003314	3.5	556.19	410.69	0.25

HEC-RAS Plan: P_Alt2_Brg_40ft (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)	
Trib1	7206	10-yr	536.90	256.83	262.33	259.92	262.45	0.003559	3.2	238.59	83.78	0.26
Trib1	7206	50-yr	718.40	256.83	262.74	260.81	262.91	0.004421	3.7	272.29	86.22	0.29
Trib1	7206	100-yr	808.30	256.83	262.92	260.97	263.10	0.004837	4.0	286.83	87.41	0.30
Trib1	7206	Atlas 14 100-yr	1001.70	256.83	263.28	261.29	263.51	0.005637	4.5	316.17	92.19	0.33
Trib1	7163	10-yr	536.90	256.72	262.19		262.28	0.003839	3.1	294.51	122.97	0.25
Trib1	7163	50-yr	718.40	256.72	262.60		262.70	0.004380	3.5	344.03	123.79	0.27
Trib1	7163	100-yr	808.30	256.72	262.77		262.88	0.004647	3.7	365.28	124.14	0.28
Trib1	7163	Atlas 14 100-yr	1001.70	256.72	263.11		263.25	0.005116	4.1	408.57	124.88	0.30
Trib1	7115	10-yr	536.90	253.54	262.01		262.10	0.003564	3.0	285.33	119.21	0.23
Trib1	7115	50-yr	718.40	253.54	262.37		262.49	0.004324	3.4	328.82	120.40	0.26
Trib1	7115	100-yr	808.30	253.54	262.53		262.65	0.004698	3.7	347.23	120.82	0.27
Trib1	7115	Atlas 14 100-yr	1001.70	253.54	262.84		262.99	0.005364	4.1	385.31	121.69	0.29
Trib1	7052	10-yr	536.90	253.54	261.92		261.96	0.001423	2.0	382.89	163.84	0.15
Trib1	7052	50-yr	718.40	253.54	262.26		262.32	0.001707	2.3	439.93	165.73	0.17
Trib1	7052	100-yr	808.30	253.54	262.41		262.47	0.001849	2.4	463.93	166.73	0.18
Trib1	7052	Atlas 14 100-yr	1001.70	253.54	262.71		262.79	0.002095	2.7	514.32	168.37	0.19
Trib1	6989	10-yr	536.90	253.54	261.79		261.85	0.002248	2.3	334.43	161.99	0.19
Trib1	6989	50-yr	718.40	253.54	262.12		262.19	0.002634	2.6	386.87	162.67	0.21
Trib1	6989	100-yr	808.30	253.54	262.25		262.33	0.002841	2.8	408.35	162.94	0.22
Trib1	6989	Atlas 14 100-yr	1001.70	253.54	262.53		262.63	0.003172	3.1	454.05	163.53	0.23
Trib1	6914	10-yr	536.90	253.54	261.72		261.74	0.000787	1.4	555.54	275.34	0.12
Trib1	6914	50-yr	718.40	253.54	262.04		262.06	0.000914	1.6	642.14	275.97	0.13
Trib1	6914	100-yr	808.30	253.54	262.16		262.19	0.000984	1.6	677.22	276.23	0.13
Trib1	6914	Atlas 14 100-yr	1001.70	253.54	262.44		262.47	0.001091	1.8	753.00	276.77	0.14
Trib1	6847	10-yr	536.90	253.54	261.66		261.69	0.001243	1.9	453.27	232.77	0.14
Trib1	6847	50-yr	718.40	253.54	261.96		262.00	0.001467	2.1	524.25	233.38	0.16
Trib1	6847	100-yr	808.30	253.54	262.09		262.13	0.001591	2.2	552.62	233.62	0.16
Trib1	6847	Atlas 14 100-yr	1001.70	253.54	262.35		262.40	0.001778	2.4	614.76	234.14	0.18
Trib1	6756	10-yr	536.90	253.54	261.58		261.60	0.000874	1.5	541.81	301.21	0.12
Trib1	6756	50-yr	718.40	253.54	261.88		261.90	0.001000	1.7	630.22	301.81	0.13
Trib1	6756	100-yr	808.30	253.54	261.99		262.02	0.001076	1.8	664.90	302.04	0.14
Trib1	6756	Atlas 14 100-yr	1001.70	253.54	262.25		262.28	0.001178	1.9	742.61	302.57	0.14
Trib1	6663	10-yr	536.90	253.54	261.46		261.49	0.001957	1.8	465.63	281.88	0.13
Trib1	6663	50-yr	718.40	253.54	261.73		261.77	0.002223	2.0	543.22	283.90	0.14
Trib1	6663	100-yr	808.30	253.54	261.83		261.88	0.002404	2.1	572.40	284.37	0.15
Trib1	6663	Atlas 14 100-yr	1001.70	253.54	262.08		262.13	0.002612	2.2	641.07	285.46	0.16
Trib1	6582	10-yr	536.90	253.54	261.24		261.27	0.003740	2.2	475.09	350.07	0.18
Trib1	6582	50-yr	718.40	253.54	261.48		261.53	0.004212	2.4	562.22	350.76	0.19
Trib1	6582	100-yr	808.30	253.54	261.57		261.61	0.004631	2.5	590.82	350.98	0.20
Trib1	6582	Atlas 14 100-yr	1001.70	253.54	261.79		261.84	0.004953	2.7	669.33	351.59	0.21
Trib1	6523	10-yr	536.90	253.54	261.07		261.10	0.002472	1.9	459.91	362.03	0.15
Trib1	6523	50-yr	718.40	253.54	261.29		261.33	0.002865	2.1	541.20	363.93	0.17
Trib1	6523	100-yr	808.30	253.54	261.35		261.39	0.003269	2.3	561.86	364.41	0.18
Trib1	6523	Atlas 14 100-yr	1001.70	253.54	261.55		261.61	0.003497	2.4	638.06	366.17	0.19
Trib1	6462	10-yr	536.90	253.54	260.97		261.00	0.001599	1.9	443.83	382.76	0.13
Trib1	6462	50-yr	718.40	253.54	261.18		261.22	0.001722	2.0	526.81	383.28	0.13
Trib1	6462	100-yr	808.30	253.54	261.23		261.27	0.001994	2.2	542.48	383.38	0.14
Trib1	6462	Atlas 14 100-yr	1001.70	253.54	261.43		261.48	0.002006	2.2	622.04	383.88	0.15
Trib1	6391	10-yr	536.90	253.54	260.39	258.79	260.69	0.017489	5.4	239.63	392.69	0.41
Trib1	6391	50-yr	718.40	253.54	260.48	259.43	260.86	0.024240	6.4	272.97	395.70	0.48
Trib1	6391	100-yr	808.30	253.54	260.69	259.73	260.92	0.016489	5.5	357.48	396.46	0.40
Trib1	6391	Atlas 14 100-yr	1001.70	253.54	261.05	260.33	261.17	0.010352	4.5	498.57	397.50	0.32
Trib1	6337	10-yr	536.90	253.54	259.96	257.12	260.12	0.005884	3.4	182.88	159.45	0.25
Trib1	6337	50-yr	718.40	253.54	260.25	257.66	260.32	0.003638	2.8	556.50	472.28	0.20
Trib1	6337	100-yr	808.30	253.54	260.44	257.87	260.50	0.003211	2.7	645.95	472.65	0.19
Trib1	6337	Atlas 14 100-yr	1001.70	253.54	260.84	258.29	260.88	0.002413	2.4	835.52	473.45	0.17
Trib1	6240	10-yr	536.90	253.54	258.53	257.72	259.01	0.029244	6.0	107.64	175.19	0.52
Trib1	6240	50-yr	718.40	253.54	258.75	258.17	259.47	0.041932	7.5	116.54	176.08	0.63
Trib1	6240	100-yr	808.30	253.54	258.82	258.39	259.69	0.049684	8.2	119.31	176.35	0.69
Trib1	6240	Atlas 14 100-yr	1001.70	253.54	258.89	258.79	260.16	0.070943	9.9	122.43	176.66	0.82
Trib1	6168	10-yr	536.90	253.54	258.62		258.63	0.001136	1.2	788.46	414.04	0.10

HEC-RAS Plan: P_Alt2_Brg_40ft (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)	
Trib1	6168	50-yr	718.40	253.54	258.98		258.99	0.001167	1.3	940.90	415.34	0.11
Trib1	6168	100-yr	808.30	253.54	259.15		259.16	0.001184	1.4	1008.79	415.92	0.11
Trib1	6168	Atlas 14 100-yr	1001.70	253.54	259.48		259.49	0.001212	1.4	1146.29	417.48	0.11
Trib1	6073	10-yr	536.90	253.34	258.50		258.52	0.001630	1.5	680.74	379.48	0.12
Trib1	6073	50-yr	718.40	253.34	258.87		258.88	0.001628	1.5	819.94	380.19	0.12
Trib1	6073	100-yr	808.30	253.34	259.03		259.05	0.001637	1.6	881.65	380.53	0.13
Trib1	6073	Atlas 14 100-yr	1001.70	253.34	259.36		259.38	0.001646	1.6	1006.74	381.21	0.13
Trib1	6008	10-yr	536.90	251.43	258.41		258.42	0.001536	1.4	721.42	433.09	0.12
Trib1	6008	50-yr	718.40	251.43	258.78		258.79	0.001474	1.5	882.14	436.75	0.11
Trib1	6008	100-yr	808.30	251.43	258.94		258.96	0.001461	1.5	953.38	438.37	0.11
Trib1	6008	Atlas 14 100-yr	1001.70	251.43	259.27		259.29	0.001431	1.5	1098.36	441.63	0.11
Trib1	5887	10-yr	536.90	250.58	258.10		258.14	0.003672	2.1	484.61	330.19	0.18
Trib1	5887	50-yr	718.40	250.58	258.49		258.52	0.003285	2.1	613.60	331.06	0.17
Trib1	5887	100-yr	808.30	250.58	258.66		258.69	0.003204	2.1	668.82	331.43	0.17
Trib1	5887	Atlas 14 100-yr	1001.70	250.58	259.00		259.03	0.003059	2.1	780.62	332.17	0.17
Trib1	5802	10-yr	536.90	250.26	257.98	253.56	258.00	0.000955	1.3	736.65	382.36	0.09
Trib1	5802	50-yr	718.40	250.26	258.37	254.26	258.39	0.001052	1.4	884.89	383.30	0.10
Trib1	5802	100-yr	808.30	250.26	258.54	254.57	258.55	0.001100	1.5	948.03	383.70	0.10
Trib1	5802	Atlas 14 100-yr	1001.70	250.26	258.87	255.18	258.89	0.001176	1.6	1076.70	384.88	0.10
Trib1	5713	10-yr	536.90	250.26	257.91	255.53	257.92	0.000732	1.2	739.13	336.41	0.08
Trib1	5713	50-yr	718.40	250.26	258.29	256.09	258.30	0.000860	1.4	865.69	337.21	0.09
Trib1	5713	100-yr	808.30	250.26	258.45	256.32	258.46	0.000922	1.4	919.35	337.55	0.09
Trib1	5713	Atlas 14 100-yr	1001.70	250.26	258.77	256.83	258.79	0.001028	1.5	1029.30	338.25	0.10
Trib1	5582	10-yr	536.90	250.26	257.80	255.32	257.82	0.001521	1.7	570.66	342.80	0.12
Trib1	5582	50-yr	718.40	250.26	258.16	255.91	258.18	0.001669	1.9	694.53	343.60	0.13
Trib1	5582	100-yr	808.30	250.26	258.31	256.17	258.33	0.001746	2.0	746.64	343.93	0.13
Trib1	5582	Atlas 14 100-yr	1001.70	250.26	258.62	256.67	258.65	0.001855	2.1	854.60	344.62	0.14
Trib1	5507	10-yr	536.90	250.26	257.66	254.92	257.68	0.002340	1.7	578.47	383.72	0.14
Trib1	5507	50-yr	718.40	250.26	258.02	255.64	258.04	0.002299	1.8	716.07	386.28	0.14
Trib1	5507	100-yr	808.30	250.26	258.17	255.95	258.19	0.002327	1.8	773.29	387.31	0.14
Trib1	5507	Atlas 14 100-yr	1001.70	250.26	258.48	256.91	258.50	0.002325	1.9	893.56	388.85	0.14
Trib1	5429	10-yr	536.90	250.26	257.24	255.91	257.34	0.009886	3.8	275.03	361.37	0.30
Trib1	5429	50-yr	718.40	250.26	257.66	256.53	257.74	0.007293	3.5	430.95	363.97	0.26
Trib1	5429	100-yr	808.30	250.26	257.82	257.05	257.89	0.006838	3.4	488.86	364.47	0.25
Trib1	5429	Atlas 14 100-yr	1001.70	250.26	258.16	257.20	258.22	0.005886	3.3	611.85	365.53	0.24
Trib1	5319	10-yr	536.90	250.26	256.51	254.56	256.59	0.005089	2.8	245.81	90.08	0.22
Trib1	5319	50-yr	718.40	250.26	257.04	254.84	257.12	0.004738	2.9	372.82	364.40	0.22
Trib1	5319	100-yr	808.30	250.26	257.21	254.97	257.28	0.004825	3.0	433.73	365.11	0.22
Trib1	5319	Atlas 14 100-yr	1001.70	250.26	257.63	255.22	257.69	0.004258	3.0	586.48	366.13	0.21
Trib1	5281	10-yr	536.90	250.26	256.00	254.69	256.22	0.015515	4.5	159.59	181.22	0.38
Trib1	5281	50-yr	718.40	250.26	256.44	255.05	256.73	0.017957	5.2	185.11	183.91	0.42
Trib1	5281	100-yr	808.30	250.26	256.51	255.22	256.86	0.021293	5.7	189.28	184.72	0.45
Trib1	5281	Atlas 14 100-yr	1001.70	250.26	256.82	255.54	257.26	0.024925	6.4	207.77	189.29	0.50
Trib1	5206	10-yr	536.90	250.26	255.77		255.79	0.002355	1.8	483.81	205.10	0.15
Trib1	5206	50-yr	718.40	250.26	256.23		256.25	0.002395	1.9	578.51	206.10	0.15
Trib1	5206	100-yr	808.30	250.26	256.25		256.28	0.002964	2.1	582.68	206.14	0.17
Trib1	5206	Atlas 14 100-yr	1001.70	250.26	256.56		256.60	0.003254	2.3	647.63	208.60	0.18
Trib1	5114	10-yr	536.90	250.26	255.57		255.58	0.001795	1.3	614.93	294.74	0.12
Trib1	5114	50-yr	718.40	250.26	256.04		256.05	0.001662	1.4	753.27	295.62	0.12
Trib1	5114	100-yr	808.30	250.26	256.00		256.02	0.002197	1.6	743.28	295.56	0.14
Trib1	5114	Atlas 14 100-yr	1001.70	250.26	256.30		256.32	0.002352	1.7	830.39	296.11	0.14
Trib1	5019	10-yr	536.90	250.26	255.42		255.44	0.001518	1.4	652.10	323.41	0.12
Trib1	5019	50-yr	718.40	250.26	255.90		255.92	0.001387	1.5	808.00	324.33	0.12
Trib1	5019	100-yr	808.30	250.26	255.82		255.84	0.001955	1.7	781.02	324.17	0.14
Trib1	5019	Atlas 14 100-yr	1001.70	250.26	256.10		256.13	0.002117	1.9	872.12	324.71	0.15
Trib1	4939	10-yr	536.90	250.26	255.29		255.30	0.001645	1.4	675.13	369.50	0.12
Trib1	4939	50-yr	718.40	250.26	255.78		255.80	0.001373	1.4	859.95	371.57	0.12
Trib1	4939	100-yr	808.30	250.26	255.64		255.66	0.002124	1.7	807.41	371.13	0.14
Trib1	4939	Atlas 14 100-yr	1001.70	250.26	255.91		255.93	0.002249	1.8	907.41	371.85	0.15
Trib1	4808	10-yr	536.90	250.19	255.01		255.03	0.002745	1.8	568.84	361.04	0.16
Trib1	4808	50-yr	718.40	250.19	255.58		255.60	0.001877	1.6	773.22	362.42	0.13
Trib1	4808	100-yr	808.30	250.19	255.28		255.31	0.003838	2.2	664.30	361.69	0.19

HEC-RAS Plan: P_Alt2_Brg_40ft (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)	
Trib1	4808	Atlas 14 100-yr	1001.70	250.19	255.53		255.57	0.003915	2.3	756.32	362.31	0.19
Trib1	4738	10-yr	536.90	246.98	254.81		254.84	0.003031	2.1	515.62	349.26	0.16
Trib1	4738	50-yr	718.40	246.98	255.45		255.47	0.001926	1.8	739.92	352.92	0.13
Trib1	4738	100-yr	808.30	246.98	254.95		255.01	0.005326	2.8	564.97	351.24	0.21
Trib1	4738	Atlas 14 100-yr	1001.70	246.98	255.20		255.26	0.005417	2.9	653.19	352.25	0.22
Trib1	4694	10-yr	536.90	246.84	254.71	252.32	254.73	0.001952	1.6	629.08	377.55	0.13
Trib1	4694	50-yr	718.40	246.84	255.38	253.05	255.40	0.001256	1.4	883.63	378.96	0.11
Trib1	4694	100-yr	808.30	246.84	254.75	253.81	254.79	0.004127	2.4	644.23	377.64	0.19
Trib1	4694	Atlas 14 100-yr	1001.70	246.84	254.99	253.72	255.04	0.004254	2.5	736.70	378.15	0.19
Trib1	4554	10-yr	536.90	246.38	254.55	252.96	254.56	0.000830	1.0	871.21	421.61	0.08
Trib1	4554	50-yr	718.40	246.38	255.27	253.54	255.28	0.000583	0.9	1177.15	423.01	0.07
Trib1	4554	100-yr	808.30	246.38	254.30	253.54	254.32	0.002784	1.7	765.14	421.12	0.15
Trib1	4554	Atlas 14 100-yr	1001.70	246.38	254.51	253.54	254.53	0.003064	1.9	854.59	421.53	0.15
Trib1	4405	10-yr	536.90	245.89	252.77	252.77	254.03	0.133714	10.0	63.39	160.75	0.92
Trib1	4405	50-yr	718.40	245.89	253.34	253.34	254.84	0.133466	11.0	77.82	166.64	0.94
Trib1	4405	100-yr	808.30	245.89	253.54	253.54	253.60	0.011985	3.4	506.52	455.60	0.28
Trib1	4405	Atlas 14 100-yr	1001.70	245.89	253.68	253.54	253.75	0.013143	3.6	569.10	459.44	0.30
Trib1	4303	10-yr	536.90	245.56	252.54		252.54	0.000687	1.0	890.37	371.21	0.08
Trib1	4303	50-yr	718.40	245.56	252.89		252.90	0.000792	1.1	1022.05	371.93	0.08
Trib1	4303	100-yr	808.30	245.56	253.08		253.09	0.000812	1.2	1091.88	372.32	0.08
Trib1	4303	Atlas 14 100-yr	1001.70	245.56	253.49		253.50	0.000819	1.2	1244.17	373.44	0.09
Trib1	4194	10-yr	536.90	245.20	252.46		252.47	0.000749	1.1	852.94	362.89	0.08
Trib1	4194	50-yr	718.40	245.20	252.80		252.81	0.000874	1.2	977.29	363.63	0.09
Trib1	4194	100-yr	808.30	245.20	252.99		253.00	0.000897	1.3	1044.80	364.58	0.09
Trib1	4194	Atlas 14 100-yr	1001.70	245.20	253.40		253.41	0.000902	1.3	1193.93	366.67	0.09
Trib1	3930	10-yr	536.90	244.33	252.28		252.29	0.000646	1.0	836.66	380.32	0.07
Trib1	3930	50-yr	718.40	244.33	252.60		252.61	0.000762	1.2	955.52	381.22	0.08
Trib1	3930	100-yr	808.30	244.33	252.78		252.79	0.000773	1.2	1024.94	381.74	0.08
Trib1	3930	Atlas 14 100-yr	1001.70	244.33	253.19		253.20	0.000757	1.2	1181.57	386.21	0.08
Trib1	3808	10-yr	536.90	243.93	252.16		252.18	0.001279	1.5	673.12	317.97	0.10
Trib1	3808	50-yr	718.40	243.93	252.45		252.47	0.001563	1.7	764.88	319.25	0.11
Trib1	3808	100-yr	808.30	243.93	252.63		252.65	0.001589	1.7	822.33	320.05	0.12
Trib1	3808	Atlas 14 100-yr	1001.70	243.93	253.04		253.07	0.001545	1.8	954.64	322.18	0.12
Trib1	3654.35	10-yr	536.90	243.43	251.77		251.78	0.001960	1.4	695.25	440.51	0.10
Trib1	3654.35	50-yr	718.40	243.43	251.97		251.99	0.002425	1.6	782.49	441.46	0.12
Trib1	3654.35	100-yr	808.30	243.43	252.17		252.18	0.002199	1.6	869.67	442.41	0.11
Trib1	3654.35	Atlas 14 100-yr	1001.70	243.43	252.64		252.66	0.001691	1.5	1080.12	444.68	0.10
Trib1	3593.5	10-yr	536.90	243.35	249.68	249.68	251.02	0.140327	9.3	57.84	33.99	1.00
Trib1	3593.5	50-yr	718.40	243.35	250.41	250.41	251.20	0.079774	7.9	186.83	604.20	0.77
Trib1	3593.5	100-yr	808.30	243.35	250.41	250.41	251.41	0.100990	8.9	186.83	604.20	0.87
Trib1	3593.5	Atlas 14 100-yr	1001.70	243.35	250.41	250.41	251.94	0.155098	11.0	186.83	604.20	1.08
Trib1	3532.7	10-yr	536.90	243.00	248.57		248.59	0.004742	1.7	450.98	278.61	0.18
Trib1	3532.7	50-yr	718.40	243.00	248.82		248.85	0.005396	1.9	519.45	280.08	0.19
Trib1	3532.7	100-yr	808.30	243.00	248.96		248.99	0.005385	1.9	559.37	280.93	0.19
Trib1	3532.7	Atlas 14 100-yr	1001.70	243.00	249.26		249.30	0.005229	1.9	645.03	282.86	0.19
Trib1	3498	10-yr	488.00	242.92	248.49	247.35	248.51	0.000694	0.6	532.96	475.71	0.07
Trib1	3498	50-yr	680.30	242.92	248.72	247.44	248.74	0.000847	0.7	612.38	476.17	0.08
Trib1	3498	100-yr	787.80	242.92	248.86	247.50	248.89	0.000881	0.8	660.72	476.45	0.08
Trib1	3498	Atlas 14 100-yr	1094.70	242.92	249.16	247.64	249.19	0.001060	0.9	761.15	477.04	0.09
Trib1	3454		Culvert									
Trib1	3396	10-yr	488.00	242.92	247.87	247.28	247.89	0.000373	1.2	387.04	505.90	0.11
Trib1	3396	50-yr	680.30	242.92	248.04	247.36	248.08	0.000422	1.3	457.33	506.44	0.12
Trib1	3396	100-yr	787.80	242.92	248.14	247.40	248.18	0.000434	1.4	495.97	506.73	0.12
Trib1	3396	Atlas 14 100-yr	1094.70	242.92	248.41	247.52	248.46	0.000450	1.5	601.65	512.08	0.13
Trib1	3291.40	10-yr	488.00	242.70	247.73		247.76	0.000861	2.0	559.92	546.29	0.21
Trib1	3291.40	50-yr	680.30	242.70	247.89		247.92	0.001082	2.3	645.07	547.11	0.24
Trib1	3291.40	100-yr	787.80	242.70	247.98		248.01	0.001146	2.4	695.72	547.48	0.25
Trib1	3291.40	Atlas 14 100-yr	1094.70	242.70	248.24		248.28	0.001223	2.6	838.76	548.55	0.26
Trib1	3186.81	10-yr	488.00	242.65	247.64	247.08	247.66	0.001097	1.9	542.08	549.65	0.19
Trib1	3186.81	50-yr	680.30	242.65	247.77	247.11	247.79	0.001450	2.2	612.48	550.04	0.21
Trib1	3186.81	100-yr	787.80	242.65	247.85	247.11	247.88	0.001535	2.3	659.37	550.21	0.22

HEC-RAS Plan: P_Alt2_Brg_40ft (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)	
Trib1	3186.81	Atlas 14 100-yr	1094.70	242.65	248.11	247.11	248.14	0.001589	2.5	799.26	550.71	0.23
Trib1	3135	10-yr	488.00	242.58	247.35	247.35	247.51	0.005213	4.7	278.05	561.06	0.51
Trib1	3135	50-yr	680.30	242.58	247.51	247.44	247.64	0.004732	4.7	368.72	561.95	0.49
Trib1	3135	100-yr	787.80	242.58	247.65	247.48	247.75	0.003545	4.2	450.16	563.10	0.43
Trib1	3135	Atlas 14 100-yr	1094.70	242.58	247.96	247.59	248.03	0.002509	3.8	623.17	563.97	0.37
Trib1	2958.70	10-yr	488.00	241.69	244.59	243.88	245.10	0.007303	5.7	85.64	37.79	0.63
Trib1	2958.70	50-yr	680.30	241.69	245.11	244.38	245.78	0.008046	6.6	103.69	44.04	0.68
Trib1	2958.70	100-yr	787.80	241.69	245.38	244.63	246.13	0.008369	6.9	113.41	48.79	0.70
Trib1	2958.70	Atlas 14 100-yr	1094.70	241.69	245.95	245.31	246.74	0.007810	7.5	255.67	380.71	0.69
Trib1	2782.40	10-yr	488.00	240.81	243.22	242.27	243.46	0.003865	3.9	124.64	62.05	0.46
Trib1	2782.40	50-yr	680.30	240.81	243.76	242.62	244.06	0.003840	4.4	154.29	64.93	0.47
Trib1	2782.40	100-yr	787.80	240.81	244.01	242.80	244.35	0.003922	4.7	168.64	67.26	0.48
Trib1	2782.40	Atlas 14 100-yr	1094.70	240.81	244.57	243.27	244.98	0.004054	5.2	300.50	344.60	0.50
Trib1	2709	10-yr	488.00	240.44	242.61	241.87	242.90	0.005240	4.3	113.97	62.27	0.53
Trib1	2709	50-yr	680.30	240.44	243.20	242.22	243.53	0.004561	4.6	146.76	64.89	0.51
Trib1	2709	100-yr	787.80	240.44	243.43	242.39	243.81	0.004699	4.9	160.04	67.07	0.52
Trib1	2709	Atlas 14 100-yr	1094.70	240.44	243.94	242.86	244.41	0.005063	5.6	268.18	338.58	0.55
Trib1	2566	10-yr	488.00	239.53	242.33		242.45	0.001716	2.9	224.87	99.90	0.31
Trib1	2566	50-yr	680.30	239.53	242.97		243.11	0.001621	3.2	289.73	103.66	0.31
Trib1	2566	100-yr	787.80	239.53	243.20		243.36	0.001737	3.4	313.49	105.02	0.33
Trib1	2566	Atlas 14 100-yr	1094.70	239.53	243.63		243.87	0.002289	4.2	359.34	108.48	0.38
Trib1	2465	10-yr	505.40	238.88	242.24		242.31	0.000880	2.1	253.62	97.56	0.23
Trib1	2465	50-yr	699.70	238.88	242.89		242.98	0.000853	2.4	317.58	100.43	0.23
Trib1	2465	100-yr	810.10	238.88	243.11		243.21	0.000935	2.6	340.04	101.82	0.24
Trib1	2465	Atlas 14 100-yr	1123.00	238.88	243.52		243.67	0.001302	3.2	381.88	105.64	0.29
Trib1	2258	10-yr	505.40	237.56	242.16	238.83	242.21	0.000295	1.7	290.45	241.12	0.14
Trib1	2258	50-yr	699.70	237.56	242.87	239.13	242.89	0.000163	1.4	716.68	245.55	0.11
Trib1	2258	100-yr	810.10	237.56	243.10	239.30	243.12	0.000180	1.5	768.33	246.89	0.11
Trib1	2258	Atlas 14 100-yr	1123.00	237.56	243.50	239.72	243.54	0.000251	1.8	861.78	250.68	0.14
Trib1	2224		Bridge									
Trib1	2181	10-yr	505.40	237.14	241.66	240.01	241.86	0.007077	3.7	149.21	209.30	0.35
Trib1	2181	50-yr	699.70	237.14	241.91	240.76	242.23	0.010209	4.7	163.91	210.71	0.42
Trib1	2181	100-yr	810.10	237.14	242.08	240.99	242.45	0.011486	5.1	173.51	211.62	0.45
Trib1	2181	Atlas 14 100-yr	1123.00	237.14	242.34	241.47	242.94	0.016952	6.5	188.86	213.09	0.55
Trib1	2066	10-yr	505.40	233.86	241.40		241.42	0.001714	1.8	456.14	392.68	0.14
Trib1	2066	50-yr	699.70	233.86	241.63		241.66	0.001898	1.9	547.66	393.35	0.15
Trib1	2066	100-yr	810.10	233.86	241.87		241.90	0.001561	1.8	641.17	393.83	0.14
Trib1	2066	Atlas 14 100-yr	1123.00	233.86	242.15		242.19	0.001820	2.0	751.09	394.50	0.15
Trib1	1943	10-yr	505.40	233.26	240.67	238.41	240.97	0.011252	4.9	198.31	477.03	0.40
Trib1	1943	50-yr	699.70	233.26	241.29		241.36	0.003505	2.9	496.02	478.36	0.23
Trib1	1943	100-yr	810.10	233.26	241.64		241.68	0.002084	2.4	665.75	479.11	0.18
Trib1	1943	Atlas 14 100-yr	1123.00	233.26	241.89		241.94	0.002490	2.7	782.51	479.63	0.19
Trib1	1845	10-yr	505.40	232.78	239.00		239.62	0.017040	6.4	85.44	23.20	0.51
Trib1	1845	50-yr	699.70	232.78	239.82		240.63	0.018752	7.5	105.06	24.92	0.54
Trib1	1845	100-yr	810.10	232.78	240.22		241.14	0.019626	8.0	115.29	26.00	0.56
Trib1	1845	Atlas 14 100-yr	1123.00	232.78	241.26	239.64	241.53	0.007699	5.5	468.61	418.05	0.36
Trib1	1740	10-yr	505.40	232.26	237.34	235.64	237.82	0.016070	5.5	92.65	80.34	0.49
Trib1	1740	50-yr	699.70	232.26	238.18	236.33	238.75	0.015516	6.2	118.28	87.30	0.50
Trib1	1740	100-yr	810.10	232.26	238.58	236.69	239.21	0.015467	6.5	131.12	90.21	0.50
Trib1	1740	Atlas 14 100-yr	1123.00	232.26	239.56	237.77	240.35	0.015624	7.3	163.77	97.30	0.52
Trib1	1635	10-yr	505.40	231.75	237.11	234.04	237.28	0.001909	3.3	153.31	32.16	0.27
Trib1	1635	50-yr	699.70	231.75	237.96	234.58	238.18	0.002079	3.8	189.88	463.36	0.29
Trib1	1635	100-yr	810.10	231.75	238.36	234.85	238.62	0.002167	4.1	208.21	472.68	0.29
Trib1	1635	Atlas 14 100-yr	1123.00	231.75	239.35	235.58	239.69	0.002385	4.8	254.54	488.54	0.32
Trib1	1568	10-yr	505.40	231.42	236.95	233.85	237.14	0.002251	3.5	142.96	29.87	0.28
Trib1	1568	50-yr	699.70	231.42	237.76	234.44	238.02	0.002512	4.1	178.04	275.03	0.31
Trib1	1568	100-yr	810.10	231.42	238.16	234.75	238.45	0.002586	4.4	197.62	280.88	0.32
Trib1	1568	Atlas 14 100-yr	1123.00	231.42	239.15	235.53	239.52	0.002737	5.0	247.35	302.07	0.33
Trib1	1446	10-yr	505.40	230.58	236.50	234.99	236.75	0.004694	4.0	127.65	41.62	0.40
Trib1	1446	50-yr	699.70	230.58	237.35	235.43	237.63	0.004123	4.3	167.56	168.70	0.39
Trib1	1446	100-yr	810.10	230.58	237.78	235.65	238.07	0.003726	4.4	195.95	181.25	0.37

HEC-RAS Plan: P_Alt2_Brg_40ft (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)	
Trib1	1446	Atlas 14 100-yr	1123.00	230.58	238.83	236.24	239.14	0.003104	4.6	266.12	200.72	0.35
Trib1	1388	10-yr	521.40	230.54	235.97	234.78	236.37	0.008288	5.0	103.66	34.06	0.51
Trib1	1388	50-yr	717.40	230.54	236.85	235.28	237.30	0.007149	5.3	134.36	35.82	0.49
Trib1	1388	100-yr	830.50	230.54	237.29	235.54	237.76	0.006743	5.5	152.77	123.13	0.48
Trib1	1388	Atlas 14 100-yr	1150.00	230.54	238.38	236.23	238.88	0.005469	5.8	211.84	153.54	0.45
Trib1	1107	10-yr	521.40	228.33	234.74	231.10	234.89	0.003349	3.1	173.20	43.00	0.24
Trib1	1107	50-yr	717.40	228.33	235.69	231.69	235.87	0.003443	3.5	212.20	51.97	0.25
Trib1	1107	100-yr	830.50	228.33	236.13	231.99	236.34	0.003562	3.7	231.21	59.88	0.26
Trib1	1107	Atlas 14 100-yr	1150.00	228.33	237.37	232.78	237.61	0.003403	4.1	317.79	291.34	0.26
Trib1	1067		Culvert									
Trib1	1016	10-yr	521.40	227.80	234.53	230.45	234.67	0.003999	3.1	170.02	38.10	0.25
Trib1	1016	50-yr	717.40	227.80	235.32	231.08	235.52	0.004425	3.6	200.67	39.64	0.27
Trib1	1016	100-yr	830.50	227.80	235.65	231.42	235.89	0.004814	3.9	214.23	40.26	0.29
Trib1	1016	Atlas 14 100-yr	1150.00	227.80	236.34	232.27	236.70	0.006237	4.8	243.51	45.57	0.34
Trib1	913	10-yr	521.40	227.62	234.27		234.35	0.002040	2.2	233.12	51.66	0.19
Trib1	913	50-yr	717.40	227.62	235.03		235.14	0.002399	2.6	272.85	53.23	0.20
Trib1	913	100-yr	830.50	227.62	235.34		235.47	0.002688	2.9	289.58	53.87	0.22
Trib1	913	Atlas 14 100-yr	1150.00	227.62	235.93		236.12	0.003776	3.6	321.33	55.08	0.26
Trib1	728	10-yr	521.40	227.30	233.65		233.79	0.004804	3.0	173.43	46.86	0.28
Trib1	728	50-yr	717.40	227.30	234.40		234.55	0.004271	3.2	278.95	177.52	0.27
Trib1	728	100-yr	830.50	227.30	234.72		234.87	0.003984	3.2	335.85	178.25	0.26
Trib1	728	Atlas 14 100-yr	1150.00	227.30	235.14		235.33	0.004856	3.8	410.85	179.13	0.29
Trib1	585	10-yr	521.40	227.30	232.99		233.12	0.004434	2.9	176.93	49.72	0.28
Trib1	585	50-yr	717.40	227.30	233.74		233.91	0.004642	3.3	214.86	51.38	0.29
Trib1	585	100-yr	830.50	227.30	234.11		234.28	0.004225	3.4	293.89	294.17	0.28
Trib1	585	Atlas 14 100-yr	1150.00	227.30	234.05	231.88	234.40	0.008762	4.8	277.18	293.63	0.40
Trib1	442	10-yr	521.40	227.30	232.31	229.62	232.45	0.004929	3.0	173.98	141.63	0.29
Trib1	442	50-yr	717.40	227.30	233.02	230.16	233.20	0.005177	3.4	211.85	145.66	0.30
Trib1	442	100-yr	830.50	227.30	233.40	230.69	233.59	0.005253	3.6	232.15	147.42	0.31
Trib1	442	Atlas 14 100-yr	1150.00	227.30	233.94	231.24	234.01	0.000913	1.6	588.39	477.29	0.13
Trib1	348	10-yr	537.80	227.30	231.80	229.36	231.96	0.005203	3.2	169.57	199.77	0.30
Trib1	348	50-yr	735.70	227.30	232.47	229.82	232.68	0.005718	3.6	201.79	203.76	0.32
Trib1	348	100-yr	851.60	227.30	232.82	230.07	233.05	0.005972	3.9	219.04	205.84	0.33
Trib1	348	Atlas 14 100-yr	1176.50	227.30	233.45	230.86	233.80	0.007554	4.7	251.04	209.86	0.37
Trib1	197	10-yr	537.80	227.30	229.10	229.10	229.94	0.070407	7.4	72.81	43.13	1.00
Trib1	197	50-yr	735.70	227.30	229.50	229.50	230.53	0.066097	8.1	90.37	43.97	1.00
Trib1	197	100-yr	851.60	227.30	229.72	229.72	230.84	0.064214	8.5	100.00	44.42	1.00
Trib1	197	Atlas 14 100-yr	1176.50	227.30	231.17	230.28	231.91	0.023017	6.9	174.86	264.21	0.65
TC_Main	4986	10-yr	2892.00	224.01	235.97	233.49	236.06	0.002147	3.4	1275.80	474.26	0.20
TC_Main	4986	50-yr	3915.90	224.01	236.45	234.89	236.56	0.002371	3.7	1499.81	476.84	0.21
TC_Main	4986	100-yr	4460.70	224.01	236.68	235.01	236.81	0.002472	3.8	1606.81	478.98	0.22
TC_Main	4986	Atlas 14 100-yr	5823.80	224.01	237.20	235.26	237.37	0.003351	4.6	1886.65	610.34	0.26
TC_Main	4863	10-yr	2892.00	224.01	235.89	232.73	235.94	0.000476	1.9	1936.57	589.38	0.10
TC_Main	4863	50-yr	3915.90	224.01	236.35	233.86	236.42	0.000613	2.3	2208.14	590.46	0.12
TC_Main	4863	100-yr	4460.70	224.01	236.57	233.86	236.65	0.000679	2.4	2338.18	590.97	0.13
TC_Main	4863	Atlas 14 100-yr	5823.80	224.01	237.07	233.96	237.17	0.000825	2.7	2635.07	592.47	0.14
TC_Main	4699	10-yr	2892.00	224.01	235.80	233.86	235.85	0.000591	1.8	1866.30	641.05	0.10
TC_Main	4699	50-yr	3915.90	224.01	236.24	233.87	236.31	0.000757	2.1	2145.00	641.92	0.12
TC_Main	4699	100-yr	4460.70	224.01	236.45	233.96	236.53	0.000836	2.3	2278.25	642.34	0.13
TC_Main	4699	Atlas 14 100-yr	5823.80	224.01	236.92	234.27	237.02	0.001014	2.6	2582.80	644.83	0.14
TC_Main	4573	10-yr	2892.00	224.01	235.71	232.08	235.76	0.000990	2.9	2053.83	789.52	0.15
TC_Main	4573	50-yr	3915.90	224.01	236.12	233.04	236.19	0.001173	3.2	2382.81	790.38	0.17
TC_Main	4573	100-yr	4460.70	224.01	236.32	234.60	236.39	0.001257	3.4	2540.35	790.79	0.18
TC_Main	4573	Atlas 14 100-yr	5823.80	224.01	236.78	234.30	236.86	0.001430	3.7	2901.50	791.73	0.19
TC_Main	4419	10-yr	2892.00	224.01	235.44	234.49	235.52	0.002256	3.7	1883.93	927.55	0.22
TC_Main	4419	50-yr	3915.90	224.01	235.81	234.74	235.91	0.002589	4.1	2236.10	928.59	0.23
TC_Main	4419	100-yr	4460.70	224.01	236.00	234.86	236.10	0.002729	4.2	2406.63	929.10	0.24
TC_Main	4419	Atlas 14 100-yr	5823.80	224.01	236.43	235.10	236.54	0.002981	4.5	2803.81	930.08	0.25
TC_Main	4284	10-yr	2892.00	224.01	234.84	232.75	235.09	0.005092	5.5	1361.14	899.19	0.32
TC_Main	4284	50-yr	3915.90	224.01	235.12	234.08	235.41	0.006357	6.2	1606.35	900.55	0.36
TC_Main	4284	100-yr	4460.70	224.01	235.28	234.87	235.57	0.006638	6.4	1753.52	901.21	0.37

HEC-RAS Plan: P_Alt2_Brg_40ft (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)	
TC_Main	4284	Atlas 14 100-yr	5823.80	224.01	235.71	235.12	235.99	0.006681	6.7	2142.30	902.95	0.37
TC_Main	4205	10-yr	2892.00	224.01	234.52	232.98	234.71	0.004465	5.1	1209.27	922.70	0.30
TC_Main	4205	50-yr	3915.90	224.01	234.62	233.86	234.90	0.006763	6.3	1301.68	922.89	0.37
TC_Main	4205	100-yr	4460.70	224.01	234.83	234.52	235.08	0.005929	6.0	1504.25	923.31	0.35
TC_Main	4205	Atlas 14 100-yr	5823.80	224.01	235.36	234.71	235.55	0.004483	5.4	1991.52	924.33	0.31
TC_Main	4011	10-yr	2892.00	223.09	229.83	229.83	232.27	0.080471	14.4	264.16	178.32	1.13
TC_Main	4011	50-yr	3915.90	223.09	231.05	231.05	232.37	0.033694	10.7	444.14	187.04	0.76
TC_Main	4011	100-yr	4460.70	223.09	231.29	231.29	232.73	0.034599	11.2	479.99	188.96	0.77
TC_Main	4011	Atlas 14 100-yr	5823.80	223.09	231.84	231.84	233.57	0.035651	12.0	564.47	191.87	0.80
DS_Trib1	3921	10-yr	3358.40	210.12	224.07	219.16	224.72	0.006940	6.5	518.92	58.06	0.38
DS_Trib1	3921	50-yr	4570.30	210.12	225.87	220.49	226.69	0.007547	7.3	626.11	61.27	0.40
DS_Trib1	3921	100-yr	5224.10	210.12	226.75	221.13	227.67	0.007816	7.7	681.25	63.24	0.41
DS_Trib1	3921	Atlas 14 100-yr	6858.00	210.12	228.68	222.56	229.80	0.008687	8.5	809.34	70.02	0.44
DS_Trib1	3815	10-yr	3358.40	208.80	223.68	217.24	224.10	0.004092	5.2	645.77	66.33	0.29
DS_Trib1	3815	50-yr	4570.30	208.80	225.44	218.46	226.00	0.004610	6.0	764.11	67.72	0.31
DS_Trib1	3815	100-yr	5224.10	208.80	226.31	219.06	226.94	0.004841	6.3	823.40	68.42	0.32
DS_Trib1	3815	Atlas 14 100-yr	6858.00	208.80	228.16	220.42	228.96	0.005723	7.2	954.08	78.24	0.35
DS_Trib1	3703	10-yr	3358.40	207.79	223.16	216.37	223.61	0.004517	5.4	622.98	66.05	0.31
DS_Trib1	3703	50-yr	4570.30	207.79	224.85	217.79	225.45	0.005142	6.2	736.72	68.71	0.33
DS_Trib1	3703	100-yr	5224.10	207.79	225.69	218.50	226.36	0.005396	6.6	794.83	74.82	0.34
DS_Trib1	3703	Atlas 14 100-yr	6858.00	207.79	227.42	220.12	228.29	0.006215	7.5	918.17	217.32	0.37
DS_Trib1	3551	10-yr	3358.40	207.82	222.44	215.64	222.90	0.004926	5.4	618.31	70.51	0.32
DS_Trib1	3551	50-yr	4570.30	207.82	224.03	217.06	224.63	0.005699	6.2	734.79	76.08	0.35
DS_Trib1	3551	100-yr	5224.10	207.82	224.83	218.01	225.50	0.005963	6.6	797.34	78.91	0.36
DS_Trib1	3551	Atlas 14 100-yr	6858.00	207.82	226.46	219.56	227.31	0.006682	7.4	929.38	83.39	0.39
DS_Trib1	3367	10-yr	3358.40	207.31	222.08	214.92	222.41	0.001440	4.6	724.80	79.69	0.27
DS_Trib1	3367	50-yr	4570.30	207.31	223.60	216.17	224.05	0.001739	5.4	851.26	86.27	0.30
DS_Trib1	3367	100-yr	5224.10	207.31	224.35	216.81	224.85	0.002025	5.7	919.81	96.59	0.32
DS_Trib1	3367	Atlas 14 100-yr	6858.00	207.31	225.97	218.26	226.59	0.002157	6.3	1088.18	110.63	0.34
DS_Trib1	3167	10-yr	3358.40	206.97	221.68	217.21	222.04	0.002375	4.9	691.36	104.60	0.33
DS_Trib1	3167	50-yr	4570.30	206.97	223.20	218.25	223.62	0.002613	5.2	872.63	128.08	0.35
DS_Trib1	3167	100-yr	5224.10	206.97	223.93	218.75	224.39	0.002567	5.4	969.95	134.94	0.35
DS_Trib1	3167	Atlas 14 100-yr	6858.00	206.97	225.60	219.84	226.10	0.002381	5.7	1204.28	327.90	0.35
DS_Trib1	2996	10-yr	3358.40	207.09	221.49	215.14	221.74	0.001150	4.0	843.73	112.39	0.26
DS_Trib1	2996	50-yr	4570.30	207.09	222.97	216.43	223.28	0.001305	4.5	1015.75	120.05	0.27
DS_Trib1	2996	100-yr	5224.10	207.09	223.69	216.94	224.04	0.001378	4.7	1105.12	126.38	0.28
DS_Trib1	2996	Atlas 14 100-yr	6858.00	207.09	225.34	218.13	225.76	0.001522	5.2	1327.30	374.55	0.30
DS_Trib1	2867	10-yr	3358.40	207.15	221.08	215.10	221.51	0.002313	5.3	634.80	83.22	0.34
DS_Trib1	2867	50-yr	4570.30	207.15	222.45	216.51	223.02	0.002712	6.1	754.75	91.13	0.37
DS_Trib1	2867	100-yr	5224.10	207.15	223.13	217.22	223.76	0.002874	6.4	817.81	95.22	0.38
DS_Trib1	2867	Atlas 14 100-yr	6858.00	207.15	224.67	218.88	225.44	0.003314	7.0	975.68	349.98	0.42
DS_Trib1	2762	10-yr	3358.40	207.57	220.87	216.01	221.25	0.002295	5.0	673.04	97.93	0.34
DS_Trib1	2762	50-yr	4570.30	207.57	222.23	217.22	222.72	0.002579	5.6	812.83	107.72	0.36
DS_Trib1	2762	100-yr	5224.10	207.57	222.90	217.79	223.44	0.002713	5.9	887.30	113.29	0.37
DS_Trib1	2762	Atlas 14 100-yr	6858.00	207.57	224.44	218.99	225.08	0.002843	6.4	1071.85	312.60	0.38
DS_Trib1	2665	10-yr	3358.40	206.87	220.69	214.89	221.03	0.002160	4.7	718.59	105.11	0.32
DS_Trib1	2665	50-yr	4570.30	206.87	222.03	216.69	222.46	0.002449	5.3	866.31	115.45	0.34
DS_Trib1	2665	100-yr	5224.10	206.87	222.69	217.24	223.17	0.002567	5.5	945.01	121.48	0.35
DS_Trib1	2665	Atlas 14 100-yr	6858.00	206.87	224.23	218.44	224.78	0.002774	6.0	1145.31	309.85	0.37
DS_Trib1	2534	10-yr	3358.40	207.38	220.40	215.09	220.74	0.002225	4.7	715.16	110.59	0.33
DS_Trib1	2534	50-yr	4570.30	207.38	221.69	216.26	222.12	0.002688	5.3	869.38	130.47	0.36
DS_Trib1	2534	100-yr	5224.10	207.38	222.35	216.80	222.81	0.002779	5.5	958.43	139.48	0.37
DS_Trib1	2534	Atlas 14 100-yr	6858.00	207.38	223.89	218.00	224.41	0.002747	5.8	1189.69	158.12	0.37
DS_Trib1	2362	10-yr	3358.40	207.19	219.59		220.19	0.004417	6.2	543.09	85.90	0.43
DS_Trib1	2362	50-yr	4570.30	207.19	220.65		221.45	0.005382	7.2	638.46	94.09	0.48
DS_Trib1	2362	100-yr	5224.10	207.19	221.22		222.11	0.005752	7.5	693.56	99.84	0.50
DS_Trib1	2362	Atlas 14 100-yr	6858.00	207.19	222.67		223.68	0.006231	8.1	851.65	119.30	0.53
DS_Trib1	2219	10-yr	3358.40	210.53	218.04		219.08	0.015152	8.2	409.99	116.33	0.77
DS_Trib1	2219	50-yr	4570.30	210.53	219.48		220.44	0.009313	7.9	582.03	121.72	0.63
DS_Trib1	2219	100-yr	5224.10	210.53	220.20		221.14	0.007854	7.8	670.52	124.70	0.59
DS_Trib1	2219	Atlas 14 100-yr	6858.00	210.53	221.84		222.78	0.006052	7.8	882.65	135.66	0.54

HEC-RAS Plan: P_Alt2_Brg_40ft (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)	
DS_Trib1	2135	10-yr	3358.40	206.78	217.32		218.20	0.006848	7.5	445.21	74.40	0.54
DS_Trib1	2135	50-yr	4570.30	206.78	218.66		219.73	0.007348	8.3	551.05	83.44	0.57
DS_Trib1	2135	100-yr	5224.10	206.78	219.33		220.48	0.007476	8.6	608.23	88.25	0.58
DS_Trib1	2135	Atlas 14 100-yr	6858.00	206.78	220.90		222.18	0.007419	9.1	756.82	100.20	0.58
DS_Trib1	1983	10-yr	3358.40	204.92	216.88	213.37	217.38	0.003374	5.7	589.83	89.66	0.39
DS_Trib1	1983	50-yr	4570.30	204.92	218.20	214.33	218.84	0.003648	6.4	710.98	94.06	0.41
DS_Trib1	1983	100-yr	5224.10	204.92	218.85	214.80	219.56	0.003751	6.8	773.42	96.30	0.42
DS_Trib1	1983	Atlas 14 100-yr	6858.00	204.92	220.41	215.87	221.26	0.003856	7.4	927.26	101.31	0.43
DS_Trib1	1746	10-yr	3358.40	205.47	215.38	213.88	216.15	0.008571	7.3	489.36	108.38	0.59
DS_Trib1	1746	50-yr	4570.30	205.47	216.91	214.67	217.68	0.006670	7.3	661.05	116.85	0.54
DS_Trib1	1746	100-yr	5224.10	205.47	217.65	215.07	218.43	0.006096	7.4	749.02	120.86	0.52
DS_Trib1	1746	Atlas 14 100-yr	6858.00	205.47	219.38	215.98	220.20	0.005147	7.5	967.68	131.65	0.49
DS_Trib1	1481	10-yr	3358.40	204.91	214.67		215.01	0.002175	4.7	716.98	110.27	0.32
DS_Trib1	1481	50-yr	4570.30	204.91	216.25		216.65	0.002145	5.1	900.96	121.21	0.33
DS_Trib1	1481	100-yr	5224.10	204.91	217.03		217.46	0.002062	5.2	996.76	123.48	0.33
DS_Trib1	1481	Atlas 14 100-yr	6858.00	204.91	218.83		219.32	0.001914	5.6	1223.77	128.62	0.32
DS_Trib1	1147	10-yr	3567.10	203.47	214.23		214.42	0.001281	3.5	1020.86	165.47	0.25
DS_Trib1	1147	50-yr	4873.20	203.47	215.87		216.09	0.001159	3.7	1300.62	175.91	0.24
DS_Trib1	1147	100-yr	5594.70	203.47	216.68		216.91	0.001116	3.9	1445.35	180.85	0.24
DS_Trib1	1147	Atlas 14 100-yr	7442.90	203.47	218.53		218.80	0.001042	4.2	1789.71	190.78	0.24
DS_Trib1	1060	10-yr	3567.10	202.94	213.98	209.59	214.27	0.001871	4.3	822.57	127.61	0.30
DS_Trib1	1060	50-yr	4873.20	202.94	215.61	210.52	215.95	0.001816	4.7	1039.97	140.47	0.30
DS_Trib1	1060	100-yr	5594.70	202.94	216.41	210.96	216.78	0.001753	4.8	1155.59	148.14	0.30
DS_Trib1	1060	Atlas 14 100-yr	7442.90	202.94	218.25	211.98	218.67	0.001598	5.2	1424.16	159.02	0.30
DS_Trib1	1008		Bridge									
DS_Trib1	984	10-yr	3567.10	202.44	210.57	209.08	211.58	0.009803	8.1	442.88	97.55	0.65
DS_Trib1	984	50-yr	4873.20	202.44	211.59	210.19	212.86	0.009873	9.0	538.72	101.71	0.67
DS_Trib1	984	100-yr	5594.70	202.44	212.11	210.64	213.51	0.009842	9.5	588.87	103.61	0.68
DS_Trib1	984	Atlas 14 100-yr	7442.90	202.44	213.67	211.68	215.23	0.008447	10.0	743.07	110.03	0.65
DS_Trib1	927	10-yr	3567.10	200.16	210.46		211.09	0.003287	6.4	558.17	99.75	0.48
DS_Trib1	927	50-yr	4873.20	200.16	211.48		212.32	0.003650	7.4	661.54	102.96	0.51
DS_Trib1	927	100-yr	5594.70	200.16	212.01		212.95	0.003813	7.8	716.53	105.47	0.53
DS_Trib1	927	Atlas 14 100-yr	7442.90	200.16	213.44		214.52	0.008061	8.3	892.18	215.83	0.72
DS_Trib1	721	10-yr	3567.10	204.34	210.00		210.40	0.002848	5.1	705.96	164.72	0.43
DS_Trib1	721	50-yr	4873.20	204.34	211.09		211.55	0.002851	5.5	889.25	183.97	0.44
DS_Trib1	721	100-yr	5594.70	204.34	211.70		212.18	0.002551	5.6	1002.44	185.24	0.42
DS_Trib1	721	Atlas 14 100-yr	7442.90	204.34	213.04		213.59	0.002210	5.9	1251.80	188.01	0.41
DS_Trib1	541	10-yr	3567.10	201.06	209.60		209.95	0.002014	4.7	752.24	145.58	0.37
DS_Trib1	541	50-yr	4873.20	201.06	210.67		211.11	0.002059	5.4	907.96	147.71	0.38
DS_Trib1	541	100-yr	5594.70	201.06	211.27		211.75	0.002245	5.6	1003.33	165.32	0.40
DS_Trib1	541	Atlas 14 100-yr	7442.90	201.06	212.63		213.20	0.002074	6.1	1229.86	168.06	0.39
DS_Trib1	17	10-yr	3567.10	201.06	208.38	205.84	208.79	0.002460	5.1	693.64	143.34	0.41
DS_Trib1	17	50-yr	4873.20	201.06	209.42	206.53	209.94	0.002460	5.8	843.89	145.89	0.42
DS_Trib1	17	100-yr	5594.70	201.06	209.95	206.91	210.52	0.002461	6.1	921.22	147.43	0.43
DS_Trib1	17	Atlas 14 100-yr	7442.90	201.06	211.34	207.87	212.01	0.002462	6.6	1134.97	161.57	0.44

Appendix G

Preliminary Cost Estimate

Appendix G - Summary of Preliminary Project Costs, Alternative 1	
Project ID	**Preliminary Estimated Cost (30% Contingency)**
Project 1 (FM 149 Culvert Replacement)	$ 295,000.00
Project 2 (Channel Improvements and Clearing)	$ 119,500.00
Project 3 (Detention Pond)	$ 457,250.00
Subtotal	$ 871,750.00
20% Contingency	$ 174,350.00
Total	$ 1,046,100.00

Appendix G - Summary of Preliminary Project Costs, Alternative 2	
Project ID	**Preliminary Estimated Cost (30% Contingency)**
Project 2 (Channel Improvements and Clearing)	$ 119,500.00
Project 3 (Detention Pond)	$ 500,450.00
Project 4 (FM 149 Bridge)	$ 379,000.00
Subtotal	$ 998,950.00
20% Contingency	$ 199,790.00
Total	$ 1,198,740.00

Montgomery City Council
AGENDA REPORT

Meeting Date: October 13, 2020	**Budgeted Amount: N/A**
Prepared By: Dave McCorquodale	**Exhibits: Plans & engineer's memo**

Subject

Consideration and possible action regarding approval of construction plans for Hills of Town Creek Section Four.

Description

The construction plans for the subdivision have been reviewed and approved by the city engineer. Attached are the plans and the engineer's memo.

Recommendation

Approve the construction plans as submitted contingent on the developer providing plans for the proposed amenity park, including perimeter fencing, and an executed detention pond maintenance agreement prior to the City's acceptance of the public infrastructure and the issuance of any building permits for the homes.

Approved By

Asst. City Administrator	Dave McCorquodale DL	Date: 10/08/2020
City Administrator	Richard Tramm RT	Date: 10/08/2020

JONES | CARTER

1575 Sawdust Road, Suite 400
The Woodlands, Texas 77380
Tel: 281.363.4039
Fax: 281.363.3459
www.jonescarter.com

October 7, 2020

The Honorable Mayor and City Council
City of Montgomery
101 Old Plantersville Road
Montgomery, Texas 77316

Re: Approval of Construction Drawings
Hills of Town Creek Sec. 4 (Dev. No. 2004)
City of Montgomery

Dear Mayor and Council:

We reviewed plans for the proposed Hills of Town Creek Sec. 4 development on behalf of The City of Montgomery (the "City"). We offer no objections to the plans as submitted to us. We recommend the City approve the construction plans as provided and require the developer to provide landscape plans for the proposed amenity park and an executed detention pond maintenance agreement prior to the City's acceptance of the public infrastructure and the issuance of any building permits for the homes.

These plans were reviewed by the City of Montgomery Planning and Zoning Commission (the "Commission") on October 6, 2020. The Commission recommended approval of the construction plans and concurred with the recommendation to withhold acceptance of the public infrastructure and the issuance of any building permits for the homes until plans are provided for the park, including the perimeter fencing, and an agreement for the maintenance of the detention pond is executed between the property owner and homeowner's association.

If you have any questions or comments, please contact me.

Sincerely,

Chris Roznovsky

Chris Roznovsky, PE
Engineer for the City

CVR/ab
K:\W5841\W5841-2004-00 Hills of Town Creek Sec. 4\Project Management\Letters\MEMO to Council RE Hills of Town Creek Sec. 4 Approval 09292020.docx

Enclosure: Construction Plans – Hills of Town Creek Sec. 4
Cc (via email): Mr. Richard Tramm – City of Montgomery, City Administrator
Ms. Susan Hensley– City of Montgomery, City Secretary
Mr. Mike Muckleroy – City of Montgomery, Director of Public Works
Mr. Dave McCorquodale – City of Montgomery, Director of Planning & Development

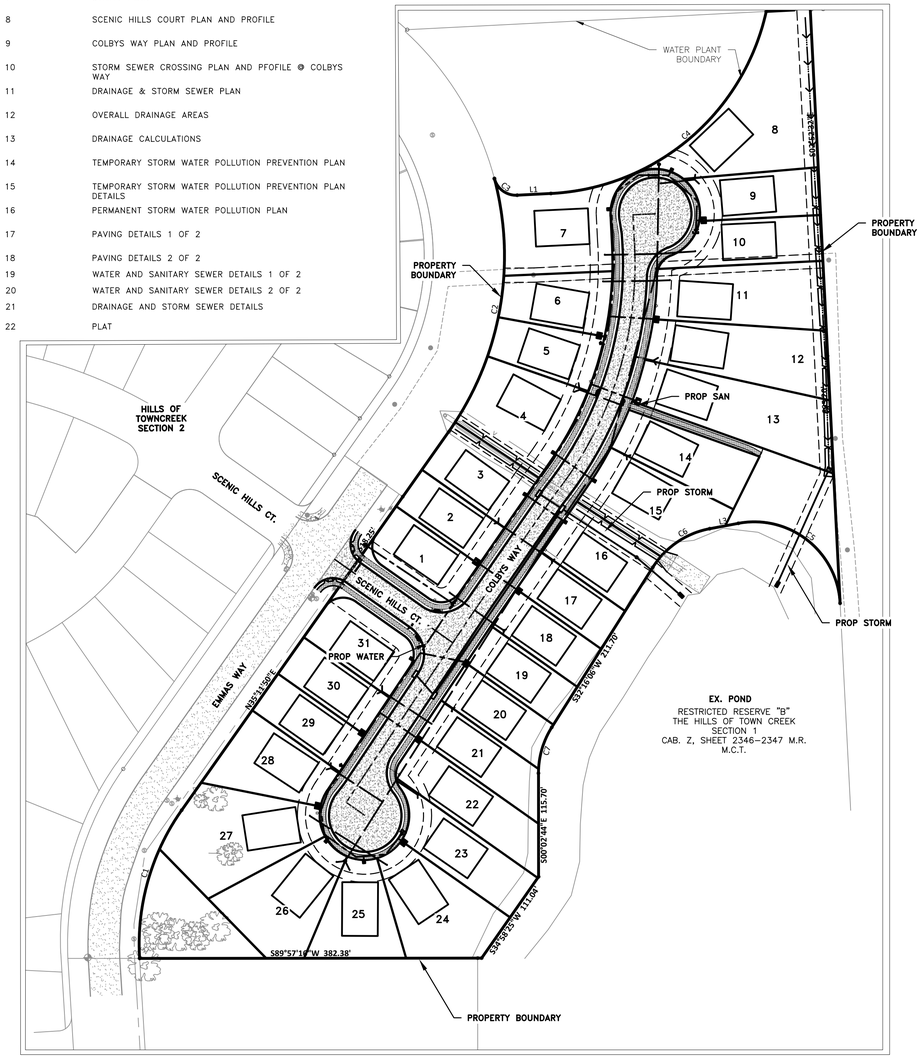
CITY OF MONTGOMERY, TEXAS

HILLS OF TOWN CREEK

SECTION 4

PUBLIC IMPROVEMENTS: WATER, SEWER, ROADS, DRAINAGE
(DEV NO. 2004)

Sheet List Table



PROJECT MAP
SCALE: 1" = 80'

PROJECT NOTES

ENGINEER'S CERTIFICATION:
I CERTIFY THAT THESE PLANS WHICH BEAR MY SEAL HAVE BEEN PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND ARE IN COMPLIANCE WITH ALL APPLICABLE CITY, STATE AND FEDERAL REQUIREMENTS. THIS PROPOSED SITE WILL NOT IMPEDE THE FLOW OF SURFACE WATERS FROM HIGHER ADJACENT PROPERTIES, WILL NOT ALTER THE NATURAL FLOW OF SURFACE WATERS SO AS TO DISCHARGE THEM UPON ADJACENT PROPERTIES AT A MORE RAPID RATE OR IN A DIFFERENT LOCATION, AND WILL NOT CONCENTRATE FLOWS OF SURFACE WATERS IN A MANNER WHICH EXCEEDS THE CAPACITY OF THE RECEIVING WATERCOURSE.

CIVIL NOTE:
FIELD VERIFY ALL EXISTING CONDITIONS AND ELEVATIONS INCLUDING PAVEMENT AND UTILITY TIE-INS PRIOR TO CONSTRUCTION. NOTIFY ENGINEER OF ALL DISCREPANCIES PRIOR TO BEGINNING ANY WORK.

TDLR NOTE:
TEXAS DEPARTMENT OF LICENSING AND REGISTRATION (TDLR) NUMBER REQUIRED FOR ALL PROPOSED COMMERCIAL BUILDINGS. **IF TDLR NUMBER IS NOT PRESENT, CLIENT IS RESPONSIBLE FOR AQUIRING REGISTRATION NUMBER PRIOR TO CONSTRUCTION.

LEGAL DESCRIPTION:
Being 8.1365 acres (354,425 square feet) of land, out of the Remainder of a called 79.905 acres, conveyed to Christian C. Cheatham and Mary E. Cheatham, by deed recorded under County Clerk's File Number (C.F.N.) 2001-065611 Official Public Records of Montgomery County, Texas (O.P.R. M.C.T.), said Benjamin Rigby League, Abstract 31 and being more particularly described by metes and bounds as follows:

BEGINNING at a found 5/8 inch iron rod in the east right-of-way (R.O.W.) of Emma's Way, 80' public R.O.W., marking the northwest corner of Restricted Reserve "A", The Hills of Town Creek, Section 1, recorded under Cabinet Z, Sheet 2346-2347 Map Records of Montgomery County, Texas (M.R. M.C.T.), also being the southwest corner of the herein described tract;
THENCE along said east R.O.W. line and a curve to the RIGHT, having a radius of 260.00 feet, a delta angle of 38°41'38", and whose long chord bears North 15°50'59" East, a distance of 172.27 feet, for an arc length of 175.59 feet to a set 5/8 inch iron rod with cap stamped "Core 6657", marking a point of tangency of the herein described tract;
THENCE North 35°11'50" East, continuing along said east R.O.W. line, passing at a distance of 432.10 feet a found 5/8 inch iron rod with cap, marking the east corner of said Emma's Way and continuing for a total distance of 518.25 feet to a point for corner, marking a point of curvature of the herein described tract;
THENCE along a curve to the LEFT, having a radius of 340.00 feet, a delta angle of 49°58'54", and whose long chord bears North 10°12'24" East, a distance of 287.28 feet, for an arc length of 296.60 feet to a set 5/8 inch iron rod with cap stamped "Core 6657", marking a point of curvature of a called 1.223 acres, conveyed to City of Montgomery, by deed recorded under C.F.N. 2012076184 O.P.R. M.C.T., also being the northwest corner of the herein described tract;
THENCE along the south line of said 1.223 acres and a curve to the LEFT, having a radius of 25.00 feet, a delta angle of 78°06'01", and whose long chord bears South 53°51'15" East, a distance of 31.50 feet, for an arc length of 34.08 feet to a set 5/8 inch iron rod with cap stamped "Core 6657", marking a point of tangency of the herein described tract;
THENCE North 87°05'32" East, continuing along said south line, a distance of 37.81 feet to a set 5/8 inch iron rod with cap stamped "Core 6657", marking a point of curvature of the herein described tract;
THENCE along continuing along said south line and a curve to the LEFT, having a radius of 260.00 feet, a delta angle of 74°38'06", and whose long chord bears North 49°46'29" East, a distance of 315.24 feet, for an arc length of 338.68 feet to a set 5/8 inch iron rod with cap stamped "Core 6657" in the south line of a called 12.384 acres, conveyed to WTRM Barnier Real Estate, LP, by deed recorded under C.F.N. 2013067842 O.P.R. M.C.T., marking the most northerly northwest corner of the herein described tract;
THENCE North 87°05'32" East, along the south line of said 12.384 acres, a distance of 49.29 feet to a point in the west line of a called 61.8107 acres, conveyed to Montgomery Independent School District, by deed recorded under C.F.N. 2001-065612 O.P.R. M.C.T., also being the southeast corner of said 12.384 acres and the northeast corner of the herein described tract, from which a found 2 inch iron pipe, bears South 69°53'35" East, a distance of 1.21 feet and a 5/8 inch iron rod bears North 89°37'58" East, a distance of 14.37 feet;
THENCE South 02°52'32" East, along said west line of said 61.8107 acres, a distance of 665.20 feet to a set 5/8 inch iron rod with cap stamped "Core 6657" to a point of curvature of Restricted Reserve "B", The Hills of Town Creek, Section 1, by deed recorded under Cabinet Z, Sheet 2346-2347 M.R. M.C.T., also being the southeast corner of the herein described tract;
THENCE along the north line of Restricted Reserve "B" and a curve to the LEFT, having a radius of 96.00 feet, a delta angle of 97°43'25", and whose long chord bears North 51°46'06" West, a distance of 144.60 feet, for an arc length of 163.74 feet to a set 5/8 inch iron rod with cap stamped "Core 6657", marking a point of tangency of said Restricted Reserve "B" and the herein described tract;
THENCE South 79°22'17" West, continuing along said north line, a distance of 32.88 feet to a set 5/8 inch iron rod with cap stamped "Core 6657", marking a point of curvature of said Restricted Reserve "B" and the herein described tract.
THENCE along continuing along said north line and a curve to the LEFT, having a radius of 96.00 feet, a delta angle of 47°06'15", and whose long chord bears South 55°49'11" West, a distance of 76.72 feet, for an arc length of 78.92 feet to a set 5/8 inch iron rod with cap stamped "Core 6657", marking a point of tangency of said Restricted Reserve "B" and the herein described tract;
THENCE South 32°16'06" West, along said west line of said Restricted Reserve "B", a distance of 211.70 feet to a set 5/8 inch iron rod with cap stamped "Core 6657", marking a point of curvature of said Restricted Reserve "B" and the herein described tract;
THENCE along continuing along said west line and a curve to the LEFT, having a radius of 96.00 feet, a delta angle of 32°18'55", and whose long chord bears South 16°06'41" West, a distance of 53.43 feet, for an arc length of 54.14 feet to a point of tangency of said Restricted Reserve "B" and the herein described tract;
THENCE South 00°02'44" East, continuing along said west line, a distance of 115.70 feet to a set 5/8 inch iron rod with cap stamped "Core 6657", marking an angle point of said Restricted Reserve "B" and the herein described tract;
THENCE South 34°58'25" West, continuing along said west line, a distance of 111.04 feet to a set 5/8 inch iron rod with cap stamped "Core 6657", marking an angle point of said Restricted Reserve "B" and the herein described tract;
THENCE South 89°57'16" West, passing at a distance of 4.50 feet to a found 5/8 inch iron rod with cap, marking the northeast corner of said Restricted Reserve "A", for a total distance of 382.38 feet to the POINT OF BEGINNING and containing a computed 8.1365 acres (354,425 square feet) of land.

PROJECT LOCATION
KEY MAP#: 122U

APPROVED VARIENCES:

MAY 12, 2020: LOT WIDTH, ORDINANCE 2014-03

MAY 12, 2020: LOT SIZE, ORDINANCE 2014-03

JUNE 9, 2020: SIDE YARD SETBACK, ORDINANCE 2014-03

BENCHMARK:
MONT 3 ELEV.=268.73'
3" BRASS DISK LOCATED FROM THE INTERSECTION OF HWY 105 AND HWY 149, WEST ±4700' TO THE PARKING LOT OF THE HERITAGE HOUSE RESTAURANT', WHICH IS LOCATED ON THE NORTH SIDE OF HWY 105.
MONT 7 ELEV.=291.77'
3" BRASS DISK IS LOCATED IN THE CENTER OF MONTGOMERY ON THE SOUTH SIDE OF HWY 105. MARK IS IN FRONT (NORTH) OF GAS PUMPING AREA OF BROOKSHIRE BROTHERS GROCERY STORE, AS WELL AS ACROSS HWY 105(SOUTH) FROM 'THE OLDE SCHOOL HOUSE'.
TEMPORARY BENCHMARK "A"
CUT SQUARE IN CONCRETE ELEV.=316.35'
CUT SQUARE IN CONCRETE ON B-B INLET LOCATED SOUTHEAST FROM SCENIC HILLS COURT AND EMMA'S WAY INTERSECTION.

FLOODPLAIN:
This site (proposed area) is situated in Zone "X" in Montgomery County, Texas according to FEMA map number 48339C0200G dated August 18, 2014: This statement does not imply that the property and/or the structures thereon will be free from flooding or flood damage. This determination has been made by scaling the property on the referenced map and is not the result of an elevation survey. This flood statement shall not create liability on the part of the surveyor.

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 12235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHRIS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK
SECTION 4
COVER SHEET

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	AS SHOWN	SHEET	01

STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER

09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:_ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\01 COVER SHEET.DWG Sep. 15, 2020 - 3:59 PM

REFERENCE SPECIFICATIONS:

APPLICABLE ENTITY DETAILS & SPECIFICATIONS SHALL APPLY. WHEN NO SUCH INFORMATION EXISTS, CONTRACTOR SHALL THEN REFERENCE CITY OF MONTGOMERY DETAILS AND SPECIFICATIONS.

GENERAL CONSTRUCTION NOTES:

1. MATERIALS, CONSTRUCTION AND TESTING TO BE IN ACCORDANCE WITH THE GOVERNING ENTITY'S ORDINANCES AND SPECIFICATIONS, LATEST PRINTING AND AMENDMENTS THERETO.

2. CONTRACTOR TO OBTAIN ALL DEVELOPMENT AND CONSTRUCTION PERMITS REQUIRED BY ALL ENTITIES AT HIS EXPENSE PRIOR TO COMMENCEMENT OF WORK.

3. CONTRACTOR SHALL GIVE NOTICE TO ALL AUTHORIZED INSPECTORS, SUPERINTENDENTS OR PERSONS IN CHARGE OF PRIVATE AND PUBLIC UTILITIES OR RAILROADS AFFECTED BY HIS OPERATIONS 48 HOURS PRIOR TO COMMENCEMENT OF WORK IN STREET RIGHTS-OF-WAY OR EASEMENTS.

4. ALL EXISTING UNDERGROUND UTILITIES SHOWN ARE NOT GUARANTEED TO BE COMPLETED OR DEFINITE, BUT WERE OBTAINED FROM THE BEST INFORMATION AVAILABLE. CONTRACTOR HAS SOLE RESPONSIBILITY FOR FIELD VERIFICATION OF ALL EXISTING FACILITIES SHOWN ON DRAWINGS. CONTRACTOR SHALL COORDINATE ALL CONFLICTS WITH THE APPROPRIATE GOVERNING AGENCY.

5. THE LOCATION OF LUFKIN-CONROE TELEPHONE EXCHANGE OR AT&T COMPANY, ENTEX, AND ENTERGY-GSU (GULF STATES UTILITIES) UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL REQUEST THE EXACT LOCATION OF THESE FACILITIES BY CALLING THE UTILITY COMPANIES, AT LEAST 48 HOURS BEFORE COMMENCING WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE WHICH OCCURS DUE TO HIS FAILURE TO REQUEST THE LOCATION AND PRESERVATION OF THESE UNDERGROUND FACILITIES. ANY DAMAGE TO EXISTING FACILITIES INCURRED AS A RESULT OF CONSTRUCTION OPERATIONS WILL BE REPAIRED BY THE CONTRACTOR AT HIS OWN EXPENSE.

6. TEXAS LAW ARTICLE 1436C, PROHIBITS ALL ACTIVITIES IN WHICH PERSONS OR EQUIPMENT MAY COME WITHIN 6 FEET OF ENERGIZED OVERHEAD POWER LINES, AND FEDERAL REGULATION, TITLE 29, PART 1910.130(1) AND PART 1926.440 (A) (15) REQUIRE A MINIMUM CLEARANCE OF 10 FEET FROM THESE FACILITIES. THE ABOVE LAWS CARRY BOTH CRIMINAL AND CIVIL LIABILITIES, WITH CONTRACTORS AND OWNERS BEING LEGALLY RESPONSIBLE FOR THE SAFETY OF WORKERS UNDER THESE LAWS. IF YOU OR YOUR COMPANY MUST WORK NEAR ENERGIZED OVERHEAD POWER LINES, CALL THE POWER COMPANY FOR THE LINES TO BE DE-ENERGIZED AND/OR MOVED AT YOUR EXPENSE.

7. CONSTRUCTION SHALL COMPLY WITH THE LATEST REVISIONS OF OSHA REGULATIONS AND STATE OF TEXAS LAW CONCERNING TRENCHING AND SHORING. CONTRACTOR SHALL PROVIDE A TRENCH SAFETY SYSTEM TO MEET, AS A MINIMUM, THE REQUIREMENTS OF OSHA SAFETY AND HEALTH REGULATION, PART 1926, SUB-PART P AS PUBLISHED IN THE FEDERAL REGISTER, VOLUME 54, NO. 209, DATED OCTOBER 31, 1989.

8. DETAILS SHOWN DO NOT EXTEND OR INCLUDE DESIGNS OR SYSTEMS PERTAINING TO THE SAFETY OF THE CONTRACTOR OR ITS EMPLOYEES, AGENTS, OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK. THE CONSTRUCTION CONTRACTOR SHALL PREPARE OR OBTAIN THE APPROPRIATE SAFETY SYSTEMS, INCLUDING THE PLANS AND SPECIFICATIONS REQUIRED BY CHAPTER 756, SUBCHAPTER "C" OF THE TEXAS HEALTH AND SAFETY CODE.

9. CONTRACTOR SHALL COVER OPEN EXCAVATIONS WITH ANCHORED STEEL PLATES DURING NON-WORKING HOURS, ALONG EXISTING ROADWAYS AND TRAFFIC AREAS.

10. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE GOVERNING ENTITY. ALL CONSTRUCTION RUNOFF SHALL COMPLY WITH STORM WATER MANAGEMENT FOR CONSTRUCTION ACTIVITIES AND THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) REQUIREMENTS.

11. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE FLAGMEN, SIGNING, STRIPING AND WARNING DEVICES, ETC., DURING CONSTRUCTION IN ACCORDANCE WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES". CONTRACTOR SHALL MAINTAIN AT LEAST ONE LANE OF TRAFFIC IN EACH DIRECTION DURING WORKING HOURS OR PROVIDE ALL-WEATHER DETOURS AROUND CONSTRUCTION SITE, PROVIDE PUBLIC NOTIFICATION, AND USE UNIFORMED POLICE OFFICERS TO CONTROL TRAFFIC.

12. EXISTING PAVEMENTS, CURBS, SIDEWALKS AND DRIVEWAYS DAMAGED OR REMOVED DURING CONSTRUCTION SHALL BE REPLACED TO THE GOVERNING ENTITY'S STANDARDS. ALL ASPHALT AND CONCRETE DRIVEWAYS EXCAVATED DURING CONSTRUCTION SHALL BE BACKFILLED WITH STABILIZED MATERIAL AND RETURNED TO EXISTING CONDITIONS. ALL STATE AND COUNTY HIGHWAY PAVEMENT AND RAILROAD RIGHT-OF-WAYS TO BE BORED ACCORDING TO THE RULES, REGULATIONS AND REQUIREMENTS FOR APPROVAL AND ACCEPTANCE BY SAID AGENCIES.

13. EXISTING ROADS AND/OR RIGHT-OF-WAYS DISTURBED DURING CONSTRUCTION SHALL BE AS GOOD OR BETTER THAN THE CONDITION PRIOR TO STARTING THE WORK, UPON COMPLETION OF THE PROJECT.

14. AFTER DISTURBED AREAS HAVE BEEN COMPLETED TO THE LINES, GRADES, AND CROSS-SECTIONS SHOWN ON THE PLANS, SEEDING SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS TO ESTABLISH ADEQUATE VEGETATION COVERAGE TO ELIMINATE EROSION. IF NO PROVISION FOR PLANTING GRASS IS INCLUDED IN THE PLANS OR SPECIFICATIONS, THE MINIMUM REQUIREMENT FOR THIS ITEM WILL BE IN ACCORDANCE WITH THE TEXAS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR "SODDING OR SEEDING FOR EROSION CONTROL."

15. ALL TRENCHES, INCLUDING TRENCHES FOR LEADS AND STUBS UNDER PAVEMENT AND TO A POINT ONE (1) FOOT BACK OF ALL CURBS SHALL BE BACKFILLED WITH CEMENT STABILIZED SAND AS PER SPECIFICATION TO A POINT IMMEDIATELY BELOW THE SUBGRADE. TRENCHES OTHER THAN UNDER PAVEMENT SHALL BE BACKFILLED WITH SUITABLE EARTH MATERIAL IN 6 INCH LAYERS AND MECHANICALLY COMPACTED TO A DENSITY OF NOT LESS THAN 95 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR COMPACTION TEST (ASTM DESIGNATION D-698/AASHTO T99). MOISTURE CONTENT OF BACKFILL SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CEMENT STABILIZED SAND SPECIFICATIONS. SEE GOVERNING ENTITY'S STANDARD DETAIL SHEETS FOR BEDDING AND OTHER DESIGN REQUIREMENTS.

16. CONTRACTOR TO REMOVE EXISTING PLUGS AND CONNECT TO EXISTING UTILITY LINES AS INDICATED ON PLANS.

17. UNLESS OTHERWISE NOTED ON PLANS, WHERE MANHOLES ARE LOCATED WITHIN THE UTILITY EASEMENTS, THE CONTRACTOR SHALL SET RIM ELEVATIONS TWO INCHES ABOVE FINISHED GROUND ELEVATIONS.

18. WHEN TRENCH CONDITION REQUIRES THE USE OF WELL POINTS, THIS IS TO BE REQUESTED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.

19. CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING THE MUD AND/OR DIRT DEPOSITED ON EXISTING PAVEMENT DUE TO HIS CONSTRUCTION ACTIVITY DAILY. ALL EQUIPMENT AND DEBRIS FROM CONSTRUCTION TO BE MOVED AT END OF PROJECT.

CITY OF MONTGOMERY

GENERAL CONSTRUCTION NOTES:

1. CONTRACTOR SHALL CONTACT CITY OF MONTGOMERY CITY ENGINEER CHRIS ROZNOVSKY AT (281) 363-4039 A MINIMUM OF 48 HOURS PRIOR TO COMMENCING CONSTRUCTION.
2. CONTRACTOR SHALL CONTACT CITY OF MONTGOMERY DIRECTOR OF PUBLIC WORKS MIKE MUCKLEROY AT (936) 597-6434 A MINIMUM OF 48 HOURS PRIOR TO COMMENCING CONSTRUCTION TO SET UP AN INSPECTION TO VERIFY CITY'S FACILITIES.
3. CONTRACTOR SHALL CONTACT CITY OF MONTGOMERY UTILITY OPERATOR, MICHAEL WILLIAMS OF GULF UTILITY SERVICE AT (346) 300-5282 A MINIMUM OF 48 HOURS PRIOR TO COMMENCING CONSTRUCTION TO SET UP AN INSPECTION TO VERIFY CITY'S FACILITIES.
4. THE CITY'S UTILITY OPERATOR AND PUBLIC WORKS FOREMAN SHALL BE NOTIFIED 24 HOURS IN ADVANCE TO WITNESS AND INSPECT ANY SANITARY SEWER LINE CONNECTION. NO SANITARY SEWER LINES SHALL BE BACKFILLED BEFORE THE CITY'S UTILITY OPERATOR OR PUBLIC WORKS FOREMAN HAS INSPECTED THE CONNECTION.
5. CONTRACTOR SHALL CONTACT THE CITY'S UTILITY OPERATOR OR PUBLIC WORKS FOREMAN TO OPERATE ALL VALVES. AT NO TIME IS THE CONTRACTOR OR CONTRACTOR'S REPRESENTATIVE TO OPERATE ANY PART OF THE CITY OF MONTGOMERY WATER SYSTEM.
6. THE OWNER OR CONTRACTOR SHALL INSTALL AND TEST APPROPRIATE BACKFLOW PREVENTION, PER CITY OF MONTGOMERY RULES & REGULATIONS.

SANITARY SEWER CONSTRUCTION NOTES:

1. SANITARY SEWERS SHALL BE CONSTRUCTED IN COMPLIANCE WITH THE LATEST SPECIFICATIONS FOR SEWER CONSTRUCTION, AND TESTED AS SPECIFIED FROM THE LATEST TEST PROCEDURE FOR EITHER LIQUID OR AIR, INCLUDING ALL AMENDMENTS AND REVISIONS THERETO. BACKFILL AND BEDDING FOR SANITARY SEWERS MUST MEET ALL MINIMUM ASPECTS OF ASTM D-2321 AND MUST BE PLACED IN ACCORDANCE WITH THE APPLICABLE ENTITY'S SPECIFICATIONS.

2. ALL SANITARY SEWER MANHOLES SHALL BE STANDARD THE APPLICABLE ENTITY PRE-CAST USING RAM-NECK OR CAST IN PLACE CONCRETE IN ACCORDANCE WITH ASTM C-478. NO BRICK MANHOLES ALLOWED. FOR PVC PIPE, USE MANHOLE WATER STOP GASKET AND CLAMP ASSEMBLY AT MANHOLE CONNECTIONS. SANITARY SEWER MANHOLE RIMS SHALL BE 3 INCHES ABOVE NATURAL GROUND. BACKFILL SHALL BE ADDED AND SLOPED AWAY FROM THE MANHOLE RIM FOR DRAINAGE PURPOSES.

3. MANHOLE CONCRETE BOTTOM FOUNDATION SHALL BE 12" REINFORCED WITH #5 BARS AT 12", ON CENTERS, EACH WAY, WITH A MINIMUM OF 6" EXTRA SLAB LENGTH AROUND THE MANHOLE, IF POURED IN PLACE. APPROVED CHEMICALS SHALL BE USED FOR PATCHING AROUND MANHOLE JOINTS. MORTAR CEMENT WILL NOT BE ACCEPTED.

4. SANITARY SEWER PIPE SHALL BE PVC SDR 26 OR PVC SDR 35 (WITH APPROVAL), IN ACCORDANCE WITH ASTM SPECIFICATIONS D-3034, FOR 4" THROUGH 15" AND ASTM F-879 FOR 18" THROUGH 27". MINIMUM SIZE SANITARY SEWER MAIN IS 6". SDR 35 MAY BE USED WHEN DEPTH IS MORE THAN 3 FEET AND LESS THAN 6 FEET.

5. SEWER LINES SHALL BE LOCATED ON THE OPPOSITE SIDE OF THE STREET FROM WHERE WATER IS LOCATED. SEWER LINE AND WATER LINE SEPARATION SHALL BE IN ACCORDANCE WITH TEXAS NATURAL RESOURCE CONSERVATION COMMISSION RULES, CHAPTER 317.13 APPENDIX E.

6. NO SEWER PIPE SHALL BE LAID ON AN UNSTABLE FOUNDATION. SELECTED MATERIAL SHALL BE USED AND/OR WET SAND CONSTRUCTION DETAILS, WHICHEVER APPLIES IN THE OPINION OF THE ENGINEER. NO PIPE SHALL BE COVERED WITHOUT APPROVAL OF THE ENGINEER OR HIS REPRESENTATIVE. SANITARY SEWERS CONSTRUCTED IN WET SAND SHALL HAVE A SPECIAL PROCEDURE AND SHALL BE CONSTRUCTED AS PER THE APPLICABLE ENTITY STANDARDS.

7. WHEN THE NATURAL GROUND LEVEL AROUND MANHOLE LIES BELOW THE 100 YEAR FLOODPLAIN ELEVATION, THE MANHOLE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SEALED AND VENTED MANHOLE DETAIL.

8. A DEFLECTION TEST SHALL BE REQUIRED AFTER THE BACKFILL HAS BEEN IN PLACE A MINIMUM OF 30 DAYS. THIS TEST SHALL BE DONE BY PULLING A HAND LINE WITH AN ATTACHED MANDREL FROM MAN-HOLE TO MANHOLE. THE MANDREL SHALL HAVE AN OUTSIDE DIAMETER THAT IS AT LEAST 95% OF THE ORIGINAL INSIDE DIAMETER OF THE PIPE. MANDREL TO BE MANUFACTURED WITH A MINIMUM OF SEVEN (7) RUNNERS, WITH EACH RUNNER BEING A MINIMUM OF 5 INCHES LONG. ANY PIPE NOT MEETING EST REQUIREMENTS TO BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE. THE TEST SHALL BE PERFORMED WITHOUT MECHANICAL PULLING DEVICES.

9. INFILTRATION/EXFILTRATION NOT TO EXCEED 200 GALLONS PER INCH DIAMETER PER MILE OF PIPE FOR 24 HOURS UNDER A MINIMUM OF 2 FEET OF HEAD, OR AN AIR TEST SHALL BE REQUIRED IN ACCORDANCE WITH ASTM C-828.

10. WHERE A SEWER LINE HAS LESS THAN (2) FEET OF COVER, PROVIDE CEMENT STABILIZED SAND BACKFILL MATERIAL.

11. CONTRACTOR SHALL KEEP RECORD OF LOCATION OF ALL STACKS, STUBS, SEWER LEADS, ETC. THE AS-BUILT MYLAR DRAWINGS MUST SHOW THE EXACT LOCATION.

12. IF SANITARY SERVICE LEADS ARE INSTALLED DURING CONSTRUCTION OF MAIN LINE, ALL LEADS TO HAVE A MINIMUM SLOPE OF 0.70% OR GREATER. ALL PVC LEADS TO BE THE SAME MATERIAL AS MAIN LINE. ALL DOUBLE SERVICE LEADS TO HAVE WYE LOCATED ON THE END OF THE LEAD. ALL SINGLE SERVICE LEADS TO BE 4 INCH, AND ALL DOUBLE SERVICE LEADS TO BE 6 INCH.

13. THE INSTALLATION OF ALL SANITARY SEWER LINES SHALL EXTEND ALONG THE ENTIRE LENGTH OF THE PROPERTY TO BE SERVED. SANITARY SEWER LINES THAT DEAD END SHALL EXTEND TO THE PROJECT LIMITS FOR FUTURE EXTENSIONS, WITH DEPTHS BASED ON ENTIRE SERVICE AREA.

STORM WATER QUALITY NOTES:

1. IF THE PROJECT DISTURBS 10 ACRES, COVERAGE IS REQUIRED UNDER THE TPDES GENERAL PERMIT TXR150000 FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTATION, INSPECTION, AND MAINTENANCE OF THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS. THE COSTS TO IMPLEMENT, INSPECT, AND MAINTAIN THE SWPPP SHALL BE CONSIDERED INCIDENTAL TO THE SWPPP BID ITEMS.

2. IF THE PROJECT DISTURBS GREATER THAN 5 ACRES, A NOTICE OF INTENT (NOI) SHALL BE SUBMITTED TO THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) AT LEAST 7 DAYS PRIOR TO THE START OF ANY EARTH DISTURBING ACTIVITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TCEQ COMPLIANCE, PLAN IMPLEMENTATION AND MAINTENANCE DURING CONSTRUCTION. WHEN DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL PROVIDE A COPY OF THE CONTRACTOR'S NOTICE OF INTENT (NOI) AND PROOF THAT IT HAS BEEN SENT TO THE TCEQ.

3. COPIES OF THE CONTACTOR'S NOI AND CONSTRUCTION SITE NOTICE (CSN) SHALL BE POSTED AT THE SITE BY THE CONTRACTOR. COPIES SHALL ALSO BE SUBMITTED TO THE PROJECT OWNER AND ENGINEER. THE CONTRACTOR SHALL LAMINATE AND POST THE TWO NOIS, TWO CSNS AND ANY "SECONDARY OPERATOR" CSNS ON THE PROJECT SITE AT A LOCATION WITH EASY ACCESS TO THE PUBLIC FOR CLEAR VIEWING AND AS APPROVED BY THE ENGINEER. THE COST OF LAMINATION AND POSTING OF THE NOIS & CSNS SHALL BE CONSIDERED INCIDENTAL TO THE SWPPP BID ITEMS.

4. UPON COMPLETION OF CONSTRUCTION ACTIVITIES AND FINAL STABILIZATION OF THE SITE, AS DEFINED BY THE TPDES GENERAL PERMIT, A NOTICE OF TERMINATION (NOT) IS REQUIRED TO BE SUBMITTED TO THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ). WHEN DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL PROVIDE A COPY OF THE CONTRACTOR'S NOTICE OF TERMINATION (NOT) AND PROOF THAT IT HAS BEEN SENT TO THE TCEQ.

5. A RAIN GAUGE SHALL BE KEPT ON THE PROJECT SITE OR WITHIN THE IMMEDIATE PROJECT VICINITY. RECORDS OF RAINFALL EVENTS SHALL BE KEPT BY THE CONTRACTOR TO ASSIST WITH DETERMINING IF AN SWPPP SITE INSPECTION IS REQUIRED. THE COSTS FOR THE RAIN GAUGE SHALL BE CONSIDERED INCIDENTAL TO THE SWPPP BID ITEMS.

6. THE SWPPP, INSPECTION & MAINTENANCE REPORTS, CERTIFICATIONS, RAINFALL RECORDS, MAJOR GRADING DATE RECORDS AND TEMPORARY AND PERMANENT STABILIZATION DATE RECORDS SHALL BE KEPT CURRENT BY THE CONTRACTOR AND IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. COPIES OF THE ALL SWPPP RECORDS SHALL BE KEPT ON-SITE, IF FEASIBLE, UNTIL THE NOTICE OF TERMINATION HAS BEEN SUBMITTED TO THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY. THE SWPPP RECORDS SHALL BE MADE READILY AVAILABLE TO ENGINEER AND REGULATORY AUTHORITIES UPON AN ON-SITE INSPECTION. THE CONTRACTOR SHALL DELIVER COPIES OF ALL SWPPP RECORDS TO PROJECT OWNER AND ENGINEER AS DIRECTED BY THE ENGINEER."

PAVING NOTES:

1. IF PROPOSED SEMI-RIGID BASE WITH 2 INCH TYPE "D" HOT MIX ASPHALTIC CONCRETE SURFACING, FOR URBAN ESTATES ONLY, SEMI-RIGID BASE MAY BE 7 INCH CEMENT STABILIZED SHELL, 8 INCH CRUSHED LIMESTONE, OR 6 INCH HOT MIX ASPHALTIC CONCRETE.

2. EXPOSE 15 INCHES OF REINFORCING STEEL AT ALL PROPOSED SAWED JOINTS. IF NO REINFORCING STEEL EXISTS, USE HORIZONTAL DOWELS PER NOTE #4.

3. REQUIRE A ONE (1) INCH REDWOOD EXPANSION BOARD OR PRE-MOLDED NON-EXTRUDING JOINT BETWEEN SIDEWALK AND BACK OF CURB.

4. HORIZONTAL DOWELS SHALL BE NO. 6 BARS, 24 INCHES LONG, DRILLED AND EMBEDDED 8 INCHES INTO THE CENTER OF THE EXISTING SLAB WITH "PO ROC" OR EQUAL. DOWELS SHALL BE 24 INCHES CENTER TO CENTER UNLESS OTHERWISE SPECIFIED.

5. WHEN PROPOSED PAVEMENT ENDS AT A CONSTRUCTION JOINT LEAVE 15 INCHES OF REINFORCING STEEL EXPOSED BEYOND PAVEMENT, COAT WITH ASPHALT, AND WRAP WITH BURLAP FOR FUTURE PAVEMENT TIE-IN. AT EXPANSION JOINTS, EXTEND DOWELS 5 INCHES; COAT AND WRAP SAME AS CONSTRUCTION JOINTS.

6. WHEREVER A SIDEWALK IS REQUIRED BY GOVERNING ENTITY'S ORDINANCE , PROVIDE WHEELCHAIR RAMP AND/OR SIDEWALKS IN ACCORDANCE WITH THE "TEXAS DEPARTMENT OF TRANSPORTATION STANDARD WHEELCHAIR RAMP AND SIDEWALK DETAILS".

7. ADJUST EXISTING MANHOLE FRAMES AND COVERS TO FIT NEW GRADE.

8. ADJUST EXISTING WATER VALVE BOXES TO NEW PAVING GRADE. REPLACE ALL MISSING OR DAMAGED VALVE BOXES AND COVERS.

9. PLACE WHITE OR YELLOW PLASTIC MARKER OR PAINT AS SHOWN BY THE UNIFORM TRAFFIC MANUAL FOR PAVEMENT MARKINGS.

10. PROVIDE A CONCRETE PAVING HEADER AT THE END OF THE PAVEMENT.

11. T. C. INDICATES TOP OF CURB ELEVATION AND T. P. INDICATES TOP OF PAVEMENT ELEVATION.

12. CURB RADII AT STREET INTERSECTIONS TO BE 24.50 FEET TO BACK OF CURB WITH A MINIMUM OF ONE (1) PERCENT GRADE UNLESS OTHERWISE NOTED.

13. GUIDELINES SET FORTH IN THE "TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES" WILL BE OBSERVED.

14. TRANSVERSE EXPANSION JOINTS SHALL BE INSTALLED AT ALL RADIUS RETURNS AND AT A MAXIMUM SPACING OF 60 FOOT INTERVALS.

15. CONTRACTOR WILL USE CONTINUOUS LONGITUDINAL REINFORCING BARS IN CURBS AS SHOWN ON DETAILS PROVIDED IN CONSTRUCTION DRAWINGS.

16. CYLINDER COMPRESSION TEST OR BEAM FLEXURAL TEST SHALL BE REQUIRED. TWO SAMPLES SHALL BE TAKEN FOR EACH 100 CUBIC YARDS OF CONCRETE POURED. FOR SMALLER QUANTITIES, TWO SAMPLES SHALL BE TAKEN REGARDLESS OF THE AMOUNT OF CONCRETE POURED EACH DAY. CONCRETE SHALL HAVE 5 SACKS CEMENT PER CUBIC YARD AND A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI IN 28 DAYS OR A MINIMUM FLEXURAL STRENGTH OF 600 PSI IN 28 DAYS. NO TRAFFIC SHALL BE ALLOWED ON CONCRETE FOR 28 DAYS. IF EXTRA TESTS ARE MADE 75% OF THE 28 DAY STRENGTH IS ACHIEVED THE GOVERNING ENTITY'S ENGINEER MAY ALLOW TRAFFIC ON THE PAVEMENT IF IT DEEMS NECESSARY.

17. PRIOR TO PLAN APPROVAL, A CERTIFIED LAB SHALL DETERMINE THE PERCENTAGE OF CEMENT CONTENT FOR SUBGRADE STABILIZATION IN SANDY SOILS WITH P.I. LESS THAN 10 TO OBTAIN A COMPRESSIVE STRENGTH OF 400 PSI IN 28 DAYS. THE LAB SHALL ALSO DETERMINE THE PERCENTAGE OF LIME CONTENT FOR SUBGRADE STABILIZATION IN CLAY SOILS WITH A P.I. GREATER THAN 20. ALL STREETS SHALL BE TESTED EVERY 200 FEET AND SUBGRADE SHALL BE STABILIZED UNLESS THE LAB CERTIFIES THE P.I. TO BE BETWEEN 10 AND 20 AND THAT STABILIZATION IS NOT NEEDED.

18. A CONCRETE MIX DESIGN BY THE CERTIFIED LAB SHALL BE SUBMITTED TO AND APPROVED BY THE GOVERNING ENTITY'S ENGINEER BEFORE ANY CONCRETE IS POURED.

19. A MINIMUM OF TWO (2) COMPACTION TESTS SHALL BE PERFORMED A MAXIMUM DISTANCE OF 500 FEET, AND FOR EACH 2'-6" MAXIMUM THICK LAYERS OF FILL. IN AREAS WHERE NO FILL IS REQUIRED, TWO (2) SAMPLES SHALL BE TAKEN AT A MAXIMUM DISTANCE OF 500 FEET. ADDITIONAL TESTING SHALL BE PERFORMED IF SEEN NECESSARY BY THE ENGINEER. NO ADDITIONAL LAYERS OF FILL SHALL BE MADE WITHOUT HAVING THE LAB'S WRITTEN APPROVAL OF COMPLETED LAYERS. PROOF ROLLING SHALL BE REQUIRED BY THE INSPECTOR ON EACH LAYER PLACED AND ANY "PUMPING" AREAS SHALL BE REMOVED IMMEDIATELY AND REPLACED OR STABILIZED AND RE-COMPACTED TO A PASSING DENSITY.

20. CONSTRUCTION OF ITEMS THAT ARE NOT SPECIFICALLY ADDRESSED TO BE IN ACCORDANCE WITH THE TEXAS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS (LATEST REVISION).

21. RIGHT-OF-WAY SHALL BE SLOPED FROM THE PROPERTY TO THE TOP OF CURB AND HYDROMULCHED OR SODDED BEFORE FINAL ACCEPTANCE BY THE GOVERNING ENTITY TO CONTROL EROSION INTO THE STREET AND STORM SEWER.

22. MEMBRANE CURING TYPE 2, WHITE PIGMENTED, SHALL BE USED FOR CURING ALL CONCRETE SURFACES IMMEDIATELY AFTER FINISHING OF SURFACES AND SHALL BE IN ACCORDANCE WITH THE TEXAS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS ITEM #526.

23. ALL FIRST STAGE INLET CONSTRUCTION SHALL BE PROTECTED WITH 3 INCH THICK BOARDS AT ALL TIMES.

24. ALL SUBGRADE AND EMBANKMENT AREAS SHALL BE STRIPPED OF ALL ORGANIC AND UNSUITABLE MATERIAL BEFORE STABILIZATION OR FILLING IS BEGUN. MATERIAL USED FOR FILL SHALL BE CERTIFIED BY A LAB TO HAVE A PLASTICITY INDEX BETWEEN 10 AND 20.

25. FORMS SHALL BE SET TO THE PROPER GRADE AND PROPERLY SUPPORTED SO THAT NO DISPLACEMENT OCCURS WITH THE PAVING ACTIVITIES. ALL CONCRETE SHALL BE VIBRATED BY MECHANICAL MEANS TO INSURE PROPER COMPACTION AND NO HONEY COMBS.

26. CONCRETE SHALL NOT BE PLACED WHEN THE TEMPERATURE IS BELOW 40° F. AND FALLING, BUT MAY BE PLACED WHEN TEMPERATURE IS ABOVE 35° F. AND RISING. THE TEMPERATURE SHALL BE TAKEN IN THE SHADE AND AWAY FROM ARTIFICIAL HEAT.

27. THE CONTRACTOR SHALL ERECT AND MAINTAIN BARRICADES TO ADEQUATELY PROTECT THE PAVEMENT. THE CONTRACTOR SHALL HAVE PERSONNEL ON SITE UNTIL THE PAVEMENT HAS REACHED SUFFICIENT STRENGTH AS NOT TO BE DAMAGED BY ANIMALS OR FOOT TRAFFIC.

28. JOINT SEALING MATERIAL SHALL BE A HOT POURED RUBBER TYPE AND SHALL MEET THE REQUIREMENTS IN ACCORDANCE WITH TEST METHOD TEX-525-C, OR AN APPROVED EQUAL. TAR WILL NOT BE ALLOWED.

29. JOINTS SHALL BE CLEANED OF ALL SCALE, DIRT, DUST, CURING COMPOUND, AND CONCRETE TO THE WIDTH AND DEPTH OF THE JOINT AND SHALL BE DRY BEFORE SEALING IS PERFORMED.

30. REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM 615 GRADE 60 (GRADE 40 ONLY FOR BARS REQUIRING BENDING). REINFORCING STEEL SHALL BE SUPPORTED ON CHAIRS STRONG ENOUGH TO HOLD IT IN PLACE AND BE TIED.

31. CONCRETE FOR PAVEMENT SHALL MEET TEXAS DEPARTMENT OF HIGHWAY STANDARD SPECIFICATIONS AND SHALL BE A MINIMUM OF 5 SACK, 3,000 PSI UNLESS STATED SPECIFICALLY BY THE PLANS OR THE SPECIFICATIONS.

32. CONCRETE PAVEMENT SHALL BE CORED TO VERIFY THICKNESS OF CONCRETE AT INTERVALS OF 1,000 LINEAR FEET PER TRAFFIC LANE, IF REQUIRED BY THE GOVERNING ENTITY ENGINEER.

STORM SEWER NOTES:

1. STORM SEWER AND LEADS SHALL BE REINFORCED CONCRETE PIPE, ASTM C-76, CLASS III, WITH O-RING RUBBER GASKET JOINTS, AND SHALL BE INSTALLED, BEDDED AND BACKFILLED IN ACCORDANCE WITH THE GOVERNING ENTITIE'S STANDARDS AND SPECIFICATIONS

NOTE: HDPE PIPE MAY BE USED PROVIDED THAT IT IS BACKFILLED WITH CEMENT STABILIZED SAND (2 SACKS CEMENT/TON), OR OTHER BACKFILL MATERIALS THAT HAVE BEEN APPROVED BY THE GOVERNING ENTITY. SEE NOTES BELOW.

2. ALL PROPOSED PIPE STUB OUTS FROM MANHOLES OR INLETS ARE TO BE PLUGGED WITH 8 INCH BRICK WALLS UNLESS OTHERWISE NOTED.

3. ALL BOX CULVERTS INSTALLED SHALL BE PLACED ON A MINIMUM OF 6 INCHES OF CEMENT STABILIZED SAND (CEMENT STABILIZED SAND SHALL BE 1½ SACK CEMENT PER TON). FOR INSTALLATION OF PRE-CASE CONCRETE BOX CULVERTS IN POOR SAIL CONDITIONS, A 7 INCH REINFORCED CONCRETE SLAB SHALL BE INSTALLED. FOR INSTALLATION OF MONOLITHIC REINFORCED CONCRETE BOX CULVERTS IN POOR SOIL CONDITIONS, A 4 INCH THICK CLASS "C" CONCRETE SEAL SLAB SHALL BE INSTALLED, PRIOR TO CONSTRUCTION OF BOX CULVERTS.

4. STORM SEWER MANHOLES SHALL BE STANDARD PRE-CAST, UNLESS OTHERWISE NOTED.

5. ALL INLETS TO BE TO THE DETAIL SPECIFICATIONS SHOWN IN THE PLANS OR APPROVED EQUAL OR UNLESS OTHERWISE STATED ON PLANS. INLETS TO BE STANDARD DEPTH UNLESS OTHERWISE NOTED.

6. ALL STORM SEWER LEADS SHALL BE 18 INCH MINIMUM UNLESS OTHERWISE INDICATED. GRADE DROP ON LEADS BETWEEN INLETS TO BE A MINIMUM OF 0.20 FOOT. GRADE DROP BETWEEN INLET AND MANHOLES TO BE 0.20 FOOT UNLESS OTHERWISE SHOWN. WHEN MANHOLE FRAME AND COVER IS REQUIRED, USE EAST JORDAN 24" FRAME AND COVER (OR EQUAL).

9. FOR ADJUSTMENT OF MANHOLE LIDS USE STANDARD CONCRETE RINGS.

10. CONCRETE USED FOR ALL POURED-IN-PLACE MANHOLES, INLETS, WINGWALLS, HEADWALLS AND OTHER APPURTENANCES TO BE CLASS "A" CONCRETE WITH 3,000 P.S.I. STRENGTH AT 28 DAYS.

11. ALL EXPOSED CORNERS TO BE CHAMFERED 3/4".

12. OTHER BACKFILL MATERIALS MAY BE USED BASED ON THE GEOTECHNICAL REPORT OR PER HDPE SPECIFICATIONS. BACKFILL MUST BE USED WITH APPROPRIATE COMPACTION.

13. SEE MANUFACTURERS SPECIFICATIONS FOR THE USE OF HIGH DENSITY POLYETHYLENE PIPE FOR STORM DRAINS FOR SPECIFIC TECHNICAL INFORMATION.

WATER CONSTRUCTION NOTES:

1. CONTRACTOR SHALL PROVIDE ADEQUATE THRUST BLOCKING TO WITHSTAND TEST PRESSURE AS SPECIFIED IN THE APPLICABLE ENTITY STANDARD DRAWINGS AND REQUIREMENTS FOR WATER MAIN CONSTRUCTION AND MATERIALS.

2. PRIOR TO INSTALLATION OF WATER METER, WATER METER LEAD OR UNMETERED FIRE SPRINKLER LINE, THE CONTRACTOR SHALL CONTACT THE PERMIT DIVISION.

3. PRIOR TO WATER MAIN CONSTRUCTION, THE CONTRACTOR SHALL CONTACT THE GOVERNING ENTITY'S ENGINEER AND COMPLY WITH ALL REQUIREMENTS NECESSARY FOR THE ISSUANCE OF A WORK ORDER FOR THE WATER MAIN CONSTRUCTION.

4. SEPARATION DISTANCES FOR ALL WATER MAIN AND SANITARY SEWER MAIN CONSTRUCTION SHALL BE GOVERNED BY THE "TEXAS NATURAL RESOURCES CONSERVATION COMMISSION RULES AND REGULATIONS FOR DESIGN CRITERIA FOR SEWERAGE SYSTEMS", SECTION 317.20, LATEST PRINTING. REFER TO THE THE APPLICABLE ENTITY DESIGN MANUAL WATER MAIN DESIGN REQUIREMENTS

5. TWELVE-INCH (12") AND SMALLER MAINS SHALL HAVE A MINIMUM COVER OF FOUR FEET (4') FROM THE TOP OF THE CURB OR FIVE FEET (5') FROM THE MEAN ELEVATION OF THE BOTTOM OF THE NEARBY DITCH AND NEARBY RIGHT-OF-WAY ELEVATION FOR OPEN DITCH SECTIONS.

6. MAINS LARGER THAN TWELVE-INCHES (12") SHALL HAVE A MINIMUM COVER OF FIVE FEET (5') FROM THE TOP OF THE CURB OR SIX FEET (6') FROM THE MEAN ELEVATION FOR OPEN DITCH SECTIONS.

7. ALL WATER MAINS SHALL BE HYDROSTATICALLY TESTED BEFORE BACTERIOLOGICAL TESTING IN ACCORDANCE WITH AWWA STANDARD C-600.

8. ALL WATER PIPING SHALL BE DISINFECTED AND BACTERIOLOGICALLY TESTED PRIOR TO USE IN ACCORDANCE WITH AWWA STANDARD C-601.

9. ALL WATER MAINS 4" THROUGH 12" SHALL BE C-900 (SDR-18). ALL WATER MAINS 14" THROUGH 36" SHALL BE C-905 (SDR-18).

10. PRIOR TO BACKFILLING OF ALL UNDERGROUND WATER LINES, INSTALL A CONTINUOUS #14 COPPER TRACER WIRE, LOCATED DIRECTLY OVER BURIED LINES AND ACCESSIBLE AT EACH VALVE STACK.

11. THE INSTALLATION OF ALL WATER LINES SHALL EXTEND ALONG THE ENTIRE LENGTH OF THE PROPERTY TO BE SERVED. WATER LINES THAT DEAD END SHALL EXTEND TO THE PROJECT LIMITS FOR FUTURE EXTENSIONS.

TCEQ NOTES:

1. THESE WATER STORAGE FACILITIES MUST BE CONSTRUCTED IN ACCORDANCE WITH THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) RULES AND REGULATIONS FOR PUBLIC WATER SYSTEMS 30 TEXAS ADMINISTRATIVE CODE (TAC) CHAPTER 290 SUBCHAPTER D.

2. ALL FACILITIES FOR POTABLE WATER STORAGE SHALL BE COVERED AND DESIGNED, FABRICATED, ERECTED, TESTED AND DISINFECTED IN STRICT ACCORDANCE WITH CURRENT AMERICAN WATER WORKS ASSOCIATION (AWWA) STANDARDS AND SHALL BE PROVIDED WITH THE MINIMUM NUMBER, SIZE AND TYPE OF ROOF VENTS, MAN WAYS, DRAINS, SAMPLE CONNECTIONS, ACCESS LADDERS, OVERFLOWS, LIQUID LEVEL INDICATORS AND OTHER APPURTENANCES AS SPECIFIED IN THESE RULES.

3. BOLTED TANKS SHALL BE DESIGNED, FABRICATED, ERECTED AND TESTED IN STRICT ACCORDANCE WITH CURRENT AWWA STANDARD D103. WELDED TANKS SHALL BE DESIGNED, FABRICATED, ERECTED AND TESTED IN STRICT ACCORDANCE

WITH CURRENT AWWA STANDARD D 100. THE ROOF OF ALL TANKS SHALL BE DESIGNED AND ERECTED SO THAT NO WATER PONDS AT ANY POINT ON THE ROOF AND, IN ADDITION, NO AREA OF THE ROOF SHALL HAVE A SLOPE OF LESS THAN 0.75 INCH PER FOOT.

4. ROOF VENTS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH CURRENT AWWA STANDARDS AND SHALL BE EQUIPPED WITH APPROVED SCREENS TO PREVENT ENTRY OF ANIMALS, BIRDS, INSECTS AND HEAVY AIR CONTAMINANTS. SCREENS SHALL BE FABRICATED OF CORROSION RESISTANT MATERIAL AND SHALL BE 16 MESH OR FINER. SCREENS SHALL BE SECURELY CLAMPED IN PLACE WITH STAINLESS OR GALVANIZED BANDS OR WIRES AND SHALL BE DESIGNED TO WITHSTAND WINDS OF NOT LESS THAN TANK DESIGN CRITERIA (UNLESS SPECIFIED OTHERWISE BY THE ENGINEER).

5. ALL ROOF OPENINGS SHALL BE DESIGNED IN ACCORDANCE WITH CURRENT AWWA STANDARDS. IF AN ALTERNATE 30 INCH DIAMETER ACCESS OPENING IS NOT PROVIDED IN A STORAGE TANK, THE PRIMARY ROOF ACCESS OPENING SHALL NOT BE LESS THAN 30 INCHES IN DIAMETER. OTHER ROOF OPENINGS REQUIRED ONLY FOR VENTILATING PURPOSES DURING CLEANING, REPAIRING OR PAINTING OPERATIONS SHALL BE NOT LESS THAN 24 INCHES IN DIAMETER OR AS SPECIFIED BY THE LICENSED PROFESSIONAL ENGINEER. AN EXISTING TANK WITHOUT A 30-INCH IN DIAMETER ACCESS OPENING MUST BE MODIFIED TO MEET THIS REQUIREMENT WHEN MAJOR REPAIR OR MAINTENANCE IS PERFORMED ON THE TANK. EACH ACCESS OPENING SHALL HAVE A RAISED CURBING AT LEAST FOUR INCHES IN HEIGHT WITH A LOCKABLE COVER THAT OVERLAPS THE CURBING AT LEAST TWO INCHES IN A DOWNWARD DIRECTION. WHERE NECESSARY, A GASKET SHALL BE USED TO MAKE A POSITIVE SEAL WHEN THE HATCH IS CLOSED. ALL HATCHES SHALL REMAIN LOCKED EXCEPT DURING INSPECTIONS AND MAINTENANCE.

6. OVERFLOWS SHALL BE DESIGNED IN STRICT ACCORDANCE WITH CURRENT AWWA STANDARDS AND SHALL TERMINATE WITH A GRAVITY HINGED AND WEIGHTED COVER. THE COVER SHALL FIT TIGHTLY WITH NO GAP OVER 1/16 INCHES. IF THE OVERFLOW TERMINATES AT ANY POINT OTHER THAN THE GROUND LEVEL, IT SHALL BE LOCATED NEAR ENOUGH AND AT A POSITION ACCESSIBLE FROM A LADDER OR THE BALCONY FOR INSPECTION PURPOSES. THE OVERFLOW(S) SHALL BE SIZED TO HANDLE THE MAXIMUM POSSIBLE FILL RATE WITHOUT EXCEEDING THE CAPACITY OF THE OVERFLOW(S). THE DISCHARGE OPENING OF THE OVERFLOW(S) SHALL BE ABOVE THE SURFACE OF THE GROUND AND SHALL NOT BE SUBJECT TO SUBMERGENCE.

7. ALL CLEARWELLS AND WATER STORAGE TANKS SHALL HAVE A LIQUID LEVEL INDICATOR LOCATED AT THE TANK SITE. THE INDICATOR CAN BE A FLOAT WITH A MOVING TARGET, AN ULTRASONIC LEVEL INDICATOR, OR A PRESSURE GAUGE CALIBRATED IN FEET OF WATER. IF AN ELEVATED TANK OR STANDPIPE HAS A FLOAT WITH MOVING TARGET INDICATOR, IT MUST ALSO HAVE A PRESSURE INDICATOR LOCATED AT GROUND LEVEL. PRESSURE GAUGES MUST NOT BE LESS THAN THREE INCHES IN DIAMETER AND CALIBRATED AT NOT MORE THAN TWO-FOOT INTERVALS. REMOTE READING GAUGES AT THE OWNER'S TREATMENT PLANT OR PUMPING STATION WILL NOT ELIMINATE THE REQUIREMENT FOR A GAUGE AT THE TANK SITE UNLESS THE TANK IS LOCATED AT THE PLANT OR STATION.

8. INLET AND OUTLET CONNECTIONS SHALL BE LOCATED SO AS TO PREVENT SHORT CIRCUITING OR STAGNATION OF WATER. CLEARWELLS USED FOR DISINFECTANT CONTACT TIME SHALL BE APPROPRIATELY BAFFLED.

9. CLEARWELLS AND POTABLE WATER STORAGE TANKS SHALL BE THOROUGHLY TIGHT AGAINST LEAKAGE, SHALL BE LOCATED ABOVE THE GROUND WATER TABLE AND SHALL HAVE NO WALLS IN COMMON WITH ANY OTHER PLANT UNITS CONTAINING WATER IN THE PROCESS OF TREATMENT. ALL ASSOCIATED APPURTENANCES INCLUDING VALVES, PIPES AND FITTINGS SHALL BE TIGHT AGAINST LEAKAGE.

10. EACH CLEARWELL OR POTABLE WATER STORAGE TANK SHALL BE PROVIDED WITH A MEANS OF REMOVING ACCUMULATED SILT AND DEPOSITS AT ALL LOW POINTS IN THE BOTTOM OF THE TANK. DRAINS SHALL NOT BE CONNECTED TO ANY WASTE OR SEWAGE DISPOSAL SYSTEM AND SHALL BE CONSTRUCTED SO THAT THEY ARE NOT A POTENTIAL AGENT IN THE CONTAMINATION OF THE STORED WATER.

11. ALL CLEAR WELLS, GROUND STORAGE TANKS, STANDPIPES, AND ELEVATED TANKS SHALL BE PAINTED, DISINFECTED, AND MAINTAINED IN STRICT ACCORDANCE WITH CURRENT AWWA STANDARDS. HOWEVER, NO TEMPORARY COATINGS, WAX GREASE COATINGS, OR COATING MATERIALS CONTAINING LEAD WILL BE ALLOWED. NO OTHER COATINGS WILL BE ALLOWED WHICH ARE NOT APPROVED FOR USE (AS A CONTACT SURFACE WITH POTABLE WATER) BY THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA), NATIONAL SANITATION FOUNDATION (NSF), OR THE UNITED STATES FOOD AND DRUG ADMINISTRATION (FDA). ALL NEWLY INSTALLED COATINGS MUST CONFORM TO ANSI/NSF STANDARD 61 AND MUST BE CERTIFIED BY AN ORGANIZATION ACCREDITED BY ANSI

12. NO TANKS OR CONTAINERS SHALL BE USED TO STORE POTABLE WATER THAT HAS PREVIOUSLY BEEN USED FOR ANY NON POTABLE PURPOSE. WHERE A USED TANK IS PROPOSED FOR USE, A LETTER FROM THE PREVIOUS OWNER OR OWNERS MUST BE SUBMITTED TO THE COMMISSION WHICH STATES THE USE OF THE TANK.

13. ACCESS MANWAYS IN THE RISER PIPE, SHELL AREA, ACCESS TUBE, BOWL AREA OR ANY OTHER LOCATION OPENING DIRECTLY INTO THE WATER COMPARTMENT SHALL BE LOCATED IN STRICT ACCORDANCE WITH CURRENT AWWA STANDARDS. THESE OPENINGS SHALL NOT BE LESS THAN 24 INCHES IN DIAMETER. HOWEVER, IN THE CASE OF A RISER PIPE OR ACCESS TUBE OF 36 INCHES IN DIAMETER OR SMALLER, THE ACCESS MANWAY MAY BE 18 INCHES TIMES 24 INCHES WITH THE VERTICAL DIMENSION NOT LESS THAN 24 INCHES. THE PRIMARY ACCESS MANWAY IN THE LOWER RING OR SECTION OF A GROUND STORAGE TANK SHALL BE NOT LESS THAN 30 INCHES IN DIAMETER. WHERE NECESSARY, FOR ANY ACCESS MANWAY WHICH ALLOWS DIRECT ACCESS TO THE WATER COMPARTMENT, A GASKET SHALL BE USED TO MAKE A POSITIVE SEAL WHEN THE ACCESS MANWAY IS CLOSED.

14. SERVICE PUMP INSTALLATION TAKING SUCTION FROM STORAGE TANKS SHALL PROVIDE AUTOMATIC LOW WATER LEVEL CUTOFF DEVICES TO PREVENT DAMAGE TO THE PUMPS. THE SERVICE PUMP CIRCUITRY SHALL ALSO RESUME PUMPING AUTOMATICALLY ONCE THE MINIMUM WATER LEVEL IS REACHED IN THE TANK.

LEGEND:

———————	EX ADJOINER LINE, ADJ
—— ———— ——	EX SANITARY, SAN
——— — ———	EX WATERLINE, WL
———————	EX STORM SEWER, STM
→···→···→···	EX DRAINAGE PATH, FL
——v————v——	EX HIGH BANK, HB
— — — — — — —	EX EASEMENT, ESMT
—— —— —— ——	EX BUILDING LINE, BL
——— P ———	EX OVERHEAD POWER, P
——— UG ———	EX UNDERGROUND POWER, UG
——— FO ———	EX FIBER, FO
——— T ———	EX TELEPHONE, T
——— G ———	EX GAS LINE, G
——— X ———	EX FENCE, FNC
━━━━━━━	PROJECT BOUNDARY LINE, BNDY
━━ ━━━━ ━━	PROP SANITARY, SAN
━━━ ━ ━━━	PROP WATERLINE, WL
━━━━━━━	PROP STORM SEWER, STM
→···→···→···	PROP DRAINAGE PATH, FL
━━v━━━━v━━	PROP HIGH BANK, HB
━━ ━━ ━━ ━━	PROP EASEMENT, ESMT
━━━━ ━━━━	PROP BUILDING LINE, BL
━━━ **P** ━━━	PROP OVERHEAD POWER, P
━━━ **UG** ━━━	PROP UNDERGND POWER, UG
━━━ **FO** ━━━	PROP FIBER, FO
━━━ **T** ━━━	PROP TELEPHONE, T
━━━ **G** ━━━	PROP GAS LINE, G
━━━ **X** ━━━	PROP FENCE, FNC
━━━━━━━	PROP PAVEMENT, PVMT
— — — — — — —	PROP BACK OF CURB, BC

BENCHMARK:
MONT 3
ELEV.=268.73'
3" BRASS DISK LOCATED FROM THE INTERSECTION OF HWY 105 AND HWY 149, WEST ±4700' TO THE PARKING LOT OF THE HERITAGE HOUSE RESTAURANT', WHICH IS LOCATED ON THE NORTH SIDE OF HWY 105.
MONT 7
ELEV.=291.77'
3" BRASS DISK IS LOCATED IN THE CENTER OF MONTGOMERY ON THE SOUTH SIDE OF HWY 105. MARK IS IN FRONT (NORTH) OF GAS PUMPING AREA OF BROOKSHIRE BROTHERS GROCERY STORE, AS WELL AS ACROSS HWY 105(SOUTH) FROM 'THE OLDE SCHOOL HOUSE'.
TEMPORARY BENCHMARK "A"
CUT SQUARE IN CONCRETE ELEV.=316.35'
CUT SQUARE IN CONCRETE ON B-B INLET LOCATED SOUTHEAST FROM SCENIC HILLS COURT AND EMMA'S WAY INTERSECTION.

FLOODPLAIN NOTE:
This site (proposed area) is situated in Zone "X" in Montgomery County, Texas according to FEMA map number 48339C0200G dated August 18, 2014: This statement does not imply that the property and/or the structures thereon will be free from flooding or flood damage. This determination has been made by scaling the property on the referenced map and is not the result of an elevation survey. This flood statement shall not create liability on the part of the surveyor

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 11235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHIRS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK
SECTION 4

CONSTRUCTION NOTES & LEGEND

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE		SHEET	2

JONATHAN T. WHITE
127058

09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:\ENGINEERING PROJECTS\10600 – HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\03 EXISTING CONDITIONS SURVEY AND DEMO PLAN.DWG Sep. 15, 2020–3:59 PM

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 22339
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHIRS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK SECTION 4

EXISTING SURVEY, DEMOLITION PLAN & TREE PRESERVATION PLAN

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	1" = 50' (24x36) 1" = 100' (11x17)	SHEET	3

STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER

09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:\ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\04 OVERALL SITE PLAN.DWG Sep. 15, 2020–3:59 PM

PAVING LEGEND:

▨	11,272 SF OF 4" CONCRETE
░	35,238 SF OF 6" CONCRETE

TOTAL TO IMPERVIOUS AREA= 115,090.15

PAVING NOTES:

1. SEE PAVING DIMENSIONS AND SPECIFICATIONS PROVIDED ON DETAIL SHEETS

DIMENSIONAL CONTROL NOTES:

1. ALL COORDINATE POINTS AND DIMENSIONS SHOWN ARE TO THE FACE OF CURB UNLESS OTHERWISE NOTED.

DRAINAGE EASEMENT NOTE:

NO FENCES ARE ALLOWED TO BE CONSTRUCTED OVER DRAINAGE EASEMENT. DRAINAGE EASEMENT TO REMAIN ACCESIBLE AT ALL TIMES.

NOTE:

1. ALL STREET LIGHTS ARE TO BE PROVIDED BY ENTERGY & ARE REQUIRED TO BE FULL CUT OFF.

2. PARK ACCESS AND SIDEWALK IS TO BEMAINTAINED BY HOA.

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 11235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHIRS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK
SECTION 4
OVERALL SITE PLAN AND PAVING PLAN

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	1" = 50' (24x36) 1" = 100' (11x17)	SHEET	4

JONATHAN T. WHITE
127058

09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

PRESERVED CANOPY CALCULATION:

QTY	SIZE	TYPE	MULTIPLIER	CANOPY CREDIT
3	24"	OAK	1.5	7,650
2	18"	OAK	1.5	5,100
1	22"	OAK	1.5	2,550
			TOTAL PROP. SF	15,300 S.F.

REQUIRED TREE CANOPY CALCULATION:

USE	SIZE	REQUIRED CANOPY %	REQUIRED CANOPY SF
PARK	.1 AC	20%	871 SF
PARK	.21 AC	20%	1830 SF
TOTAL REQUIRED CANOPY			2,701 S.F.

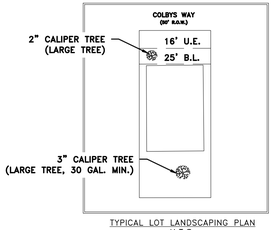
0 50' 100'

LANDSCAPE LEGEND:

TREE PRESERVATION AREA

LANDSCAPE NOTES:

1. LANDSCAPE PLAN IS CONCEPTUAL ONLY AND IS SUBJECT TO CHANGE. DEVELOPER IS TO SUBMIT REVISED LANDSCAPE PLAN TO THE GOVERNING ENTITY FOR APPROVAL IF THIS PLAN CHANGES.
2. THE OWNER OF THE PROPERTY IS RESPONSIBLE FOR MAINTAINING THE TRESS AND SHRUBS.
3. TREES SHALL COMPLY WITH THE APPROVED LIST FOUND IN TABLE 2 OF SECTION 78-176 OF THE CITY OF MONTGOMERY CODE OF ORDINANCES.
4. PRIOR TO CERTIFICATE OF OCCUPANCY, HOME BUILDER IS TO INSTALL PROPOSED TREES.



TYPICAL LOT LANDSCAPING PLAN
N.T.S.

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 12235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHRIS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK SECTION 4

LANDSCAPE PLAN

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	1" = 50' (24x36) 1" = 100' (11x17)	SHEET	5

STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER

09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:\ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\05 LANDSCAPE PLAN.DWG Sep. 15, 2020 - 4:00 PM

GRADING NOTES:

1. OWNER, CLIENTS AND/OR CONTRACTORS SHALL NOTIFY ENGINEER 48 HOURS IN ADVANCED OF PAVEMENT PLACEMENT FOR A MANDATORY FORM AND/OR "BLUE TOP" INSPECTION. USE OF THESE PLANS IS CONTINGENT UPON ACCEPTANCE OF THIS NOTE.
2. ADDITIONAL GRADING DESIGN AND DETAILS MAY BE PROVIDED PRIOR TO CONSTRUCTION.
3. CONTRACTOR SHALL ESTABLISH GRADE CONTROL TO PROVIDE ELEVATIONS ON STREETS, LOT PADS, SWALES AND OTHER DRAINAGE FEATURES TO WITHIN A 1' TOLERANCE AS SHOWN ON THE PLANS.
4. FILL MATERIAL USED IN LOT PAD AREAS SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:
   - 4.1. MAXIMUM PLASTICITY INDEX: 20
   - 4.2. MINIMUM PLASTICITY INDEX: 3
   - 4.3. MINIMUM AND MAXIMUM PASSING #200 SIEVE: 10% TO 70%
   - 4.4. NO STONES LARGER THAN 1-1/2"
   - 4.5. COMPACTION SHOULD BE 95 PERCENT OF MAXIMUM LABORATORY DENSITY DETERMINED IN ACCORDANCE WITH AMERICAN SOCIETY OF TESTING MATERIALS, METHOD ASTM D 698, USING A COMPACTIVE EFFORT OF 7.16 FOOT-LBS/IN^3
5. FILL SHALL BE PLACED IN MAXIMUM OF 8" LIFTS, EACH LIFT SHOULD BE INSPECTED AND TESTED FOR DENSITY COMPLIANCE BY THE GEOTECHNICAL ENGINEER PRIOR TO PLACING THE NEXT LIFT, THE CONTRACTOR MAY TEST UP TO A TOTAL OF 12" AT A TIME. IF THE CONTRACTOR CHOOSES TO TEST 12" INSTEAD OF 8" THE 12" SHALL HAVE BEEN INSTALLED IN TWO-SIX INCH LIFTS.
6. CONTRACTOR SHALL PROVIDE A 110 LB SAMPLE OF PROPOSED FILL MATERIAL TO THE GEOTECHNICAL ENGINEER FOR APPROVAL AND FOR DETERMINATION OF MOISTURE-DENSITY RELATIONSHIP IN ADVANCE OF FILLING AND COMPACTION OPERATIONS TO PERMIT INSPECTION AND TESTING AS FILL IS PLACED. NOT LESS THAN ONE FILED DENSITY TEST PER 2000 SQUARE FEET OR MINIMUM OF 3 PER LIFT IS REQUIRED.
7. CONTRACTOR TO REMOVE AND STALK PILE TOP 6" OF TOP SOIL MATERIAL FROM ENTIRE SITE DURING CONSTRUCTION. THE CONTRACTOR SHALL THEN REPLACE AND SPREAD TOP SOIL ON ENTIRE SITE TO MATCH FINAL GRADE SHOWN ON THE PLANS.
8. DRAINAGE AREA WITHIN DRAINAGE EASEMENT TO BE MAINTAINED BY HOA AND IS TO REMAIN CLEAR OF FENCES, LANDSCAPING ETC.

LEGEND:

× 323.00	EXISTING ELEVATION POINT
MEP=323.00	PROPOSED TOP OF CURB
TC=323.00	PROPOSED TOP OF CURB
FL=323.00	PROPOSED FLOWLINES AT LOT LINE SWALES
PAD=323.00	PROPOSED PAD ELEVATION
TW=323.00	TOP OF WALK
A	TYPE A GRADING (TO FRONT)
B	TYPE B GRADING (TO REAR)
C	TYPE C GRADING (TO FRONT AND DITCH)
	PROP LOT LINE SWALE
1.0%	SLOPE
1 1	CROSS SECTION

0 50' 100'

Cut/Fill		
Cut	Fill	Net
8,298 CU. YD.	7,628 CU. YD.	670 CU. YD.

*INCLUDES STRIPPING AND PAVEMEMNT ADJUSTMENT

CROSS SECTION "D"
HORIZ: 1"=50'
VERT: 1"=5'

CROSS SECTION "C"
HORIZ: 1"=50'
VERT: 1"=5'

CROSS SECTION "A"
HORIZ: 1"=50'
VERT: 1"=5'

CROSS SECTION "B"
HORIZ: 1"=50'
VERT: 1"=5'

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 11233
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHIRS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK SECTION 4

GRADING PLAN

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

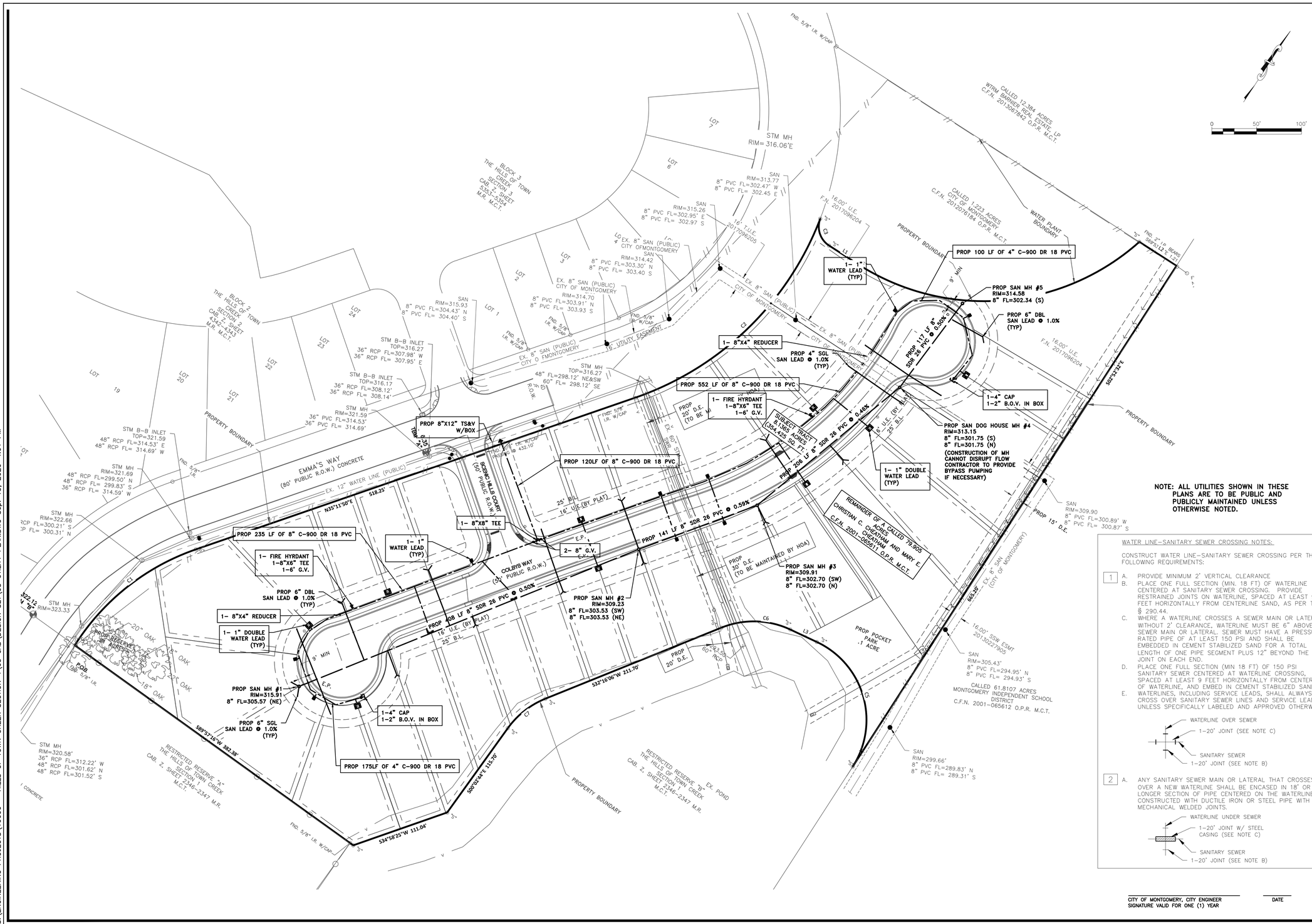
DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	1" = 50' (24x36) 1" = 100' (11x17)	SHEET	6

STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER
09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:\ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\07 GRADING PLAN.DWG Sep. 18, 2020 - 9:06 AM



NOTE: ALL UTILITIES SHOWN IN THESE PLANS ARE TO BE PUBLIC AND PUBLICLY MAINTAINED UNLESS OTHERWISE NOTED.

WATER LINE–SANITARY SEWER CROSSING NOTES:

CONSTRUCT WATER LINE–SANITARY SEWER CROSSING PER THE FOLLOWING REQUIREMENTS:

1 A. PROVIDE MINIMUM 2' VERTICAL CLEARANCE
B. PLACE ONE FULL SECTION (MIN. 18 FT) OF WATERLINE CENTERED AT SANITARY SEWER CROSSING. PROVIDE RESTRAINED JOINTS ON WATERLINE, SPACED AT LEAST 9 FEET HORIZONTALLY FROM CENTERLINE SAND, AS PER TAC § 290.44.
C. WHERE A WATERLINE CROSSES A SEWER MAIN OR LATERAL WITHOUT 2' CLEARANCE, WATERLINE MUST BE 6" ABOVE SEWER MAIN OR LATERAL. SEWER MUST HAVE A PRESSURE RATED PIPE OF AT LEAST 150 PSI AND SHALL BE EMBEDDED IN CEMENT STABILIZED SAND FOR A TOTAL LENGTH OF ONE PIPE SEGMENT PLUS 12" BEYOND THE JOINT ON EACH END.
D. PLACE ONE FULL SECTION (MIN 18 FT) OF 150 PSI SANITARY SEWER CENTERED AT WATERLINE CROSSING, SPACED AT LEAST 9 FEET HORIZONTALLY FROM CENTERLINE OF WATERLINE, AND EMBED IN CEMENT STABILIZED SAND.
E. WATERLINES, INCLUDING SERVICE LEADS, SHALL ALWAYS CROSS OVER SANITARY SEWER LINES AND SERVICE LEADS UNLESS SPECIFICALLY LABELED AND APPROVED OTHERWISE.

2 A. ANY SANITARY SEWER MAIN OR LATERAL THAT CROSSES OVER A NEW WATERLINE SHALL BE ENCASED IN 18' OR LONGER SECTION OF PIPE, CENTERED ON THE WATERLINE OR CONSTRUCTED WITH DUCTILE IRON OR STEEL PIPE WITH MECHANICAL WELDED JOINTS.

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 12235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHRIS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK
SECTION 4
UTILITY PLAN

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

DRAWING INFORMATION

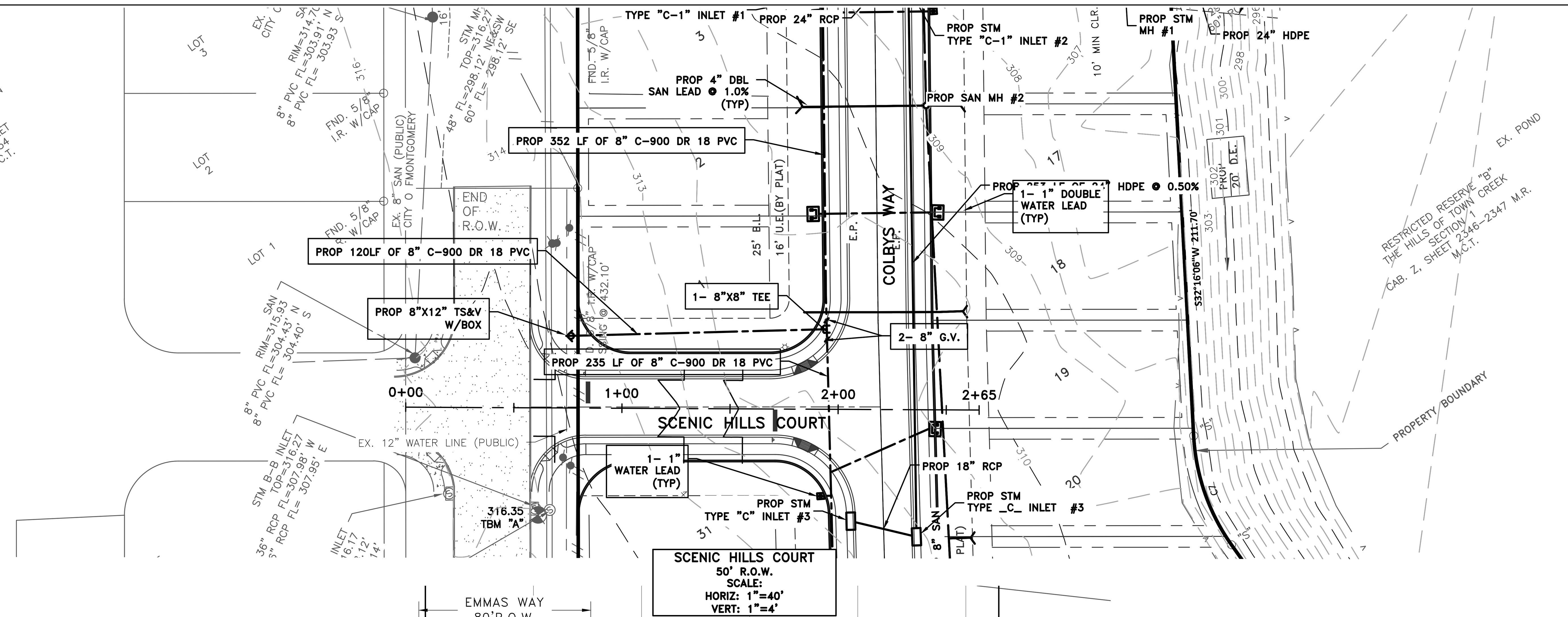
PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	1" = 50' (24x36) 1" = 100' (11x17)	SHEET	7

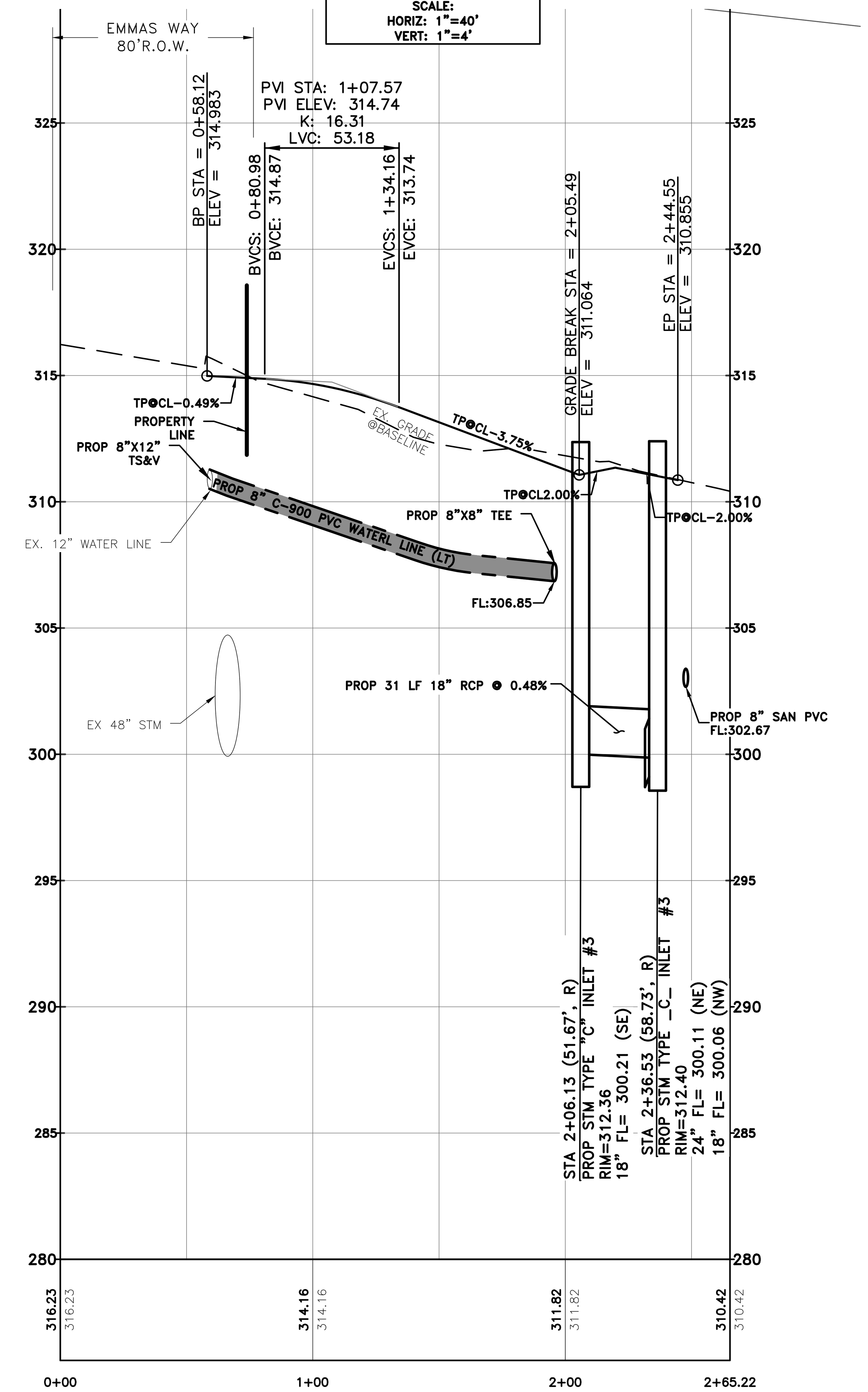
STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER

09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:\ENGINEERING PROJECTS\10600 – HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\08 UTILITY PLAN.DWG Sep. 15, 2020–4:01 PM





VERTICLE CURVE TABLE

0+58.12	314.98'		PVI
0+68.12	314.93'	-0.49%	
0+78.12	314.88'	-0.49%	
0+80.98	314.87'	-0.49%	PVC
0+88.12	314.82'	-0.71%	
0+98.12	314.70'	-1.24%	
1+07.57	314.52'	-1.83%	Crest
1+08.12	314.51'	-2.14%	
1+18.12	314.26'	-2.46%	
1+28.12	313.96'	-3.08%	
1+34.16	313.74'	-3.57%	PVT

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

S:\ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\09 P&P.DWG Sep. 15, 2020-4:01 PM

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 11235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHIRS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK SECTION 4

SCENIC HILLS COURT PLAN AND PROFILE

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

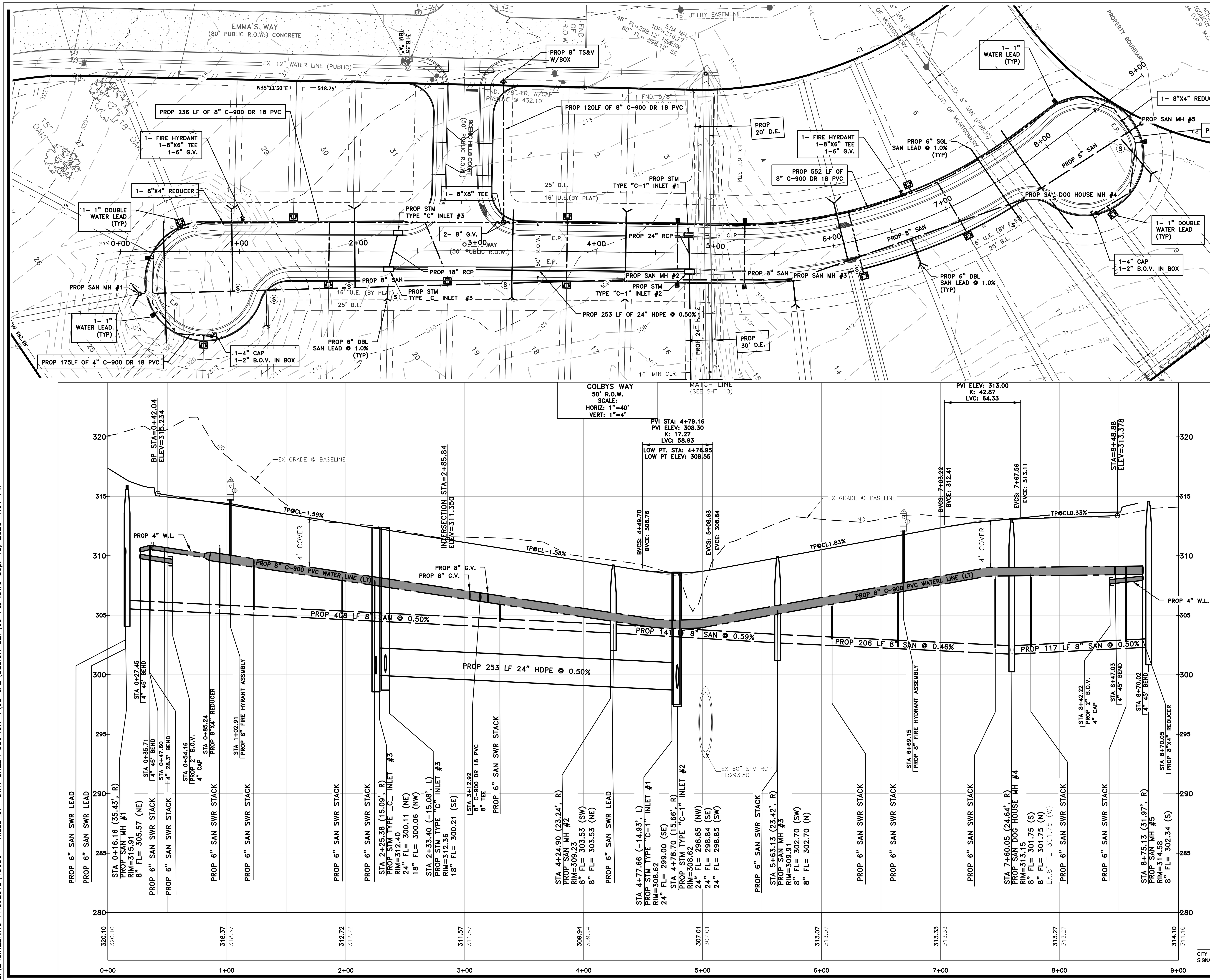
DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE 1" = 40' (24x36) 1" = 80' (11x17)		SHEET	8

STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER

09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE



VERTICLE CURVE TABLE

4+49.70	308.76'	-1.58%	PVC
4+52.04	308.73'	-1.51%	
4+62.04	308.61'	-1.15%	
4+72.04	308.56'	-0.57%	
4+79.16	308.55'	-0.08%	Sag
4+82.04	308.56'	0.21%	
4+92.04	308.62'	0.58%	
5+02.04	308.73'	1.16%	
5+08.63	308.84'	1.64%	PVT

7+03.22	312.41'	1.83%	PVC
7+12.04	312.56'	1.73%	
7+22.04	312.71'	1.51%	
7+32.04	312.84'	1.28%	
7+35.39	312.88'	1.12%	Crest
7+42.04	312.95'	1.01%	
7+52.04	313.03'	0.81%	
7+62.04	313.08'	0.58%	
7+67.56	313.11'	0.40%	PVT

NOTES:

1. ALL LONGSIDE LEADS SHALL INCLUDE STACKS, RISERS, TEES, WYES, AND ALL APPURTENANCES TO END AT A DEPTH OF 4'-5' BELOW NATURAL GROUND.
2. ALL SANITARY SEWER SERVICE LINES TO BE 1% SLOPE, UNLESS OTHERWISE NOTED
3. ALL FIRE HYDRANTS TO BE LOCATED 3' BEHIND BACK OF CURB.
4. ALL UTILITY LEADS UNDER PAVEMENT IN CUL-DE-SACS AND/OR KNUCKLES TO BE BACKFILLED WITH CEMENT STABILIZED SAND UP TO PAVEMENT SUBGRADE.

SAN LEAD TABLE

STATION & OFFSET	LENGTH	START FL	END FL
0+14.66, 33.89	3.61	310.14	310.21
0+15.03, 37.30	5.20	310.09	310.18
0+37.36, 34.50	59.99	310.40	311.00
0+37.40, 35.15	41.67	310.40	310.81
0+94.32, 33.35	66.78	310.07	310.76
1+22.64, 32.82	26.95	308.87	309.16
1+97.26, 30.67	64.23	307.42	308.08
2+24.27, 30.25	8.03	307.42	307.52
3+29.40, 26.97	59.11	305.57	306.18
3+29.43, 27.27	9.86	305.39	305.50
4+24.91, 21.13	52.86	303.60	304.15
4+24.92, 25.40	11.73	303.45	303.59
5+63.29, 25.14	16.79	304.77	304.95
6+09.29, 14.77	45.84	305.31	305.81
6+63.69, 12.09	19.68	306.26	306.48
7+47.30, 21.56	15.75	307.98	308.15
7+47.30, 21.56	53.20	307.57	308.14
7+75.87, 25.03	40.49	307.82	308.24
7+75.87, 25.03	55.13	307.80	308.38
8+53.66, 32.77	36.02	308.29	308.67

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR
DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 11235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHIRS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK SECTION 4

COLBYS WAY PLAN AND PROFILE

DRAWING ISSUE

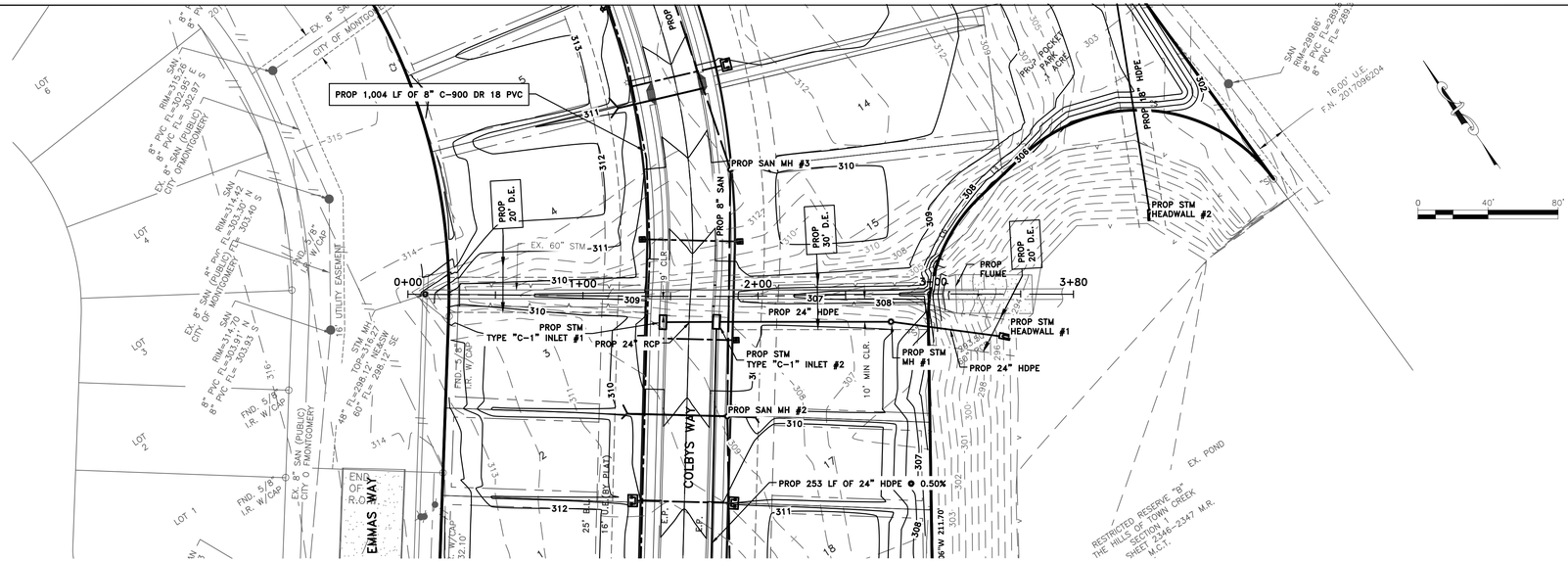
#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

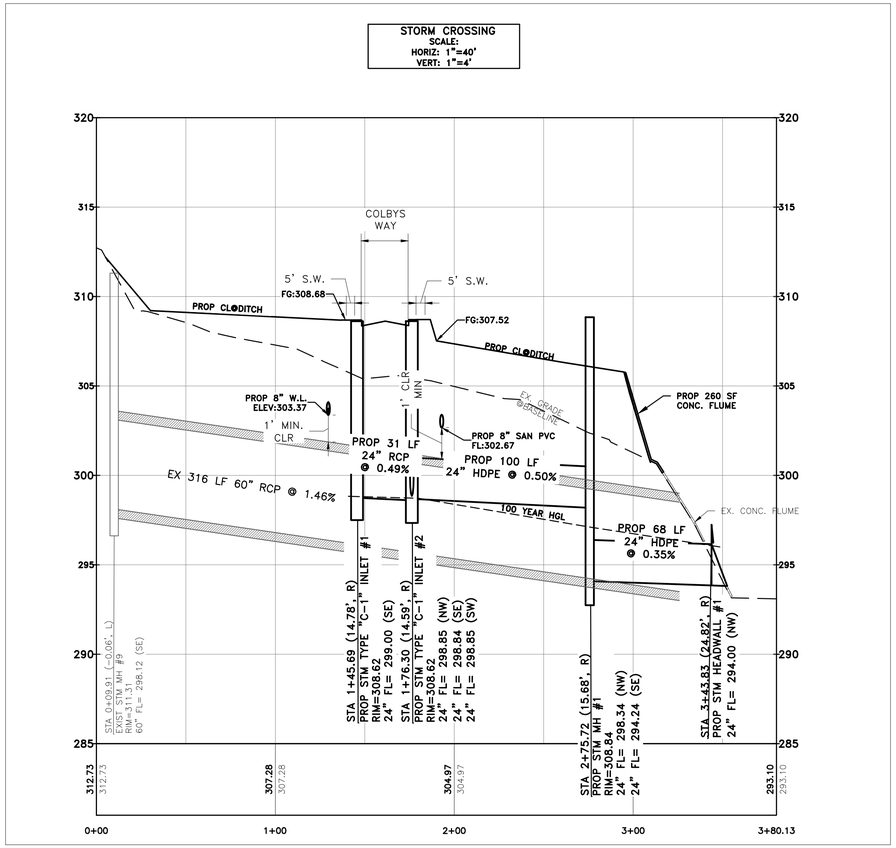
DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	1" = 40' (24x36) 1" = 80' (11x17)	SHEET	9

STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER
09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE





DRAINAGE EASEMENT NOTE:

NO FENCES ARE ALLOWED TO BE CONSTRUCTED OVER DRAINAGE EASEMENT. DRAINAGE EASEMENT TO REMAIN ACCESSIBLE AT ALL TIMES. SWALE IS TO REMAIN CLEAR OF OBSTRUCTIONS AND BE MAINTAINED BY THE HOA.

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 12235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHRIS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK SECTION 4
STORM SEWER CROSSING PLAN AND PROFILE @ COLBYS WAY

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	1" = 40' (24x36) 1" = 80' (11x17)	SHEET	10

STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER
09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:\ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\09 P&P.DWG Sep. 15, 2020-4:01 PM

DRAINAGE LEGEND:

- PROP DRAINAGE AREA BREAKLINE
- DA-A1 / AREA / FLOW — PROP DRAINAGE AREA NUMBER; PROP DRAINAGE AREA ACRES & FLOW (5 YEAR)
- OUTFALL A / AREA / FLOW — PROP OUTFALL NAME; PROP OUTFALL CUMULATIVE ACRES & FLOW (100 YEAR)
- FLOW — DRAINAGE FLOW DIRECTION
- EXTREME EVENT OVERFLOW PATH
- 1 1 — DITCH CROSS SECTION (SEE SHEET 6)

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 22329
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHIRS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK
SECTION 4
DRAINAGE & STORM SEWER PLAN

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

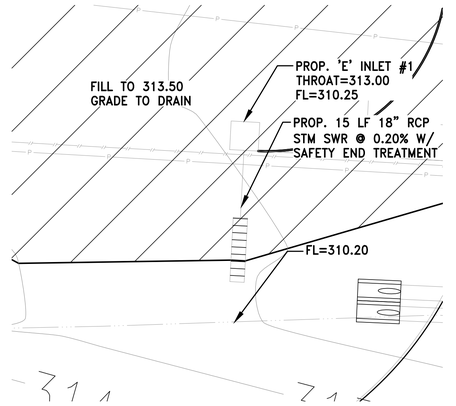
DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	1" = 50' (24x36) 1" = 100' (11x17)	SHEET	11

STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER
09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:_ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\11 DRAINAGE AND STORM SEWER PLAN.DWG Sep. 15, 2020-4:02 PM



DETAIL 'A'
SCALE: 1"=10'

LEGEND

- PROPERTY LINE
- PROPOSED STORM SEWER (BY OTHERS)
- PROPOSED SANITARY SEWER (BY OTHERS)
- PROPOSED WATERLINE (BY OTHERS)
- PROPOSED PAVEMENT (BY OTHERS)
- 295 EXISTING CONTOUR MAJOR
- 294 EXISTING CONTOUR MINOR
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING EASEMENT
- EXISTING BUILDING LINE
- EXISTING POWERLINE
- EXISTING DITCH
- EXISTING FENCE
- PROPOSED RIGHT-OF-WAY
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERLINE
- PROPOSED PAVEMENT
- PROPOSED EASEMENT
- PROPOSED DRAINAGE AREAS

AREA / CFS — 100 YR STORM EVENT UNLESS NOTED OTHERWISE. CALCULATED WITH RATIONAL METHOD, TC = 10 MIN. (TYP.)

CFS — CUMULATIVE AREA STORM EVENT

TC = TIME OF CONCENTRATION

PROPOSED FLOW DIRECTION (DEVELOPED)

Note 1: DA's D1 thru D12 shall not discharge more than the flow indicated. Future development to utilize mitigation as needed to reduce flow appropriately.

Note 2: Future development in DA's D19 and D20 shall provide storm water conveyance for developed flows directly to detention pond via storm sewer and extreme event swales.

Note 3: Drainage System's A, B, & C shall discharge directly to road ditches in the amounts shown. Excess flow shall be mitigated as appropriate in future development. A restrictor may be required to mitigate flows to TXDOT drainage facility capacities.

Note 4: Drainage System E shall discharge directly to the Town Creek Tributary in future development.

Note 5: Drainage System Total Flows as shown in Drainage System labels are calculated using TR-55 Methodology with a SCS Type III Storm. Expect some variation between calculated rational flows which were utilized in the storm sewer design (shown in circles).

Note 6: The Drainage and Grading plan for any future development in systems "C" & "E" must be reviewed and approved by TXDOT.

L SQUARED ENGINEERING
Civil • Consulting • Management

CITY OF MONTGOMERY, CITY ENGINEER DATE
SIGNATURE VALID FOR ONE (1) YEAR

DRAWING ISSUE/REVISIONS

No.	DATE	BY	COMMENT

L SQUARED ENGINEERING
Civil • Consulting • Management

CLIENT
CHEATHAM

PROJECT TITLE
THE HILLS OF TOWN CREEK
SECTION 1 SUBDIVISION PLANS
OVERALL DRAINAGE AREAS

ENGINEER CONTACT INFO.:
LSQUARED ENGINEERING, LLC.
21123 EVA ST. SUITE 210-H
MONTGOMERY, TX 77356
936-647-0420

PROJECT LOCATION
AT THE INTERSECTION OF LONESTAR PARKWAY AND HIGHWAY 105 MONTGOMERY COUNTY, TEXAS

PROJECT LEGAL DESCRIPTION
12.384 Acres of land being part of that certain 79.9035 Acre Tract of land conveyed from MONTGOMERY INDEPENDENT SCHOOL DISTRICT to MONTGOMERY ENERGY RESOURCES, INC., lying in the BENJAMIN RIGBY LEAGUE, Abstract 31

SEAL
STATE OF TEXAS
E. LEVI LOVE, JR.
99340
LICENSED
PROFESSIONAL ENGINEER
12/26/2012

FIRM No.	11235
DATE	11/12/2012
PROJECT No.	10003
DRAWN BY	CBJ
SCALE	1"=200'
DRAWING No.	12

5 Year

Inlet Info

Inlet/MH From	Inlet/MH To	Drainage Area	Total Drainage Area	Runoff Co. "C"	DA C*A	Total C*A	Drainge Area Time of Conc. (Min)	Total Time of Conc. (Min)	Drainage Area Intensity (I)	Total Drainage Area Intensity (I)	Cf	Drainage Area Flow (cfs)	Total Flow (cfs)	Number of Barrels	Diameter (ft)	Slope	Area (A)	Perimeter (P)	R=(A/P)	Length (ft)	Roughness (n)	$Q_{capacity}$ (CFS)	$V_{full\ flow}$ (FPS)	Upstream FL	Downstream FL	HGL Change In Head (ft)	HGL Hydraulic Gradeline %	HGL Elevation of Hyd. Grad. Upstream (ft)	HGL Hyd. Grad. Downstream (ft)
A3	A4	1.65	1.65	0.55	0.91	0.91	5	5	8.5	8.5	1.00	7.71	7.71	1	1.5	0.0050	1.77	4.71	0.375	30	0.013	7.43	4.20	300.21	300.06	0.16	0.54	296.95	296.79
A4	A2	0.42	2.07	0.55	0.23	1.14	5	5	8.5	8.5	1.00	1.96	9.68	1	2	0.0050	3.14	6.28	0.5	243	0.011	18.86	6.00	300.06	298.85	0.32	0.13	296.79	296.47
A1	A2	2.91	2.91	0.55	1.60	1.601	26.24	26.24	4.40	4.40	1.00	7.04	7.04	1	2	0.0050	3.14	6.28	0.5	30	0.013	15.99	5.09	299	298.85	0.03	0.10	296.50	296.47
A2	MH1	0.81	5.79	0.55	0.45	3.18	5	26.24	8.50	4.40	1.00	3.79	14.01	1	2	0.0050	3.14	6.28	0.5	102	0.011	18.90	6.02	298.85	298.34	0.28	0.27	296.47	296.19
MH1	OUT	0	5.79	0.55	0.00	3.18	0.00	26.24	0.00	4.40	1.00	0.00	14.01	1	2	0.0035	3.14	6.28	0.5	68	0.011	15.88	5.05	294.24	294	0.19	0.27	296.19	296.00
																											Starting TW Elevation:		296

100 Year

Inlet Info

Inlet/MH From	Inlet/MH To	Drainage Area	Total Drainage Area	Runoff Co. "C"	DA C*A	Total C*A	Drainge Area Time of Conc. (Min)	Total Time of Conc. (Min)	Drainage Area Intensity (I)	Total Drainage Area Intensity (I)	Cf	Drainage Area Flow (cfs)	Total Flow (cfs)	Number of Barrels	Diameter (ft)	Slope	Area (A)	Perimeter (P)	R=(A/P)	Length (ft)	Roughness (n)	$Q_{capacity}$ (CFS)	$V_{full\ flow}$ (FPS)	Upstream FL	Downstream FL	HGL Change In Head (ft)	HGL Hydraulic Gradeline %	HGL Elevation of Hyd. Grad. Upstream (ft)	HGL Hyd. Grad. Downstream (ft)
A3	A4	1.65	1.65	0.55	0.91	0.91	5	5	14.8	14.8	1.25	16.79	16.79	1	1.5	0.0050	1.77	4.71	0.375	30	0.013	7.43	4.20	300.21	300.06	0.77	2.54	300.28	299.52
A4	A2	0.42	2.07	0.55	0.23	1.14	5	5	14.8	14.8	1.25	4.27	21.06	1	2	0.0050	3.14	6.28	0.5	243	0.011	18.86	6.00	300.06	298.85	1.51	0.62	299.52	298.01
A1	A2	2.91	2.91	0.55	1.60	1.60	26.24	26.2	7.30	7.30	1.25	14.60	14.60	1	2	0.0050	3.14	6.28	0.5	30	0.013	15.99	5.09	299	298.85	0.12	0.41	298.13	298.01
A2	MH1	0.81	5.79	0.55	0.45	3.18	5	26.2	14.80	7.30	1.25	4.07	29.06	1	2	0.0050	3.14	6.28	0.5	102	0.011	18.90	6.02	298.85	298.34	1.20	1.18	298.01	296.80
MH1	OUT	0.00	5.79	0.55	0.00	3.18	0	26.2	0.00	7.30	1.25	0.00	29.06	1	2	0.0035	3.14	6.28	0.5	68	0.011	15.88	5.05	294.24	294	0.80	1.18	296.80	296.00
																											Starting TW		296

5 Year

Inlet Info

Inlet/MH From	Inlet/MH To	Drainage Area	Total Drainage Area	Runoff Co. "C"	DA C*A	Total C*A	Drainge Area Time of Conc. (Min)	Total Time of Conc. (Min)	Drainage Area Intensity (I)	Total Drainage Area Intensity (I)	Cf	Drainage Area Flow (cfs)	Total Flow (cfs)	Number of Barrels	Diameter (ft)	Slope	Area (A)	Perimeter (P)	R=(A/P)	Length (ft)	Roughness (n)	$Q_{capacity}$ (CFS)	$V_{full\ flow}$ (FPS)	Upstream FL	Downstream FL	HGL Change In Head (ft)	HGL Hydraulic Gradeline %	HGL Elevation of Hyd. Grad. Upstream (ft)	HGL Hyd. Grad. Downstream (ft)
B1	OUT	1.60	1.60	0.55	0.88	0.880	23.31	23.31	4.70	4.70	1.00	4.14	4.14	1	1.5	0.0050	1.77	4.71	0.375	120	0.011	8.78	4.97	294.6	294	0.13	0.11	295.63	295.50
																											Starting TW Elevation:		295.5

100 Year

Inlet Info

Inlet/MH From	Inlet/MH To	Drainage Area	Total Drainage Area	Runoff Co. "C"	DA C*A	Total C*A	Drainge Area Time of Conc. (Min)	Total Time of Conc. (Min)	Drainage Area Intensity (I)	Total Drainage Area Intensity (I)	Cf	Drainage Area Flow (cfs)	Total Flow (cfs)	Number of Barrels	Diameter (ft)	Slope	Area (A)	Perimeter (P)	R=(A/P)	Length (ft)	Roughness (n)	$Q_{capacity}$ (CFS)	$V_{full\ flow}$ (FPS)	Upstream FL	Downstream FL	HGL Change In Head (ft)	HGL Hydraulic Gradeline %	HGL Elevation of Hyd. Grad. Upstream (ft)	HGL Hyd. Grad. Downstream (ft)
B1	OUT	1.60	1.60	0.55	0.88	0.88	23.305871	23.3	7.80	7.80	1.25	8.58	8.58	1	1.5	0.0050	1.77	4.71	0.375	120	0.011	8.78	4.97	294.6	294	0.57	0.48	296.07	295.50
																												Starting TW		295.5

HOTC MASTER DRAINAGE CALCS:

Drainage Area: DA-A1

Segment:	Flow Type	n	length	slope	V, if req'd.	>>>>	Time (hr)	Time (min)
1	sheet	0.24	150	0.0233	N/A		0.37	21.97
2	shallow		506	0.0150	1.97606		0.07	4.27
			656					26.24

Drainage Area: DA-A2

Segment:	Flow Type	n	length	slope	V, if req'd.	>>>>	Time (hr)	Time (min)
1	sheet	0.011	50	0.0100	N/A		0.02	1.18
2	shallow		500	0.0150	1.97606		0.07	4.22
			550					5.40

Drainage Area: DA-B1

Segment:	Flow Type	n	length	slope	V, if req'd.	>>>>	Time (hr)	Time (min)
1	sheet	0.24	150	0.0233	N/A		0.37	21.97
2	shallow		400	0.0200	5.00000		0.02	1.33
			550					23.31

Drainage Area: OF DA-D

Segment:	Flow Type	n	length	slope	Paved?	V, if req'd.	>>>>	Time (hr)	Time (min)
1	sheet	0.24	100	0.0100	yes	N/A		0.40	24.27
2	shallow		906	0.0050	yes	1.43742081		0.18	10.50
			1006						34.77

Drainage Area: OF DA-D19B

Segment:	Flow Type	n	length	slope	Paved?	V, if req'd.	>>>>	Time (hr)	Time (min)
1	sheet	0.011	300	0.0050	yes	N/A		0.12	7.02
2	shallow		350	0.0050	yes	1.43742081		0.07	4.06
			650						11.08

Drainage Calculations (100-Yr)

Drainage Area	Area	Tc	C	I	C_f	Q
OF DA-D	7.4	34.77	0.55	6.20	1.25	31.54
OF DA-D19B	3.39	11.08	0.85	11.2	1.25	40.34
OF DA-D19A	1.41	5.00	0.85	14.8	1.25	22.17

Drainage Ditch Capacity

Ditch No.	Contributing DA	Depth	Right Sideslope (ft):1	Left Sideslope (ft):1	Bottom Width	Top Width	Area (A)	Wetted Perimeter (P)	R=(A/P)	Slope (S) (ft/ft)	Roughness (n)	>>>>	$Q_{capacity}$ (CFS)	$V_{full\ flow}$ (FPS)	100-Yr Flow	Capacity?
1	OF DA-D, DA-A1, DA-A2	1.5	3	3	2	11.00	9.75	11.49	0.84879793	0.0185	0.027		65.43	6.71	60.60	yes
2	OF DA-19B, DA-B1	1.5	3	3	0	9.00	6.75	9.49	0.71151247	0.03	0.027		51.28	7.60	48.92	yes

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 12229
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHRIS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK
SECTION 4

DRAINAGE CALCULATIONS

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE		SHEET	13

STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER

09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:\ENGINEERING PROJECTS\10600 – HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\12 DRAINAGE CALCULATIONS.DWG Sep. 15, 2020–4:04 PM

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 12235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHIRS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK
SECTION 4
TEMPORARY STORM WATER POLLUTION PREVENTION PLAN

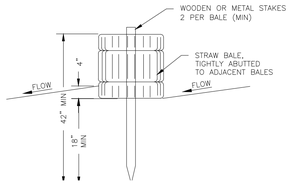
DRAWING ISSUE			
#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

DRAWING INFORMATION			
PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE		SHEET	
1" = 50' (24x36) 1" = 100' (11x17)		14	

STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER
09/15/2020

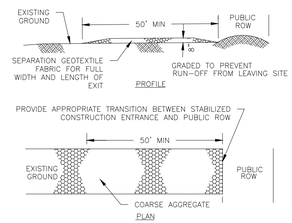
*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:\ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\14 TEMP SWPP PLAN.DWG Sep. 15, 2020-4:04 PM



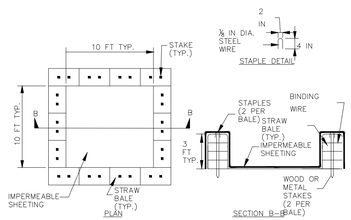
NOTES:
1. STRAW BALE BARRIERS SHALL BE INSTALLED PRIOR TO ANY LAND DISTRURBING ACTIVITIES.
2. BALES SHALL CONSIST OF APPROXIMATELY 5 CF OF CERTIFIED WEED FREE HAY OR STRAW AND WEIGH NOT LESS THAN 35 POUNDS.
3. BALES ARE TO BE PLACED IN A SINGLE ROW WITH THE END OF THE BALES TIGHTLY ABUTTING ONE ANOTHER.
4. EACH BALE IS TO BE SECURELY ANCHORED WITH AT LEAST TWO STAKES AND THE FIRST STAKE IS TO BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER.
5. STAKES ARE TO BE A MINIMUM OF 42" LONG. METAL STAKES SHALL BE STANDARD "T" OR "U" TYPE WITH MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT. WOOD STAKES SHALL HAVE A MINIMUM DIAMETER OR CROSS SECTION DIMENSION OF 2".
6. BALES ARE TO BE BOUND WITH EITHER WIRE OR STRING AND ORIENTED SUCH THAT THE BINDINGS ARE AROUND THE SIDES AND NOT ALONG THE TOPS AND BOTTOMS OF THE BALE.
7. GAPS BETWEEN BALES ARE TO BE CHINKED (FILLED BY WEDGING) WITH STRAW OR THE SAME MATERIAL AS THE BALE.
8. END BALES ARE TO EXTEND UPSLOPE SO THE TRAPPED RUNOFF CANNOT FLOW AROUND THE ENDS OF THE BARRIER.
9. CONTRACTOR SHALL INSPECT STRAW BALE BARRIERS IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL.
10. DAMANGED OR INEFFECTIVE BARRIERS SHALL PROMPTLY BE REPAIRED. UNTRENCHED BALES NEED TO BE REPAIRED WITH COMPACTED BACKFILL MATERIAL.
11. SEDIMENT SHALL BE REMOVED FROM BEHIND STRAW BALE BARRIERS WHEN IT ACCUMULATES TO APPROXIMATELY ½ THE HEIGHT OF THE BARRIER.
12. STRAW BALE BARRIERS SHALL BE REMOVED WHEN ADEQUATED VEGETATIVE COVER IS ATTAINED.

STRAW BALE BARRIER DETAIL
NTS



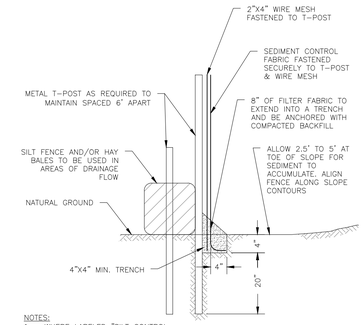
NOTES:
1. LENGTH SHALL BE AS SHOWN ON THE CONSTR. DRAWINGS, BUT NOT LESS THAN 50 FEET.
2. THICKNESS SHALL BE NOT LESS THAN 8 INCHES.
3. WIDTH SHALL BE NOT LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS.
4. STABILIZATION FOR OTHER AREAS SHALL HAVE THE SAME AGGREGATE THICKNESS AND WIDTH REQUIREMENTS AS THE STABILIZED CONSTR. EXIT, UNLESS OTHERWISE SHOWN ON THE CONSTRUCTION DRAWINGS.
5. STABILIZED AREA MAY BE WIDENED/ LENGTHENED TO ACCOMMODATE A TRUCK WASHING AREA.
6. AN OUTLET SEDIMENT TRAP MUST BE PROVIDED FOR THE TRUCK WASHING AREA.
7. SEE STANDARD SPECIFICATION FOR STABILIZED CONSTRUCTION EXIT.
8. STABILIZED CONSTRUCTION EXIT SHALL BE MAINTAINED FREE OF SEDIMENT FOR THE DURATION OF THE PROJECT.

STABILIZED CONSTRUCTION EXIT DETAIL
NTS



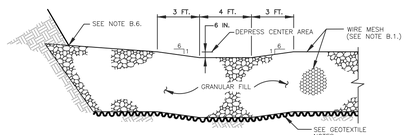
CONCRETE TRUCK WASHOUT DETAIL
NTS

NOTES:
1. CAN BE TWO STACKED BALES OR PARTIALLY EXCAVATED TO REACH 3' MINIMUM DEPTH
2. LOCATE WASHOUT STRUCTURE A MINIMUM OF 50 FEET AWAY FROM OPEN CHANNELS, STORM DRAIN INLETS, SENSITIVE AREAS, WETLANDS, BUFFERS AND WATER COURSES AND AWAY FROM CONSTRUCTION TRAFFIC.
3. SIZE WASHOUT STRUCTURE FOR VOLUME NECESSARY TO CONTAIN WASH WATER AND SOLIDS AND MAINTAIN AT LEAST 4 INCHES OF FREEBOARD. TYPICAL DIMENSIONS ARE 10 FEET X 10 FEET X 3 FEET DEEP.
4. PREPARE SOIL BASE FREE OF ROCKS OR OTHER DEBRIS THAT MAY CAUSE TEARS OR HOLES IN THE LINER. FOR LINER, USE 10 MIL OR THICKER UV RESISTANT, IMPERMEABLE SHEETING, FREE OF HOLES AND TEARS OR OTHER DEFECTS THAT COMPROMISE IMPERMEABILITY OF THE MATERIAL.
5. PROVIDE A SIGN FOR THE WASHOUT IN CLOSE PROXIMITY TO THE FACILITY.
6. KEEP CONCRETE WASHOUT STRUCTURE WATER TIGHT. REPLACE IMPERMEABLE LINER IF DAMAGED (E.G., RIPPED OR PUNCTURED). EMPTY OR REPLACE WASHOUT STRUCTURE THAT IS 75 PERCENT FULL AND DISPOSE OF ACCUMULATED MATERIAL PROPERLY. DO NOT REUSE PLASTIC LINER. WET-VACUUM STORED LIQUIDS THAT HAVE NOT EVAPORATED AND DISPOSE OF IN AN APPROVED MANNER. PRIOR TO FORECASTED RAINSTORMS, REMOVE LIQUIDS OR COVER STRUCTURE TO PREVENT OVERFLOWS. REMOVE HARDENED SOLIDS, WHOLE OR BROKEN UP, FOR DISPOSAL OR RECYCLING. MAINTAIN RUNOFF DIVERSION AROUND EXCAVATED WASHOUT STRUCTURE UNTIL STRUCTURE IS REMOVED.



NOTES:
1. WHERE LABELED "SILT CONTROL FENCE," HAY BALE MAY BE OMITTED.
2. WHERE LABELED "HAY BALLE BARRIER," THE ENTIRE SILT FENCE ASSEMBLY SHALL BE BUILT

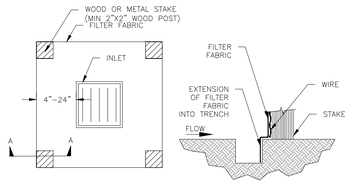
SILT FENCE ASSEMBLY
NTS



C SECTION

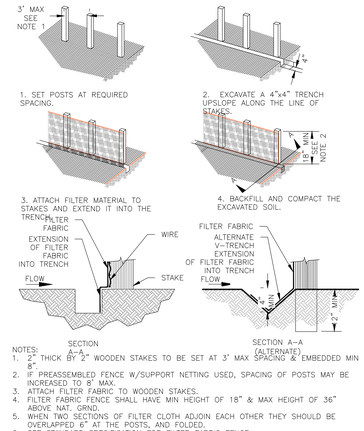
B SECTION

FILTER DAM



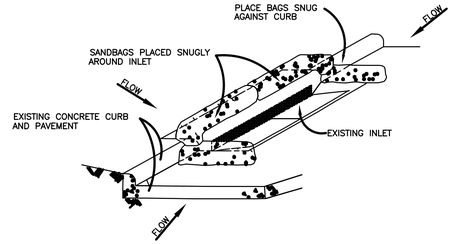
NOTES:
1. SET 2 INCH BY 2 INCH WOODEN STAKES SPACED A MAX OF 6 FEET APART AND EMBEDDED A MIN OF 12 INCHES.
2. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POST WITH STAPLES.
3. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE, WITH TIES SPACED EVERY 24" AT TOP & MIDSECTION.
4. MINIMUM HEIGHT OF FILTER SHOULD BE 18 INCHES AND A MAXIMUM OF 36 INCHES ABOVE NATURAL GROUND.
5. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED 6" AT THE POSTS, & FOLDED.
6. SEE STANDARD SPECIFICATION FOR FILTER FABRIC BARRIER.

SILT FENCE INLET PROTECTION BARRIER
NTS



NOTES:
1. 2" THICK BY 2" WOODEN STAKES TO BE SET AT 3' MAX SPACING & EMBEDDED MIN 8".
2. IF PREASSEMBLED FENCE W/SUPPORT NETTING USED, SPACING OF POSTS MAY BE INCREASED TO 8' MAX.
3. ATTACH FILTER FABRIC TO WOODEN STAKES.
4. FILTER FABRIC FENCE SHALL HAVE MIN HEIGHT OF 18" & MAX HEIGHT OF 36" ABOVE NAT. GRND.
5. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHOULD BE OVERLAPPED 6" AT THE POSTS, AND FOLDED.
6. SEE STANDARD SPECIFICATION FOR FILTER FABRIC FENCE.

FILTER FABRIC FENCE DETAIL
NTS



SEE CONSTRUCTION HANDBOOK SECTION 4.3.4 FOR SANDBAG DESIGN AND MAINTENANCE REQUIREMENTS

GENERAL NOTES:

1. BAGS OR WATTLES CAN BE USED FOR THIS APPLICATION.
2. PROVIDE WOVEN OR UNWOVEN GEOTEXTILE FILTER FABRIC FOR BAGS.
3. PROVIDE COARSE SAND AND AGGREGATE MIX FOR FILL MATERIAL FOR BAGS. USE ONLY PARTICLES CONSISTING OF CLEAN, HARD, DURABLE MATERIALS FREE FROM ADHERENT COATINGS, SALT, ALKALI, DIRT, CLAY, LOAM, SHALE, SOFT OR FLAKY MATERIALS, OR ORGANIC AND INJURIOUS MATTER.
4. REMOVE SEDIMENT DEPOSIT WHEN THE SEDIMENT HAS ACCUMULATED TO ONE-THIRD THE HEIGHT OF THE BARRIER.

INLET PROTECTION BARRIERS

FOR STAGE II INLETS

IPB

SYMBOL

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 22235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHIRS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK
SECTION 4
TEMPORARY STORM WATER POLLUTION PREVENTION PLAN DETAILS

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	1" = 50' (24x36) 1" = 100' (11x17)	SHEET	15

STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER

09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:\ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\14 TEMP SWPP PLAN.DWG Sep. 15, 2020 - 4:04 PM

PLEGEND:

HYDRO SEED (.34 ACRES)

DRILL SEED (6.83 ACRES)

NOTE:

CONTRACTOR TO RESTORE ALL AREAS OF EXISTING POND SIDE SLOPES THAT ARE DISTURBED DURING CONSTRUCTION.

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 12253
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHIRS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK SECTION 4 PERMANENT STORM WATER POLLUTION PLAN

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

DRAWING INFORMATION

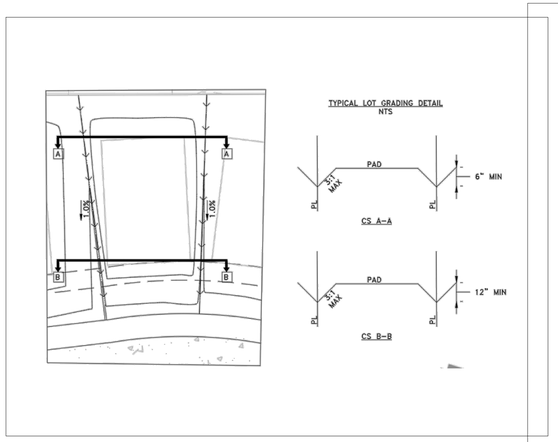
PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	1" = 50' (24x36) 1" = 100' (11x17)	SHEET	16

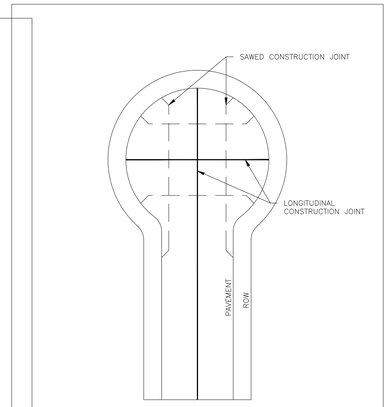
STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER

09/15/2020

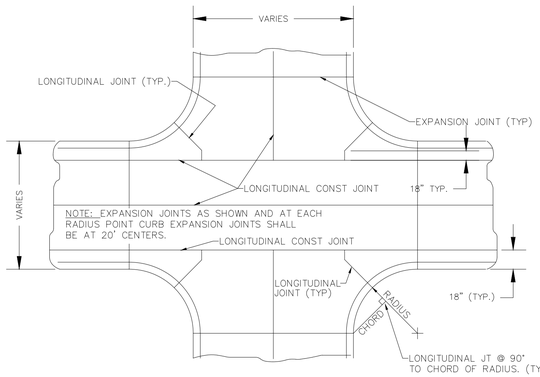
*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:\ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\15 PERM SWPP PLAN.DWG Sep. 18, 2020 - 9:06 AM

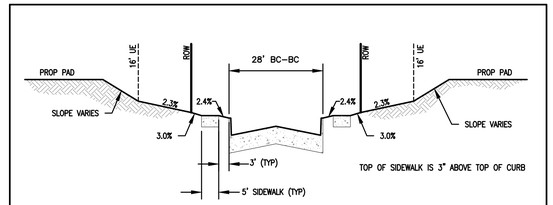




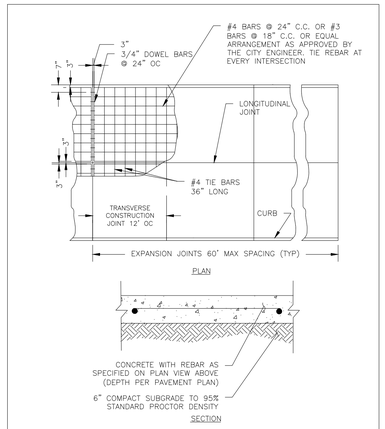
CONCRETE CONSTRUCTION JOINT DETAIL FOR CUL DE SAC
NTS



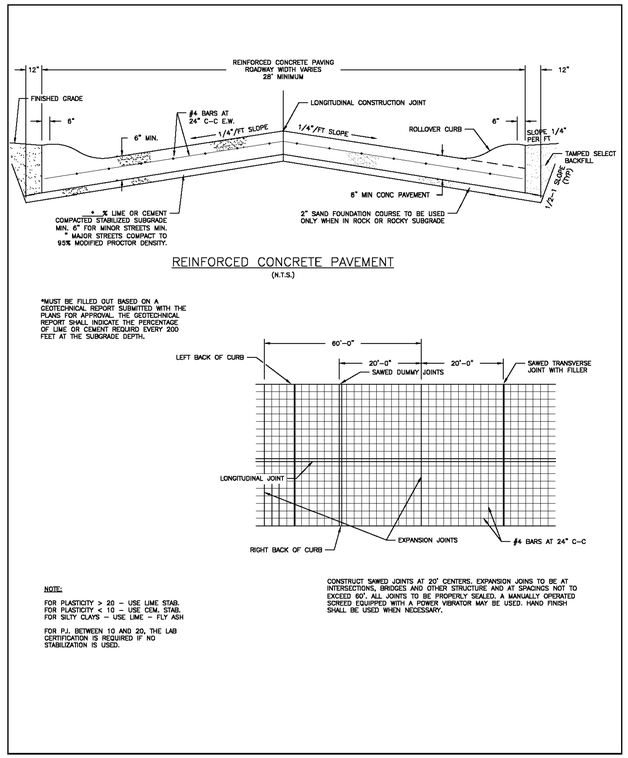
CONCRETE INTERSECTION



TYPICAL LOT & ROAD CROSS SECTION
N.T.S.



TYPICAL CONCRETE PAVEMENT DETAIL
NTS



REINFORCED CONCRETE PAVEMENT
(N.T.S.)

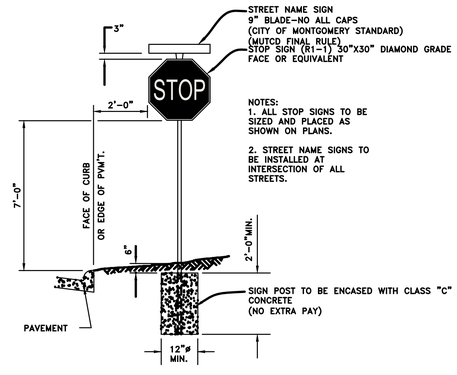
*MUST BE FILLED OUT BASED ON A GEOTECHNICAL REPORT SUBMITTED WITH THE PLANS FOR APPROVAL. THE GEOTECHNICAL REPORT SHALL INDICATE THE PERCENTAGE OF LIME OR CEMENT REQUIRED EVERY 200 FEET AT THE SUBGRADE DEPTH.

NOTE:

FOR PLASTICITY > 20 – USE LIME STAB.
FOR PLASTICITY < 10 – USE CEM. STAB.
FOR SILTY CLAYS – USE LIME – FLY ASH

FOR P.I. BETWEEN 10 AND 20, THE LAB CERTIFICATION IS REQUIRED IF NO STABILIZATION IS USED.

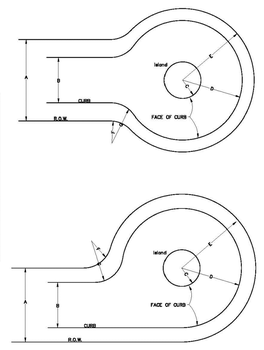
CONSTRUCT SAWED JOINTS AT 20' CENTERS. EXPANSION JOINS TO BE AT INTERSECTIONS, BRIDGES AND OTHER STRUCTURE AND AT SPACINGS NOT TO EXCEED 60'. ALL JOINTS TO BE PROPERLY SEALED. A MANUALLY OPERATED SCREED EQUIPPED WITH A POWER VIBRATOR MAY BE USED. HAND FINISH SHALL BE USED WHEN NECESSARY.

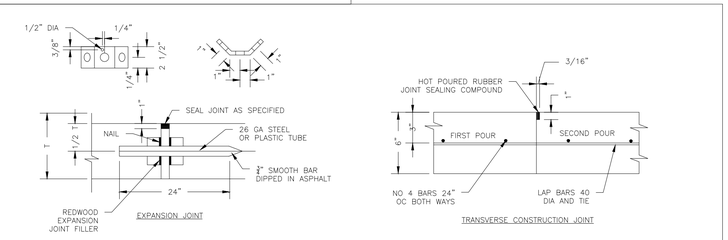


STOP SIGN WITH STREET NAME ATTACHED
N.T.S.

	ABUTTING LAND USE	
	SINGLE FAMILY	ALL OTHER
A	50'	60'
B	28'	40'
C (MIN)	0	0
C (MAX)	20'	15'
D	40'	50'
E	50'	60'
F	25'	25'
G	35'	35'

ALL DIMENSIONS MEASURED IN FEET TO FACE OF CURB





CONCRETE CONSTRUCTION JOINT DETAILS
NTS

REVISIONS		
10-2013 REVISED NOTES	CITY OF MONTGOMERY TYPICAL RESIDENTIAL CONCRETE PAVING WITH ROLLOVER CURB	PAVING P-2

REVISIONS		
	CITY OF CONROE CUL-DE-SAC DESIGN FOR STREET TERMINATION	DWG. NO. 1203 P-20

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 12230
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHIRS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK SECTION 4

PAVING DETAILS 1 OF 2

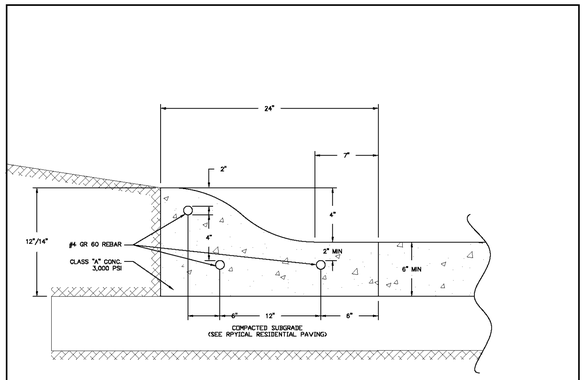
DRAWING ISSUE			
#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

DRAWING INFORMATION			
PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	AS NOTED	SHEET	17

STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER
09/15/2020

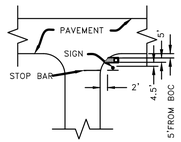
*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:\ENGINEERING PROJECTS\10600 – HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\17 PAVING DETAILS.DWG Sep. 15, 2020–4:05 PM

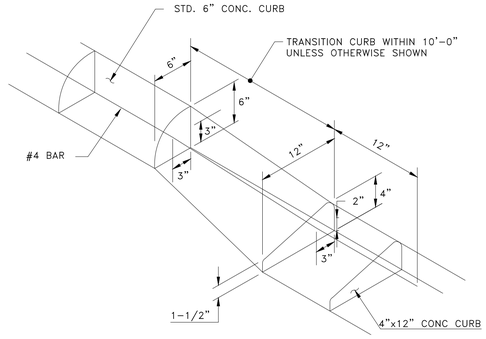


NOTES:
1. ALL HONEYCOMBING SHALL BE GROUTED TO PROVIDE A UNIFORM SURFACE.
2. WHEN HONEYCOMBING IS EXCESSIVE AS DETERMINED BY THE INSPECTOR, CURB AND GUTTER SHALL BE REPLACED.
3. BACKFILL BEHIND CURBS SHALL BE ACCOMPLISHED WITHIN 7 DAYS.
4. CURB AND GUTTER CONCRETE SHALL BE CLASS "A" (3000 PSI). CURB POURED WITH PAVEMENT SHALL MATCH PAVEMENT.
5. REINFORCING STEEL AS SHOWN.
6. EXPANSION JOINTS AT A MAXIMUM LENGTH OF 60 FEET.
7. SAWED CONTRACTION JOINTS EVERY 20 FEET BETWEEN EXPANSION JOINTS.
8. ALL JOINTS ARE TO BE PROPERLY SEALED.

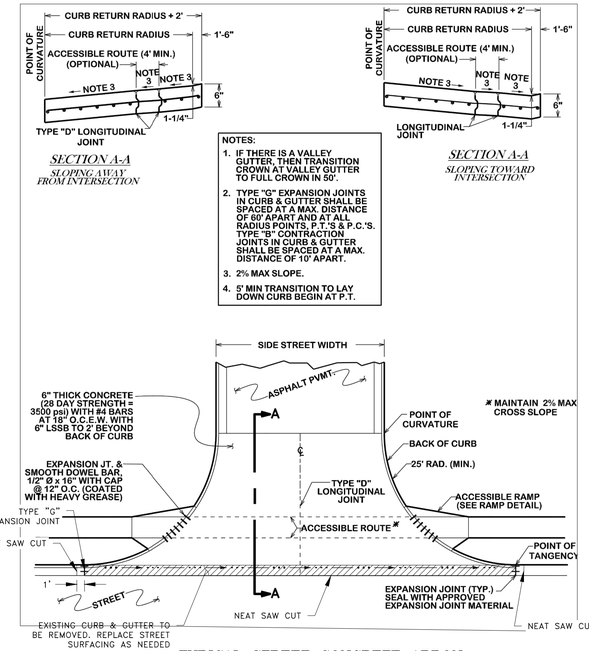
REVISIONS	CITY OF MONTGOMERY	PAVING
10-2013 REVISED NOTES	ROLLOVER CURB & GUTTER	P-5



SIGN LOCATION
N.T.S.

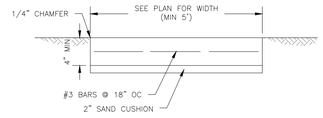


TYPICAL CURB TRANSITION
N.T.S.



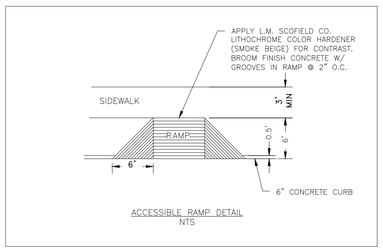
NOTES:
1. IF THERE IS A VALLEY GUTTER, THEN TRANSITION CROWN AT VALLEY GUTTER TO FULL CROWN IN 50'.
2. TYPE "G" EXPANSION JOINTS IN CURB & GUTTER SHALL BE SPACED AT A MAX. DISTANCE OF 60' APART AND AT ALL RADIUS POINTS, P.T.'S & P.C.'S. TYPE "S" CONTRACTION JOINTS IN CURB & GUTTER SHALL BE SPACED AT A MAX. DISTANCE OF 10' APART.
3. 2% MAX SLOPE.
4. 5' MIN TRANSITION TO LAY DOWN CURB BEGIN AT P.T.

TYPICAL STREET CONCRETE APRON
N.T.S.



NOTES:
1. SIDEWALKS SHALL NOT EXCEED 5% RUNNING SLOPE OR 2% CROSS SLOPE.
2. CONCRETE IS 3000 PSI OR EQUIVALENT TO SPECIFICATIONS.
3. SIDEWALKS TO BE MIN. OF 3' FROM BACK OF CURB.

TYPICAL SIDEWALK DETAIL
NTS



ACCESSIBLE RAMP DETAIL
NTS

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 12235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHRIS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK
SECTION 4
PAVING DETAILS 2 OF 2

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

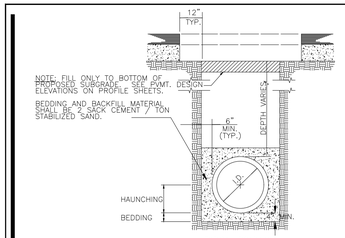
DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	AS NOTED	SHEET	18

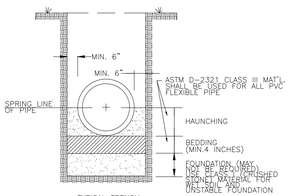
STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER
09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:_ENGINEERING PROJECTS_10600 - HILLS OF TOWN CREEK SECTION 4_03 CAD_DESIGN SET_17 PAVING DETAILS.DWG Sep. 15, 2020 - 4:05 PM



TYPICAL ROADWAY TRENCH BEDDING

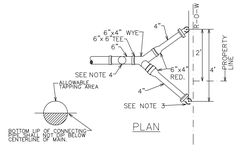


TYPICAL TRENCH BEDDING

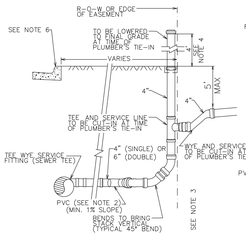
Foundation
A foundation is required when the trench bottom is unstable. Any foundation that will support a rigid pipe without causing loss of grade or flexural breaking will be more than adequate for PVC pipe.
Bedding
The bedding directly underneath the pipe is required only to bring the trench bottom up to grade. It should not be so thick or soft that the pipe will settle and lose grade. The purpose of the bedding is to provide a firm, stable and uniform support of the pipe. A layer of material sufficient to establish line, grade, and support should be placed. Bell holes should be excavated to insure uniform bearing.
Haunching
The haunching area is the most important in terms of limiting the deflection of a flexible pipe. This is the area that should be compacted to the required or specific density.
ASTM D 2321
Description of embedment materials
Class I
Angular, 1/4" to 1 1/2" graded stone, including a number of fill materials
that have regional significance, such as coral, stag, cinders, crushed stone
and crushed shells.

Class II
Coarse sands and gravels with maximum particle size of 1 1/2", including variously graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class.
Class III
Fine sand and clayey gravels including fine sands, sand-clay mixtures, and gravel-clay mixtures. Soil Types GM, GC, SM, and SC are included in this class.
Class IV
Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil Types MH, ML, CH and CL are included in this class.
Class V
This class includes the organic soils OL, OH, and PT as well as soils containing frozen earth, debris, rocks larger than 1 1/2" in diameter, and other foreign materials. These materials are not recommended for bedding, haunching, or initial backfill.
NOTE: BACKFILL ABOVE THE BEDDING SHALL CONFORM TO "TYPICAL WATERLINE BACKFILL AND TRENCH REPAIR" STANDARD DRAWING W-5.

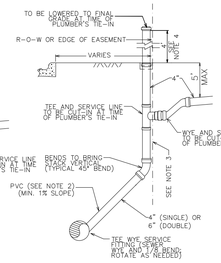
TYPICAL WATERLINE BEDDING AND TRENCH DETAIL
N.T.S



PLAN



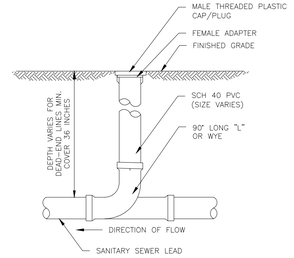
STANDARD CONNECTION PROFILE



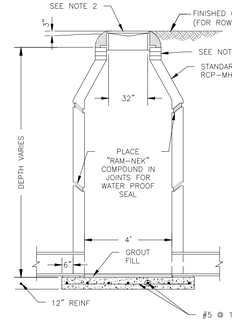
DEEP CONNECTION PROFILE

NOTE:
1. ALL MATERIAL SHALL BE ASTM D3034 SDR26 W/ GASKETS
2. ALL SERVICE CONNECTIONS & STUB-OUTS ARE TO BE INSTALLED WITH THE MAIN LINE CONSTRUCTION.
3. A CLEAN OUT IS REQUIRED AND WILL BE INSTALLED BY THE CONTRACTOR AT THE ROW FOR EACH SERVICE.
4. CLEANOUTS SHALL BE EXTENDED 4 FEET ABOVE NATURAL GROUND, AND BE PAINTED GREEN OR CONSTRUCTED WITH GREEN PVC. CLEANOUT CAP FITTING SHALL BE PLACED ON TOP.
5. ALL SINGLE SEVICE LEADS SHALL BE 4" UNLESS OTHERWISE NOTED ON THE PLANS. ALL DOUBLE SERVICE LEADS SHALL BE 6" UNLESS OTHERWISE NOTED ON THE PLANS.
6. AN "S" MUST BE MARKED BY BEING STAMPED ON THE FACE OF CURB AND GUTTER AT EACH TAP LOCATION IN ADDITION TO A 2" GREEN PVC MARKER BEING PLACED AT THE END OF THE SERVICE CONNECTION AND EXTENDING 4' ABOVE NG.

SANITARY SEWER SERVICE CONNECTION

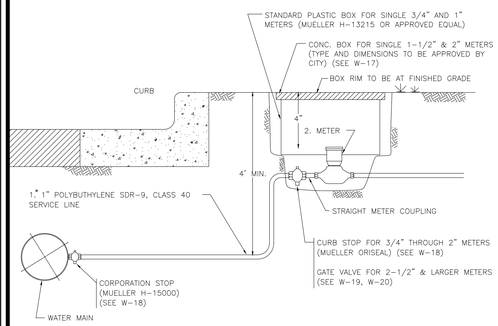


TYPICAL SANITARY SEWER CLEAN OUT DETAIL
NTS



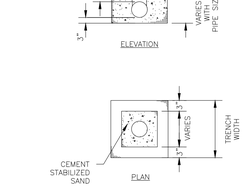
NOTES:
1. ALL RCP MANHOLES SHALL BE IN ACCORDANCE ASTM C-478
2. EAST JORDAN 32" FRAME AND COVER (OR EQUAL)
3. FOR ADJUSTMENT OF MANHOLE LID USE STANDARD CONCRETE RINGS. NO BRICK ADJUSTMENT ALLOWED.
4. PRECAST BOTTOM SECTION OF MANHOLE TO BE SECURELY ATTACHED TO REINFORCED CONCRETE SLAB WITH WATERPROOF SEALER
5. MANHOLE SECTIONS, CONES AND INVERT TOPS SHALL BE COATED WITH A SUITABLE, PROTECTIVE, 20 MILS THICK, COLD TAR EPOXY COATING

STANDARD SANITARY PRE-CAST MANHOLE
NTS



1. SDR-9 SERVICE LEAD BY CONTRACTOR, WITH STANDARD PLASTIC METER BOX. 2.
2. METER INSTALLED BY CITY OF MONTGOMERY.

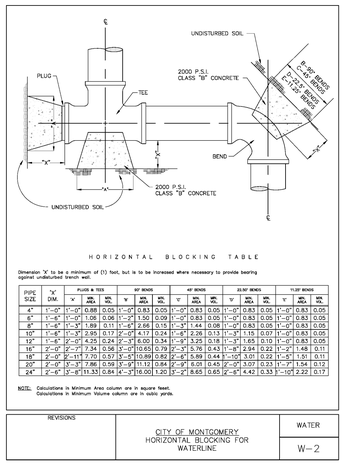
TYPICAL WATER SERVICE CONNECTION DETAIL
NTS



ELEVATION

PLAN

SANITARY SEWER STACK DETAIL
NTS



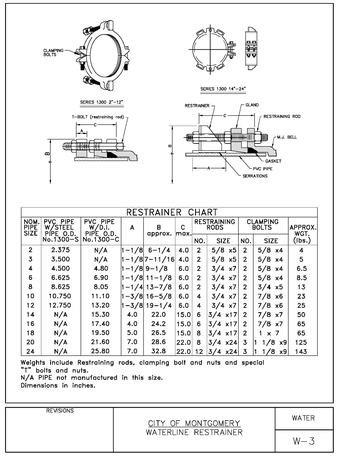
HORIZONTAL BLOCKING TABLE

Dimension 'X' to be a minimum of (1) foot, but is to be increased where necessary to provide bearing against undisturbed trench wall.

PIPE SIZE	"X" DIM.	PLUGS & TEES		90° BENDS		45° BENDS		22.50° BENDS		11.25° BENDS	
		V	MIN. HOR. VOL.	MIN. VER. VOL.	V	MIN. HOR. VOL.	MIN. VER. VOL.	V	MIN. HOR. VOL.	MIN. VER. VOL.	V	MIN. HOR. VOL.	MIN. VER. VOL.
4"	1'-0"	1'-0"	0.88	0.05	1'-0"	0.83	0.05	1'-0"	0.83	0.05	1'-0"	0.83	0.05	1'-0"	0.83	0.05
6"	1'-6"	1'-0"	1.06	0.06	1'-2"	1.50	0.09	1'-0"	0.83	0.05	1'-0"	0.83	0.05	1'-0"	0.83	0.05
8"	1'-6"	1'-3"	1.89	0.11	1'-6"	2.66	0.15	1'-3"	1.44	0.08	1'-0"	0.83	0.05	1'-0"	0.83	0.05
10"	1'-6"	1'-3"	2.95	0.17	2'-0"	4.17	0.24	1'-6"	2.26	0.13	1'-3"	1.15	0.07	1'-0"	0.83	0.05
12"	1'-6"	2'-0"	4.25	0.24	2'-3"	6.00	0.34	1'-9"	3.25	0.18	1'-3"	1.65	0.10	1'-0"	0.83	0.05
16"	2'-0"	2'-1"	7.34	0.58	3'-0"	10.65	0.79	2'-3"	5.76	0.43	1'-6"	2.94	0.22	1'-3"	1.48	0.11
18"	2'-0"	2'-11"	7.70	0.57	3'-5"	10.89	0.82	2'-6"	5.89	0.44	1'-10"	3.01	0.22	1'-5"	1.50	0.11
20"	2'-0"	3'-1"	7.86	0.59	3'-9"	11.12	0.84	2'-9"	6.01	0.45	2'-0"	3.07	0.23	1'-7"	1.54	0.12
24"	2'-6"	3'-6"	11.33	0.84	4'-3"	16.00	1.20	3'-2"	8.65	0.65	2'-6"	4.42	0.33	1'-10"	2.22	0.17

NOTE: Calculations in Minimum Area column are in square feet.
Calculations in Minimum Volume column are in cubic yards.

REVISIONS	CITY OF MONTGOMERY HORIZONTAL BLOCKING FOR WATERLINE	WATER
		W-2



RESTRAINER CHART

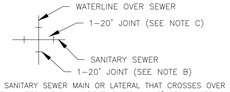
NOM. PIPE SIZE	PVC PIPE W/STEEL PIPE O.D. No.1300-S	PVC PIPE W/D.I. PIPE O.D. No.1300-C	A	B approx.	C min.	RESTRAINING RODS		CLAMPING BOLTS		APPROX. WGT. (lbs.)
						NO.	SIZE	NO.	SIZE	
2	2.375	N/A	1-1/8	6-1/4	4.0	2	5/8 x5	2	5/8 x4	4
3	3.500	N/A	1-1/8	7-11/16	4.0	2	5/8 x5	2	5/8 x4	5
4	4.500	4.80	1-1/8	9-1/8	6.0	2	3/4 x7	2	5/8 x4	6.5
6	6.625	6.90	1-1/8	11-1/8	6.0	2	3/4 x7	2	5/8 x4	8.5
8	8.625	8.05	1-1/4	13-7/8	6.0	2	3/4 x7	2	3/4 x5	13
10	10.750	11.10	1-3/8	16-5/8	6.0	4	3/4 x7	2	7/8 x6	23
12	12.750	13.20	1-3/8	19-1/4	6.0	4	3/4 x7	2	7/8 x6	25
14	N/A	15.30	4.0	22.0	15.0	6	3/4 x17	2	7/8 x7	50
16	N/A	17.40	4.0	24.2	15.0	6	3/4 x17	2	7/8 x7	65
18	N/A	19.50	5.0	26.5	15.0	8	3/4 x17	2	1 x 7	65
20	N/A	21.60	7.0	28.6	22.0	8	3/4 x24	3	1 1/8 x9	125
24	N/A	25.80	7.0	32.8	22.0	12	3/4 x24	3	1 1/8 x9	143

Weights include Restraining rods, clamping bolt and nuts and special "T" bolts and nuts.
N/A PIPE not manufactured in this size.
Dimensions in inches.

REVISIONS	CITY OF MONTGOMERY WATERLINE RESTRAINER	WATER
		W-3

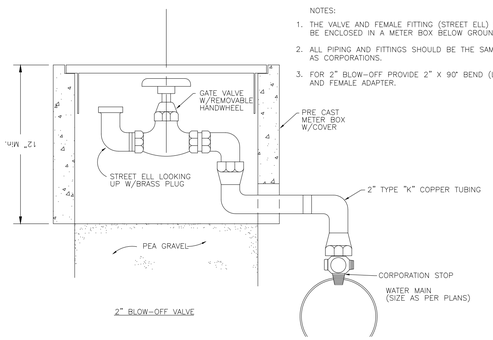
CONSTRUCT WATER LINE-SANITARY SEWER CROSSING PER THE FOLLOWING REQUIREMENTS:

1
- A. PROVIDE MINIMUM 2' VERTICAL CLEARANCE
- B. PLACE ONE FULL SECTION (MIN. 18 FT) OF WATERLINE CENTERED AT SANITARY SEWER CROSSING. PROVIDE RESTRAINED JOINTS ON WATERLINE, SPACED AT LEAST 9 FEET HORIZONTALLY FROM CENTERLINE SAND, AS PER TAC § 290.44.
- C. WHERE A WATERLINE CROSSES A SEWER MAIN OR LATERAL WITHOUT 2' CLEARANCE, WATERLINE MUST BE 6" ABOVE SEWER MAIN OR LATERAL. SEWER MUST HAVE A PRESSURE RATED PIPE OF AT LEAST 150 PSI AND SHALL BE EMBEDDED IN CEMENT STABILIZED SAND FOR A TOTAL LENGTH OF ONE PIPE SEGMENT PLUS 12" BEYOND THE JOINT ON EACH END.
- D. PLACE ONE FULL SECTION (MIN 18 FT) OF 150 PSI SANITARY SEWER CENTERED AT WATERLINE CROSSING, SPACED AT LEAST 9 FEET HORIZONTALLY FROM CENTERLINE OF WATERLINE, AND EMBED IN CEMENT STABILIZED SAND.
- E. WATERLINES, INCLUDING SERVICE LEADS, SHALL ALWAYS CROSS OVER SANITARY SEWER LINES AND SERVICE LEADS UNLESS SPECIFICALLY LABELED AND APPROVED OTHERWISE.



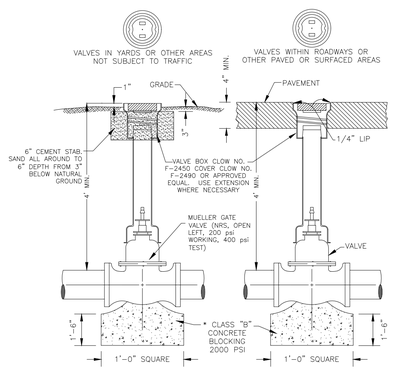
2
- A. ANY SANITARY SEWER MAIN OR LATERAL THAT CROSSES OVER A NEW WATERLINE SHALL BE ENCASED IN 18' OR LONGER SECTION OF PIPE CENTERED ON THE WATERLINE OR CONSTRUCTED WITH DUCTILE IRON OR STEEL PIPE WITH MECHANICAL WELDED JOINTS.

WATER LINE AND SANITARY SEWER CROSSING NOTES AND DETAIL
NTS



2" BLOW-OFF VALVE

2" BLOW-OFF VALVE FOR WATERLINE
NTS



* BLOCK GATE VALVES WITH COMPRESSION JOINT FITTINGS ON 8" & LARGER LINES

GATE VALVE & BOX INSTALLATION
14" AND SMALLER WATERLINE
NTS

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 22235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHRIS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK SECTION 4
WATER AND SANITARY SEWER DETAILS
1 OF 2

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

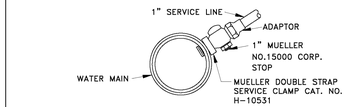
DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	AS NOTED	SHEET	19

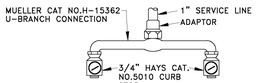
STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER
09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

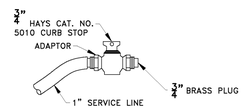
S:\ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\18 WATER AND SANITARY SEWER DETAILS.DWG Sep. 15, 2020 - 4:05 PM



TAP DETAIL

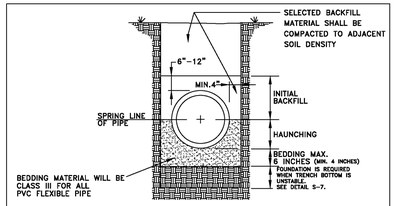


DOUBLE SERVICE LINE CURB STOP DETAIL



SINGLE SERVICE LINE CURB STOP DETAIL

REVISIONS	CITY OF MONTGOMERY	WATER
10-2013 REVISED SERVICE LINE SIZE	CURB STOP & TAP FOR WATERLINE	W-10



BEDDING DETAIL

NOTE: BACKFILL AND BEDDING MUST MEET ALL MINIMUM ASPECTS OF ASTM D-2321

Foundation
A foundation is required when the trench bottom is unstable. Any foundation that will support a rigid pipe without causing loss of grade or flexural breaking will be more than adequate for PVC pipes.

Bedding
The bedding directly underneath the pipe is required only to bring the trench bottom up to grade. It should not be so thick or soft that the pipe will settle and lose grade. The purpose of the bedding is to provide a firm, stable and uniform support of the pipe. A layer of material sufficient to establish line, grade, and support should be placed. Bell holes should be excavated to insure uniform bearing.

Haunching
The haunching area is the most important in terms of limiting the deflection of a flexible pipe. This is the area that should be compacted to the required or specified density.

ASTM D-2321
DESCRIPTION OF EMBEDMENT MATERIALS

Class I
Angular, 1/4" to 1-1/2" graded stone, including a number of fill materials that have regional significance, such as shell, slag, cinders, crushed stone and crushed shells.

Class II
Coarse sands and gravels with maximum particle size of 1-1/2", including variously graded sands, and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil types GW, GP, SW, and SP are included in this class.

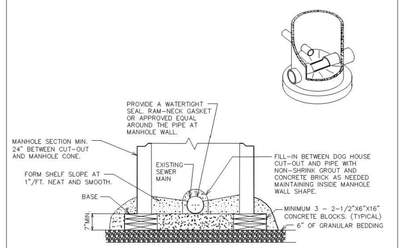
Class III
Fine sand and clayey gravels, including fine sands and sand-clay mixtures, and gravel clay mixtures. Soil types GM, GC, SM and SC are included in this class.

Class IV
Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil types MH, ML, OH, and CL are included in this class.

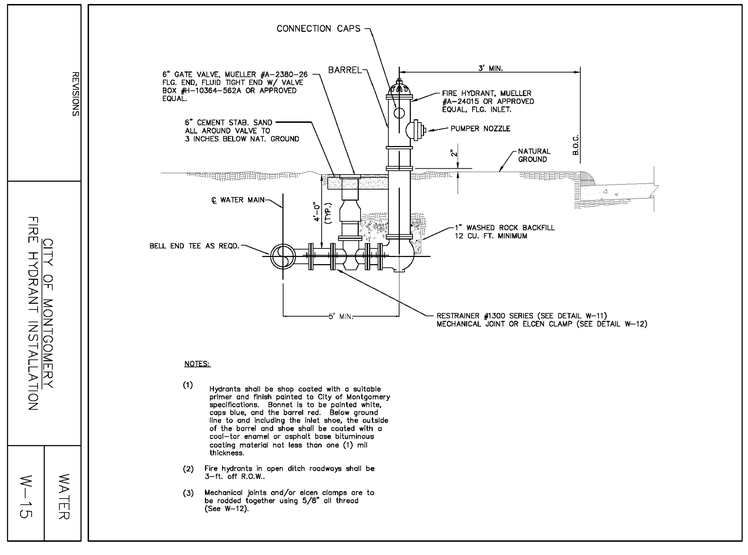
Class V
This class includes the organic soils OL, OH, and PT as well as soils containing frozen earth, debris, rocks larger than 1-1/2" in diameter, and other foreign materials. These materials are not recommended for bedding, haunching, or initial backfill.

REVISIONS	CITY OF MONTGOMERY TYPICAL SANITARY SEWER BEDDING AND TRENCH DETAIL	SEWER
		S-1

NOTES:
1. FLOW SHALL BE MAINTAINED DURING CONSTRUCTION.
2. THIS DETAIL TO BE USED WHEN A 6" OR LARGER LATERAL NECESSITATES CONSTRUCTION OF A NEW MANHOLE.
3. FOR ADDITIONAL STANDARDS NOT SHOWN, SEE "STANDARD PRECAST MANHOLE" DETAIL S-4.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPORT OF EXISTING SEWER DURING INSTALLATION OF MANHOLE.
5. DOGHOUSE OPENING MAY ONLY BE USED WHEN PLACING A NEW MANHOLE OVER AN EXISTING LINE; OTHERWISE, THE OPENING MUST BE CAST. SIZE, LOCATION, AND ANGLE OF ENTRY SHALL BE AS REQUIRED BY THE PLANS.
6. EXCAVATE TRENCH TO MIN. 13" BELOW BOTTOM OF EXISTING PIPE, COMPACT SUBGRADE. PLACE AND COMPACT 6" OF GRANULAR BEDDING. MONOLITHIC POUR OF MIN. 7" DEPTH, 6 SACK TOPPING MIX TO BE PLACED INSIDE, UNDER, AND OUTSIDE MANHOLE BARREL FROM SURFACE OF BEDDING, AROUND CONCRETE BLOCK RISERS, TO A POINT APPROXIMATELY AT THE SPRING LINE OF THE EXIST. PIPE.
7. DURING THE SAME POUR, THE FINISH MANHOLE SHELF SHALL BE FORMED AND FINISHED AROUND THE BARREL AND EXISTING PIPE AS SHOWN.
8. AFTER CONCRETE SHELF HAS CURED, THE EXISTING PIPE SHALL BE SAW-CUT ON BOTH SIDES TO THE FINISHED SHELF GRADE AND REMOVED. THE EXISTING PIPE SHALL FORM THE TROUGH OF THE MANHOLE AS SHOWN. FILE CUT PIPE TO GIVE SMOOTH EDGES.



REVISIONS	CITY OF MONTGOMERY DOG HOUSE MANHOLE	SEWER
		S-12



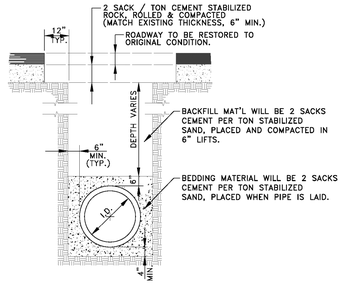
NOTES:

(1) Hydrants shall be shop coated with a suitable primer and finish painted to City of Montgomery specifications. Bonnet is to be painted white, caps blue, and the barrel red. Below ground line to and including the inlet shoe, the outside of the barrel and shoe shall be coated with a coal-tar enamel or asphalt base bituminous coating material not less than one (1) mil thickness.

(2) Fire hydrants in open ditch roadways shall be 3-ft. off R.O.W..

(3) Mechanical joints and/or elcen clamps are to be rodded together using 5/8" all thread (See W-12).

REVISIONS	CITY OF MONTGOMERY FIRE HYDRANT INSTALLATION	WATER
		W-15



NOTE: BACKFILL AND BEDDING MUST MEET ALL MINIMUM ASPECTS OF ASTM D-2321

REVISIONS	CITY OF MONTGOMERY TYPICAL ROADWAY TRENCH BEDDING AND BACKFILL DETAIL	SEWER
		S-2

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 22257
21323 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHIRS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK
SECTION 4
WATER AND SANITARY SEWER DETAILS
2 OF 2

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

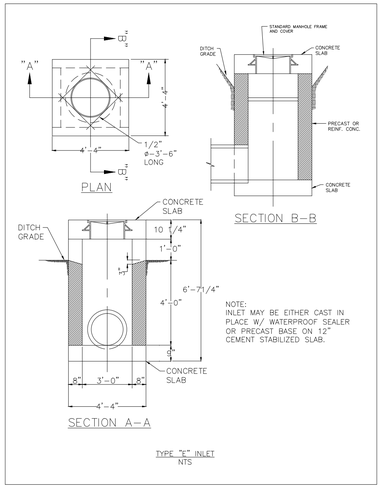
DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	AS NOTED	SHEET	20

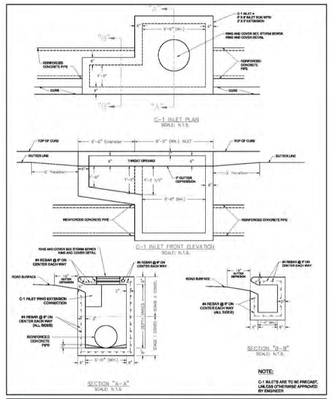
STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER
09/15/2020

*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

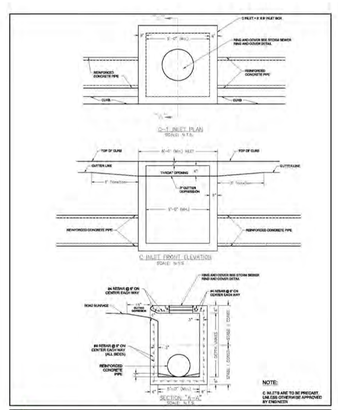
S:\ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\18 WATER AND SANITARY SEWER DETAILS.DWG Sep. 15, 2020-4:05 PM



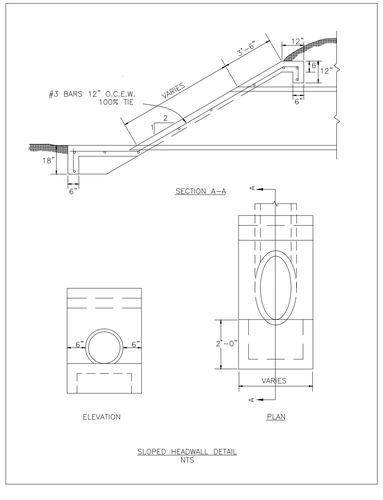
TYPE "C" INLET
NTS



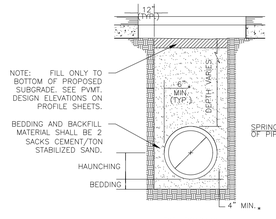
CITY OF CONROE ENGINEERING
STANDARD "TYPE C-1" INLET DETAIL



CITY OF CONROE ENGINEERING
STANDARD "TYPE C" INLET DETAIL



SLOPED HEADWALL DETAIL
NTS



TYP TRENCH BEDDING

FOUNDATION:
A FOUNDATION IS REQUIRED WHEN THE TRENCH BOTTOM IS UNSTABLE. ANY FOUNDATION THAT WILL SUPPORT A RIGID PIPE WITHOUT CAUSING LOSS OF GRADE OR FLEXURAL BREAKING WILL BE MORE THAN ADEQUATE FOR PVC PIPES.

BEDDING:
THE BEDDING DIRECTLY UNDERNEATH THE PIPE IS REQUIRED ONLY TO BRING THE TRENCH BOTTOM UP TO GRADE. IT SHOULD NOT BE SO THICK OR SOFT THAT THE PIPE WILL SETTLE AND LOSE GRADE. THE PURPOSE OF THE BEDDING IS TO PROVIDE A FIRM, STABLE AND UNIFORM SUPPORT OF THE PIPE. A LAYER OF MATERIAL SUFFICIENT TO ESTABLISH LINE, GRADE, AND SUPPORT SHOULD BE PLACED. BELL HOLES SHOULD BE EXCAVATED TO INSURE UNIFORM BEARING.

HAUNCHING:
HAUNCHING AND INITIAL BACKFILL ARE THE MOST IMPORTANT IN TERMS OF LIMITING THE DEFLECTION OF AREAS HORIZONTAL A FLEXIBLE PIPE. THESE AREAS SHOULD BE COMPACTED TO REQUIRED OR SPECIFIED DENSITY.

TYP. ROADWAY TRENCH BEDDING

NOTE 1: WHEN USING HDPE PIPE, THE BACKFILL MATERIAL SHALL BE CEMENT STABILIZED SAND (2 SACK CEMENT/TON) OR OTHER APPORVED BACKFILL MATERIAL AS SPECIFIED BY THE ENGINEER, AND IN ACCORDANCE TO CITY OF CONROE HDPE SPECIFICATION, SECTION 6.f FURTHER, THE BACKFILL MATERIAL SHALL BE USED FOR THE WHOLE DEPTH AND WIDTH OF ALL DITCHES, TRENCHES, ETC. UNDER ANY ROADWAY OR PAVED SURFACES. WHEN PIPES ARE NOT UNDER PAVED SURFACES, THE BACKFILL MATERIAL SHALL BE USED TO A MINIMUM OF 6" UNDER AND AROUND THE PIPE, BUT SHALL COVER THE FULL WIDTH OF THE TRENCH TO THE UNDISTURBED WALLS. THE MINIMUM DIMENSION OF THE TRENCH FOR THE HDPE PIPE SHALL BE AS SPECIFIED IN THE HDPE SPECIFICATION, TABLE 6.1.

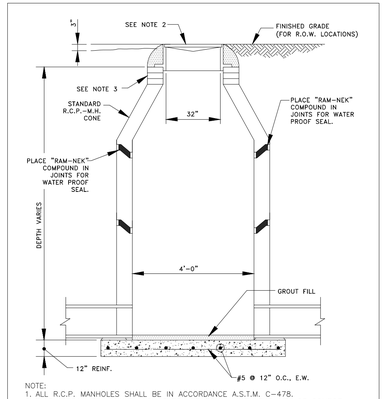
NOTE 2: ONLY RCP (REINFORCED CONC PIPE) SHALL BE USED UNDER THE PAVED SURFACE OF ROADWAYS. PIPE MAY ONLY BE PLACED UNDER A ROADWAY WHEN IT RUNS PERPENDICULAR TO A ROADWAY. PIPE MAY RUN LONGITUDINALLY BESIDE THE ROADWAY IN THE R.O.W.

NOTE 3: BACKFILL ABOVE THE BEDDING SHALL CONFORM TO "TYPICAL STORM SEW. BACKFILL AND TRENCH REPAIR" STANDARD DRAWING D-5.

ASTM D-2321
DESCRIPTION OF EMBEDMENT MATERIALS
CLASS I

ANGULAR, 1/4" TO 1-1/2" GRADED STONE, INCLUDING A NUMBER OF FILL MATERIALS THAT HAVE REGIONAL SIGNIFICANCE, SUCH AS CORAL, SLAG, CINDERS, CRUSHED STONE AND CRUSHED SHELLS. CLASS II COARSE SANDS AND GRAVELS WITH MAXIMUM PARTICLE SIZE OF 1-1/2", INCLUDING VARIOUSLY GRADED SANDS, AND GRAVELS CONTAINING SMALL PERCENTAGES OF FINES, GENERALLY GRANULAR AND NONCOHESIVE, EITHER WET OR DRY. SOIL TYPES GW, GP, SW, AND SP ARE INCLUDED IN THIS CLASS. CLASS III FINE SAND AND CLAYEY GRAVELS, INCLUDING FINE SANDS AND SAND-CLAY MIXTURES, AND GRAVEL CLAY MIXTURES. SOIL TYPES GM, GC, SM AND SC ARE INCLUDED IN THIS CLASS.

STORM SEWER BEDDING AND TRENCH DETAIL
NTS



NOTE:
1. ALL R.C.P. MANHOLES SHALL BE IN ACCORDANCE A.S.T.M. C-478.
2. EAST JORDAN 32" FRAME AND COVER (OR EQUAL) WITH THE CITY OF CONROE LOGO EMBEDDED IN LID.
3. FOR ADJUSTMENT OF MANHOLE LID USE STANDARD CONCRETE RINGS. NO BRICK ADJUSTMENT ALLOWED.
4. PRECAST BOTTOM SECTION OF MANHOLE TO BE SECURELY ATTACHED TO REINFORCED CONCRETE SLAB WITH WATERPROOF SEALER.
5. MANHOLE SECTIONS, CONES AND INVERT TOPS SHALL BE COATED WITH A SUITABLE, PROTECTIVE, 20 MILS THICK, COLD TAR EPOXY COATING.

STANDARD PRECAST MANHOLE
NTS

CITY OF MONTGOMERY, CITY ENGINEER
SIGNATURE VALID FOR ONE (1) YEAR

DATE

L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
WWW.L2ENGINEERING.COM
FIRM REGISTRATION NUMBER 22235
21123 EVA STREET #200
MONTGOMERY, TEXAS 77356
OFFICE: 936-647-0420

CLIENT INFORMATION
CHEATHAM MANAGMENT, LLC
CHRIS CHEATHAM
PO BOX 234
MONTGOMERY, TX 77356

PROJECT ADDRESS
EMMA'S WAY
MONTGOMERY TEXAS

HILLS OF TOWN CREEK
SECTION 4
DRAINAGE AND STORM SEWER DETAILS

DRAWING ISSUE

#	DATE	BY	* COMMENT
1	09/15/20	JTW	FOR PERMIT

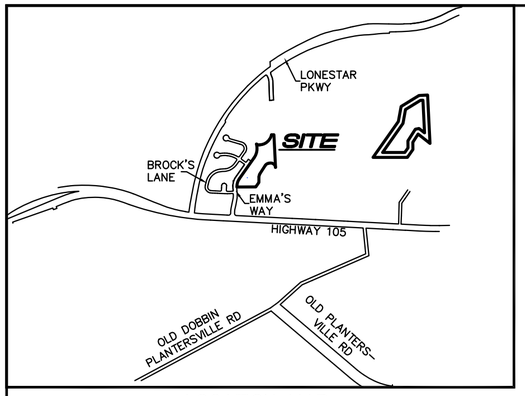
DRAWING INFORMATION

PROJECT	10600	TDLR	**
DRAWN	MCV	CHECKED	JTW
SCALE	AS NOTED	SHEET	21

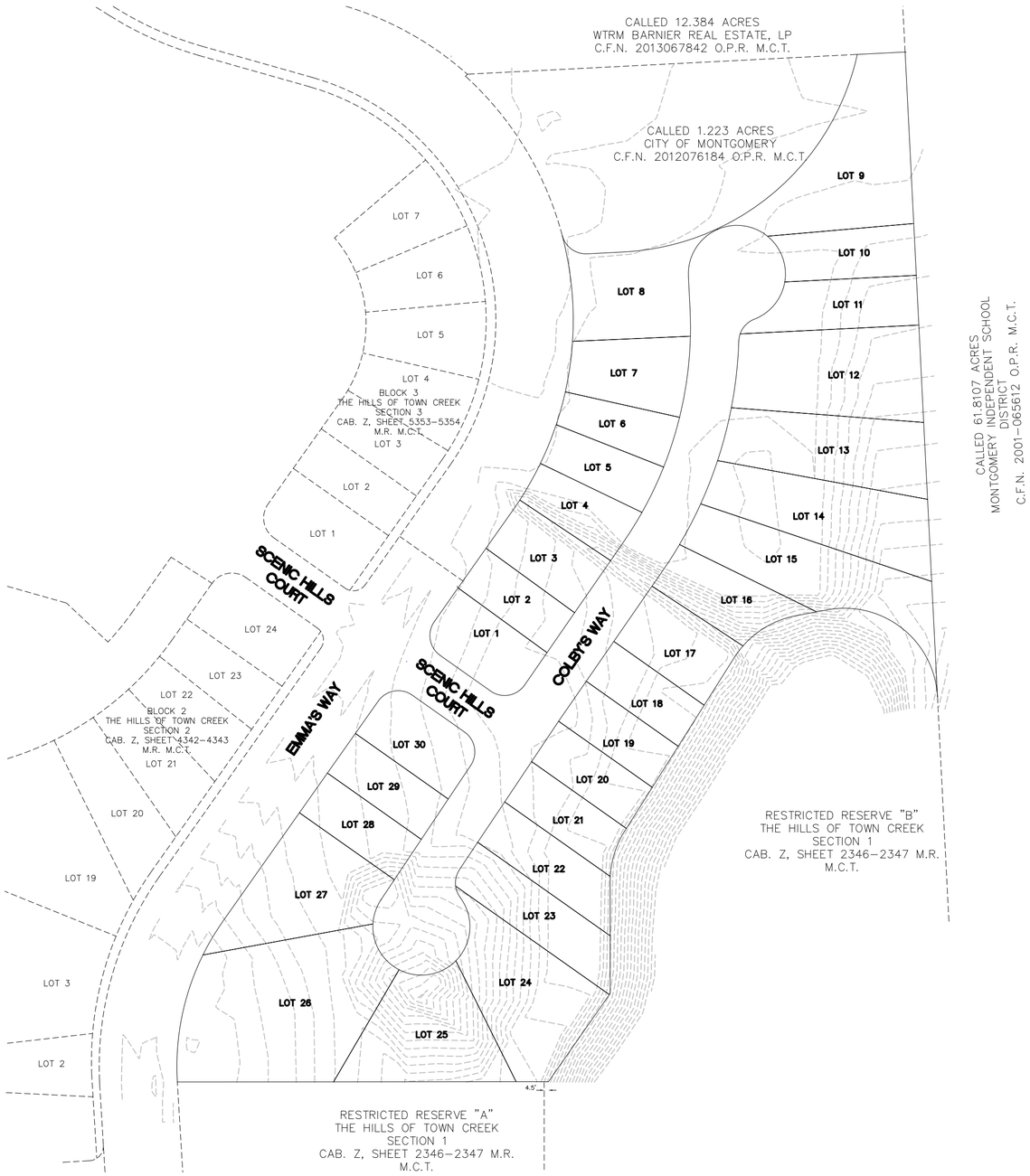
STATE OF TEXAS
JONATHAN T. WHITE
127058
LICENSED
PROFESSIONAL ENGINEER
09/15/2020

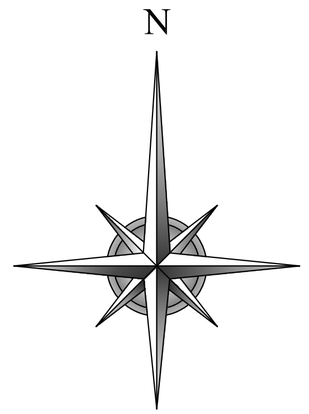
*PLANS NOT RELEASED FOR CONSTRUCTION UNLESS INDICATED ABOVE

S:\ENGINEERING PROJECTS\10600 - HILLS OF TOWN CREEK SECTION 4\03 CAD\DESIGN SET\19 DRAINAGE AND STORM SEWER DETAILS.DWG Sep. 15, 2020 - 4:05 PM



LOCATION MAP
NOT TO SCALE





GRAPHIC SCALE

100 0 100 200

(IN FEET)
1 inch = 100 ft.

LEGEND / ABBREVIATIONS

CAB.	CABINET
C.F.N.	CLERK'S FILE NUMBER
FND.	FOUND
I.R.	IRON ROD
O.P.R.	OFFICIAL PUBLIC RECORDS
M.C.T.	MONTGOMERY COUNTY, TEXAS
M.R.	MAP RECORDS
R.O.W.	RIGHT OF WAY
(TYP.)	TYPICAL
V.S.	VEGETATION SETBACK

PROPERTY MARKER O

CITY OF MONTGOMERY BENCHMARKS

MONT 3 ELEV.=268.73'

3" BRASS DISK LOCATED FROM THE INTERSECTION OF HWY 105 AND HWY 149, WEST ±4700' TO THE PARKING LOT OF THE HERITAGE HOUSE RESTAURANT', WHICH IS LOCATED ON THE NORTH SIDE OF HWY 105.

MONT 7 ELEV.=291.77'

3" BRASS DISK IS LOCATED IN THE CENTER OF MONTGOMERY ON THE SOUTH SIDE OF HWY 105. MARK IS IN FRONT (NORTH) OF GAS PUMPING AREA OF BROOKSHIRE BROTHERS GROCERY STORE, AS WELL AS ACROSS HWY 105(SOUTH) FROM 'THE OLDE SCHOOL HOUSE'.

BENCHMARK

BRASS DISK IN CONCRETE ELEV.=314.12'

BRASS DISK IN CONCRETE IN THE SOUTHEAST RIGHT-OF-WAY OF EMMA'S WAY LOCATED NORTH 29°13'51" WEST, A DISTANCE OF 2.19' FROM THE COMMON CORNER OF LOTS 1 AND 2, BLOCK 1, THE HILLS OF TOWN CREEK.

GENERAL NOTES:

1. The coordinates shown hereon are Texas Central Zone No. 4204 State Plane Grid Coordinates (NAD83) and may be brought to surface by applying the following combined scale factor 0.999922.

2. Distances shown along curves are arc lengths.

3. Flood Statement: This site (proposed area) is situated in Zone "X" in Montgomery County, Texas according to FEMA map number 48339C0200G dated August 18, 2014: This statement does not imply that the property and/or the structures thereon will be free from flooding or flood damage. This determination has been made by scaling the property on the referenced map and is not the result of an elevation survey. This flood statement shall not create liability on the part of the surveyor.

4. All corners are set 5/8 inch iron rods with cap stamped "Core 6657" unless otherwise shown or noted.

5. In addition to the building line shown on the face of the plat, all lots shall have a minimum 5' side yard setback and a minimum 10' rear yard setback, unless otherwise noted.

PRELIMINARY PLAT
THE HILLS OF TOWN CREEK SECTION 4
A SUBDIVISION OF
8.1365 ACRES (354,425 SQ FT.)
BENJAMIN RIGBY LEAGUE, ABSTRACT 31
MONTGOMERY COUNTY, TEXAS

30 LOTS 1 BLOCK

APRIL 2020

SURVEYOR:
CORE
LAND SURVEYING TBPLS REG NO. 10194560
10210 GROGANS MILL ROAD, SUITE 120
THE WOODLANDS, TX 77380
T: 224.828.1208
corelandsurveying.com

ENGINEER:
L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
21123 EVA ST #200,
MONTGOMERY, TX 77356
(936) 647-0420

LINE TABLE		
NO.	BEARING	LENGTH
L1	N 87°05'32" E	37.81'
L2	N 87°05'32" E	49.29'
L3	S 79°22'17" W	32.88'
L4	S 56°15'21" E	25.00'
L5	N 02°52'32" W	32.80'
L6	N 87°07'28" E	25.00'
L7	S 23°23'42" E	0.69'

CURVE TABLE					
NO.	LENGTH	RADIUS	DELTA	CHD. BRG.	CHORD
C1	175.59'	260.00	38°41'38"	N 15°50'59" E	172.27'
C2	296.60'	340.00	49°58'54"	N 10°12'24" E	287.28'
C3	34.08'	25.00	78°06'01"	S 53°51'15" E	31.50'
C4	338.68'	260.00	74°38'06"	N 49°46'29" E	315.24'
C5	163.74'	96.00	97°43'25"	N 51°46'06" W	144.60'
C6	78.92'	96.00	47°06'15"	S 55°49'11" W	76.72'
C7	54.14'	96.00	32°18'55"	S 16°06'41" W	53.43'
C8	39.29'	25.00	90°02'44"	N 80°13'13" E	35.37'
C9	39.25'	25.00	89°57'16"	N 09°46'47" W	35.34'
C10	38.62'	25.00	88°30'04"	S 10°30'23" E	34.89'
C11	39.52'	25.00	90°34'53"	S 79°57'08" W	35.53'
C12	218.63'	50.00	250°31'44"	N 88°28'47" E	81.65'
C13	30.77'	25.00	70°31'44"	S 01°31'13" E	28.87'
C14	255.51'	390.00	37°32'14"	N 15°53'35" E	250.96'
C15	271.89'	415.00	37°32'14"	S 15°53'35" W	267.05'
C16	251.84'	440.00	32°47'37"	N 18°15'53" E	248.41'
C17	29.27'	25.00	67°04'15"	N 35°24'12" E	27.62'
C18	219.75'	50.00	251°48'53"	N 56°58'07" W	81.00'

N

GRAPHIC SCALE

50 0 50 100

(IN FEET)
1 inch = 50 ft.

LEGEND / ABBREVIATIONS

CAB.	CABINET
C.F.N.	CLERK'S FILE NUMBER
FND.	FOUND
I.R.	IRON ROD
O.P.R.	OFFICIAL PUBLIC RECORDS
M.C.T.	MONTGOMERY COUNTY, TEXAS
M.R.	MAP RECORDS
R.O.W.	RIGHT OF WAY
(TYP.)	TYPICAL
V.S.	VEGETATION SETBACK

PROPERTY MARKER ○

CITY OF MONTGOMERY BENCHMARKS

MONT 3 ELEV.=268.73'

3" BRASS DISK LOCATED FROM THE INTERSECTION OF HWY 105 AND HWY 149, WEST ±4700' TO THE PARKING LOT OF THE HERITAGE HOUSE RESTAURANT', WHICH IS LOCATED ON THE NORTH SIDE OF HWY 105.

MONT 7 ELEV.=291.77'

3" BRASS DISK IS LOCATED IN THE CENTER OF MONTGOMERY ON THE SOUTH SIDE OF HWY 105. MARK IS IN FRONT (NORTH) OF GAS PUMPING AREA OF BROOKSHIRE BROTHERS GROCERY STORE, AS WELL AS ACROSS HWY 105(SOUTH) FROM 'THE OLDE SCHOOL HOUSE'.

BENCHMARK

BRASS DISK IN CONCRETE ELEV.=314.12'

BRASS DISK IN CONCRETE IN THE SOUTHEAST RIGHT-OF-WAY OF EMMA'S WAY LOCATED NORTH 29°13'51" WEST, A DISTANCE OF 2.19' FROM THE COMMON CORNER OF LOTS 1 AND 2, BLOCK 1, THE HILLS OF TOWN CREEK.

PRELIMINARY PLAT
THE HILLS OF TOWN CREEK SECTION 4
A SUBDIVISION OF
8.1365 ACRES (354,425 SQ FT.)
BENJAMIN RIGBY LEAGUE, ABSTRACT 31
MONTGOMERY COUNTY, TEXAS

30 LOTS 1 BLOCK

APRIL 2020

SURVEYOR:
CORE
LAND SURVEYING TBPLS REG NO. 10194560
10210 GROGANS MILL ROAD, SUITE 120
THE WOODLANDS, TX 77380
T: 224.828.1208
corelandsurveying.com

ENGINEER:
L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
21123 EVA ST #200,
MONTGOMERY, TX 77356
(936) 647-0420

LEGEND / ABBREVIATIONS

CAB.	CABINET
C.F.N.	CLERK'S FILE NUMBER
FND.	FOUND
I.R.	IRON ROD
O.P.R.	OFFICIAL PUBLIC RECORDS
M.C.T.	MONTGOMERY COUNTY, TEXAS
M.R.	MAP RECORDS
R.O.W.	RIGHT OF WAY
(TYP.)	TYPICAL
V.S.	VEGETATION SETBACK
PROPERTY MARKER	o

CITY OF MONTGOMERY BENCHMARKS

MONT 3 ELEV.=268.73'

3" BRASS DISK LOCATED FROM THE INTERSECTION OF HWY 105 AND HWY 149, WEST ±4700' TO THE PARKING LOT OF THE HERITAGE HOUSE RESTAURANT', WHICH IS LOCATED ON THE NORTH SIDE OF HWY 105.

MONT 7 ELEV.=291.77'

3" BRASS DISK IS LOCATED IN THE CENTER OF MONTGOMERY ON THE SOUTH SIDE OF HWY 105. MARK IS IN FRONT (NORTH) OF GAS PUMPING AREA OF BROOKSHIRE BROTHERS GROCERY STORE, AS WELL AS ACROSS HWY 105(SOUTH) FROM 'THE OLDE SCHOOL HOUSE'.

BENCHMARK

BRASS DISK IN CONCRETE ELEV.=314.12'

BRASS DISK IN CONCRETE IN THE SOUTHEAST RIGHT-OF-WAY OF EMMA'S WAY LOCATED NORTH 29°13'51" WEST, A DISTANCE OF 2.19' FROM THE COMMON CORNER OF LOTS 1 AND 2, BLOCK 1, THE HILLS OF TOWN CREEK.

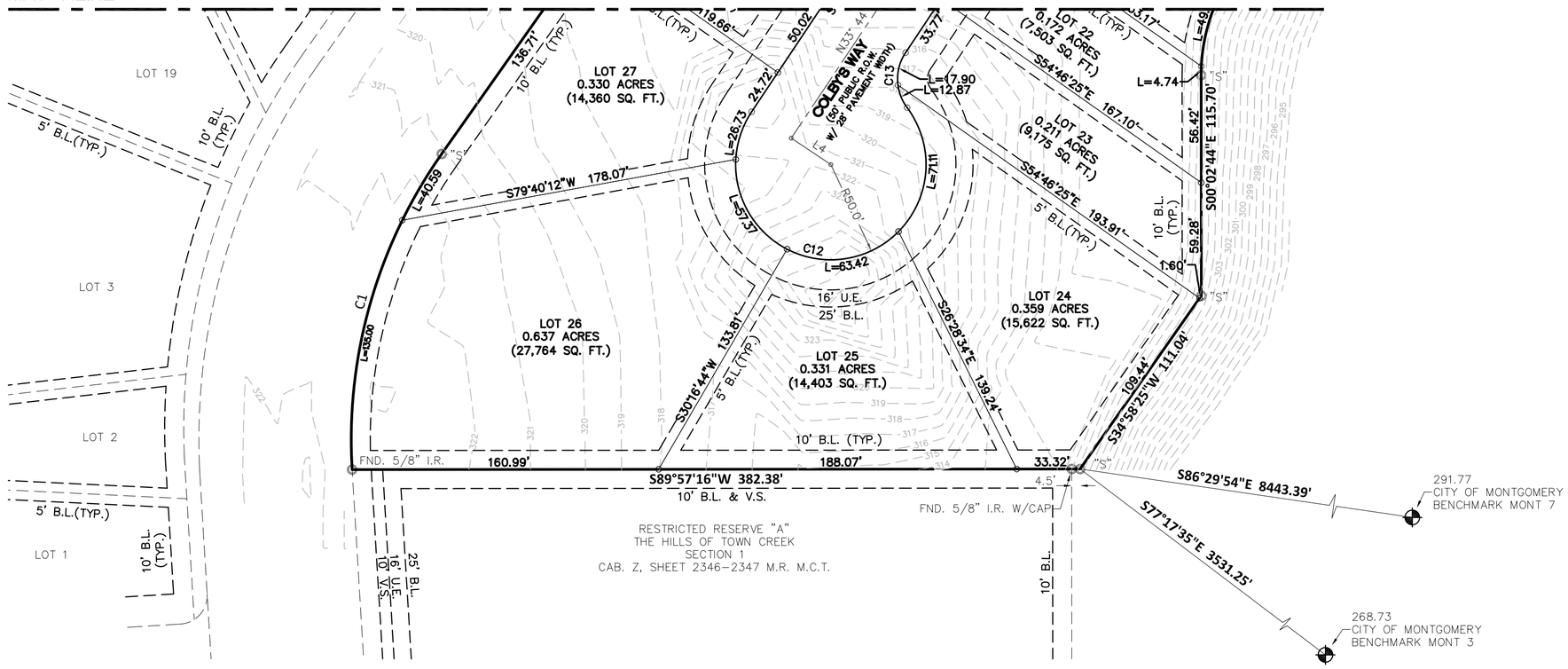
N

GRAPHIC SCALE

50 0 50 100

(IN FEET)
1 inch = 50 ft.

MATCHLINE



LINE TABLE

NO.	BEARING	LENGTH
L1	N 87°05'32" E	37.81'
L2	N 87°05'32" E	49.29'
L3	S 79°22'17" W	32.88'
L4	S 56°15'21" E	25.00'
L5	N 02°52'32" W	32.80'
L6	N 87°07'28" E	25.00'
L7	S 23°23'42" E	0.69'

CURVE TABLE

NO.	LENGTH	RADIUS	DELTA	CHD. BRG.	CHORD
C1	175.59'	260.00	38°41'38"	N 15°50'59" E	172.27'
C2	296.60'	340.00	49°58'54"	N 10°12'24" E	287.28'
C3	34.08'	25.00	78°06'01"	S 53°51'15" E	31.50'
C4	338.68'	260.00	74°38'06"	N 49°46'29" E	315.24'
C5	163.74'	96.00	97°43'25"	N 51°46'06" W	144.60'
C6	78.92'	96.00	47°06'15"	S 55°49'11" W	76.72'
C7	54.14'	96.00	32°18'55"	S 16°06'41" W	53.43'
C8	39.29'	25.00	90°02'44"	N 80°13'13" E	35.37'
C9	39.25'	25.00	89°57'16"	N 09°46'47" W	35.34'
C10	38.62'	25.00	88°30'04"	S 10°30'23" E	34.89'
C11	39.52'	25.00	90°34'53"	S 79°57'08" W	35.53'
C12	218.63'	50.00	250°31'44"	N 88°28'47" E	81.65'
C13	30.77'	25.00	70°31'44"	S 01°31'13" E	28.87'
C14	255.51'	390.00	37°32'14"	N 15°53'35" E	250.96'
C15	271.89'	415.00	37°32'14"	S 15°53'35" W	267.05'
C16	251.84'	440.00	32°47'37"	N 18°15'53" E	248.41'
C17	29.27'	25.00	67°04'15"	N 35°24'12" E	27.62'
C18	219.75'	50.00	251°48'53"	N 56°58'07" W	81.00'

PRELIMINARY PLAT

THE HILLS OF TOWN CREEK SECTION 4

A SUBDIVISION OF
8.1365 ACRES (354,425 SQ FT.)
BENJAMIN RIGBY LEAGUE, ABSTRACT 31
MONTGOMERY COUNTY, TEXAS

30 LOTS 1 BLOCK

APRIL 2020

SURVEYOR:
CORE
LAND SURVEYING TBPLS REG NO. 10194560
10210 GROGANS MILL ROAD, SUITE 120
THE WOODLANDS, TX 77380
T: 224.828.1208
corelandsurveying.com

ENGINEER:
L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
21123 EVA ST #200,
MONTGOMERY, TX 77356
(936) 647-0420

STATE OF TEXAS
COUNTY OF MONTGOMERY

That The Hills of Town Creek, LLC herein acting individually or through the undersigned duly authorized agents, does hereby adopt this plat designating described real property as the Hills of Town Creek Section 4, and does hereby make subdivision of said property according to the lines, streets, alleys, parks, and easements therein shown, and dedicate to public use forever all areas shown on this plat as streets, alleys, parks, and easements, except those specifically indicated as private; and does hereby waive any claims for damages occasioned by the establishing of grades as approved for the streets and alleys dedicated, or occasioned by the alteration of the surface of any portion of streets or alleys to conform to such grades and does hereby bind Owner, and Owner's successors and assigns to warrant and forever defend the title to the land so dedicated.

Owner hereby certifies that Owner has or will comply with all applicable regulations of the city, and that a rough proportionality exists between the dedications, improvements, and exactions required under regulations and the projected impact of the subdivision.

Where streets or alleys are dedicated for private use, such dedication shall include an easement covering the street area which permits the installation, operation and maintenance of water, sewer, gas, electric, telephone, cable, elevation or other such utility facilities by the city and other utilities lawfully entitled to provide service to the abutting property. The easement shall also provide a right of access to public agencies engaged in both routine and emergency public service including law enforcement, fire protection, medical response, inspection and code enforcement.

IN TESTIMONY WHEREOF, The Hills of Town Creek, LLC have caused these presents to be signed by _____, its _____ thereunto authorized, this _____ day of _____, 2020.

The Hills of Town Creek, LLC

By: _____
_____, _____

STATE OF TEXAS
COUNTY OF MONTGOMERY

BEFORE ME, the undersigned authority, on this day personally appeared _____, its _____ ,known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that they executed the same for the purposes and considerations therein expressed and in the capacity therein and herein stated, and as the act and deed of said corporation.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this _____ day of _____, 2020.

_____
Notary Public in and for the State of Texas

Print Name: _____

My Commission expires: _____

That I Clemente Turrubiartes Jr., do hereby certify that I prepared this plat from an actual and accurate survey of the land and that the corner monuments shown thereof were property placed under my personal supervision, in accordance with the subdivision regulations of the City of Montgomery, Texas.

_____
Clemente Turrubiartes Jr.
Texas Registration No. 6657

CITY OF MONTGOMERY

I THE UNDERSIGNED, Engineer for the City of Montgomery, hereby certify that this subdivision plat conforms to all requirements of the subdivision regulations of the City as to which his approval is require.

BY: _____
Chris Roznovsky, P.E.
City Engineer – City of Montgomery

This plat and subdivision has been submitted to and considered by the City Planning and Zoning Commission and the City Council of the City of Montgomery, Texas and is hereby approved by such Commission and Council.

Dated this _____ Day of _____, 2020

ATTEST:

By: _____
Sara Countryman
Mayor

By: _____
Nelson Cox
Chairman–Planning Zoning Commission

By: _____
Susan Hensley
City Secretary

I, _____, Clerk of the County Court of Montgomery County, Texas, do hereby certify that the within instrument with its certificate of authentication was filed for registration in my office on _____, 2020, at _____ o'clock, __.M., and duly recorded on _____ 2020, at _____ o'clock, __.M., in cabinet _____, sheet _____, of record of _____ for said County.

WITNESS MY HAND AND SEAL OF OFFICE, at Conroe, Montgomery County, Texas, the day and date last above written.

By: _____
Mark Turnbull, Clerk County Court
Montgomery County, Texas

By: _____ Deputy

PRELIMINARY PLAT

THE HILLS OF TOWN CREEK SECTION 4

A SUBDIVISION OF
8.1365 ACRES (354,425 SQ FT.)
BENJAMIN RIGBY LEAGUE, ABSTRACT 31
MONTGOMERY COUNTY, TEXAS

30 LOTS 1 BLOCK

APRIL 2020

SURVEYOR:
CORE
LAND SURVEYING TBPLS REG NO. 10194560
10210 GROGANS MILL ROAD, SUITE 120
THE WOODLANDS, TX 77380
T: 224.828.1208
corelandsurveying.com

ENGINEER:
L SQUARED ENGINEERING
MUNICIPAL COMMERCIAL RESIDENTIAL
21123 EVA ST #200,
MONTGOMERY, TX 77356
(936) 647-0420

Montgomery City Council
AGENDA REPORT

Meeting Date: October 13, 2020	**Budgeted Amount: N/A**
Prepared By: Dave McCorquodale	**Exhibits: Engineer's memo and Certificate of Substantial Completion & Certificate of Acceptance**

Subject

Consideration and possible action regarding approval of Certificate of Substantial Completion, Certificate of Acceptance, and completion of the one-year warranty period for the 18" Gravity Sanitary Sewer Line Extension Phase II project.

Description

The timing of certifying completion and accepting this project was delayed due to the construction pace of the Lift Station #1 project. The line was tested and has been in service since October 2019.

Following the completion of Lift Station #1, the gravity sanitary sewer line was retested and all necessary documentation was provided by the contractor on October 20, 2020.

Recommendation

Review the attached documents and act as you see fit. City staff has no objections to the engineer's recommendation of approving the Certificate of Completion, Certificate of Acceptance, and ending the one-year warranty period.

Approved By

Asst. City Administrator	Dave McCorquodale DM	Date: 10/08/2020
City Administrator	Richard Tramm RT	Date: 10/08/2020

JONES | CARTER

1575 Sawdust Road, Suite 400
The Woodlands, Texas 77380-3795
Tel: 281.363.4039
Fax: 281.363.3459
www.jonescarter.com

October 8, 2020

The Honorable Mayor and City Council
City of Montgomery
101 Old Plantersville Road
Montgomery, Texas 77316

Re: Construction of 18 Inch Gravity Sanitary Sewer Line Extension Phase II
City of Montgomery

Dear Mayor and Council:

Jones|Carter held a final inspection for the referenced project on October 15, 2019. Attendees of the final inspection included representatives from the City, contractor, and Jones|Carter. A punch list of items to be addressed by the contractor prior to the City's acceptance of the project was generated at that time. On October 25, 2019, we deemed the project to be substantially complete as the contractor had addressed all punch list items, with the exception of providing necessary affidavits, as-built drawings, and testing on the sanitary sewer line, which was delayed as a result of construction of the Stewart Creek WWTP Lift Station Expansion project. Upon completion of the Lift Station project, the gravity sanitary sewer line was tested and received passing results, and Affidavits of Bills Paid and as-built drawings were provided by the Contractor on October 2, 2020.

Due to the time that has elapsed since the original inspection and the sanitary sewer testing inspection, we recommend ending the one-year warranty period simultaneously with acceptance of the infrastructure. Enclosed is Pay Estimate No. 2 & Final in the amount of $14,210.21, a Certificate of Substantial Completion for the City's approval and execution which concurs with the substantial completion date and therefore sets the beginning of the one year warranty period, and a Certificate of Acceptance for the City's execution to accept the infrastructure.

Should you have any questions or need any additional information, please do not hesitate to contact me.

Sincerely,

Chris Roznovsky

Chris Roznovsky, PE
Engineer for the City

K:\W5841\W5841-0900-00 General Consultation\Correspondence\Letters\2020\Memo to Council 18 Inch Gravity SSE Phase II Final PE 10082020.docx

Enclosures: Pay Estimate No. 2 & Final
Certificate of Substantial Completion
Punchlist
Certificate of Acceptance
Affidavits of Bills Paid

JONES | CARTER

1575 Sawdust Road, Suite 400
The Woodlands, Texas 77380-3795
Tel: 281.363.4039
Fax: 281.363.3459
www.jonescarter.com

Cc (via email): Mr. Richard Tramm – City of Montgomery, City Administrator
Ms. Susan Hensley – City of Montgomery, City Secretary
Mr. Dave McCorquodale – City of Montgomery, Assistant City Administrator
Mr. Mike Muckleroy – City of Montgomery, Director of Public Works
Mr. Alan Petrov - Johnson Petrov, LLP, City Attorney

CERTIFICATE OF ACCEPTANCE

Mr. Danny L. Glover
DL Glover, Inc.
PO Box 1852
Humble, TX 77347

Re: Construction of 18 Inch Gravity Sanitary Sewer Line Extension (Phase II)
City of Montgomery
TIN No. 74-2063592

Mr. Glover:

This is to certify that City of Montgomery accepts the subject project on the basis of the Certificate of Substantial Completion issued by our engineers, Jones|Carter, and understands that a guarantee shall cover a period of one (1) year beginning October 25, 2019.

By: _____

Mr. Richard Tramm
City Administrator, City of Montgomery

Approved by City Council on: _____

K:\W5841\W5841-0034-00 18 Inch Gravity Sanitary Sewer Line Ext\3 Construction Phase\Phase II\5. Pay Estimate and Change Orders\FINAL LETTER.doc

cc: Mr. Richard Tramm – City of Montgomery, City Administrator
Ms. Susan Hensley – City of Montgomery, City Secretary
Mr. Mike Muckleroy – City of Montgomery, Public Works Director
Mr. Alan Petrov – Johnson Petrov, LLP, City Attorney
Mr. Chris Roznovsky, PE – Jones|Carter, City Engineer

JONES | CARTER

1575 Sawdust Road, Suite 400
The Woodlands, Texas 77380
Tel: 281.363.4039
Fax: 281.363.3459
www.jonescarter.com

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: City of Montgomery
Contractor: DL Glover, Inc.
Engineer: Jeffrey M. Bishop, PE
Project: Construction of 18 Inch Gravity Sanitary Sewer Line Extension (Phase II)

Engineer's Project No.: W5841-0034-01
Completion Date: October 25, 2019

This final Certificate of Substantial Completion applies to:

☒ All Work ☐ The following specified portions of the Work:

The Work to which this Certificate applies has been reviewed by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion.

The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

Jones & Carter, Inc. provided periodic field project representation and our Certification is based on approved submittals, provided inspection reports and work that was visible at the time of the inspection.

A completed punch list is attached to this Certificate. This list may not be all-inclusive, and in accordance with the Contract, failure to include any items on such list does not alter the responsibility of the Contractor for all Work completed.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows:

Amendments to Owner's responsibilities:
☒ None ☐ As follows

Amendments to Contractor's responsibilities:
☒ None ☐ As follows

The following documents are attached to and made a part of this Certificate: Final Inspection Punch List

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, is not a release of the Contractor's obligation to complete the Work in accordance with the Contract and does not warrant or imply a warranty of the Contractor's materials or workmanship.

EXECUTED BY ENGINEER:

Jeff Bishop

(Authorized Signature & Seal)

STATE OF TEXAS
JEFFREY M. BISHOP
126363
LICENSED PROFESSIONAL ENGINEER

10/08/2020

ACKNOWLEDGED BY:

Owner (Authorized Signature)

Title:

Date:

ACKNOWLEDGED BY:

Contractor (Authorized Signature)

Title: VP

Date: 10/8/2020

K:\W5841\W5841-0034-00 18 Inch Gravity Sanitary Sewer Line Ext\3 Construction Phase\Phase II\5. Pay Estimate and Change Orders\COSC.docx

PUNCH LIST

Project: Construction of 18-inch Gravity Sewer Line Extension (Phase II)

Contractor: DL Glover, Inc.	Construction Manager: Michael D. Carpenter
Job No.: W5841-0034-01	Field Project Representative: Jim Gregg
Owner: City of Montgomery	Design Engineer: Jones|Carter

Final Inspection: Date: 10/15/2019 Time: 11:00 AM

One-Year Warranty: Date: 10/2/2020 Time: 8:30 AM

The following items are to be corrected or completed to comply with the Contract Documents:

Item No.	Description	Date Comp.	FPR Sign Off
1	Grout interior manhole A1 at seams as shown onsite	10/25/2019	MDC
2	Remove grout spoils from ground on Northwest side of job	10/25/2019	MDC
3	Provide Affidavits of Bills Paid	10/2/2020	MDC
4	Provide As Built Drawings	10/2/2020	MDC
5	Provide testing on sanitary line and manhole per the specs (to be completed)	10/2/2020	MDC

This list does not relieve the Contractor from Contractual Obligations to perform work in accordance with Contract Documents.

Final Inspection Attendees:

Mr. Michael Carpenter - Jones|Carter
Mr. Jim Gregg - Jones|Carter
Mr. Jeffrey M. Bishop, PE - Jones|Carter
Mr. Eric Standifer - City of Montgomery
Mr. Chris Scott Ford - DL Glover, Inc.

One-Year Warranty Attendees:

Mr. Michael Carpenter - Jones|Carter
Mr. Jim Gregg - Jones|Carter
Mr. Chris Scott Ford - DL Glover, Inc.

JONES | CARTER

1575 Sawdust Road, Suite 400
The Woodlands, Texas 77380
Tel: 281.363.4039
Fax: 281.363.3459
www.jonescarter.com

October 8, 2020

The Honorable Mayor and City Council
City of Montgomery
101 Old Plantersville Road
Montgomery, TX 77316

Re: Construction of 18 Inch Gravity Sanitary Sewer Line Extension Phase II
City of Montgomery
TIN No. 74-2063592

Dear Mayor and Council:

Enclosed is Progress Payment Request No. 2 & Final from DL Glover, Inc. for the referenced project. The estimate is in order and we recommend payment in the amount of $14,210.21 to DL Glover, Inc.

Also enclosed is Construction Progress Report No. 2 & Final, which is submitted in accordance with Texas Commission on Environmental Quality Rule No. 293.62. This report covers construction activities for the referenced project during the period 10/16/2019 to 10/1/2020.

You will also find your copies of the Contractor's Affidavits of Bills Paid and Affidavit of Guarantee, and our Certificate of Substantial Completion. Copies of the Certificate of Acceptance will be forwarded to you under separate cover, and we will distribute copies for your records after approval and execution.

Sincerely,

Jeffrey M. Bishop, PE

JB2:ab/jmr
K:\W5841\W5841-0034-00 18 Inch Gravity Sanitary Sewer Line Ext\3 Construction Phase\Phase II\5. Pay Estimate and Change Orders\W5841-0034-00 EST LETTER.docx
Enclosure
cc: DL Glover, Inc.
Mr. Richard Tramm – City of Montgomery, City Administrator
Ms. Susan Hensley – City of Montgomery, City Secretary
Mr. Alan Petrov – Johnson Petrov, LLP, City Attorney
Mr. Chris Roznovsky, PE – Jones|Carter, City Engineer

October 8, 2020

Construction Progress Report No. 2 & Final
Period 10/16/2019 to 10/1/2020

Construction of 18 Inch Gravity Sanitary Sewer Line Extension Phase II
City of Montgomery
TIN No. 74-2063592

Contract:

A. Contractor: DL Glover, Inc.
B. Contract Date: July 11, 2019
C. Authorization to Proceed: 7/26/2019 (90 Calendar Days)
D. Completion Date: 10/24/2019
E. Contract Time Used: 433 Calendar Days (481%)

I. General
The project is complete.

II. Change Orders
None Issued this Report.

III. Completion Report

A. Estimated Cost as of this Report Period

1.	Contract Bid Price	$	135,984.00
2.	Change Orders	$	7,672.05
3.	Final Adjustment to Quantities	$	(1,554.00)
4.	Total Estimated Contract Price	$	142,102.05

B.	Actual cost as of this Report	$	142,102.05
C.	Amount Retained (0% of B)	$	0.00
D.	Total Paid Contractor	$	142,102.05
E.	Estimated Cost Remaining (A.4 - B)	$	0.00
F.	Construction Complete (B/A.4)		100%

III. Frequency of Observation – Periodically

IV. Problems
No Problems This Report.

OWNER: The City of Montgomery

PROGRESS PAYMENT # 2 & FINAL

PROJECT: Construction of 18 Inch Gravity Sanitary Sewer Line Extension Phase II

JOB NO. : W5841-0034-01

CONTRACTOR: DL Glover, Inc.

CONTRACT DATES	FROM	TO
ORIGINAL	7/26/2019	10/24/2019
REVISED	7/26/2019	10/24/2019
THIS EST.	10/16/2019	10/1/2020

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	THIS ESTIMATE		PREVIOUS ESTIMATE		TOTAL TO DATE		REMARKS
					QUANTITY	AMOUNT	QUANTITY	AMOUNT	QUANTITY	AMOUNT	
1	Move-in and start-up, including performance and payment bonds for 100 percent (100%) of the contract amount.	L.S.	1.0	$17,000.00	0.0%	$0.00	100.0%	$17,000.00	100.0%	$17,000.00	100.0%
2	15-inch sanitary sewer pipe, (SDR-35 PVC) by open cut construction all depths, (including air testing, mandrel testing, bedding and backfill, and final adjustment), complete in place.	L.F.	222.0	$185.00	0.0	$0.00	222.0	$41,070.00	222.0	$41,070.00	100.0%
3	18-inch sanitary sewer pipe, (SDR-35 PVC) by open cut construction all depths, (including air testing, mandrel testing, bedding and backfill, and final adjustment), complete in place.	L.F.	18.0	$600.00	0.0	$0.00	18.0	$10,800.00	18.0	$10,800.00	100.0%
4	Abandon existing 12-inch sanitary sewer line in place by filling with cementitious grout.	L.F.	336.0	$21.00	0.0	$0.00	336.0	$7,056.00	336.0	$7,056.00	100.0%
5	Sanitary sewer manhole, standard depth, complete in place.	EA.	1.0	$4,137.00	0.0	$0.00	1.0	$4,137.00	1.0	$4,137.00	100.0%
6	Extra depth sanitary sewer manhole, greater than 6-foot depth, complete in place.	V.F.	5.0	$430.00	0.0	$0.00	5.0	$2,150.00	5.0	$2,150.00	100.0%
7	Abandon existing extra depth sanitary sewer manhole.	EA.	3.0	$2,527.00	0.0	$0.00	4.0	$10,108.00	4.0	$10,108.00	133.3%
8	Final vertical adjustment of sanitary sewer manholes, complete in place, as directed by Engineer.	EA.	1.0	$1,350.00	0.0	$0.00	1.0	$1,350.00	1.0	$1,350.00	100.0%
9	Provide sanitary sewer by-pass pumping from manhole "B-5" & "B-6", including labor, materials, inspection, temporary plugs, and equipment necessary to prevent sanitary sewer over flows and back-ups, for duration necessary to complete construction, complete in place. Final bypass pumping plan must be approved by the engineer.	L.S.	1.0	$20,000.00	0%	$0.00	100%	$20,000.00	100%	$20,000.00	100.0%

OWNER: The City of Montgomery

PROGRESS PAYMENT # 2 & FINAL

PROJECT: Construction of 18 Inch Gravity Sanitary Sewer Line Extension Phase II

JOB NO. : W5841-0034-01

CONTRACTOR: DL Glover, Inc.

	CONTRACT DATES FROM	TO
ORIGINAL	7/26/2019	10/24/2019
REVISED	7/26/2019	10/24/2019
THIS EST.	10/16/2019	10/1/2020

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	THIS ESTIMATE		PREVIOUS ESTIMATE		TOTAL TO DATE		REMARKS
					QUANTITY	AMOUNT	QUANTITY	AMOUNT	QUANTITY	AMOUNT	
10	Trench safety system for all pipe sizes, all depths.	L.F.	240.0	$21.00	0.0	$0.00	240.0	$5,040.00	240.0	$5,040.00	100.0%
11	Placement of reinforced filter fabric barrier as per Pollution Prevention Site Plan (including installation, maintenance, and removal after construction).	L.S.	1.0	$2,047.00	0%	$0.00	100%	$2,047.00	100%	$2,047.00	100.0%
12	Site restoration including hydro-mulch seeding of easements, as necessary. Contractor to ensure growth of vegetation by whatever means necessary, including re-seeding, over-seeding or watering at no separate pay.	L.S.	1.0	$2,047.00	0%	$0.00	0%	$0.00	0%	$0.00	0.0%
13	Well point system, complete in place and operated per specifications, as directed by Engineer.	L.F.	222.0	$20.00	0.0	$0.00	222.0	$4,440.00	222.0	$4,440.00	100.0%
14	Additional cost above minimum bid for Well Point system, complete in place and operated per sepceifcations, as directed by Engineer.	L.F.	222.0	$6.00	0.0	$0.00	222.0	$1,332.00	222.0	$1,332.00	100.0%
15	Traffic control plan, as directed by the Engineer.	L.S.	1.0	$5,050.00	0%	$0.00	100%	$5,050.00	100%	$5,050.00	100.0%
16	Additional cost for wet sand construction, complete in place, as directed by Engineer.	L.F.	222.0	$15.00	0.0	$0.00	0.0	$0.00	0.0	$0.00	0.0%
17	Additional cost above minimum bid for wet sand construction, complete in place, as directed by Engineer.	L.F.	222.0	$7.00	0.0	$0.00	0.0	$0.00	0.0	$0.00	0.0%

OWNER: The City of Montgomery

PROGRESS PAYMENT # 2 & FINAL

PROJECT: Construction of 18 Inch Gravity Sanitary Sewer Line Extension Phase II

JOB NO. : W5841-0034-01

CONTRACTOR: DL Glover, Inc.

CONTRACT DATES	FROM	TO
ORIGINAL	7/26/2019	10/24/2019
REVISED	7/26/2019	10/24/2019
THIS EST.	10/16/2019	10/1/2020

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	THIS ESTIMATE		PREVIOUS ESTIMATE		TOTAL TO DATE		REMARKS
					QUANTITY	AMOUNT	QUANTITY	AMOUNT	QUANTITY	AMOUNT	
18	Relocation and setup of the bypass pump system south of SH-105 to capture all COM flows to the lift station, including vactor truck pumping of downstream manhole on the WWTP Site, as necessary, and installation and removal of an 18" plug, complete in place. ***** CHANGE ORDER NO. 1 *****	L.S.	1.0	$3,100.00	0%	$0.00	100%	$3,100.00	100%	$3,100.00	100.0%
19	Rental cost per week for the additional bypass pumping. ***** CHANGE ORDER NO. 1 *****	EA.	1.0	$2,850.00	0.0	$0.00	2.0	$5,700.00	2.0	$5,700.00	200.0%
20	Removal and replacement of existing concrete pavement of the private driveway for abandonment of an additional manhole, complete in place. ***** CHANGE ORDER NO. 1 *****	L.S.	1.0	$1,722.05	0%	$0.00	100%	$1,722.05	100%	$1,722.05	100.0%

JONES|CARTER

OWNER: The City of Montgomery

PROGRESS PAYMENT # 2 & FINAL

PROJECT: Construction of 18 Inch Gravity Sanitary Sewer Line Extension Phase II

JOB NO. : W5841-0034-01

CONTRACTOR: DL Glover, Inc.

CONTRACT DATES	FROM	TO
ORIGINAL	7/26/2019	10/24/2019
REVISED	7/26/2019	10/24/2019
THIS EST.	10/16/2019	10/1/2020

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	THIS ESTIMATE QUANTITY	THIS ESTIMATE AMOUNT	PREVIOUS ESTIMATE QUANTITY	PREVIOUS ESTIMATE AMOUNT	TOTAL TO DATE QUANTITY	TOTAL TO DATE AMOUNT	REMARKS
	MATERIALS ON HAND									$0.00	
						$0.00		$0.00		$0.00	
	TOTAL MATERIALS ON HAND										

CHANGE ORDER PLUS/MINUS	VALUE	DAYS
Change Order No. 001	$7,672.05	0
Change Order No. 002	$0.00	
Change Order No. 003	$0.00	
Final Adjustment to Quantities	($1,554.00)	0

TOTAL CONTRACT MODIFICATIONS				$6,118.05
Subtotal (Line Items)		$0.00	$142,102.05	$142,102.05
Materials on Hand		$0.00	$0.00	$0.00
Subtotal (Materials on Hand/Line Items)		$0.00	$142,102.05	$142,102.05
Less Retainage (0%)		($14,210.21)	$14,210.21	$0.00
Total		$14,210.21	$127,891.84	$142,102.05
Less Previous Estimates				$127,891.84
Due this Estimate				$14,210.21

0 Impact Days Requested this Pay Period

0 Impact Days Approved this Pay Period

0 Impact Days Approved to Date

0 Change Order Days

481% Complete by Time

100% Complete by Value

Orig. Contract Amount	$135,984.00
Contract Modifications	$6,118.05
Total Contract Amount	$142,102.05
Construction Remaining	$0.00
Amount Approved	$14,210.21

APPROVED BY JONES|CARTER

BY: Jeffrey M. Bishop, PE

AFFIDAVIT

OF

GUARANTEE

STATE OF TEXAS §

COUNTY OF MONTGOMERY §

Before me, a Notary Public in and for the State of Texas, on this day personally appeared _____ of **DL GLOVER, INC.** well known to me to be the person making this affidavit, who, being by me first duly sworn and deposed did say:

I am _____ of **DL GLOVER, INC.** and have personal knowledge of the matter stated in this affidavit. **DL GLOVER, INC.** does hereby give notice to the Owner, **CITY OF MONTGOMERY** that work for the Owner, known as JC Job No. W5841-0034-01 Construction of 18 Inch Gravity Sanitary Sewer Line Extension (Phase II), has been substantially completed. In accordance with the provisions of paragraph 5.07 Guarantee, of the General Conditions of Agreements, **DL GLOVER, INC.** does hereby guarantee all of the work under the contract to be free from faulty materials and improper workmanship in every particular, and against injury from proper and usual wear; and agrees to replace or re-execute without cost to the Owner such work as may be found to be improper or imperfect, and to make good all damage caused to other work or materials due to such required replacement or recompletion of all work under this contract, as evidenced by the Engineer's Certificate of Substantial Completion.

This affidavit is made in connection with the final payment under the contract between **CITY OF MONTGOMERY** and **DL GLOVER, INC.** and with the knowledge that it will be relied upon in making such payment and that such payment would not be made except upon the truth of the matter contained in this affidavit.

DATE: 10/8/2020 SIGNATURE: _____

STATE OF TEXAS §

COUNTY OF Montgomery §

BEFORE ME, the undersigned, a Notary Public, in and for the State of Texas, on this day personally appeared, Christopher Ford known to me to be the person whose name subscribed to the foregoing instrument, and acknowledge to me that he executed the same for the purposes and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this 8th day of October, 2020.

JESSICA BAEZ GARCIA
Notary Public, State of Texas
Comm. Expires 06-03-2023
Notary ID 128142767

_____
Notary Public Signature

(Notary Seal)

K:\W5841\W5841-0034-00 18 Inch Gravity Sanitary Sewer Line Ext\3 Construction Phase\Phase II\5. Pay Estimate and Change Orders\FINAL LETTER.doc

AFFIDAVIT

OF

BILLS PAID

STATE OF TEXAS §

COUNTY OF MONTGOMERY §

Before me, a Notary Public in and for the State of Texas, on this day personally appeared Christopher Ford of **DL GLOVER, INC.** well known to me to be the person making this affidavit, who, being by me first duly sworn and deposed did say:

I am Vice President of **DL GLOVER, INC.** and have personal knowledge of the matter stated in this affidavit. **DL GLOVER, INC.** has paid all of the labor and material costs in connection with construction for **CITY OF MONTGOMERY** known as JC Job No. W5841-0034-01 Construction of 18 Inch Gravity Sanitary Sewer Line Extension (Phase II), and as of this date, there are no unpaid bills for labor performed upon, or materials or supplies delivered to or used in connection with such job.

This affidavit is made in connection with the final payment under the contract between **CITY OF MONTGOMERY** and **DL GLOVER, INC.** and with the knowledge that it will be relied upon in making such payment and that such payment would not be made except upon the truth of the matter contained in this affidavit.

DATE: 10/8/2020 SIGNATURE: _____

STATE OF TEXAS §

COUNTY OF Montgomery §

BEFORE ME, the undersigned, a Notary Public, in and for the State of Texas, on this day personally appeared, Christopher Ford known to me to be the person whose name subscribed to the foregoing instrument, and acknowledge to me that he executed the same for the purposes and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this 8th day of October, 2020.

JESSICA BAEZ GARCIA
Notary Public, State of Texas
Comm. Expires 06-03-2023
Notary ID 128142767

_____
Notary Public Signature

(Notary Seal)

Montgomery City Council
AGENDA REPORT

Meeting Date: October 13, 2020	**Budgeted Amount: N/A**
Prepared By: Dave McCorquodale	**Exhibits: Engineer's memo & Certificate of Substantial Completion with punch list**

Subject

Consideration and possible action regarding approval of Certificate of Substantial Completion for the Stewart Creek Wastewater Treatment Plant Lift Station Relocation project.

Description

Start up for the facility was held on September 3, 2020 and Jones & Carter deemed facility fully operational on September 17, 2020.

Approving the Certificate of Substantial Completion will give an official end date for the construction work, which is needed to make a final determination on liquidated damages and also provides the starting date of the contractor's warranty period.

Recommendation

Review the attached documents and act as you see fit. City staff has no objections to the engineer's recommendation of approval.

Approved By

Asst. City Administrator	Dave McCorquodale	Date: 10/08/2020
City Administrator	Richard Tramm	Date: 10/08/2020

JONES | CARTER

1575 Sawdust Road, Suite 400
The Woodlands, Texas 77380-3795
Tel: 281.363.4039
Fax: 281.363.3459
www.jonescarter.com

October 7, 2020

The Honorable Mayor and City Council
City of Montgomery
101 Old Plantersville Road
Montgomery, Texas 77316

Re: Construction of Stewart Creek Wastewater Treatment Plant Lift Station Relocation
City of Montgomery

Dear Mayor and Council:

Jones|Carter held a facility start-up and final inspection for the referenced project on September 3, 2020. Attendees of the start-up and final inspection included representatives from the City, Gulf Utility Service, Texas Water Development Board, contractor, and Jones|Carter. A punch list of items to be addressed by the contractor prior to the City's acceptance of the project was generated at that time. On September 17, 2020, we deemed the project to be substantially complete as the contractor had provided the required operations manuals and proven the facility was fully operational to serve its intended function. Enclosed is a Certificate of Substantial Completion for the City's approval and execution which concurs with the substantial completion date and therefore sets the beginning of the one year warranty period.

The contractor is currently addressing all remaining punchlist items. Upon the completion of all punch list items and a final determination regarding settlement for liquidated damages, we will present a Certificate of Acceptance and final pay estimate for the City's approval.

Should you have any questions or need any additional information, please do not hesitate to contact me.

Sincerely,

Chris Roznovsky

Chris Roznovsky, PE
Engineer for the City

K:\W5841\W5841-0900-00 General Consultation\Correspondence\Letters\2020\Memo to Council LS No. 1 COSC 10072020.docx

Enclosures: Certificate of Substantial Completion
Punchlist

Cc (via email): Mr. Richard Tramm – City of Montgomery, City Administrator
Ms. Susan Hensley – City of Montgomery, City Secretary
Mr. Dave McCorquodale – City of Montgomery, Assistant City Administrator
Mr. Mike Muckleroy – City of Montgomery, Director of Public Works
Mr. Alan Petrov - Johnson Petrov, LLP, City Attorney

JONES | CARTER

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: City of Montgomery
Contractor: Veritas Management Company LLC
DBA Black Castle General Contractor
Engineer: Rebecca L. Watkins, P.E.
Project: Construction of the Stewart Creek
Wastewater Treatment Plant Lift Station Relocation

Owner's Contract No.: N/A
Contractor's Project No.: N/A
Engineer's Project No.: W5841-0036-00
Date: September 17, 2020

This final Certificate of Substantial Completion applies to:

☒All Work ☐ The following specified portions of the Work:

The Work to which this Certificate applies has been reviewed by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion.

The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, maintenance, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows:

Amendments to Owner's responsibilities: ☒ None
☐ As follows

Amendments to Contractor's responsibilities: ☒ None
☐ As follows:

The following documents are attached to and made a part of this Certificate: *Punch List*

JONES | CARTER

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, is not a release of the Contractor's obligation to complete the Work in accordance with the Contract and does not warrant or imply a warranty of the Contractor's materials or workmanship.

EXECUTED BY ENGINEER:	ACKNOWLEDGED:	ACKNOWLEDGED:
By: Rebecca L. Watkins	By:	By:
(Authorized signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: Project Manager	Title:	Title: Division Manager
Date: 10-7-2020	Date:	Date 10/07/2020

10-7-2020

Rebecca L. Watkins

Job #: W5841-0036-00 Stewart Creek Wastewater Treatment Plant Lift Station Relocation
265 Buffalo Springs Drive
Montgomery Texas. 77356

Jones & Carter, Inc.
6330 West Loop S #150
Bellaire, Texas 77401
United States
(713) 777-5337

Punch Items for W5841-0036-00 - Stewart Creek Wastewater Treatment Plant Lift Station Relocation

12 Items

#1: Install Confined Space Markings on the Lift Station Hatches

Type:

Location:

Date Created:
09/18/2020

Due Date:
10/18/2020

Priority:

Status:
Work Required

Creator:
Tyralyn Spriggins

Reference:

Punch Item Manager:
Tyralyn Spriggins

Final Approver:
Tyralyn Spriggins

Ball in Court:
Mitchell Whitney (Jones|Carter)

Assignee Name:
Whitney, Mitchell (Jones|Carter)
Work Required
Eddy, Clinton P. (Veritas Management Company LLC)
Ready for Review

Description:
Please install signage per the notes on page G2 of the conformed documents.

#2: Install Transducer Bolts

Type:

Location:

Date Created:
09/18/2020

Due Date:
10/18/2020

Priority:

Status:
Closed by Tyralyn Spriggins on 10/07/2020

Creator:
Tyralyn Spriggins

Reference:

Punch Item Manager:
Tyralyn Spriggins

Final Approver:
Tyralyn Spriggins

Ball in Court:

Assignee Name:
Whitney, Mitchell (Jones|Carter)
Ready for Review
Eddy, Clinton P. (Veritas

Management Company LLC)
Ready for Review

Description:

#3: Remove spray foam and fill MCC control building wall penetration with grout

Type:

Location:

Date Created:
09/18/2020

Due Date:
10/18/2020

Priority:

Status:
Ready for Review

Creator:
Tyralyn Spriggins

Reference:

Punch Item Manager:
Tyralyn Spriggins

Final Approver:
Tyralyn Spriggins

Ball in Court:
Tyralyn Spriggins (Jones|Carter)

Assignee Name:
Whitney, Mitchell (Jones|Carter)
Ready for Review
Eddy, Clinton P. (Veritas Management Company LLC)
Ready for Review

Description:

#6: Install label on mcc for Lift Station in control bldg.

Type:

Location:

Date Created:
09/19/2020

Due Date:
10/19/2020

Priority:

Status:
Ready for Review

Creator:
Tyralyn Spriggins

Reference:

Punch Item Manager:
Tyralyn Spriggins

Final Approver:
Tyralyn Spriggins

Ball in Court:
Tyralyn Spriggins (Jones|Carter)

Assignee Name:
Eddy, Clinton P. (Veritas Management Company LLC)
Ready for Review
Whitney, Mitchell (Jones|Carter)
Ready for Review

Description:

#7: Establish grass as required on site

Type:

Location:

Date Created:
09/19/2020

Due Date:
10/19/2020

Priority:

Status:
Work Required

Creator:
Tyralyn Spriggins

Reference:

Punch Item Manager:
Tyralyn Spriggins

Final Approver:
Tyralyn Spriggins

Ball in Court:

Mitchell Whitney (Jones|Carter)
Clinton P. Eddy (Veritas Management Company LLC)

Assignee Name:
Whitney, Mitchell (Jones|Carter)
Work Required
Eddy, Clinton P. (Veritas Management Company LLC)
Work Required

Description:

#8: Remove dirt and leave driveway in the same condition as when the project began

Type:

Location:

Date Created:
09/19/2020

Due Date:
10/19/2020

Priority:

Status:
Work Required

Creator:
Tyralyn Spriggins

Reference:

Punch Item Manager:
Tyralyn Spriggins

Final Approver:
Tyralyn Spriggins

Ball in Court:

Mitchell Whitney (Jones|Carter)
Clinton P. Eddy (Veritas Management Company LLC)

Assignee Name:
Whitney, Mitchell (Jones|Carter)
Work Required
Eddy, Clinton P. (Veritas Management Company LLC)
Work Required

Description:

#9: Install laminate panel label on main

Type:

Location:

Date Created:
09/19/2020

Due Date:
10/19/2020

Priority:

Status:
Work Required

Creator:
Tyralyn Spriggins

Reference:

Punch Item Manager:
Tyralyn Spriggins

Final Approver:
Tyralyn Spriggins

Ball in Court:
Mitchell Whitney (Jones|Carter)

Assignee Name:
Whitney, Mitchell (Jones|Carter)
Work Required
Eddy, Clinton P. (Veritas Management Company LLC)
Ready for Review

Description:

#10: Overload push button for pump 2 is missing on Lift Station Control Panel

Type:

Location:

Date Created:
09/19/2020

Due Date:
10/19/2020

Priority:

Status:
Closed by Tyralyn Spriggins on 10/07/2020

Creator:
Tyralyn Spriggins

Reference:

Punch Item Manager:
Tyralyn Spriggins

Final Approver:
Tyralyn Spriggins

Ball in Court:

Assignee Name:
Whitney, Mitchell (Jones|Carter)
Ready for Review
Eddy, Clinton P. (Veritas Management Company LLC)
Ready for Review

Description:

#11: Grout in the main panel legs at Pump Control Panel

Type:

Location:

Date Created:
09/19/2020

Due Date:
10/19/2020

Priority:

Status:
Ready for Review

Creator:
Tyralyn Spriggins

Reference:

Punch Item Manager:
Tyralyn Spriggins

Final Approver:
Tyralyn Spriggins

Ball in Court:
Tyralyn Spriggins (Jones|Carter)

Assignee Name:
Whitney, Mitchell (Jones|Carter)
Ready for Review
Eddy, Clinton P. (Veritas Management Company LLC)
Ready for Review

Description:
Please provide a cut about 1"-1.5" wide, with a slope to the edge of the concrete pad so that it will drain.

#12: Repair Flood Light

Type:

Location:

Date Created:
09/19/2020

Due Date:
10/19/2020

Priority:

Status:
Work Required

Creator:
Tyralyn Spriggins

Reference:

Punch Item Manager:
Tyralyn Spriggins

Final Approver:
Tyralyn Spriggins

Ball in Court:
Mitchell Whitney (Jones|Carter)

Assignee Name:
Eddy, Clinton P. (Veritas Management Company LLC)
Ready for Review
Whitney, Mitchell (Jones|Carter)
Work Required

Description:
The light near the lift station was flickering overnight. The light stays on for 5 seconds, turn off for 1 second and then back on for 5 seconds.

#13: Height of Sun Shield at LS Control Panel

Type:

Location:

Date Created:
10/01/2020

Due Date:
10/31/2020

Priority:

Status:
Work Required

Creator:
Tyralyn Spriggins

Reference:

Punch Item Manager:
Tyralyn Spriggins

Final Approver:
Tyralyn Spriggins

Ball in Court:
Mitchell Whitney (Jones|Carter)
Clinton P. Eddy (Veritas Management Company LLC)

Assignee Name:
Whitney, Mitchell (Jones|Carter)
Work Required
Eddy, Clinton P. (Veritas Management Company LLC)
Work Required

Description:
Per drawing E9, provide 6" clearance from top of panel to bottom of edge of sun shield.

#14: Generator Nuisance Alarms

Type:

Location:

Date Created:
10/07/2020

Due Date:
11/06/2020

Priority:

Status:
Work Required

Creator:
Tyralyn Spriggins

Reference:

Punch Item Manager:
Tyralyn Spriggins

Final Approver:
Tyralyn Spriggins

Ball in Court:
Clinton P. Eddy (Veritas Management Company LLC)
Jennifer Catalan (Black Castle General Contractor)

Assignee Name:
Eddy, Clinton P. (Veritas Management Company LLC)
Work Required
Catalan, Jennifer (Black Castle General Contractor)
Work Required

Description:
The operator has been receiving a number of call outs from the WWTP onsite generator. The call outs are mainly running alarms but when they arrive on site there is no sign that the generator was running.

Montgomery City Council
AGENDA REPORT

Meeting Date: October 13, 2020	**Budgeted Amount: N/A**
Prepared By: Dave McCorquodale	**Exhibits: Proposed ordinance**

Subject

Consideration and possible action regarding amending Section 98-50 of the Zoning Ordinance pertaining to membership and appointment to the Planning & Zoning Commission.

Description

City Council dissolved the Zoning Board of Adjustment in 2019, which means City Council serves as the ZBA. In reviewing the upcoming Planning & Zoning Commission appointment process, the City Secretary found the Zoning Code currently requires the P&Z Commission to contain at least one member of the Zoning Board of Adjustment. Since City Council members cannot serve concurrently on P&Z, staff recommends removing the requirement:

"Sec. 98-50. - Membership and appointment.

The planning and zoning commission shall be composed of five qualified individuals. These individuals shall be residents of the city, and be registered to vote in city elections. The city council will consider for appointment to the commission only those persons who have demonstrated their civic interest, general knowledge of the community, independent judgment, interest in planning and zoning, and availability to prepare for and attend meetings. It is the intent of the city council that members shall, by reason of their diversity, constitute a commission, which is broadly representative of the community. For purposes of planning, the membership is encouraged to regularly include non-voting individuals, as may be appropriate, at their meetings to provide specific areas of expertise. Any member of the commission who has two consecutive absences without justification may be removed from the commission by the city council and the vacancy treated as an unexpired term. Any member of the commission may be removed for just cause upon recommendation from the chairperson of the commission and approval of the city council and the vacancy treated as an unexpired term. ~~*At least one member of the commission shall be a member of the board of adjustment.*~~ "

Recommendation

Approve the ordinance as presented.

Approved By

Asst. City Administrator	Dave McCorquodale DM	Date: 10/09/2020
City Administrator	Richard Tramm RT	Date: 10/09/2020

ORDINANCE NO. _____

AN ORDINANCE BY THE CITY COUNCIL OF THE CITY OF MONTGOMERY, TEXAS, AMENDING CHAPTER 98, "ZONING," ARTICLE II, "ADMINISTRATION AND ENFORCEMENT," DIVISION 2, "PLANNING AND ZONING COMMISSION," SECTION 98-50, "MEMBERSHIP AND APPOINTMENT," OF THE CODE OF ORDINANCES OF THE CITY OF MONTGOMERY, TEXAS TO CONFORM TO THE ADMINISTRATION OF THE BOARD OF ADJUSTMENT; REPEALING ALL OTHER CONFLICTING ORDINANCE PROVISIONS; PROVIDING A SEVERABILITY CLAUSE; PROVIDING FOR A TEXAS OPEN MEETINGS ACT CLAUSE; AND PROVIDING AN EFFECTIVE DATE

WHEREAS, by Ordinance 2019-19, the City Council of the City of Montgomery, Texas (the "City Council") amended Section 98-29 of the Code of Ordinance to establish that the City Council serve as the Board of Adjustment for the City of Montgomery, Texas; and

WHEREAS, City Council has determined that it is necessary to amend Section 98-50 of the Code of Ordinance in order to conform to the administration of the Board of Adjustment;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MONTGOMERY, TEXAS THAT:

Section 1. Amendment to the Code of Ordinances.

Chapter 98, "ZONING," Article II, "ADMINISTRATION AND ENFORCEMENT," Division 2, "PLANNING AND ZONING COMMISSION," Section 98-50, "Membership and appointment," of the Code of Ordinances of the City of Montgomery, Texas, is hereby amended to read as follows:

Sec. 98-50. – Membership and appointment.

The planning and zoning commission shall be composed of five qualified individuals. These individuals shall be residents of the city, and be registered to vote in city elections. The city council will consider for appointment to the commission only those persons who have demonstrated their civic interest, general knowledge of the community, independent judgment, interest in planning and zoning, and availability to prepare for and attend meetings. It is the intent of the city council that members shall, by reason of their diversity, constitute a commission, which is broadly representative of the community. For purposes of planning, the membership is encouraged to regularly include non-voting individuals, as may be appropriate, at their meetings to provide specific areas of expertise. Any member of the commission who has two consecutive absences without justification may be removed from the commission by the city council and the vacancy treated as an unexpired term. Any member of the commission may be removed for just cause upon recommendation from the chairperson of the commission and approval of the city council and the vacancy treated as an unexpired term.

Section 2. Repealing All Other Conflicting Ordinance Provisions.

All ordinances or parts of ordinances in conflict with this Ordinance are hereby repealed to the extent of conflict only.

Section 3. Severability Clause.

Should any section, subsection, sentence, clause, or phrase of this Ordinance be declared unconstitutional or invalid by a court or competent jurisdiction, it is expressly provided that any and all remaining portions of this Ordinance shall remain in full force and effect. The City Council hereby declares that it would have passed this Ordinance, and each section, subsection, sentence, clause, or phrase thereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, and phrases be declared unconstitutional or invalid.

Section 4. Texas Open Meetings Act.

It is hereby officially found and determined that the meeting at which this Ordinance was considered was open to the public as required and that the public notice of the time, place, and purpose of said meeting was given as required by the Texas Open Meetings Act, Chapter 551 of the Texas Government Code.

Section 5. Effective Date.

The provisions of this Ordinance shall become effective immediately upon adoption by the City Council of the City of Montgomery, Texas, and publication if required by law.

PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF MONTGOMERY, TEXAS ON THIS THE _____ DAY OF _____, 2020.

CITY OF MONTGOMERY, TEXAS

_____
Sara Countryman, Mayor

ATTEST:

_____
Susan Hensley, City Secretary

APPROVED AS TO FORM:

_____
Alan P. Petrov, City Attorney

Montgomery City Council
AGENDA REPORT

Meeting Date: October 13, 2020	**Budgeted Amount: N/A**
Prepared By: Dave McCorquodale	**Exhibits: Reference materials**

Subject

Consideration and possible action regarding establishing minimum standards for creation of Special Purpose Districts.

Description

Since allowing the creation of two in-city MUD's in recent years, City Council should consider establishing minimum standards for creation of Special Purpose Districts within the city's jurisdiction.

These districts vary significantly in their purposes and compositions, and keeping these standards broad in nature is essential to allow for maximum flexibility in negotiations with developers. These standards should be thought of as goals, guiding principles, and a comprehensive checklist to aid City Council in considering future districts and should allow for some flexibility in negotiation with each developer.

The purpose of the attached documents is to give City Council a brief overview of the topic. Input from staff, the city engineer, and city attorney will supplement the attachments.

The goal of this discussion is for City Council to provide direction to staff on how to move forward. One option is to augment city staff with a specialized consultant to provide a workshop on types of Special Purpose Districts that are relevant to the City and how best to formulate standards for them.

Recommendation

Consider the information and discuss. Provide direction to staff as necessary.

Approved By

Asst. City Administrator	Dave McCorquodale DM	Date: 10/09/2020
City Administrator	Richard Tramm RT	Date: 10/09/2020

Texas Public Policy Foundation

Local Government

Legislator's Guide to the Issues 2017-18

Special Purpose Districts

The Issue

Special purpose districts (SPDs) are the most numerous units of government in Texas, yet many people know relatively little about their function, structure, or governance, earning them the nickname: Invisible Governments.

SPDs are independent governmental entities that exist locally and provide infrastructure and deliver specific services, like firefighting, road construction, and water treatment. Districts can be created by local government bodies, the Texas Legislature, or the Texas Commission on Environmental Quality. Generally, SPDs are governed by the commissioners court of the county of their origin or by a board of directors.

The purpose and jurisdiction of SPDs tend to vary from district to district, but broadly speaking, they can include the power to:

- Impose a property tax;
- Impose a sales tax;
- Issue bonds and borrow money;
- Contract with other entities;
- Sue and be sued;
- Acquire, purchase, sell, or lease real or personal property; and/or
- Eminent domain.

Although SPDs have broad powers, they are not limitless. For example, district bonds must be approved by two-thirds of the voting public residing in the district, and may not exceed one-fourth of the assessed value of property in the SPD.

Today, there are approximately 3,350 special districts in Texas providing all manner of government goods and services. Of these thousands of districts, there are approximately 40 different types.

Because of the expansive nature and sheer quantity of special districts, there are common problems that have begun to arise in relation to these entities, including:

- **Layering of local governments.** Overlapping layers of governments servicing the same jurisdictional boundaries create the conditions necessary for inefficiency, redundancy, and waste.
- **Contribution to soaring property taxes.** A majority of special districts levy property taxes, which are fast outgrowing people's ability to pay. Consider that from 2000 to 2013 local property tax levies increased by 101.1%, well above population and inflation, which increased only a combined 70.3%.

Types of Special Districts in Texas

Groundwater Management Area (GMA)	County Development District (CDD)
Sports and Community Venue District (SCVD)	Library District (LD)
Noxious Weed Control District (NWCD)	Levee Improvement District (LID)
Groundwater Conservation District (GCD)	County Assistance District (CAD)
Multijurisdictional Library District (MJLD)	Independent School District (ISD)
Road District (RdD)	Irrigation District (ID)
Water Control and Improvement District (WCID)	Hospital District (HD)
Public Improvement District (PID)	Regional District (RD)
Road Utility District (RUD)	Health Services District (HSD)
Fresh Water Supply District (FWSD)	Navigation District (ND)
Homestead Preservation District &	Mosquito Control District (MCD)
Reinvestment Zone (HPD)	Self-Liquidating Navigation District (SLND)
Wind Erosion District (WED)	Emergency Services District (ESD)
Municipal Utility District (MUD)	Special Utility District (SUD)
Municipal Management District (MMD)	Jail District (JD)
Arts and Entertainment District (A&E)	Stormwater Control District (SCD)
Water Improvement District (WID)	Crime Control and Prevention District (CCPD)
Municipal Development District (MDD)	Municipal Management District (MMD)
Sports Facility District (SFD)	Agricultural Development District (ADD)
Drainage District (DD)	

Source: Texas Senate Research Center

continued on back

- **Questions of accountability.** There is no comprehensive review mechanism in place to determine if these entities are providing value to the community.
- **Lack of transparency.** Few, if any, financial transparency requirements exist oftentimes meaning that the public has little or no idea about how their tax dollars are being spent.

Addressing these problem areas with targeted reforms will be a critical task for lawmakers next session.

The Facts

- As of 2014, there were more than 3,350 special purpose districts, including school districts, in Texas.
- Special purpose districts are taxing entities that can have the authority to levy a property tax, a sales tax, or both.
- There is no comprehensive review process for special districts.

Recommendations

- Require special districts to adhere to basic financial transparency standards, such as the public posting of budgets, financial statements, and a check register online.
- Create a comprehensive review process for SPDs to undergo a periodic assessment of its roles and responsibilities.
- For certain districts, include a "sunset" provision that automatically expires the district unless a public vote affirms the continuance of the SPD.
- Require SPDs to hold an election to approve a tax rate that increases annual property tax revenue by more than 4% or population growth plus inflation, whichever is less.

Resources

Your Money and the Taxing Facts, Texas Comptroller of Public Accounts (Aug. 2012).

Invisible Government: Special Purpose Districts in Texas, Texas Senate Research Center (Oct. 2014).

FOR REVIEW: TAKEN FROM CITY OF AUSTIN, TX

Municipal Utility District (MUD) Basics

A Municipal Utility District (MUD) is one of several types of special districts that function as independent, limited governments. The purpose of a MUD is to provide a developer an alternate way to finance infrastructure, such as water, sewer, drainage, and road facilities. Managed by a Board elected by property owners within the MUD, a MUD may issue bonds to reimburse a developer for authorized improvements and the MUD will utilize property tax revenues ~~and user fees received from water and sewer services operated by the MUD~~ to repay the debt. As the MUD pays off its debt, more of its tax revenue can be directed to other services. Originally, MUDs were very limited in what they were allowed to finance and what services they could provide. Over time, MUDs began taking on more responsibilities and providing enhanced services for their residents such as parks and recreation, deed restriction enforcement, and solid waste service. ~~MUDs rely on the County to provide police and road maintenance services and Emergency Service Districts (ESDs) for providing fire protection. Currently within the City of Austin Planning Area there are 27 MUDs.~~

MUD Creation

A MUD can be created by either (1) adoption of a district creation bill by the Texas Legislature or (2) by the Texas Commission on Environmental Quality (TCEQ) following a petition and consent process described in the Texas Water Code. For property located in the City's jurisdiction, to be included in a MUD, City consent is required prior to creation as part of the TCEQ process. There are limitations on what the City may require as condition for consent, particularly for MUDs that do not propose to connect to the City's water or sewer systems. If the City fails or refuses to grant consent within 90 days after receipt of a petition, the state statute provides for a 120 day period for negotiation of a contract for City water and sewer service to the proposed development. If a contract for service is not executed, the applicant is authorized to initiate proceedings with TCEQ to create a MUD.

Creation of a MUD presumes a long term delay of the City annexation of new development

MUDs are typically located outside the city limits and in the Extra Territorial Jurisdiction (ETJ). Texas law requires that MUDs be annexed in their entirety. If the City annexes a MUD before its bonds are paid in full, the City must assume the balance of the MUD debt and reimburse the developer for any unbonded facilities. In past MUD annexations, a portion of this debt has been repaid by property owners who were formerly in the MUD through post annexation surcharges as provided for by state law. This is a charge on a homeowner's utility bill and is calculated based on the amount of debt that the City absorbs at the time of annexation. If full purpose annexation is deferred until the MUD bonds are paid in full, this development would be excluded from the City's tax base for that period of time, reasonably decades.

City of Austin's MUD Policy

In 2011 the City Council adopted Resolution No. 20110217-030 establishing a new policy and criteria for considering requests to create MUDs, superseding the previous 1984 MUD policy that discouraged the creation of new MUDs. The impetus for the 2011 policy shift was driven by an influx of applications to

the City requesting consent to MUD creation and a change in state laws favoring MUDs, resulting in greater authority for MUDs and increased opportunity for their creation. ~~The most significant difference between the City's 1984 and 2011 MUD policies is related to the provision of City utility service.~~ Previously, if the City could provide utility services, the Council would deny consent to the creation of a new MUD. Under current policy, the use of City utility services is a basic requirement for creation of a MUD. The 2011 policy states that the City's objective in creating a MUD should be to promote superior development. Further, the current MUD policy requires that the MUD proposal must demonstrate that the City would benefit more from creation of a MUD than from use of the standard City development process or other types of districts. The various benefits listed in the MUD policy are for the most part informed by the PUD zoning ordinance.

City Review of MUD Applications

Chapter 25-9 of the City Code establishes procedures by which the City reviews MUD applications. The City review process ensures an in-depth interdepartmental review of each application and allows for the maximum amount of public input possible. City boards and commissions that review MUD applications include the Water and Wastewater Commission, Urban Transportation Commission, Environmental Board, Parks and Recreation Board, and Planning Commission.

Types of MUD applications include:

- Petitions for consent to creation of MUDs
- The addition of land to existing MUDs
- Approval of out-of-district service
- Contract amendments, and
- Bond issuances

Ultimately, MUD applications are brought to Council for consideration and approval or denial.

FOR REVIEW : TAKEN FROM CITY OF AUSTIN, TX

RESOLUTION NO. 20110217-030

WHEREAS, a municipal utility district ("MUD") created by the TCEQ or the Legislature with the City's express consent and approval can be used to meet community needs by funding public improvements or services; and

WHEREAS, the creation of MUDs may affect the City's ability to implement the City's Comprehensive Plan; and

WHEREAS, the City can benefit if the owners of property in the MUD pay their fair share for improvements and services funded through a MUD; and

WHEREAS, a MUD that finances public infrastructure benefits developers by allowing them to reduce their debt to private lenders by using public financing to pay the cost of infrastructure for development; and

WHEREAS, those requesting creation of such a MUD should demonstrate that it confers an extraordinary benefit not only to the properties within the MUD, but also to the community in general and to the City; and

WHEREAS, in 1984 the City Council adopted Resolution No. 840202-37 setting out the City's policy with respect to petitions for the City's consent to the creation of MUDs; and

WHEREAS, this Resolution No. 20110217-030 outlines current issues for the City Council to consider in determining whether to establish a MUD and is not intended to limit the authority of the City Council to consider or approve any particular request; **NOW, THEREFORE,**

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF AUSTIN:

The City Council resolves that the following are established as its policy and criteria for considering requests to create MUDs to fund public infrastructure, municipal services, or both in association with development projects:

1. The MUD must demonstrate that the City would benefit more from creation of a MUD than from use of the standard City development process or other types of districts.

2. The City's objective in creating the MUD should be to promote superior development, with attention to the Comprehensive Plan.

3. The City's basic requirements for creation of a MUD should be that:

    - All developments supported by a MUD must comply with the City's Planned Unit Development ("PUD") Green Building Program, regardless of whether the development receives PUD zoning;

    - The development supported by the MUD provides extraordinary public benefits (such as extension or enhancement of infrastructure, affordable housing, environmental improvement, public transportation facilities, and open space);

    - It is in the City's preferred growth area (currently designated as "Desired Development Zone");

    - It is accompanied by consent and other applicable agreements;

- The development that it supports meets or exceeds the intent of the development standards of the City Code;
- It is financially self-sustaining and its ad valorem tax rate will approximate or be greater than the City's rate;
- It will use City design criteria for water, wastewater, drainage, and public safety infrastructure;
- It will be created only if the water, wastewater, and reclaimed water provider is the City.
- It will require the developer(s) to contribute a portion of infrastructure without reimbursement by the MUD or the City;
- It will not impair the City's future annexation of the MUD or adjacent property, or impose costs not mutually agreed upon; and
- It must be located entirely within the City's extraterritorial jurisdiction.

4. Whether development supported by the MUD provides sufficient public benefits should be determined by weighing the value of the benefits to the community, and to property in the MUD, against the costs to the City, including delayed annexation.

5. In considering whether a MUD provides sufficient public benefits, Council will consider benefits including but not limited to:

- Land use controls (including land plans) that otherwise would not be available in the City's ETJ;
- Amenities that would not typically accompany a development with conventional financing;
- Connectivity with other existing City infrastructure;
- The potential for City capital improvement program funds to be redirected to other high priority needs by financing capital infrastructure with alternative MUD financing and by the application of post-annexation surcharges;
- School and public safety sites, and transportation infrastructure, sufficient to meet development needs; and
- A MUD organizational structure, and policies and procedures, that promote timely dissolution of the MUD and which fully meets the basic requirements for the City for creation of a MUD.

6. As a basis for approving the issuance of MUD bonds, Council should consider criteria including but not limited to the following:
    - Evidence that the value of the property within the MUD will be significantly increased by construction of the public improvements by the MUD, as determined by the City.
    - If development occurs in phases, development must be sustainable by the proposed bonding capacity, bond phasing, and development approvals.

- The MUD must be in compliance with all terms and conditions of development and consent agreements.
- The term of the MUD bonds should be limited to 25 years.

7. If an applicant for consent to creation of a MUD chooses to challenge either the City's determination of whether to consent to a MUD, or the lawfulness of the conditions imposed by the City in consenting to a MUD, the City will pursue the following course of action:
   - The applicant's request before the Texas Commission on Environmental Quality (TCEQ) for the creation of the MUD shall be challenged.
   - If the City is not successful before the TCEQ, the City will pursue all available legal remedies to enforce its decision, including appeal of the decision of the TCEQ.
8. City Resolution No. 840202-37 is superseded by this Resolution No. 20110217-030.

APPROVED: February 17, 2011 **ATTEST:** Shirley A. Gentry

Shirley A. Gentry
City Clerk

EXCERPT FROM ROSENBERG, TX

Back to Table of Contents

CHAPTER 5 - EXTENSION OF SYSTEMS AND CREATION OF CERTAIN SPECIAL DISTRICTS

ARTICLE I. - EXTENSION OF SYSTEMS

DIVISION 1. - GENERALLY

Secs. 5-1—5-200. - Reserved.

DIVISION 2. - SPECIAL DISTRICTS

Sec. 5-201. - Establishment of special district; generally.

Upon application by the proponents of any political subdivision (district) to the city council for the creation or expansion of such a district within the corporate limits of the city, or all or any part of the city's extraterritorial jurisdiction, the proponents of such political subdivision shall adhere to and comply with the rules, regulations, and standards set forth in this chapter and with the provisions of such written consent, whether expressed by ordinance, resolution, or otherwise, and shall be a prerequisite to the granting of such written consent. In the event of the creation of such a district, within thirty (30) days after such creation and the appointment or election of the district's board of directors and officers, the board shall authorize and its officers shall execute and deliver a written document to the city adopting, approving, and agreeing to comply with and abide by all of the rules, regulations, standards, conditions, and covenants set forth in this division and in the city's written consent to the creation of such district.

Sec. 5-202. - Deposit against expenditures.

A. Upon application for consent to the creation of such a district, the owner or the developer of the land within such proposed district shall deposit with the city the sum of twenty thousand dollars ($20,000.00) to reimburse the city for all fiscal, legal, and engineering fees and expenses incurred by it relating to:

    1. All related professional fees, including but not limited to legal, engineering, and consultants services (professional fees) to determine the necessity and feasibility of the creation of the district;

    2. The financial advisory services to the city described herein;

    3. All professional fees regarding the application for consent to create and the creation of such district;

    4. All professional fees pertaining to the review and submittal for approval of any agreements associated with the creation of the district e.g. utility agreement, development agreement, related agreements, and ordinance preparation etc.;

5. Any other professional fees incurred by the city in relation to district creation and continuation thereafter, such as bond sales and approval, annexations related to district, ordinances, fire service agreement, etc.

B. The owner or the developer of the land within such proposed district shall also be obligated to pay additional expenses incurred by the city for services of the nature heretofore described in an amount not to exceed an additional ten thousand dollars ($10,000.00) (additional deposit) as determined by the city manager. Such sums shall be used by the city for the purpose of paying the costs incurred for such purposes. No interest will be allowed on any deposit provided for herein.

C. If any portion of the additional deposit is not needed for the purpose of paying such fees and expenses, such unused portion shall be returned forthwith to the owner, developer or district. It is understood and agreed that the fees and expenses paid in relation to the additional deposit will be those actually incurred for such purposes by the city and that the city will make an accounting of such expenditures to the owner, developer or district. Those persons requesting the city's consent to the creation of the district shall be obligated to guarantee payment to the city of the sums set forth herein.

Sec. 5-203. - Council to approve member on board of directors of district.

At least one (1) member of the initial board of directors of the district shall be a person approved by the city council.

Secs. 5-204—5-229. - Reserved.

ARTICLE II. - CREATION OF CERTAIN SPECIAL DISTRICTS

DIVISION 1. - IN-CITY MUNICIPAL UTILITY DISTRICTS

Sec. 5-230. - Policy.

A. There is hereby adopted a policy and plan establishing the conditions under which a municipal utility district may be formed within the corporate limits of the city, which shall read as follows:

B. The following terms, conditions and standards establish the basis under which the City Council of the City of Rosenberg may consent to the formation of a municipal utility district within the corporate limits of the City of Rosenberg.

Sec. 5-231. - Ordinance to create MUD.

A. The city's consent to the creation of a municipal utility district (MUD) proposed to be formed within the corporate limits of the city under the Texas Water Code and the Texas Constitution Section 59, Article XVI, shall be evidenced by the adoption of an ordinance.

B. No ordinance shall be adopted consenting to the creation of a MUD until the city council finds that the proposed MUD (1) will be an economically feasible and sound development benefiting the city, (2) will not adversely affect the existing city water, sewer and storm facilities or other city utilities or city functions, and (3) will not increase the city's taxes or utility rates or adversely impact the city's financing or bond rating, and that (4) all of the conditions imposed by this article have been agreed to by the majority in value of landowners within the proposed MUD.

Sec. 5-232. - Conditions to creation.

The following conditions shall apply to every MUD within the city:

A. The MUD may acquire property outside its boundaries with consent of the city only for purposes of providing stormwater drainage and detention, potable water distribution, wastewater collection, and for all other purposes permitted by law.

B. The MUD shall not provide services for, or acquire property to provide services for, any property outside its boundaries without the consent of the city.

C. The MUD shall not allow use of easements or stormwater drainage facilities owned or controlled by the MUD for any property or development outside its boundaries without the consent of the city.

D. The petitioner shall pay all costs as provided for in 5-202.

E. The facilities to be constructed by the MUD shall be designed and constructed in compliance with all applicable requirements and criteria of the applicable regulatory agencies and subject to the applicable provisions of the city's ordinance granting a petition for inclusion of certain territory in the MUD (the "consent ordinance").

F. The city shall not allow any connection to be made to the MUD's wastewater system until, with respect to such connection:

1. The MUD has issued an assignment of capacity specifying the number of gallons per day of water supply and wastewater treatment allocated for such connection, and has provided a copy thereof to the city manager;

2. The city has inspected the connection and premises and has issued a building permit for that connection; and

3. All buildings or structures served by connections shall be located entirely within the boundaries of a lot or parcel shown in a plan, plat or replat filed with and finally approved by the city and city council and duly recorded in the official records of the county where the property is located (provided this limitation shall not apply if no plan, plat or replat is required by applicable state statutes or city ordinances).

G. Unless and until the city shall dissolve the MUD and assume the properties, assets, obligations and liabilities of the MUD, the bonds of the MUD, as to both principal and interest, shall be and remain obligations solely of the MUD and shall never be deemed or construed to be obligations or indebtedness of the city.

H. All contracts with third parties for construction of water, wastewater and stormwater facilities to serve the proposed MUD will contain the following provisions:

1. A requirement that all plans and specifications for construction of improvements or modification of improvements which are to be built to serve the MUD and/or require approval of the Texas Commission on Environmental Quality be prepared in accordance with the then adopted city specifications and requirements for such facilities and delivered to the city engineer for approval prior to submission to the Texas Commission on Environmental Quality. All plans and specifications presented to the bidders shall be approved by the city prior to advertising for bids;

2. An agreement that all construction or modification of improvements to serve the MUD will be inspected by the city and that no underground improvements will be backfilled prior to inspection and approval by the city; and

3. All contracts for construction of improvements will be awarded in compliance with the terms contained within public bidding statutes in Chapter 49 of the Texas Water Code.

I. As the MUD's facilities are acquired and constructed, the MUD shall convey the same to the city, including all warranties relating to the facilities; provided, however, that the MUD shall not convey, and the city shall not accept, stormwater detention systems (stormwater detention systems shall be owned and operated by the homeowners association or other entity acceptable to the city as provided in the utility contract and the MUD shall be granted a drainage easement on the stormwater detention systems in a form acceptable to the city).

J. As acquisition and/or construction of each phase of the facilities is completed, representatives of the city shall inspect the same and, if the city finds that the same has been completed in accordance with the final plans and specifications, the city will accept the same, whereupon such portion of the facilities shall be operated and maintained by the city at its sole expense; provided, however, that the city shall not accept, or operate and maintain, stormwater detention systems; (stormwater detention systems shall be owned and operated by the homeowners association or other entity acceptable to the city as provided in the consent agreement); and further provided, however, that in the event that the facilities have not been completed in accordance with the final plans and specifications, the city will immediately advise the MUD in what manner said facilities do not comply, and the MUD shall immediately correct the same, whereupon the city shall again inspect the facilities and accept the same if the defects have been corrected.

K. The city shall bill and collect from customers of the facilities and shall from time to time fix such rates and charges for such customers of the facilities as the city, in its sole discretion, determines are necessary; provided that the rates and charges for services afforded by the facilities will be equal and uniform to those charged other similar classifications of users in non-MUD areas of the city; and all revenues from the facilities shall belong exclusively to the city without rebate of such revenues to the MUD.

L. The city may impose a charge for connection to the facilities at a rate to be determined from time to time by the city, provided the charge is equal to the sums charged other city users for comparable connections; and the connection charge shall belong exclusively to the city.

M. The MUD is authorized to assess, levy and collect ad valorem taxes upon all taxable properties within the MUD to provide for: (a) the payment in full of the MUD's obligations, including principal, redemption premium, if any, and interest on the bonds to be issued by the MUD and to establish and maintain any interest and sinking fund, debt service fund or reserve fund, (b) the administration, operation and maintenance purposes, all in accordance with applicable law, and (c) to pay expenses of assessing and collecting the taxes. The city will levy and collect ad valorem taxes upon all taxable properties in the city, including the MUD. The city will agree in the utility agreement to rebate to the MUD on an annual basis city ad valorem taxes attributable to the city's debt service payments for drainage only to the extent required by applicable law.

N. Unless the MUD is in default under the terms of its utility agreement after reasonable opportunity to cure, the city shall not dissolve the MUD until the water, wastewater and drainage utilities required to serve the MUD have been completed and bonds issued by the MUD to finance same; and the city shall afford the MUD the opportunity to discharge any obligations of the MUD pursuant to any existing agreements of the MUD with third parties for construction of facilities, by either: (a) authorizing the MUD to sell its bonds before or during a transition period prior to the effective date of dissolution, as established by the city, (b) issuing bonds and selling bonds of the city pursuant to Vernon's Texas Codes Annotated, Local Government Code Section 43.080, as amended, in at least the amount necessary to discharge the MUD's obligations, including those under any such agreements, or (c) providing written notice to the MUD that the city has sufficient funds available from other sources to discharge the MUD's obligations, including those under any such existing agreements with third parties. The city shall have the right to dissolve the MUD if construction of water, wastewater or drainage utilities required to serve the MUD does not begin within thirty-six (36) months of execution of the consent agreement.

O. All city ordinances and codes, including applicable permits, fees and inspections, shall be of full force and effect within the boundaries of the MUD in the same manner as with respect to other areas within the city's corporate limits, except as specifically herein provided otherwise.

P. No bonds, other than refunding bonds, or notes of the MUD shall be issued or sold unless not less than twenty (20) days following the filing of an application with the Texas Commission on Environmental Quality for the approval of projects and bonds, the MUD provides the city with a copy of such application and not less than twenty (20) days prior to publication of notice of sale, the MUD provides the city with a copy of the staff memorandum of Texas Commission on Environmental Quality approving the projects and bonds, a copy of its proposed bond order, preliminary official statement, bid form and notice of sale and the following criteria are met. The MUD shall not issue bonds unless the following conditions have been satisfied:

1. The MUD shall not issue any bonds, other than refunding bonds, unless the purpose for which the proceeds of such bonds may be used is limited to one (1) or more of the following and no others:

    i. Designing, purchasing and/or constructing or otherwise acquiring:

        (a) waterworks facilities,

        (b) wastewater facilities, or

        (c) stormwater drainage and detention facilities,

    ii. Purchasing, constructing, owning, operating, repairing, improving, extending or otherwise acquiring interests in real property, improvements, facilities, appliances, equipment, buildings, plants or structures necessary or incidental to the operation of waterworks facilities, wastewater facilities, or stormwater drainage facilities. Proceeds of the bonds for costs of operations of the MUD shall not exceed ten (10) percent of the issuance amount.

    iii. All costs of issuance of the bonds (including but not limited to legal fees, financial advisory fees, administrative and organizational fees and expenses and costs of operations during construction, bond discount, capitalized interest, developer interest, creation costs, printing expenses, publication expenses and contingencies relative to facilities not yet under contract). Proceeds of the bonds for costs of operations of the MUD shall not exceed ten (10) percent of the issuance amount.

    iv. All other purposes authorized by law.

2. The MUD shall not sell or issue any bonds unless:

    i. The terms of such bonds expressly provide that the MUD reserves and shall have the right to redeem the bonds not later than the 15th anniversary of the date of issuance, without premium.

ii. The bonds, except refunding bonds, are sold after the taking of public bids therefor.

iii. None of such bonds, other than refunding bonds, are sold for less than ninety-five (95) percent of par.

iv. The net effective interest rate on bonds so sold, taking into account any discount or premium as well as the interest rate borne by such bonds, does not exceed two (2) percent above the highest average interest rate reported by the daily bond buyer in its weekly "20 Bond Index" during the one-month period next preceding the date notice of the sale of such bonds is given and bids for the bonds will be received not more than forty-five (45) days after notice of sale of the bonds is given.

v. The maximum term of any debt issuance shall be no greater than twenty-five (25) years.

vi. The minimum par amount of any bonds issued, except a final issue, shall be one million dollars ($1,000,000.00).

vii. Each issue of bonds shall be structured to achieve either level principal payments or level debt service payments, excluding the first two (2) years of debt service.

viii. The MUD shall submit to the city pro forma cash flows evidencing a MUD tax rate (both maintenance and operations rate and interest and sinking rate combined) not to exceed one dollar and fifty cents ($1.50) per one hundred dollars ($100.00) assessed valuation.

ix. Each bond issue shall not include more than two (2) years of capitalized interest. The city shall review the documents required to be provided hereunder and the evidence of compliance with the foregoing criteria within fifteen (15) days following receipt of same. The issuance of bonds by the MUD must be approved by the city council of the city, or its designee. Any costs incurred by the city in connection with review of the issuance of bonds shall be paid by the MUD, in an amount not to exceed two thousand five hundred dollars ($2,500.00).

Q. The city acknowledges that a MUD has authority to assess an unlimited tax for payment of debt service. However, prior to implementation of any increase in tax rate above its initial rate, the MUD shall make a formal presentation to city council explaining the need for the increase, at which time residents of the MUD shall be given an opportunity to be heard. Notice of such presentation shall be sent to each owner of taxable property within the MUD as reflected on its most recent certified tax roll. This provision shall be in addition to any requirements of notice and hearing which may be contained in the Texas Water Code and in the Texas Tax Code which apply to the MUD.

R. In addition to the information the MUD is required to file of record as required by the Texas Water Code, the MUD shall annually deliver to each property owner within the MUD, as reflected on its most recent certified tax roll, written notice of the existence of the MUD and its right to assess taxes in addition to those assessed by the city. Such notice shall also contain a reference to the consent agreement, the consent ordinance and this paragraph. Such notice shall advise the property owner that such documents are available for inspection during regular business hours in the MUD's office.

S. The majority in value of landowners within the proposed MUD shall enter into a water supply and wastewater services contract ("utility contract") with the city, which shall contain the terms and conditions set forth in this Section 5-232, as well as other terms and conditions which may be agreed to by the city or imposed herein. The utility contract shall be assigned by the proponent to the MUD upon its creation;

T. The utility agreement shall be entered into simultaneously with the adoption of the consent ordinance.

U. The MUD shall establish an official meeting location within the corporate limits of the city and at all times after the MUD has one hundred (100) residential connections, it is to hold the meetings of its board of directors at such location.

V. In addition to any other notice requirements applicable to the MUD, the MUD must post an agenda of the meetings of its board of directors at all primary entrances to the MUD and at the location designated for notices at city hall not less than seventy-two (72) hours prior to any meeting. An agenda shall also be provided to the city manager of the city prior to any meeting of the board of directors.

W. The official office for recordkeeping of the MUD must be accessible to the district residents and shall not require a long distance phone call for a district resident to contact the official office for recordkeeping.

X. The MUD shall comply with all applicable requirements of the Texas Commission on Environmental Quality regarding the display of signage at entrances into the MUD.

Sec. 5-233. - Petition for creation of MUD.

Upon the presentation of a petition for consent for the creation of a MUD within the corporate limits of the city, the majority in value of landowners within the proposed MUD shall:

A. Present evidence that the proposed MUD contains one hundred (100) or more acres; present evidence that the petition is filed on behalf of the majority in value of landowners within the proposed MUD; and show that the proposed MUD is wholly within the corporate limits of the city;

B. Present a preliminary report describing the MUD and proposed use of the land within the MUD showing that the proposed MUD and land use are feasible;

C. Present an estimate of assessed valuation of the MUD showing the value of property as it exists on date of the petition; a build-out schedule showing the projected value of the property when fifty (50) percent of the projected vertical improvements for the MUD, exclusive of wastewater, water, sewer and drainage improvements, have been completed; and showing the projected value of the improvements upon completion of the development within the MUD; and

D. Agree that the majority in value of landowners within the proposed MUD shall develop the property for the purposes substantially as described in the preliminary report, except as may otherwise be agreed by the proponent and the city, and that prior to commencement of any improvements, will comply with all provisions of the subdivision ordinances and zoning ordinances of the city.

Sec. 5-234. - Other requirements.

The city reserves the right to impose other specific requirements relative to a given MUD, including, but not limited to park requirements, construction material or houses and other buildings, amenities, and minimum lot sizes, which shall be agreed to and set forth in the consent agreement.

Sec. 5-235. - Abolition.

It is the policy of the city that a MUD created within the city should not be abolished until such time as it has retired all of its outstanding bonded indebtedness, so that the city taxpayers outside the MUD shall not have to pay off all or any part of the bonded indebtedness incurred by the MUD. The city does reserve the right to abolish any MUD, regardless of whether it has any outstanding debt, if it is deemed to be in the best interest of the city.

Sec. 5-236. - City services.

The city shall provide fire, police and other general city services to the areas within the MUD equal to those provided in non-MUD areas of the city.

Secs. 5-237—5-239. - Reserved.

DIVISION 2. - STANDARD CONDITIONS TO THE CITY'S CONSENT TO THE CREATION OF POLITICAL SUBDIVISIONS WITHIN THE EXTRATERRITORIAL JURISDICTION (ETJ) OF THE CITY

Sec. 5-240. - Policy

The city council hereby finds, determines, and declares that it is to the best interests of the City of Rosenberg and of the territory within its extraterritorial jurisdiction, that the proponents of any municipal utility district or any other political subdivision having

as one (1) of its purposes the supplying of fresh water for domestic or commercial uses, the furnishing of sanitary sewer service, or the furnishing of drainage and/or flood control services when such district is sought to be created within the area of the extraterritorial jurisdiction of the City of Rosenberg, shall as a prerequisite to the written consent of the City of Rosenberg, agree and covenant in writing, to adhere to the following rules, regulations and standards:

A. Bonds may be issued by the district only for the purpose of purchasing and constructing, or purchasing or constructing, or under contract with the city, or otherwise acquiring waterworks systems, sanitary sewer systems, sewage treatment facilities, storm sewer systems and drainage facilities, levee facilities, fire protection facilities or parts of such systems or facilities, and to make any and all necessary purchases, construction, improvements, extensions, additions and repairs thereto, and to purchase or acquire all necessary lands, rights-of-way, easements, sites, equipment, buildings, plants, structures, and facilities therefore, and maintain same and to sell water, sanitary sewer and other services within or without the boundaries of the district. Such bonds and all refunding bonds of the district shall only be sold after taking public bids therefore. All district bonds shall expressly provide that the district shall reserve the right to redeem said bonds on any interest payment date subsequent to the fifteenth anniversary of the date of issuance without premium. No bonds, other than refunding bonds, shall be sold at less than ninety-five (95) percent of par, provided that the net effective interest rate on bonds so sold, taking into account any discount or premium as well as the interest rate borne by such bond, will not exceed two (2) percent above the highest average interest rate reported by the Daily Bond Buyer in its weekly “20 Bond Index” during the one-month period next preceding the date notice of the sale of such bonds is given, and that bids for the bonds will be received not more than forty-five (45) days after the notice of sale of the bonds is given.

   The maximum term of any debt issuance shall be no greater than twenty-five (25) years. The minimum par amount of any bonds issued, except a final issue, shall be one million dollars ($1,000,000.00). Each issue of bonds shall be structured to achieve either level principal payments or level debt service payments, excluding the first two (2) years of debt service. The district shall submit to the city pro forma cash flows evidencing a district tax rate (both maintenance and operations rate and interest and sinking rate combined) not to exceed one dollar and fifty cents ($1.50) per one hundred dollars ($100.00) assessed valuation. Each bond issue shall not include more than two (2) years of capitalized interest. The resolution authorizing the issuance of the district's bonds will contain a provision that any pledge of the revenues from the operation of the district's water and sewer and/or drainage system to the payment of the district's bonds will terminate when and if the City of Rosenberg annexes the district, takes over the assets of the district and assumes all of the obligations of the district. No land will be added or annexed to the district until the City of Rosenberg has given its written consent by resolution or ordinance of the city council to such addition or annexation.

B. Before the commencement of any construction within the district, the district, its

directors, officers, or developers and landowners will submit to the city or its designated representative all plans and specifications for the construction of water, sanitary sewer, and drainage facilities to serve such district and obtain the approval of such plans and specifications from the city. All water wells, water meters, flush valves, valves, pipes, drainage pipes, drainage ditches, drainage basins, all water service lines and sewer service lines, lift stations, sewage treatment facilities and appurtenances thereto, installed or used within the district shall comply with the city's standard plans and specifications. Prior to the construction of such facilities within the district, the district, or its engineer shall give written notice to the city stating the date that such construction will be commenced. The construction of the district's water, sanitary sewer and drainage facilities shall be in accordance with the approved plans and specifications of the city, and during the progress of the construction and installation of such facilities, the city or a designated representative of the city may make periodic on-the-ground inspections to determine that the construction and installation complies with the approved plans and specifications.

C. No such construction of water, sanitary sewer, and drainage facilities shall be started or undertaken by the district unless it has in its possession a certificate of the district's engineer, who shall be a registered professional engineer under the laws of the State of Texas, that in his opinion, such construction conforms to the city's established standards and specifications; and a letter or certificate from the engineer of the City of Rosenberg that, in his opinion, such construction conforms to the city's established standards and specifications.

D. The owner and developer of the land within the district shall covenant and agree that he or they will, prior to the sale of any lot or parcel of land, obtain the approval of the planning and zoning commission and city council and all other applicable authorities of the City of Rosenberg of a plat thereof and properly record it in the deed records.

E. The district will not provide water or sewer service to a residential lot unless the plat covering such a lot has been approved by the planning and zoning commission and city council and all other applicable authorities of the City of Rosenberg.

F. Full-time resident inspection shall be provided during the construction period by the district inspectors approved by the engineer of the city, which inspectors shall be removed upon the request of said city engineer if the inspectors are found not to be competent. In addition, an additional inspector or inspectors shall be furnished, if deemed necessary by the city engineer. Daily inspection reports shall be furnished, with a copy to the City of Rosenberg. All construction contracts shall be let on a competitive bidding basis with the contract to be awarded on the basis of the lowest and best bid by a responsible, competent contractor, which bid shall include evidence of the financial condition of the bidders. Bid bonds, payment bonds, performance bonds and affidavits of payment shall be in all cases required. Upon completion of construction, submission of a complete set of "as built" plans to the city by the district engineer shall be required.

G. Any district providing sewage treatment services agrees to employ a sewage treatment plant operator holding a valid certificate of competency issued by the Texas Commission on Environmental Quality ("TCEQ"). The district agrees to send copies to the city of all reports, data and filings required to be made to TCEQ or any other regulatory authority having jurisdiction over the district's facilities or operations.

H. The district, its board of directors, officers, developers, and/or landowners will not permit the construction, or commit to any development, within the district that will result in wastewater flow to the serving treatment facility which exceeds that facility's legally permitted average daily flow limitations or the district's allocated capacity therein.

I. The district shall not be permitted to escrow any funds in excess of two (2) years interest on the bonds which the district issues and shall levy a tax simultaneously with the first installment of such bonds and continue a tax levy until such bonds are paid in full, unless revenues of the system are adequate to discharge such bonds.

J. No bonds or notes of the district shall be issued or sold unless the district is in compliance with paragraph (1) above and not less than twenty (20) days following the filing of an application with the TCEQ for the approval of projects and bonds, the district provides the city with a copy of such application and not less than twenty (20) days prior to the publication of notice of sales, the district provides the city with a copy of the staff memorandum of the TCEQ approving the projects and bonds and a copy of its proposed bond order, preliminary official statement, bid form and notice of sale and the criteria set forth in subsection (A) above are met. The city shall review the documents submitted and the evidence of compliance with the criteria within fifteen (15) days following receipt of same. The issuance of bonds by the district must be approved by the city council of the city or its designee.

K. Prior to the sale of any series of district bonds, the district shall secure a letter to the Attorney General of Texas from the City of Rosenberg to the effect that the district is in compliance with the terms and conditions of this division.

L. The district will use its best efforts to structure its rates for water and sewer service in the same manner as the City of Rosenberg even though levels of rates may vary.

M. The petitioner shall pay all costs as provided for in Section 5-202.

N. In addition to any other notice requirements applicable to the district, the district must post notice of the meetings of its board of directors at all primary entrances into the district, and at the location designated for notices at city hall, not less than seventy-two (72) hours prior to any meeting. Notices shall also be provided to the city manager of the city prior to any meetings of the board of directors. The board of directors shall hold its meetings at a location accessible to its residents. At all

times after the district has one hundred (100) residential connections, it shall hold the meetings of its board of directors at a location within the corporate limits of the city or within the boundaries of the district.

O. The official office for recordkeeping of the district must be accessible to the district residents and shall not require a long distance phone call for a district resident to contact the official office for recordkeeping.

P. The district shall comply with all applicable requirements of the TCEQ regarding the display of signage at entrances into the district.

Q. Within six (6) months of the creation of the district, the district shall enter into an agreement for fire protection services with the city.

R. The petitioner shall be required to comply with the terms of the city's park dedication ordinance.

Secs. 5-241—5-246. - Reserved.

DIVISION 3. – REFUNDING OF EXISTING AND FUTURE INDEBTEDNESS OF SPECIAL UTILITY DISTRICTS

Sec. 5-247. - Policy.

This Ordinance establishes the policy of the City with regard to refunding the existing and future Indebtedness of a District.

Sec. 5-248. - Refunding Bonds.

A District may issue Refunding Bonds to refund Indebtedness of the District in compliance with the standards and conditions of this Ordinance. The City Manager shall have the authority to approve the issuance of Refunding Bonds that comply with this Ordinance. A District may issue Refunding Bonds that do not meet the requirements of this Ordinance only after obtaining approval of the City Council to do so.

Sec. 5-249. - Bond Ratings and Insurance.

The City encourages the District to obtain a municipal bond rating and/or municipal bond insurance when such rating and/or insurance is available and results in greater Net Present Value Savings than the cost of such rating and/or insurance.

Sec. 5-250. - Transfer of Funds.

To the extent a District is authorized by applicable law, a District may transfer any cash or securities to the escrow fund or redemption fund for the payment of the Refunded Bonds. Any surplus debt service funds allocable to the Refunded Bonds which would no longer be dedicated to the payment of the District’s remaining Indebtedness shall be

placed in the escrow fund or redemption fund for the Refunded Bonds. The governing body of the District shall determine the amount, if any, of such surplus debt service funds.

Sec. 5-251. - Price and Terms.

The Refunding Bonds may be sold at a competitive sale or through a negotiated sale. The Refunding Bonds must be optionally redeemable at par plus accrued interest to the date of redemption at a time not greater than 10 years from the Date of Issuance of the Refunding Bonds. The Refunding Bonds may be structured utilizing current interest payment bonds, capital appreciation bonds, convertible capital appreciation bonds or any other type of market-accepted hybrid security. The Refunding Bonds shall not be sold for less than ninety-five percent (95%) of the par value of the bonds, provided the True Interest Cost of the bonds so sold, taking into account any discount or premium as well as the interest rate borne by such bonds, shall not exceed two percent (2%) above the highest average interest rate reported by the Daily Bond Buyer in its weekly "20 Bond Index" during the one-month period next preceding the Date of Issuance of the Refunding Bonds.

Sec. 5-252. - Rate of Taxation.

Whenever a rate of ad valorem taxation is required to be calculated or determined hereunder, such rate shall, for all purposes of this Ordinance, be rounded to the nearest $.01.

Sec. 5-253. - Adoption of Ordinance Provisions.

In order to avail itself to the authority of this Ordinance, the District shall include a covenant in the order or resolution authorizing the issuance of the Refunding Bonds to observe the provisions of this Ordinance in the refunding of the District's Indebtedness.

Sec. 5-254. - Documents.

Following the issuance of the Refunding Bonds, the District shall file a bound or digital transcript of proceedings authorizing the issuance of Refunding Bonds with the City Secretary.

Sec. 5-255. - Waiver for Exceptional Circumstances.

The City Council recognizes that from time to time exceptional circumstances may occur that make the application of one or more of the conditions contained in this Ordinance inappropriate, or not in the City's interest, and, accordingly, the City Council may waive one or more requirements of this Ordinance. In order to initiate such a waiver, the District may submit a request for a waiver, in writing, addressed to the attention of the City Secretary.

Sec. 5-256. - Standards and Conditions.

A District may issue Refunding Bonds to refund Indebtedness if the District and such Refunding Bonds meet the following standards and conditions:

A. The refunding transaction provides both Gross Debt Service Savings and Net Present Value Savings;

B. The Net Present Value Savings is three percent (3%) or more of the principal amount of the Refunded Bonds;

C. The Gross Debt Service Savings is structured on a uniform basis, that is, during the period which ends on the final scheduled maturity of the Refunding Bonds, the spread from the greatest annual debt service savings in any Annual Payment Period to the least annual debt service savings in any Annual Payment Period (excluding savings in the year of the final scheduled maturity of the Refunding Bonds, if not a complete Annual Payment Period) is not more than $5,000 plus the interest thereon; provided that, for purposes of this subsection, Gross Debt Service Savings in the first Annual Payment Period shall not include the transfer of any cash or securities from District sources, other than proceeds of the Refunding Bonds, to the escrow fund or redemption fund for the Refunded Bonds except as necessary to achieve the level debt service savings required by this subsection;

D. There shall be positive Gross Debt Service Savings during the period between the final Annual Payment Period and the final scheduled maturity of the Refunding Bonds;

E. The date of the latest scheduled maturity of the Refunding Bonds is not later than the date of the latest scheduled maturity of the Refunded Bonds; and

F. The Verifier certifies the mathematical accuracy of the calculations necessary to satisfy the requirements relative to Gross Debt Service Savings and the Net Present Value Savings.

Sec. 5-257. - City Approval.

Prior to the issuance of any Refunding Bonds, the District will request City approval and shall submit the following information with such request:

A. A request to approve the Refunding Bonds in a par amount not to exceed the amount specified in the request;

B. The District's financial advisor's report for the proposed transaction on which the District considered and based its approval of the transaction, including the par amount of the bonds, whether the transaction will be a Current Refunding or an Advance Refunding, the sources and uses of funds, a summary of refunding results, savings, anticipated pricing, bonds to be refunded, costs of issuance, and escrow statistics (if there will be an escrow of funds) and such other

documents that were or are to be presented to the District's board of directors related to the proposed transaction;

C. The Official Statement (draft is acceptable), if any;

D. Parameters of the sale, if the transaction is to be a parameter sale;

E. A certificate from the financial advisor that the transaction complies with the requirements of this Ordinance; and

F. Such other documents as the City may reasonably request.

Secs. 5-258 – 5-260. – Reserved.