RICHMOND UTAH
Home of Black & White Days

RICHMOND CITY CORPORATION
90 SOUTH 100 WEST
RICHMOND, UTAH 84333

AGENDA

Public Notice is given that the Richmond City Council will meet in a regularly scheduled meeting at 90 South 100 West, Richmond, Utah, on **Thursday, October 16, 2025.** The meeting will begin at 6:30 PM.

Welcome and Opening Ceremonies by Bryce Wood.

1. Approval of the city council meeting minutes from September 18, 2025.

2. Audit presentation for Fiscal Year 2025, which is the period of July 1, 2024 through June 30, 2025, by representatives of Richey May formerly Allred Jackson.

3. Review of the Wastewater Collection Master Plan with representatives of J-U-B Engineers.

4. Review of the Culinary Water Master Plan with representatives of J-U-B Engineers.

5. Discussion and possible approval of the Emergency Operations Plan.

6. Public Hearing for the purpose of discussing Ordinance 2025-12, an Ordinance amending the Richmond City Municipal Code, Title 3-000 “Municipal Government”, Parts 3-110 “Campaign Finance Disclosure”, 3-111 “General”, 3-112 “Definitions”, 3-113 “Filing Of Disclosure Reports”, 3-114 “Time Of Filing”, 3-115 “Contents Of Statement”, 3-116 “Public Information”, 3-117 “Penalty For Noncompliance”, adding Part 3-201 “Six-Member Council Form Of Municipal Government”, amending Parts 3-210 “Eligibility For Elective Office”, 3-220 “Vacancies In Elective Office” , 3-221 “Vacancy In Office” and 3-222 “Vacancy In Office Of Mayor”.

7. Discussion and possible vote on Ordinance 2025-12.

8. Staff reports and monthly financial review

9. Council Member and Mayor Reports

Adjournment

*****Items on the agenda may be considered earlier than shown on the agenda.*****

In accordance with the Americans with Disabilities Act, individuals needing special accommodation for this meeting should contact the City Office at (435) 258-2092, at least 3 days before the date of the meeting.

RICHMOND CITY COUNCIL SEPTEMBER 18, 2025

The regular meeting of the Richmond City Council was held at the Park Community Center located at 90 South 100 West, Richmond, Utah on Thursday, September 18, 2025. The meeting began at 6:30 P.M.; Mayor Paul J. Erickson was in the chair. The opening remarks were made by Daryl Black.

The following Council Members were in attendance: Lyle Bair, Amber Ervin, Bryce Wood and Daryl Black.

Joel Draxler was excused.

City Administrator HollyJo Karren, Karyn Tejan, John Harris, Bryan Tolbert and City Recorder Justin Lewis were also in attendance.

VISITORS: Todd Smith, Cindy Smith, Dave Cavanaugh

APPROVAL OF THE CITY COUNCIL MEETING MINUTES FROM AUGUST 19 & 21, 2025

> ***A motion to approve the August 19 and 21, 2025 city council meeting minutes was made by Bryce, seconded by Daryl and the vote was unanimous.***

Yes Vote: Bair, Ervin, Wood, Black
No Vote: None
Absent: Draxler

DISCUSSION AND POSSIBLE VOTE ON ORDINANCE 2025-11, AN ORDINANCE REZONING CACHE COUNTY PARCEL NUMBER 09-051-0018 FROM RLD (RESIDENTIAL LOW DENSITY) TO RMD (RESIDENTIAL MEDIUM DENSITY). THE PARCEL IS LOCATED AT 396 WEST MAIN AND IS 0.61 ACRES.

JUSTIN: The request is to rezone a parcel located at 396 West Main from Residential Low Density (RLD) to Residential Medium Density (RMD). The parcel is 0.61 acres. The parcel has two homes on it. There is a regular house on the south end and a mobile home on the north end. Each home has separate water, sewer, electricity and natural gas connections. The current lot is nonconforming because it has two units on it. Vern Fielding, who is the applicant, submitted the following letter with his rezone application:

"August 18, 2025

Richmond City Planning and Zoning Committee

RE: REZONE REQUEST FOR TAX ID#09-051-0018

Please note the following information while considering this application for rezone from RLD to RMD.

The city approved a building permit in 1974 for the construction of a second home behind the house at 396 W Main, Richmond. It is built on a permanent cinder block foundation and has always had its own separate water, sewer, power and gas hookups.

Because there are two residences on a single tax id, our options are limited with what we can do with the property.

The property has .61 acres and is short 8000 sq feet to be able to subdivide in the RLD zone. It has more than enough acreage and frontage to legally subdivide into two conforming lots in the RMD zone.
PLEASE NOTE: This rezone will not facilitate any new structures or homes. It is simply a way to bring the current property into conformity and resolve a situation that was created 50+ years ago. Also, the city will benefit by receiving the tax revenue from the second lot, with no increase in infrastructure or maintenance.

Thanks for your consideration of this matter.

Vern and Marian Fielding"

AMBER: The planning commission did not have any concerns. They recommend approval of the request. Their only real point of discussion was regarding the advertising of the public hearing. About 80% of the utility accounts in the city are on the CivicReady email system. How do we inform the neighbors of a rezone request?
MAYOR: What was their discussion in this regard?
AMBER: It was just a comment which was made.
MAYOR: Some cities require adjoining parcel owners to be notified. I encourage people to become more involved and pay attention to the emails we send out.
AMBER: This was a topic of discussion around 18 months ago. Some cities actually require a sign to be posted on the parcel.
MAYOR: Logan City does something similar. Do you have a recommendation?
AMBER: I don't have a problem informing the community as there might be a need in this regard. We are meeting the legal requirements for advertising. We can talk to the city employees and see how they feel as they would have to deal with additional requirements. The advertising is separate from this request and the planning commission does recommend approval of the rezone request.
DARYL: The parcel has a very confusing legal description.
MAYOR: It basically states the parcel cannot be modified while those people are alive.
AMBER: The original owner allowed a family member to put a mobile home on the north end of the parcel. The original homeowner passed away but those residing in the mobile home still live there.
DARYL: The Harris parcel west of this is zoned RMD (Residential Medium Density)?
JUSTIN: Correct.
AMBER: There were not any comments at the public hearing on the request.
DARYL: I don't see the neighbors being impacted by approving this request. What are the differences in lot sizes?
JUSTIN: RLD (Residential Low Density) is a minimum lot size of 14,500 square feet and RMD (Residential Medium Density) is a minimum lot size of 10,000 square feet.

> ***A motion to adopt Ordinance 2025-11, an Ordinance rezoning Cache County Parcel Number 09-051-0018 from RLD (Residential Low Density) to RMD (Residential Medium Density) was made by Daryl, seconded by Bryce and the vote was unanimous.***

Yes Vote: Bair, Ervin, Wood, Black
No Vote: None
Absent: Draxler

UPDATE AND DISCUSSION ON THE SANITARY SEWER SYSTEM OF THE CITY.

MAYOR: Bryan Tolbert is our MBR Plant Manager. I have asked him to provide an overview and management plan for the MBR Plant. Bryan recently received his Level III Wastewater Treatment license for our mechanical (MBR) plant. We also have another employee who passed this test recently as well.
BRYAN TOLBERT: We have a great team. We have a work order program we use to track maintenance and repairs. We can add specific notes and details in the system about the work that was completed. If you do a search, you can find most of the work completed since the system was implemented in 2021 or 2022. Over 60 work orders have been completed in the last 15 months. I have asked Shane to do an inventory of the parts on hand. We want to do a facility assessment in January. This would review our equipment and the process as well as look at inefficiencies. The cassettes are a big deal. The eleventh section was installed this morning. We have now rebuilt 11 of the 12 sections.
MAYOR: Was this done with only our staff helping?
BRYAN: Yes. Shane and I had some additional assistance from other city employees. It is a great accomplishment. We have spent a lot of money to get to this point. We need to replace the RAS pump. It is original equipment. It is a recycling pump and runs constantly. It helps make the biology in the plant. We have a pump on hand and need to change it out. We changed out the motors last fall.
MAYOR: Can the pump be rebuilt?
BRYAN: I don't recommend doing that where the pump is 17 years old.

MAYOR: Do you have a cost estimate?
BRYAN: I would estimate around $10,000. We have a couple of new pumps installed and have rebuilt a couple of pumps as well.
MAYOR: How long does it take to acquire a new one?
BRYAN: A few weeks is all. They are available.
MAYOR: If an extra one is needed, I would order one.
BRYAN: We don't need an additional one right now. Most of the lighting has been updated to LED. We are getting a bid from TEC Electric to update the remaining lights. The lights are basically on 24/7. There is only one roof ventilator working, the other three are in disrepair. Shane and I are concerned about the inflow and infiltration into the system from rainstorms. We think it needs to be addressed. We have talked to a company that seals manholes. It will cost around $2,500 to $4,000 per manhole to seal them. It depends on the depth.
MAYOR: Do you have any idea of which ones need to be sealed?
BRYAN: I would start in the flatland areas. Typically there isn't flow into a manhole on a hill it is in the flat areas. There are three manholes by the city maintenance shop and we have observed runoff water running into them. Ground water does not need to be treated and should not be in the sewer system. Some cities require manholes to be sealed on new developments. I think it is something you should consider. We don't want to pump and treat that water. The maintenance document I provided is a working document and will change over time.
MAYOR: Who came up with the idea of dredging the lagoon in the manner which was done?
BRYAN: I got the ball rolling but several people deserve credit. The problem was in lagoon one. We cannot have sludge above the waterline. We saved a lot of money by not dredging the lagoon. The depth of the sludge in the pond was anywhere from six feet to one foot. A vendor brought in a mixing boat. They pumped and mixed the sludge for three days. We did some measurements the day after they were done to see how it panned out. The depth was about two feet where it had been six feet. Some places settled down to about 18 inches. The average depth was 1.7 feet. We should be able to get another ten to fifteen years before it needs to be dredged.
MAYOR: The estimated cost to dredge the lagoon was approximately $1,000,000.
AMBER: Since those 60 work orders have been completed have you noticed a change in day-to-day responsibilities?
BRYAN: There are always things to do down there. The numbers on the permitting side have always looked good. The lab results look good.
AMBER: Has efficiency improved?
BRYAN: Some filters had plugged and failed which causes a loss of capacity. When that happens not as many gallons can be treated. I think our treatment capacity has increased quite a bit with the improvements we have made.
MAYOR: It is a vital job and we are glad Bryan and Shane do it.
DARYL: Thank you for putting these plans together.

STAFF REPORTS AND MONTHLY FINANCIAL REVIEW.

HOLLY: There were two generous anonymous donations to the city. One for The Park Bench and the other for the library. We appreciate everyone who contributes to the various departments in the city. The water tank cleaning project at the Cherry Creek tank was completed today. They recommend it be cleaned every three to four years not every eight to twelve years at least for the first couple of segments.
MAYOR: How many times has that one been cleaned?
JUSTIN: Once if I recall correctly.
HOLLY: They will start to clean the Main Street tank tomorrow. I would like to thank the Richmond Lions Club, youth council, and everyone else for their help at the city party. Lots of great comments on the fireworks show as well. This is a great event for the city. The Halloween Carnival will be on Friday, October 3rd. The banners will go up next week. This years sidewalk replacement projects will start within the next two weeks. I will provide the council a list of areas. There are two new zoning clearances in The Knolls, one in Johnson View, three sheds and one pavilion recently approved. Shane Lewis passed his Wastewater Level III certification exam. It was originally approved with a restriction. We learned the restriction would be removed once some paperwork is submitted. I appreciate the support of the council in helping to get two employees on staff with Level III certifications. I am in the third week of the human resources class. It is a great class and I am learning a lot of things. The course ends in November. We have obtained one bid so far for a new roof on the community building.
MAYOR: We need to install some rain gutters on the north side of the building as well. Daryl has reviewed the building and recommended we start the renovation project by repairing the roof.

DARYL: Water has been coming off of the roof through the threshold and into the kitchen. There is frost damage to some of the bricks. We need to address these items before we do anything inside the building. I think the bid is fair.
JOHN HARRIS: I am obtaining another bid tomorrow. I talked to another company as well and it is not a project they can complete.
DARYL: The work needs to be completed. Some slope and drainage will be added so the project will be completed in the correct way.
MAYOR: The funds to pay for the project would come from the Capital Projects Fund.
DARYL: The building is worth saving and updating.
HOLLY: We had our post Black & White Days meeting. Some suggestions were given. We will meet again in December with the various committees. We have received some good input on the Hamburger Stand. Joel and Amber attended the meeting. We are considering hiring an outside vendor to oversee the Hamburger Stand next year. The one thing they must include on the menu is a hamburger option. We are going to reach out to the local businesses first to see if they have any interest.

MAYOR: When is our next council meeting?
JUSTIN: Thursday, October 16th. Next month the council will review Ordinance 2025-12 which includes a few housekeeping items. It will update our code in regard to campaign financial statements to follow the state code. The second item is it will state officially in our code we are a six-member form of government which is a five-member council and mayor. It does not change anything we are currently doing but adds a section in our code to refer to the state code in this regard. It also includes some verbiage about referring to the state code when it comes to filling a mayor or council member vacancy. I have provided each of you an Ethical Behavior Pledge Form which I should have done at the same time I had you complete the Conflict-of-Interest forms earlier this year. Also, included is a copy of the annual Fraud Risk Assessment we are required to complete and submit on a yearly basis. The new entrance door to the gymnasium on the east side of the Park Community Center has been replaced. We are starting to pay for a lot of the road work which was completed in July and August. Those funds come out of Class "C" Road funds, local road tax and the Rural Transportation Investment Fund (RTIF) tax we receive. In the Capital Projects Fund the two items we budgeted for are complete or received. The sprinkler system at the Black & White Days building is done and we have received our new lawnmower. For the first two months of the fiscal year we have received $45,352 in water impact fees and $30,957 in sewer impact fees. We have also purchased some new garbage cans. As we grow more cans are needed and old cans need to be replaced. The city party was a great success. We ran out of plates at about 720. We estimate with the kids who did not eat we had around 800 in attendance. I would like to thank Lower Foods, Lee's Marketplace and Kevin Humpherys, Checketts Amusements, the Richmond Lions Club, Karyn Tejan and The Park Bench, the youth council, Shirley Whitman, the Smithfield Fire Department and Riley Jensen and his fireworks team. Free food, free kids rides and free fireworks was a big success. The number one comment I have received is that the city should make the fireworks show part of the city party each year. I would like to offer a special thanks to Spartan Companies because without their generous donation the fireworks show would not have been possible.
MAYOR: The audit is currently being worked on.
JUSTIN: We are almost complete with this year's audit and the auditor's will come before the city council in the next couple of months. I haven't seen the final numbers but we had a really good year overall. Impact fees and grants were a big focus this year. Impact fees are tested right from the zoning clearance being issued all the way to where the funds were deposited in the bank and accounted for on the annual impact fee report. Grants are always tested. I knew the COG (Cache County Council of Governments) road grant would be a focus point mainly based on the size where it was over $800,000. I would like to thank the council and mayor going back to approximately 2013 when we made the decision to store all documents electronically. We pulled more documents than ever this year because we are growing and our finances are growing. Hours were spent gathering these items but many more hours would have been spent had the items not been available electronically. All of the items we gather are uploaded through an online portal. We spent a lot of time on the audit but saved a lot of time based on the internal documentation system we have created.

COUNCIL MEMBER AND MAYOR REPORTS

DARYL: We are obtaining bids for the Community Building roof project. We are also getting some bids for some pickle ball courts to go where the tennis courts are currently located. The painting portion of the project is very labor intensive. We will have a future discussion on this topic. We could possibly use the help of the seniors on this project. We are going to need to talk about irrigation water shares moving forward. The dynamics of the water system is changing. The time is coming where the connections will need to be metered. We are going to have to discuss how we bill for this service and who oversees it. There is one situation we are aware of where the developer provided irrigation water shares to the city in lieu of paying the water dedication payment fee and sold the remainder of the shares to the property owners in the subdivision. The issue is the irrigation system does not go to their subdivision. They will be responsible for getting the mainline to their subdivision and it will be expensive.

BRYCE: The youth council did a great job with the city party. The royalty was involved as well.
MAYOR: They all helped to get plates for the seniors.
AMBER: They were busy helping and serving all night long.
BRYCE: Lyndsey Bair got a promotion where she works and will no longer be able to help with the youth council. The school community council is worried about the kids crossing the road at 100 North State Street. There have been some close calls where people are speeding and kids are crossing the road. The parents are asking for options.
HOLLY: We can request an officer patrol this area.
BRYCE: Could we get some orange crossing flags?
HOLLY: We have some by the post office and could put some there as well as they are quite cheap.
AMBER: The school also needs to educate the kids on how to use the flags.

AMBER: It is nice to get happy calls about the city and I did after the city party. There were a lot of comments about how the community looks. I delivered some meals a few weeks ago. One of the people told me the city has never physically looked better. It is so good to have two Level III wastewater operators on staff. It is nice not having this worry like in the past. I attended the ribbon cutting at the new flour mill by Pepperidge Farms. There were around 25 people from Japan in attendance. This project has been a significant investment in this area. They will have a thrift store long term. They supply a lot of products to big companies. The Cache Chamber of Commerce was in attendance. People in Cache Valley love food outlets. They have a good relationship with Pepperidge Farms. The third anniversary of The Park Bench will be on Thursday, November 6th at noon. We surveyed those who attend The Park Bench and they preferred noon over a nightly activity. Karyn does a great job with the monthly calendar and the lunches have been great.

LYLE: I want to thank Weston and Holly. Our list of outstanding projects keeps decreasing. We will have some preliminary numbers for the sewer pipe expansion project soon.
HOLLY: Weston will be discussing the water master plan and sewer collection master plan at the October council meeting.

MAYOR: Horrific things have happened in the last couple of weeks. The worst thing I think I have ever seen in Utah happened a couple of weeks ago. There were some very professional people who did not rest until they found the person who committed the crime. The governor held his composure during the entire event and he is a good leader. Closer to home, something happened in a neighboring city and it is bad. I hope this person chooses to make a change in his life. I hope he has a desire not to repeat what happened. When elected officials disparage someone they should be exposed. I want to thank our council, staff and community members who would never do this. We had a great fireworks show. I hope it is considered on an annual basis. The audit will show we have accountability, reportability and every dollar is accounted for.

The council took a short recess at 7:34 P.M.

The council meeting was reconvened at 7:43 P.M.

CLOSED MEETING TO HOLD A STRATEGY SESSION TO DISCUSS A PROJECT PROPOSAL AND THE PURCHASE, EXCHANGE OR LEASE OF REAL PROPERTY. UTAH CODE ANNOTATED 52-4-205 (1) (D).

> ***A motion to close the regular council meeting and open the closed meeting was made by Bryce, seconded by Amber and the vote was unanimous.***

Yes Vote: Bair, Ervin, Wood, Black
No Vote: None
Absent: Draxler

The closed meeting opened at 7:43 P.M.

Those in attendance: Mayor Erickson, Lyle Bair, Amber Ervin, Bryce Wood, Daryl Black, HollyJo Karren, Justin Lewis

A motion to close the closed meeting and reopen the regular council meeting was made by Bryce, seconded by Amber and the vote was unanimous.

Yes Vote: Bair, Ervin, Wood, Black
No Vote: None
Absent: Draxler

The closed meeting closed at 8:20 P.M.

A motion to adjourn was made by Bryce, seconded by Lyle, and the vote was unanimous.

Yes Vote: Bair, Ervin, Wood, Black
No Vote: None
Absent: Draxler

Adjournment at 8:21 P.M.

RICHMOND CITY CORPORATION

____
Paul J. Erickson, Mayor

ATTEST:

____
Justin B. Lewis, City Recorder

RICHEY MAY

RICHMOND UTAH

Home of Black & White Days

Financial Statements
For the Year Ended
June 30, 2025

Richey, May & Co., LLP
50 East 2500 North, # 200
North Logan, UT 84341
(435) 752-6441
richeymay.com

INTRODUCTORY SECTION

This page intentionally left blank.

RICHMOND
UTAH
Home of Black & White Days

(435) 258-2092 • 90 South 100 West , Richmond, Utah 84333

Mayor
Paul J. Erickson
City Council Members
Lyle Bair
Daryl Black
Joel Draxler
Amber Ervin
Bryce Wood
City Administrator
HollyJo Karren
City Recorder
Justin B. Lewis

October 8, 2025

Richmond City Council
Richmond, Utah

Council:

It is with great pleasure that the financial statements for Richmond City ("City") for the year ended June 30, 2025, are presented.

State law requires that all local governments publish within six months of the close of each fiscal year a complete set of financial statements presented in conformity with generally accepted accounting principles (GAAP) and audited in accordance with generally accepted auditing standards by a firm of licensed certified public accountants. These financial statements are hereby issued and submitted to you for the fiscal year ended June 30, 2025, in accordance with these requirements.

This report consists of management's representations concerning the finances of the City. Management assumes full responsibility for the completeness and reliability of all of the information presented in this report. To provide a reasonable basis for making these representations, management has established an internal control framework that is designed to both protect the assets of the City from loss, theft, or misuse and to allow for the compiling of sufficient reliable information for the preparation of the City's financial statements in conformity with GAAP. Because the cost of internal controls should not outweigh the benefits, the City's internal control procedures have been designed to provide reasonable rather than absolute assurance that the financial statements will be free from material misstatement. This internal control structure is subject to periodic evaluation by management. To the best of management's knowledge and belief, this financial report is complete and reliable in all material respects.

The City's financial statements have been audited by Richey, May & Co., LLP, a firm of licensed certified public accountants. The goal of the independent audit was to provide reasonable assurance that the financial statements of Richmond City for the fiscal year ended June 30, 2025, are free of material misstatement. The independent audit involved examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements; assessing the accounting principles used and significant estimates made by management; and evaluating the overall financial statement presentation. The independent auditor concluded, based upon the audit, that there was a reasonable basis for rendering an unqualified opinion that the City's financial statements for the fiscal year ended June 30, 2025, are fairly presented in conformity with GAAP. The independent auditor's report is presented as the first component of the financial section of this report.

The financial reporting entity includes all funds of the primary government (i.e., Richmond City as legally defined).

I wish to express my appreciation to all members of the City who assisted and contributed to the preparation of this report.

Respectfully submitted,

Mayor Paul Erickson
Richmond City

FINANCIAL SECTION

This page intentionally left blank.

RICHEY MAY

INDEPENDENT AUDITOR'S REPORT

Honorable Mayor and City Council of
Richmond City, Utah

Report on the Audit of the Financial Statements

Opinions

We have audited the financial statements of the governmental activities, the business-type activities, the aggregate discretely presented component units, each major fund, and the aggregate remaining fund information of Richmond City, as of and for the year ended June 30, 2025, and the related notes to the financial statements, which collectively comprise Richmond City's basic financial statements as listed in the table of contents.

In our opinion, the accompanying financial statements present fairly, in all material respects, the respective financial position of the governmental activities, the business-type activities, the aggregate discretely presented component units, each major fund, and the aggregate remaining fund information of Richmond City, as of June 30, 2025, and the respective changes in financial position and, where applicable, cash flows thereof and the respective budgetary comparison for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Basis for Opinions

We conducted our audit in accordance with auditing standards generally accepted in the United States of America (GAAS) and the standards applicable to financial audits contained in *Government Auditing Standards* (*GAS*), issued by the Comptroller General of the United States. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of Richmond City and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audit. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Other Matter

Report on Summarized Comparative Information

We have previously audited Richmond City's 2024 financial statements, and we expressed an unmodified opinion on the respective financial statements in our report dated October 8, 2024. In our opinion, the summarized comparative information presented herein as of and for the year ending June 30, 2024, is consistent, in all material respects, with the audited financial statements from which it has been derived.

Responsibilities of Management for the Financial Statements

Richmond City's management is responsible for the preparation and fair presentation of the financial statements in accordance with accounting principles generally accepted in the United States of America, and for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about Richmond City's ability to continue as a going concern for 12 months beyond the financial statement issuance date, including any currently known information that may raise substantial doubt shortly thereafter.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinions. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS and GAS will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence a reasonable user based on the financial statements.

In performing an audit in accordance with GAAS and GAS, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of Richmond City's internal control. Accordingly, no such opinion is expressed.
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.
- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about Richmond City's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control–related matters that we identified during the audit.

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis and pension schedules as listed in the table of contents be presented to supplement the basic financial statements. Such information is the responsibility of management and, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Supplementary Information

Our audit was conducted for the purpose of forming opinions on the financial statements that collectively comprise Richmond City's basic financial statements. The accompanying supplementary information, such as the combining nonmajor fund financial statements are presented for purposes of additional analysis and are not a required part of the basic financial statements.

The combining nonmajor fund financial statements are the responsibility of management and were derived from and relates directly to the underlying accounting and other records used to prepare the basic financial statements. The information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the combining nonmajor fund financial statements are fairly stated, in all material respects, in relation to the basic financial statements as a whole.

Other Information

Management is responsible for the other basic information. The other information comprises the introductory section but does not include the financial statements and our auditor's report thereon. Our opinions on the basic financial statements do not cover the other information, and we do not express an opinion or any form of assurance thereon. In connection with our audit of the basic financial statements, our responsibility is to read the other information and consider whether a material inconsistency exists between the other information and the financial statements, or the other information otherwise appears to be materially misstated. If, based on the work performed, we conclude that an uncorrected material misstatement of the other information exists, we are required to describe it in our report.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated October 8, 2025, on our consideration of Richmond City's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering Richmond City's internal control over financial reporting and compliance.

Richey, May & Co., LLP

North Logan, Utah
October 8, 2025

As management of Richmond City, we offer readers of Richmond City's (the "City") financial statements this narrative overview and analysis of our financial activities for the fiscal year ended June 30, 2025. This overview and analysis is also intended to assist interested parties in understanding the significant financial issues, including identifying changes in the City's financial position (its ability to address the next and subsequent year's challenges), identifying any material changes to the original budget and identifying individual fund issues or concerns. This analysis requires that you also consider the information presented in the City's basic financial statement.

FINANCIAL HIGHLIGHTS

- The total net position of Richmond City increased $3,455,579 to $21,888,076.
- The total net position of Richmond City is made up of $12,389,956 in capital assets net of related debt and $9,498,120 in other net position.
- Total capital assets increased $1,546,943.
- Business-type activities total net position increased $1,600,206.
- Governmental activities total net position increased $1,855,373.

REPORTING THE CITY AS A WHOLE

This discussion and analysis is intended to serve as an introduction to the City's basic financial statements, consisting of the following components: 1) government-wide financial statements, 2) fund financial statements, and 3) notes to the financial statements. This report also includes other supplementary information in addition to the basic financial statements.

The government-wide financial statements are designed to provide a broad overview of the City's finances, in a manner similar to a private-sector business.

- The Statement of Net Position presents information on all of Richmond City's assets and liabilities, with the difference between the two reported as net position. Over time, increases or decreases in net position may serve as a useful indicator of whether the financial position of Richmond City is improving or deteriorating. However, users should also consider other nonfinancial factors when evaluating the financial statements of the City.

- The Statement of Activities presents information showing how the City's net position changed during the fiscal year reported. All changes in net position are reported as soon as the underlying event giving rise to the change occurs, regardless of the timing of related cash flows. Thus, all of the current year's revenues and expenses are considered regardless of when cash is received or paid.

The government-wide financial statements distinguish functions of Richmond City that are principally supported by taxes and intergovernmental revenues (governmental activities) from other functions that are intended to recover all or a significant portion of their costs through user fees and charges (business-type activities).

The government-wide financial statements can be found on pages 17-19 of this report.

REPORTING THE CITY'S MOST SIGNIFICANT FUNDS

A fund is a grouping of related accounts used to maintain control over resources that have been segregated for specific activities or objectives. Richmond City also uses fund accounting to ensure and demonstrate compliance with finance-related legal requirements. All of the funds of the City can be divided into two categories: governmental funds and proprietary funds. City funds are also held in the Fiduciary Fund.

- Governmental funds – These funds are used to account for the same functions reported as governmental activities in the government-wide financial statements. These fund statements focus on the flow of resources and the balances left at year-end that are available for spending. These funds are reported using an accounting method called modified accrual accounting, which measures cash and other financial assets that can be readily converted to cash. The governmental fund statements provide a detailed, short-term view of the City's general government operations and the basic services provided. Governmental fund information helps users determine whether there are more or fewer financial resources available to spend in the near future to finance the City's programs. We describe the relationship (or differences) between governmental activities (reported in the Statement of Net Position and the Statement of Activities) and governmental funds in a reconciliation included with the fund financial statements.

  The only major governmental funds are the General Fund and the Capital Projects Fund. The rest of the governmental funds are determined to be nonmajor and are included in the combining statements within this report.

- Proprietary funds – Richmond City maintains one type of proprietary fund (enterprise fund), which reports the same functions presented as business-type activities in the government-wide financial statements. Richmond City uses enterprise funds to account for its water utility, sewer utility, and solid waste utility.

  All enterprise funds meet the criteria of major fund classification.

- Fiduciary Funds – Richmond City maintains an agency fund, in which the assets are held by the City in a purely custodial capacity.

GOVERNMENT-WIDE FINANCIAL ANALYSIS

As noted previously, net position may serve over time as a useful indicator of a government's financial position. In the case of Richmond City, assets exceed liabilities by $21,888,076.

The largest portion of Richmond City's net position reflects its investment in capital assets (e.g., land, buildings, infrastructure, and equipment), less any related outstanding debt used to acquire those assets. The City uses these capital assets to provide services to citizens; consequently, these assets are not available for future spending. Although the City's investment in its capital assets is reported net of related debt, it should be noted that the resources needed to repay this debt must be provided from other sources, since the capital assets themselves cannot be used to liquidate these liabilities.

The accompanying financial statements outline and show the revenue and expenditures, together with transfers and changes in the beginning and ending net position in both the governmental and business-type activities.

	Governmental Activities		Business-type Activities	
	2025	2024	2025	2024
Current and other assets	$ 4,351,234	$ 3,780,938	$ 6,168,594	$ 5,331,489
Capital assets	5,846,231	4,595,736	9,413,904	9,117,456
Deferred outflow of resources	65,412	75,697	94,129	88,862
Total assets and deferred outflow	10,262,877	8,452,371	15,676,627	14,537,807
Long-term debt outstanding	14,018	5,428	2,870,179	3,204,179
Other liabilities	548,427	643,700	214,132	341,368
Deferred inflow of resources	404,228	362,412	444	594
Total liabilities and deferred inflow	966,673	1,011,540	3,084,755	3,546,141
Net position				
Net investment in capital assets	5,846,231	4,595,736	6,543,725	5,913,277
Restricted for debt and capital improv.	347,783	170,676	1,666,843	963,925
Unrestricted	3,102,190	2,674,419	4,381,304	4,114,464
Total net position	$ 9,296,204	$ 7,440,831	$ 12,591,872	$ 10,991,666

The following table summarizes the changes in the City's net position for the year ended June 30, 2025:

	Governmental Activities		Business-type Activities	
	2025	2024	2025	2024
Revenues:				
Program revenues:				
Charges for services	$ 362,191	$ 331,024	$ 2,263,215	$ 2,068,235
Operating grants & contributions	336,727	327,757	-	-
Capital grants & contributions	1,468,334	131,014	1,932,050	1,470,549
General revenues:				
Property taxes	415,325	373,070	-	-
Other taxes	1,281,598	1,336,034	-	-
Investment income	154,326	155,899	255,356	228,629
Total revenues	4,018,501	2,654,798	4,450,621	3,767,413
Expenses:				
General government	370,700	477,985	-	-
Public safety	307,756	338,123	-	-
Highways/public improvements	830,574	901,871	-	-
Parks & recreation	530,431	324,358	-	-
Library	123,667	131,908	-	-
Water	-	-	945,770	839,238
Wastewater collection	-	-	1,598,999	1,080,834
Solid waste management	-	-	305,646	254,335
Total expenses	2,163,128	2,174,245	2,850,415	2,174,407
Increase in net position	1,855,373	480,553	1,600,206	1,593,006
Net position, beginning	7,440,831	6,960,278	10,991,666	9,398,660
Net position, ending	$ 9,296,204	$ 7,440,831	$ 12,591,872	$ 10,991,666

FINANCIAL ANALYSIS OF GOVERNMENTAL FUNDS

The focus of the City's governmental funds is to provide information on near-term inflows, outflows, and balances of spendable resources. Such information is useful in assessing the City's financing requirements.

As of June 30, 2025, the City's governmental funds (General, Special Revenue, and Capital Projects) reported combined fund balances of $3,448,572 as compared to $2,819,315 as of June 30, 2024.

Significant changes in the governmental funds include an increase in intergovernmental income and related expenditures of approximately $900,000 due to the receipt of grant revenue and related expenses.

FINANCIAL ANALYSIS OF GOVERNMENTAL FUNDS – *continued*

The General Fund is the chief operating fund of the City. All activities which are not required to be accounted for in separate funds either by state or local ordinance or by a desire to match revenues and expenses are accounted for in this fund. Taxes are the largest source of revenue in the General Fund and represent 48 percent of total General Fund revenues.

GENERAL FUND BUDGETARY HIGHLIGHTS

The original General Fund budget was amended from $2,911,479 to $3,379,902. Increases were for revenue received from an equipment surplus sale, sales tax, franchise tax, mass transit tax, local road fund tax, Class "C" Road funds, and the RTIF (Rural Transportation Investment Fund) tax. Other increases were for grants received including transportation planning, library ILL grant, library CLEF grant, library children's book grant, KUED library grant, and RAPZ tax. Donation increases were for the library, DUP (Daughters of Utah Pioneers) project, and Black & White Days. It was the 110th celebration of Black & White Days in May which resulted in significant donations received as well as higher than normal expenses in relation to the yearly event. Revenue decreases were for dog licenses, justice court fines, interest earnings and donations to The Park Bench (Senior Center). Expense increases were in several funds. Administration Fund for the sales tax rebate paid to Lee's Marketplace. The percentage paid to Lee's decreases every 12 months, but their sales have continued to grow and the amount paid to them by the city has increased. Building Fund increases for maintenance and repair, the Park Bench program and for the Black & White Days building remodel which was mostly funded with RAPZ Tax funding. The project was completed in advance of the 110th Black & White Days celebration which was held in May. Streets Department increases for maintenance, supplies, Class "C" Road Funds, local road tax, mass transit tax and RTIF (Rural Transportation Investment Fund) tax. Decreases for insurance and wages. The 400 West 150 North road construction project was completed during the fiscal year and the grant funding for the project was received. Parks Department increases were for wages, benefits utilities, tree pruning, construction of a new bathroom facility at the city park as well as the Black & White Days celebration. Library increases were for building maintenance which included the remodel of the bathrooms in the library, and several grants which included KUED, ILL, hotspot, CLEF and children's book. Planning Fund increases were for legal counsel fees and insurance. A transfer to the Capital Projects Fund was included in the final budget. Revenue increases in the Water Enterprise Fund were for dedication payments, meter installations, impact fees, interest revenue and the monthly utility fee. Expense increases were for wages, benefits, utilities, engineering, supplies and insurance. Decreases were for maintenance and repair, annual audit fee, sampling and water meter purchases. Revenue increases in the Sewer Enterprise Fund were for impact fees, interest revenue and the monthly utility fee. Expense increases were for maintenance and repair, engineering, supplies, insurance and sampling. Master Plans for the culinary water system and sewer treatment and sewer collection were worked on throughout the fiscal year. Solid Waste Enterprise Fund revenue increases were for the monthly utility fee. Expense increases were for credit/debit card fees, annual audit, insurance, carrier fee, and IT equipment and service. Expense decreases were for legal and professional fees and new garbage can purchases. With significant growth throughout the city mainly in the Richmond Village, The Knolls Phase 1, City Creek Subdivision, and the Johnson View Subdivisions monthly utility revenue will continue to increase across all funds.

CAPITAL ASSET AND DEBT ADMINISTRATION

Capital assets – Richmond City's investment in capital assets (net of accumulated depreciation) as of June 30, 2025, amounted to $15,260,135. This investment in capital assets includes land, buildings, improvements, machinery, and equipment.
Long-term debt – At June 30, 2025, the City had business activity (enterprise funds) debt equal to $2,870,179. Compensated absences totaled $14,018 for the governmental activities. During the year, the City made its required principal and interest payments on all debt.

ECONOMIC FACTORS AND NEXT YEAR'S BUDGET AND RATES

Revenue across all funds was higher than budgeted with the addition of several grants as well as a population that continues to grow at a higher rate than in the past. The vast majority of the growth being in The Knolls, Phase 1, Richmond Village, which will be built out in Fiscal Year 2026, City Creek and the Johnson View Subdivisions. The 400 West 150 North road construction project was completed in Fiscal Year 2025. This significantly improved safety in the area by adding a new asphalt road and sidewalk in the area of 150 North from 200 West to 400 West and on 400 West from Main Street to 150 North. Impact Fees were substantial in Fiscal Year 2025 and are not budgeted for until they are received. With the Richmond Village project almost completed it is anticipated that impact fee revenue will decrease in Fiscal Year 2026 compared to Fiscal Year 2025. Utility revenue in water, sewer and solid waste will continue to increase in Fiscal Year 2026 as these new units are completed and occupied. A RAPZ Tax project for the renovation of the Community Building and future home of The Park Bench was approved and remodel work is anticipated to start in Fiscal Year 2026. The original General Fund budget is less in Fiscal Year 2026 than in Fiscal Year 2025 as the COG (Cache County Council of Governments) grant for the road construction project was included in Fiscal Year 2025 and is not part of Fiscal Year 2026. This grant was for just under $900,000. Installation of a sprinkler system at the Black & White Days building was budgeted for as was the purchase of a new commercial grade lawnmower. The percentage paid to Lee's Marketplace for their sales tax rebate decreases every 12 months but as their sales continue to grow the amount paid to them has continued to increase. Only a couple of renovation projects at the Park Community Center have been budgeted for one of which includes a new electronic steel entry door on the east side of the gym. The monthly central dispatch fee was increased by Logan City and changed from $3.00 per month to $3.30 per month starting in July 2025. The Transportation Master plan is forecasted to be completed in Fiscal Year 2026; it started in Fiscal Year 2025. Typically, grants are not budgeted for until received other than RAPZ Tax which is typically approved in May of each year for the following fiscal year. The water utility base rate was increased by $1.00 per month in July and by $2.00 per month in the sewer utility fee. The amount paid by Lewiston City and Richmond City to fund the Cub River Sports Complex stayed the same at $25,000 per city.

REQUESTS FOR INFORMATION

This final report is designed to provide a general overview of the City's finances for all those with an interest in the City's financials. Questions concerning any information provided in this report or request for additional information should be addressed to: City Recorder, Richmond City Corporation, 90 South 100 West, Richmond, Utah 84333.

RICHMOND CITY
Statement of Net Position

As of June 30, 2025

	Governmental Activities	Business-type Activities	Total 2025	Memorandum Total 2024
Assets				
Cash and cash equivalents	$ 3,184,413	$ 4,205,835	$ 7,390,248	$ 7,027,876
Accounts receivable	223,374	295,916	519,290	272,245
Taxes receivable	562,989	-	562,989	508,317
Prepaid expenses and other assets	-	-	-	8,898
Restricted assets:				
Cash and cash equivalents	340,117	1,666,843	2,006,960	1,262,801
Accounts receivable	40,341	-	40,341	32,290
Net pension asset	-	-	-	-
Capital assets:				
Land	345,288	1,853,186	2,198,474	2,120,922
Construction in process	-	-	-	69,706
Buildings	2,542,564	4,797,611	7,340,175	7,023,101
Improvements	-	11,639,721	11,639,721	10,832,990
Infrastructure	7,434,659	-	7,434,659	6,072,806
Machinery and equipment	2,110,630	1,867,586	3,978,216	3,935,445
Less: accumulated depreciation	(6,586,910)	(10,744,200)	(17,331,110)	(16,341,778)
Total assets	10,197,465	15,582,498	25,779,963	22,825,619
Deferred outflow of resources - pensions	65,412	94,129	159,541	164,559
Total assets and deferred outflows	$ 10,262,877	$ 15,676,627	$ 25,939,504	$ 22,990,178

See accompanying notes to the financial statements.

RICHMOND CITY
Statement of Net Position

Continued

	Governmental Activities	Business-type Activities	Total 2025	Memorandum Total 2024
Liabilities & deferred inflows of resources				
Accounts payable and accrued expenses	$ 114,896	$ 142,634	$ 257,530	$ 602,325
Deposits	383,846	-	383,846	287,127
Noncurrent liabilities:				
Pension liability	49,685	71,498	121,183	95,616
Due within one year	7,009	188,000	195,009	187,714
Due in more than one year	7,009	2,682,179	2,689,188	3,021,893
Total liabilities	562,445	3,084,311	3,646,756	4,194,675
Deferred inflow - pensions	308	444	752	1,100
Deferred inflow - property taxes	403,920	-	403,920	361,906
Total liabilities and deferred inflows	$ 966,673	$ 3,084,755	$ 4,051,428	$ 4,557,681
Net Position				
Net investment in capital assets	$ 5,846,231	$ 6,543,725	$ 12,389,956	$ 10,509,013
Restricted - debt service	-	491,704	491,704	491,454
Restricted - class c and local road tax	347,783	-	347,783	170,676
Restricted - impact fees	-	1,175,139	1,175,139	472,471
Unrestricted	3,102,190	4,381,304	7,483,494	6,788,883
Total net position	$ 9,296,204	$ 12,591,872	$ 21,888,076	$ 18,432,497

See accompanying notes to the financial statements.

For the Year Ended June 30, 2025

	Expenses	Program Revenues: Charges for Services	Program Revenues: Operating Grants and Contributions	Program Revenues: Capital Grants and Contributions	Net Governmental Activities	Business-Type Activities	Total 2025	Memorandum Total 2024
Governmental activities:								
General government	$ 370,700	$ 186,292	$ 35,536	$ -	$ (148,872)	$ -	$ (148,872)	$ (215,170)
Public safety	307,756	41,819	-	-	(265,937)	-	(265,937)	(272,003)
Streets and highway	830,574	11,067	217,484	1,286,473	684,450	-	684,450	(617,932)
Parks, recreation & public property	530,431	122,848	50,475	181,861	(175,247)	-	(175,247)	(162,239)
Library	123,667	165	33,232	-	(90,270)	-	(90,270)	(117,106)
Total governmental activities	2,163,128	362,191	336,727	1,468,334	4,124	-	4,124	(1,384,450)
Business-type activities:								
Water	945,770	983,439	-	1,048,220	-	1,085,889	1,085,889	953,357
Sewer	1,598,999	983,509	-	883,830	-	268,340	268,340	392,247
Solid waste	305,646	296,267	-	-	-	(9,379)	(9,379)	18,773
Total business-type activities	2,850,415	2,263,215	-	1,932,050	-	1,344,850	1,344,850	1,364,377
General Revenues:								
Taxes:								
Sales and use tax					718,931	-	718,931	710,400
Franchise and other taxes					562,667	-	562,667	625,634
Property tax					415,325	-	415,325	373,070
Total taxes					1,696,923	-	1,696,923	1,709,104
Investment income					154,326	255,356	409,682	384,528
Total general revenues					1,851,249	255,356	2,106,605	2,093,632
Change in net position					1,855,373	1,600,206	3,455,579	2,073,559
Net position, beginning					7,440,831	10,991,666	18,432,497	16,358,938
Net position, ending					$ 9,296,204	$ 12,591,872	$ 21,888,076	$ 18,432,497

See accompanying notes to the financial statements.

RICHMOND CITY
Balance Sheet
Governmental Funds

As of June 30, 2025

	General	Capital Projects Fund	Other Governmental Funds	Total 2025	Memorandum Total 2024
Assets					
Cash and cash equivalents	$ 573,271	$ 2,595,734	$ 15,408	$ 3,184,413	$ 2,892,841
Accounts receivable, net	222,519	-	855	223,374	89,653
Taxes receivable	562,989	-	-	562,989	508,317
Prepaid expense and deposits	-	-	-	-	8,898
Restricted assets:					
Cash and cash equivalents	340,117	-	-	340,117	248,939
Accounts receivable	40,341	-	-	40,341	32,290
Total assets	$ 1,739,237	$ 2,595,734	$ 16,263	$ 4,351,234	$ 3,780,938
Liabilities, deferred inflow of resources and fund balance					
Liabilities:					
Accounts payable and accrued expenses	$ 80,174	$ -	$ 2,047	$ 82,221	$ 202,037
Deferred revenue	32,675	-	-	32,675	110,553
Customer deposits	383,846	-	-	383,846	287,127
Total liabilities	496,695	-	2,047	498,742	599,717
Deferred inflow of resources	403,920	-	-	403,920	361,906
Total liabilities and deferred inflow of resources	900,615	-	2,047	902,662	961,623
Fund balance:					
Restricted-class c and local road tax	347,783	-	-	347,783	170,676
Assigned	-	2,595,734	14,216	2,609,950	2,035,387
Unassigned	490,839	-	-	490,839	613,252
Total fund balances	838,622	2,595,734	14,216	3,448,572	2,819,315
Total liabilities, deferred inflow of resources and fund balance	$ 1,739,237	$ 2,595,734	$ 16,263	$ 4,351,234	$ 3,780,938

See accompanying notes to the financial statements.

RICHMOND CITY
Reconciliation of the Balance Sheet of Governmental Funds to the Statement of Net Position

For the Year Ended June 30, 2025

Total fund balances for governmental funds		$ 3,448,572
Amounts reported for governmental activities in the statement of net position are different because:		
Capital assets used in governmental activities are not financial resources and therefore are not reported in the governmental funds.		
Land	$ 345,288	
Infrastructure	7,434,659	
Buildings	2,542,564	
Machinery and equipment	2,110,630	
Accumulated depreciation	(6,586,910)	5,846,231
Long-term liabilities are not due and payable in the current period and therefore are not reported in the governmental funds.		
Deferred outflows of resources related to pensions	65,412	
Deferred inflows of resources related to pensions	(308)	
Net pension liability	(49,685)	
Compensated absences	(14,018)	1,401
Net position of governmental activities		$ 9,296,204

See accompanying notes to the financial statements.

RICHMOND CITY
Statement of Revenues, Expenditures, and Changes in Fund Balances
Governmental Funds

For the Year Ended June 30, 2025

	General	Capital Projects Fund	Other Governmental Funds	Total 2025	Memorandum Total 2024
Revenues:					
Taxes	$ 1,696,923	$ -	$ -	$ 1,696,923	$ 1,709,104
Licenses and permits	4,730	-	-	4,730	4,830
Intergovernmental	1,254,546	-	25,000	1,279,546	383,153
Charges for services	314,374	-	-	314,374	265,943
Fines and forfeitures	2,529	-	-	2,529	28,630
Library	565	-	-	565	1,672
Miscellaneous revenues	158,058	105,576	2,096	265,730	242,836
Total revenues	3,431,725	105,576	27,096	3,564,397	2,636,168
Expenditures:					
General government	650,707	-	-	650,707	555,421
Public safety	271,588	-	-	271,588	300,867
Streets and public improvements	1,413,420	-	-	1,413,420	950,269
Parks, recreation and public property	406,519	-	66,389	472,908	342,347
Library	126,517	-	-	126,517	127,072
Total expenditures	2,868,751	-	66,389	2,935,140	2,275,976
Excess (deficiency) of revenues over expenditures	562,974	105,576	(39,293)	629,257	360,192
Other financing sources (uses):					
Transfers in	-	483,280	25,000	508,280	550,807
Transfers out	(508,280)	-	-	(508,280)	(550,807)
Total other financing sources (uses)	(508,280)	483,280	25,000	-	-
Net change in fund balances	54,694	588,856	(14,293)	629,257	360,192
Fund balances, beginning	783,928	2,006,878	28,509	2,819,315	2,459,123
Fund balances, ending	$ 838,622	$ 2,595,734	$ 14,216	$ 3,448,572	$ 2,819,315

See accompanying notes to the financial statements.

RICHMOND CITY
Reconciliation of the Statement of Revenues, Expenditures, and Changes in Fund Balances of Governmental Funds to the Statement of Activities

For the Year Ended June 30, 2025

Amounts reported for the governmental activities in the statements of activities are different due to the following items:	2025
Net change in fund balances-total governmental funds	$ 629,257
Governmental funds report capital outlays as expenditures.	
However, in the Statement of Activities the cost of those assets is allocated over their estimated useful lives and reported as depreciation expense. This is the amount by which depreciation exceeded capital outlays in the current period.	
Depreciation expense	(389,128)
Capital outlay	1,185,519
Capital contributions	454,104
Pension expense	(15,789)
Compensated absences are an expense in the statement of activities but not in governmental funds.	
Changes in compensated absences	(8,590)
Change in net position of governmental activities	$ 1,855,373

See accompanying notes to the financial statements.

RICHMOND CITY
Statement of Revenues, Expenditures, and Changes in Fund Balance
Budget and Actual - General Fund

For the Year Ended June 30, 2025

	Original Budget	Final Budget	Actual	Variance Favorable (Unfavorable)
Revenues:				
Taxes	$ 1,338,256	$ 1,603,467	$ 1,696,923	$ 93,456
Licenses and permits	4,600	4,665	4,730	65
Intergovernmental	1,219,200	1,314,539	1,254,546	(59,993)
Charges for services	263,073	301,252	314,374	13,122
Fines and forfeitures	5,000	2,000	2,529	529
Library	100	510	565	55
Miscellaneous revenues	81,250	153,469	158,058	4,589
Total revenues	2,911,479	3,379,902	3,431,725	51,823
Expenditures:				
General government	622,183	714,989	650,707	64,282
Public safety	281,045	274,827	271,588	3,239
Streets and public improvements	1,549,761	1,755,319	1,413,420	341,899
Parks, recreation and public property	321,124	395,825	406,519	(10,694)
Library	122,218	130,662	126,517	4,145
Total expenditures	2,896,331	3,271,622	2,868,751	402,871
Excess of revenues over expenditures	15,148	108,280	562,974	454,694
Other financing sources (uses):				
Transfers in (out):				
Capital projects fund	-	(83,280)	(483,280)	(400,000)
Special revenue fund	(25,000)	(25,000)	(25,000)	-
Total other financing sources (uses)	(25,000)	(108,280)	(508,280)	(400,000)
Excess (deficiency) of Net change in fund balances	(9,852)	-	54,694	54,694
Fund balance, beginning	783,928	783,928	783,928	-
Fund balance, ending	$ 774,076	$ 783,928	$ 838,622	$ 54,694

See accompanying notes to the financial statements.

RICHMOND CITY
Statement of Net Position
Proprietary Funds

As of June 30, 2025

	Water Utility Fund	Sewer Utility Fund	Solid Waste Utility Fund	Totals 2025	Memorandum Totals 2024
Assets					
Current assets:					
Cash and cash equivalents	$ 2,662,288	$ 1,511,910	$ 31,637	$ 4,205,835	$ 4,135,035
Accounts receivable, net	136,571	132,554	26,791	295,916	182,592
Restricted cash	1,466,676	200,167	-	1,666,843	1,013,862
Total current assets	4,265,535	1,844,631	58,428	6,168,594	5,331,489
Pension asset	-	-	-	-	-
Capital assets:					
Land and water rights	1,682,758	170,428	-	1,853,186	1,793,186
Buildings	149,984	4,647,627	-	4,797,611	4,797,611
Improvements other than buildings	8,201,280	3,438,441	-	11,639,721	10,832,990
Equipment	375,555	1,492,031	-	1,867,586	1,809,237
Less accumulated depreciation	(4,199,238)	(6,544,962)	-	(10,744,200)	(10,115,568)
Total capital assets	6,210,339	3,203,565	-	9,413,904	9,117,456
Deferred outflow of resources - pensions	49,458	43,076	1,595	94,129	88,862
Total assets and deferred outflows	10,525,332	5,091,272	60,023	15,676,627	14,537,807
Liabilities					
Current liabilities:					
Accounts payable	61,821	62,121	18,692	142,634	239,798
Deferred revenue	-	-	-	-	49,937
Bonds payable, current	-	188,000	-	188,000	185,000
Total current liabilities	61,821	250,121	18,692	330,634	474,735
Long-term liabilities:					
Pension liability	37,567	32,719	1,212	71,498	51,633
Bonds payable	2,094,179	588,000	-	2,682,179	3,019,179
Total long-term liabilities	2,131,746	620,719	1,212	2,753,677	3,070,812
Total liabilities	2,193,567	870,840	19,904	3,084,311	3,545,547
Deferred inflow of resources - pensions	233	203	8	444	594
Total liabilities and deferred inflows	2,193,800	871,043	19,912	3,084,755	3,546,141
Net Position					
Net investment in capital assets	4,116,160	2,427,565	-	6,543,725	5,913,277
Restricted - debt service	291,537	200,167	-	491,704	491,454
Restricted - impact fees	1,175,139	-	-	1,175,139	472,471
Unrestricted	2,748,696	1,592,497	40,111	4,381,304	4,114,464
Total net position	$ 8,331,532	$ 4,220,229	$ 40,111	$ 12,591,872	$ 10,991,666

See accompanying notes to the financial statements.

RICHMOND CITY
Statement of Revenues, Expenses and Changes in Fund Net Position
Proprietary Funds

For the Year Ended June 30, 2025

	Water Utility Fund	Sewer Utility Fund	Solid Waste Utility Fund	Totals 2025	Memorandum Totals 2024
Operating revenues:					
Charges for services	$ 891,504	$ 975,557	$ 296,267	$ 2,163,328	$ 1,981,140
Connection fees and other	31,935	7,952	-	39,887	32,095
Total operating revenues	923,439	983,509	296,267	2,203,215	2,013,235
Operating expenses:					
Salaries and benefits	270,683	304,018	20,893	595,594	454,100
Current expenses	337,165	920,435	284,753	1,542,353	1,008,443
Depreciation	254,086	374,546	-	628,632	622,382
Total operating expenses	861,934	1,598,999	305,646	2,766,579	2,084,925
Operating income (loss)	61,505	(615,490)	(9,379)	(563,364)	(71,690)
Non-operating revenue (expense):					
Interest expense	(83,836)	-	-	(83,836)	(89,482)
Interest income	173,494	80,778	1,084	255,356	228,629
Total non-operating revenue (expense)	89,658	80,778	1,084	171,520	139,147
Net income before contributions	151,163	(534,712)	(8,295)	(391,844)	67,457
Impact fees	791,368	509,572	-	1,300,940	1,256,807
Water dedication contributions	60,000	-	-	60,000	55,000
Contributed capital	206,915	263,705	-	470,620	141,015
Grant income	49,937	110,553	-	160,490	72,727
Change in net position	1,259,383	349,118	(8,295)	1,600,206	1,593,006
Net position, beginning	7,072,149	3,871,111	48,406	10,991,666	9,398,660
Net position, ending	$ 8,331,532	$ 4,220,229	$ 40,111	$ 12,591,872	$ 10,991,666

See accompanying notes to the financial statements.

RICHMOND CITY
Statement of Cash Flows
Proprietary Funds

For the Year Ended June 30, 2025

	Water Utility Fund	Sewer Utility Fund	Solid Waste Utility Fund	Total 2025	Memorandum Total 2024
Cash Flows From Operating Activities					
Receipts from customers and users	$ 866,885	$ 929,781	$ 293,225	$ 2,089,891	$ 2,013,121
Payments to suppliers	(379,906)	(960,863)	(284,300)	(1,625,069)	(889,236)
Payments to employees	(270,683)	(304,018)	(20,893)	(595,594)	(454,100)
Net cash flows from operating activities	216,296	(335,100)	(11,968)	(130,772)	669,785
Cash Flows From Noncapital Financing Activities					
Impact fees	791,368	509,572	-	1,300,940	1,256,807
Water dedication contribution	-	-	-	-	55,000
Net cash flows from noncapital financing activities	791,368	509,572	-	1,300,940	1,311,807
Cash Flows From Capital and Related Financing Activities					
Acquisition and construction of capital assets	(189,939)	(204,521)	-	(394,460)	(166,331)
Proceeds from grant	-	110,553	-	110,553	-
Principal payments on bonds payable	(149,000)	(185,000)	-	(334,000)	(325,000)
Interest payments on bonds payable	(83,836)	-	-	(83,836)	(89,482)
Net cash flows from capital and related financing activities	(422,775)	(278,968)	-	(701,743)	(580,813)
Cash Flows From Investing Activities					
Interest received	173,494	80,778	1,084	255,356	228,629
Net cash flows from investing activities	173,494	80,778	1,084	255,356	228,629
Net increase (decrease) in cash, restricted cash and cash equivalents	758,383	(23,718)	(10,884)	723,781	1,629,408
Cash, restricted cash, and cash equivalents at beginning of year	3,370,581	1,735,795	42,521	5,148,897	3,519,489
Cash, restricted cash, and cash equivalents at end of year	$ 4,128,964	$ 1,712,077	$ 31,637	$ 5,872,678	$ 5,148,897
Shown in the Statement of Net Position as:					
Cash and cash equivalents	$ 2,662,288	$ 1,511,910	$ 31,637	$ 4,205,835	$ 4,135,035
Restricted cash and cash equivalents	1,466,676	200,167	-	1,666,843	1,013,862
Total cash, restricted cash, and cash equivalents	$ 4,128,964	$ 1,712,077	$ 31,637	$ 5,872,678	$ 5,148,897

See accompanying notes to the financial statements.

RICHMOND CITY
Statement of Cash Flows
Proprietary Funds

Continued

	Water Utility Fund	Sewer Utility Fund	Solid Waste Utility Fund	Total 2025	Memorandum Total 2024
Reconciliation of operating income (loss) to net cash provided by operating activities:					
Operating income (loss)	$ 61,505	$ (615,490)	$ (9,379)	$ (563,364)	$ (71,690)
Adjustments to reconcile operating income (loss) to net cash provided by operating activities:					
Depreciation	254,086	374,546	-	628,632	622,382
Changes in assets & liabilities:					
(Increase) decrease in accounts receivable	(56,554)	(53,728)	(3,042)	(113,324)	(114)
(Increase) decrease in deferred outflows	(9,964)	6,292	(1,595)	(5,267)	(13,235)
Increase (decrease) in accounts payable	(47,365)	(50,627)	828	(97,164)	120,091
Increase (decrease) in pension liability	14,619	4,034	1,212	19,865	12,877
Increase (decrease) in deferred inflows	(31)	(127)	8	(150)	(526)
Net cash flows from operating activities	$ 216,296	$ (335,100)	$ (11,968)	$ (130,772)	$ 669,785
Supplementary information					
Non-cash transactions:					
Acquisition of capital assets through developer contributions	$ 206,915	$ 263,705	$ -	$ 470,620	$ 141,015
Water dedication shares donated in lieu of fee	$ 60,000	$ -	$ -	$ 60,000	$ -

See accompanying notes to the financial statements.

RICHMOND CITY
Statement of Fiduciary Net Position
Fiduciary Funds

As of June 30, 2025

		Agency Funds
Assets		
Pooled cash and cash equivalents	$	265,500
Accounts receivable		3,316
Furniture, fixtures and equipment, net		114,016
Total assets	$	382,832
Liabilities		
Payables	$	1,466
Due to other government units		381,366
Total liabilities	$	382,832

See accompanying notes to the financial statements.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Richmond City (the "City"), operates as an incorporated governmental entity within the State of Utah. The City operates under a council-mayor form of government and provides the following services: public safety (police and fire), highway and streets, recreation, public improvements, planning and zoning, health services and general administrative services. In addition, the City owns and operates water, sewer system, and solid waste utility funds.

The financial statements of the City have been prepared in conformity with accounting principles generally accepted in the United States of America (GAAP) as applied to governmental units. The Governmental Accounting Standards Board (GASB) is the accepted standard-setting body for establishing governmental accounting and financial reporting principles. Significant accounting policies established by GAAP and used by the City are discussed below.

Reporting Model

The financial statements include a Management's Discussion and Analysis (MD&A) section, which provides an analysis of the City's overall financial position and results of operations.

The Statement of Net Position and Statement of Activities have been prepared using accrual accounting.

The financial statements focus on major funds and provide a reconciliation between fund balance and net position.

In addition to the financial statement changes noted above, required changes in note disclosures are included in the basic financial statements.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES – *continued*

Financial Reporting Entity

The City's basic financial statements include the accounts of all City operations. The accounting policies of the City conform to generally accepted accounting principles.

The City has an agreement with Lewiston City to jointly operate the Cub River Sports Complex. Accounting for the Cub River Sports Complex has been performed by Richmond City since July 1, 2006 and is a discretely presented component unit of the City.

The City has created a Municipal Building Authority (MBA) in anticipation of future bonding needs. The MBA was not funded and had no financial activity during the year. The MBA is a discretely presented component unit of the City.

Richmond City Cemetery Maintenance District (the "District") is a separate legal entity that the City does not control and is not dependent on the City. However, the District has contracted with the City to perform accounting duties, collect funds, and pay bills as directed by the District. This activity is reported in the City's agency fund.

The City has no oversight responsibility for any other governmental entity since no other entities are considered to be controlled by or dependent on the City. Controls or dependence is determined on the basis of budget adoption, taxing authority, funding, and appointment of the respective governing board.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES – *continued*

Basic Financial Statements – Government-Wide Statements

The City's basic financial statements include both government-wide (reporting the City as a whole) and fund financial statements (reporting the City's major funds). Both the government-wide and fund financial statements categorize primary activities as either governmental or business type. The City's public safety, highway and streets, sanitation, recreation, public improvements, planning and zoning, health services and general administrative services are classified as governmental activities. The City's water, sewer, and solid waste management services are classified as business-type activities.

In the government-wide Statement of Net Position, both the governmental and business-type activities columns are a) presented on a consolidated basis by column, and b) are reported on a full accrual, economic resource basis, which recognizes all long-term assets and receivables as well as long-term debt and obligations. The City's net position is reported in three parts, net investment in capital assets; restricted net position; and unrestricted net position. The City first utilizes restricted resources to finance qualifying activities.

Governmental activities are usually financed through taxes, intergovernmental revenues, and other non-exchange revenues. Business-type activities are financed in whole or in part by fees charged to external parties for goods or services.

The government-wide Statement of Activities reports both the gross and net cost of each of the City's functions and business-type activities (general, public safety, etc.). The functions are also supported by general government revenues (property, sales and use taxes, certain intergovernmental revenues, fines, permits and charges, etc.). The Statement of Activities reduces gross expenses (including depreciation) by related program revenues, operating and capital grants.

Program revenues must be directly associated with a function or a business-type activity. Operating grants include operating-specific and discretionary (either operating or capital) grants while the capital grants column reflects capital-specific grants.

The net costs (by function of business-type activities) are normally covered by general revenue (property or sales taxes, intergovernmental revenues, interest income, etc.). The City does not allocate indirect costs.

These government-wide statements focus on the sustainability of the City as an entity and the change in the City's net position resulting from the current year's activities.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES – *continued*

Basic Financial Statements – Fund Statements

The City's accounting system is organized on a fund basis. A fund is a fiscal and accounting entity with a self-balancing set of accounts that the government establishes for accountability purposes in accordance with statutes, laws, regulations, restrictions, or specific purposes.

Financial statements are presented for both governmental funds and proprietary funds. The emphasis of fund financial statements is on major individual funds, as defined by GAAP, with each displayed as a separate column. All remaining governmental and proprietary funds are aggregated and reported as nonmajor funds in their respective fund financial statements.

The following fund types are used by the City.

Governmental Funds

The focus of the governmental funds' measurement (in the fund statements) is upon determination of financial position and changes in financial position (sources, uses, and balances of financial resources) rather than upon net income. The following is a description of the governmental funds of the City.

- The General Fund is the general operating fund of the City. It is used to account for all financial resources except those required to be accounted for in another fund.
- The Special Revenue Fund for the Cub River Sports Complex is used to account for the proceeds of specific revenue sources that are legally restricted and can only be expended for specified purposes.
- The Capital Projects Fund is used to account for the financial resources to be used for the acquisition of capital facilities and equipment by the City.

The City's major governmental funds include the General Fund and the Capital Projects Fund while the Cub River Sports Complex is shown as a nonmajor fund.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES – *continued*

Basic Financial Statements – Fund Statements – *continued*

Proprietary Funds

The focus of proprietary fund measurement is upon determination of operating income, changes in net position, financial position, and cash flows. The generally accepted accounting principles applicable are similar to those applied by businesses in the private sector. The following is a description of the proprietary funds of the City. Proprietary funds distinguish operating revenues and expenses from non-operating items. Operating revenues and expenses generally result from providing services and producing and delivering goods in connection with a proprietary fund's principal ongoing operations. Revenues and expenses not meeting this definition, such as investment earnings, are reported as non-operating.

Enterprise Funds are required to be used to account for operations for which a fee is charged to external users for goods or services and the activity is a) financed with debt that is solely secured by a pledge of the net revenues, b) has third party requirements that the cost of providing services, including capital costs, be recovered with fees and charges or c) establishes fees and charges based on a pricing policy designed to recover similar costs.

The City's major enterprise funds consist of the following:

Water Utility Fund – This fund accounts for the water services provided to City residents.

Sewer Utility Fund – This fund accounts for the collection of sewer waste by the City sewer system.

Solid Waste Utility Fund – This fund accounts for the solid waste management services provided to City residents.

Fiduciary Funds

The City's fiduciary funds consist solely of an agency fund. Agency funds account for assets held by the City in a purely custodial capacity. Since agency funds are custodial in nature (i.e., assets equal liabilities), they do not involve the measurement of results of operations. As required under GASB, fiduciary's funds are not included in the government-wide statements, but are included as part of the fund financials in this report. The agency fund consists of:

Richmond Cemetery Maintenance District – This fund is used to account for the funds held on behalf of Richmond Cemetery Maintenance District.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES – *continued*

Basis of Accounting

Basis of accounting refers to the point at which revenues or expenditures/expenses are recognized in the accounts and reported in the financial statements. It relates to the timing of the measurements made regardless of the measurement focus applied.

Accrual

Both governmental and business-type activities in the government-wide financial statement and the proprietary fund financial statements are represented on the accrual basis of accounting. Revenues are recorded when earned and expenses are recorded when a liability is incurred, regardless of the timing of related cash flows. Property taxes are recognized as revenues in the year for which they are levied. Grants and similar items are recognized as revenue as soon as all eligibility requirements imposed by the provider have been met.

Modified Accrual

The governmental funds financial statements are presented on the modified accrual basis of accounting. Under the modified accrual basis of accounting, revenues are recorded when they are both measurable and available. Revenues are considered to be available when they are collectible within the current period or soon enough thereafter to pay liabilities of the current period. For this purpose, the City considers revenues to be available if they are collected within 60 days of the end of the current fiscal period. Expenditures are generally recognized under the modified accrual basis of accounting when the related liability is incurred. However, debt service and compensated absences expenditures are recorded only when payment is due.

Financial Statement Amounts

Cash and Cash Equivalents

The City considers cash and cash equivalents in proprietary funds to be cash on hand, demand deposits, and short-term investments with original maturities of three months or less from the date of acquisition, including investments in the Utah Public Treasurers' Investment Fund (PTIF).

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES – *continued*

Financial Statement Amounts – *continued*

Interfund Receivables and Payables

During the course of operations, transactions sometimes occur between individual funds that may result in amounts owed between funds. Interfund receivables and payables between funds within governmental activities are eliminated in the Statement of Net Position.

Accounts Receivable and Due From Other Governments

Receivables consist of all revenues earned at year-end but received after year-end. Allowances for uncollectible accounts are based upon historical trends. Receivable balances for the governmental activities include sales taxes, franchise taxes, property taxes, garbage collection fees, and ambulance fees. Business-type activities report receivables for utility service fees.

Capital Assets

Capital assets purchased or acquired with an original cost of $5,000 or more are reported at historical cost or estimated historical cost. Contributed assets are reported at fair market value as of the date received. Additions, improvements, and other capital outlays that significantly extend the useful life of an asset are capitalized. Other costs incurred for repairs and maintenance are expensed as incurred.

Depreciation on all depreciable assets has been provided over the estimated useful lives using the straight-line method. The estimated useful lives are as follows:

Buildings	30 years
Improvements other than buildings	10-50 years
Structures and systems	15-60 years
Machinery and equipment	3-20 years

Infrastructure assets include roads, bridges, underground pipe (other than related to utilities), etc.

In the governmental fund financial statements, the acquisition or construction of capital assets is accounted for as capital outlay expenditures.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES – *continued*

Financial Statement Amounts – *continued*

Unearned Revenues

In the government-wide statements and the proprietary fund statements, unearned revenue is recognized when cash or other assets are received or recognized prior to being earned. In the governmental fund statements, unearned revenue is recorded when revenue is either unearned or unavailable.

Compensated Absences

The City's policies regarding personal time off (PTO) permit employees to accumulate unused leave up to 240 hours. An employee who is separated or retires from employment shall be compensated for all PTO which he/she has accrued. The liability for compensated absences is recognized for leave that has not been used and leave that has been used but not yet paid in cash or settled through noncash means. A liability is recognized if the leave is attributable to services already rendered, accumulates, and is more likely than not to be used for time off or paid out upon termination or retirement. The liability for these compensated absences is recorded as long-term debt in the government-wide statement of governmental activities and as accrued liabilities in the business-type activities. The current portion of this debt is estimated based on historical trends. In the fund financial statements, governmental funds do not report a liability for compensated absences while proprietary funds report the liability as it is incurred. Compensated absences related to governmental activities are usually liquidated by the General Fund.

Long-term Debt

The accounting treatment of long-term debt depends on whether the assets are used in governmental fund operations or proprietary fund operations and whether they are reported in the government-wide or fund financial statements.

All long-term debt to be repaid from governmental and business-type resources is reported as liabilities in the government-wide financial statements. The long-term debt consists primarily of bonds payable, notes payable, and accrued compensated absences.

Long-term debt for governmental funds is not reported as liabilities in the fund financial statements. The debt proceeds are reported as other financing sources and payment of principal and interest reported as expenditures. The accounting for proprietary fund long-term debt is the same in the fund statement as it is in the government-wide statements.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES – *continued*

Financial Statement Amounts – *continued*

Equity Classifications

Equity in the government-wide financial statements is classified as net position and displayed in three components:

- *Net investment in capital assets* consists of capital assets including restricted capital assets, net of accumulated depreciation and unexpended bond proceeds reduced by the outstanding balances of any bonds, notes, or other borrowings that are attributable to the acquisition, construction or improvement of such assets.

- *Restricted net position* consists of net position with constraints placed on the City by 1) external groups such as creditors, grantors or laws and regulations of other governments; or 2) law through constitutional provisions or enabling legislation.

- *Unrestricted net position* consists of all other net position that does not meet the definition of *restricted or invested in capital assets, net of related debt*.

In the governmental fund financial statements, fund balances are classified as nonspendable, restricted, or unrestricted (committed, assigned, or unassigned). Restricted represents those portions of fund balance where constraints placed on the resources are externally imposed by state or federal law or by the conditions set by grantors or creditors. Committed fund balance represents amounts that can only be used for specific purposes pursuant to constraints imposed by formal action of the City Council. Assigned fund balance is constrained by the City Council's intent to use such funds for specific purposes. Unassigned constitutes the residual balances in the General Fund.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES – *continued*

Financial Statement Amounts – *continued*

Revenues

Property taxes, franchise taxes, licenses, fees-in-lieu, and interest associated with the current fiscal period are all considered to be susceptible to accrual and so have been recognized as revenues of the current fiscal period. Property taxes and fees-in-lieu associated with future periods are deferred. All other revenue items are considered to be measurable and available only when the City receives cash. Grants are usually reimbursable grants and are thus recognized as revenue at the time the expenditures are made.

Subsidies and grants to proprietary funds, which finance either capital or current operations, are reported as non-operating revenue based on GAAP. In addition, other revenues that do not result from providing services are reported as non-operating revenues.

Expenses/Expenditures

When an expense/expenditure is incurred for purposes for which both restricted and unrestricted resources are available, it is the City's general policy to use restricted resources first. For proprietary fund financial statements, operating expenses are those that result from providing services to customers.

Use of Estimates in the Preparation of Financial Statements

The preparation of financial statements requires management to make estimates and assumptions that affect the reported amount of assets and liabilities and disclosures of contingent assets and liabilities at the date of the financial statements and the reported amount of revenues and expenses during the reporting period. Actual amounts could differ from those estimates.

Property Tax Calendar

Cache County assesses all taxable property other than centrally assessed property, which is assessed through the State, by May 22 of each year. The City must adopt a final tax rate prior to June 30, which is then submitted to the State for approval. Property taxes are due on November 30. Delinquent taxes are subject to a penalty of two percent or $10, whichever is greater. After January 16 of the following year, delinquent taxes and penalties bear interest at six percent above the federal discount rate from January 1 until paid.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES – *continued*

Legal Compliance – Budgets

Budgets for governmental funds are adopted on a basis consistent with generally accepted accounting principles (GAAP). Budgets for proprietary funds are adopted on a legally enacted basis. The legally enacted budget differs from a GAAP basis budget by including debt proceeds, capital expenses, and principal payments and excluding depreciation expense. Annual appropriated budgets are adopted for the general and proprietary funds. All annual appropriations lapse at fiscal yearend.

On or before the first scheduled council meeting in May, all agencies of the City submit requests for appropriation to the City's financial officers so that a budget may be prepared. The budget is prepared by fund, function, and activity and includes information on the past year, current year estimates and requested appropriations for the next fiscal year.

The proposed budget is presented to the City Council for review at the first scheduled meeting in May. The City Council holds public hearings and may add to, subtract from, or change appropriations, but may not change the form of the budget. The City financial officer must, within the revenues and reserves, estimate any changes in the budget as available or revenue estimates may be changed by an affirmative vote of a majority of the City Council. Within 30 days of adoption, the final budget must be submitted to the State Auditor. If there is no increase to the certified tax rate, a final tax rate is adopted by June 30, and adoption of budgets is performed similarly.

State statute requires that City officers shall not incur expenditures or encumbrances in excess of total appropriations for any department in the budget as adopted or subsequently amended.

Only the City Council at a properly advertised public hearing can make increases in total fund appropriations. The budget information presented includes all approved amendments.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES – *continued*

Deferred Outflows/Inflows of Resources

In addition to assets, financial statements will sometimes report a separate section for deferred outflows of resources. This separate financial statement element represents a consumption of net position that applies to a future period or periods and therefore will not be recognized as an outflow of resources (expense/expenditure) until then. The deferred outflows of resources related to pensions includes 1) net difference between projected and actual earnings on pension plan investments, 2) changes in proportion and differences between contributions and proportionate share of contributions, and 3) City contributions subsequent to the measurement date. The deferred charge on refunding is reported in both the government-wide statement of net position and the proprietary funds statement of net position. A deferred charge on refunding results from the difference in the carrying value of refunded debt and its reacquisition price. This amount is deferred and amortized over the shorter of the life of the refunded or refunding debt.

In addition to liabilities, the financial statements will sometimes report a separate section for deferred inflows of resources. This separate financial statement element, deferred inflows of resources, represents an acquisition of net position that applies to a future period or periods and therefore will not be recognized as an inflow of resources (revenue) until then. The City has three types of items which qualify for reporting in this category. The first item, revenues in the funds which are unavailable, is reported only in the governmental funds balance sheet. The second item, revenues which are intended to finance the operations of a future period, is reported in both the governmental funds balance sheet and the government-wide statement of net position. The third item, pension amounts, is reported in both the government-wide statement of net position and each proprietary fund statement of net position and results from actuarial calculations.

Pensions

For purposes of measuring the net pension liability, deferred outflows of resources and deferred inflows of resources related to pensions, and pension expense, information about the fiduciary net position of the Utah Retirement Systems Pension Plan (URS) including additions to/deductions from URS's fiduciary net position, have been determined on the same basis as they are reported by URS. For this purpose, benefit payments (including refunds of employee contributions) are recognized when due and payable in accordance with the benefit terms. Investments are reported at fair value.

2. CASH, CASH EQUIVALENTS & INVESTMENTS

Deposits

Deposits - *Custodial Credit Risk* – Custodial credit risk is the risk that in the event of a bank failure, the City's deposits may not be returned to it. The City follows the requirements of the Utah Money Management Act (Section 51, chapter 7 of the Utah Code, the "Act") in handling its depository and investing transactions. The City considers such actions to be sufficient for adequate protection of its uninsured bank deposits. City funds are deposited in qualified depositories as defined by the Act. The City does not have a deposit policy for custodial credit risk. As of June 30, 2025, $1,295,612 of the local government's bank balances of $2,067,755 was uninsured and uncollateralized. No deposits are collateralized, nor are they required to be by state statute.

Investments

The Utah Money Management Council has the responsibility to advise the State Treasurer about investment policies, promote measures and rules that will assist in strengthening the banking and credit structure of the state, and review the rules adopted under the authority of the Act that relate to the deposit and investment of public funds.

The City follows the requirements of the Act in handling its depository and investment transactions. The Act requires the depositing of City funds in a qualified depository. The Act defines a qualified depository as any financial institution whose deposits are insured by an agency of the Federal Government, and which has been certified by the State Commissioner of Financial Institutions as meeting the requirements of the Act and adhering to the rules of the Utah Money Management Council.

The Act defines the types of securities authorized as appropriate investments for the City's funds and the conditions for making investment transactions. Investment transactions may be conducted only through qualified depositories, certified dealers, or directly with issuers of the investment securities.

Statutes authorize the City to invest in negotiable or nonnegotiable deposits of qualified depositories and permitted negotiable depositories; repurchase and reverse repurchase agreements; commercial paper that is classified as "first tier" by two nationally recognized statistical rating organizations; bankers' acceptances; obligations of the United States Treasury including bills, notes, and bonds; obligations, other than mortgage derivative products, issued by U.S. government sponsored enterprises (U.S. Agencies) such as the Federal Home Loan Bank System, Federal Home Loan Mortgage Corporation (Freddie Mac), and Federal National Mortgage Association (Fannie Mae); bonds, notes, and other evidence of indebtedness of political subdivisions of the State; fixed rate corporate obligations and variable rate securities

2. CASH, CASH EQUIVALENTS & INVESTMENTS – *continued*

Investments – *continued*

rated “A” or higher, or the equivalent of “A” or higher, by two nationally recognized statistical rating organizations; shares or certificates in a money market mutual fund as defined in the Act; and the Utah State Public Treasurers’ Investment Fund.

The Utah State Treasurer’s Office operates the Public Treasurers’ Investment Fund (PTIF). The PTIF is available for investment of funds administered by any Utah public treasurer and is not registered with the SEC as an investment company. The PTIF is authorized and regulated by the Act. The Act established the Money Management Council which oversees the activities of the State Treasurer and the PTIF and details the types of authorized investments. Deposits in the PTIF are not insured or otherwise guaranteed by the State of Utah, and participants share proportionally in any realized gains or losses on investments.

The PTIF operates and reports to participants on an amortized cost basis. The income, gains, and losses of the PTIF, net of administration fees, are allocated based upon the participant’s average daily balance. The fair value of the PTIF investment pool is approximately equal to the value of the pool shares.

Fair Value of Investments

The City measures and records its investments using fair value measurement guidelines established by generally accepted accounting principles. These guidelines recognize a three-tiered fair value hierarchy, as follows:

- *Level 1:* Quoted prices for identical investments in active markets;
- *Level 2:* Observable inputs other than quoted market prices; and,
- *Level 3:* Unobservable inputs.

At June 30, 2025 the City had the following recurring fair value measurements.

		Fair Value Measurements Using		
Investments by fair value level	**6/30/2025**	**Level 1**	**Level 2**	**Level 3**
Debt Securities				
Utah Public Treasurers' Investment Fund	$ 8,062,587	$ -	$ 8,062,587	$ -
Total investments measured at fair value	$ 8,062,587	$ -	$ 8,062,587	$ -

2. CASH, CASH EQUIVALENTS & INVESTMENTS – ***continued***

Investments – ***continued***

Debt and equity securities classified in Level 1 are valued using prices quoted in active markets for those securities. Debt and equity securities classified in Level 2 are valued using the following approaches:

- Utah Public Treasurers' Investment Fund: application of the June 30, 2025 fair value factor, as calculated by the Utah State Treasurer, to the District's average daily balance in the Fund.

Interest Rate Risk

Interest rate risk is the risk that changes in interest rates will adversely affect the fair value of an investment. The City's policy for managing its exposure to fair value loss arising from increasing interest rates is to comply with the State's Money Management Act. Section 51-7-11 of the Money Management Act requires that the remaining term to maturity of investments may not exceed the period of availability of the funds to be invested. The Act further limits the remaining term to maturity on all investments in commercial paper, bankers' acceptances, fixed rate negotiable deposits, and fixed rate corporate obligations to 270 days - 15 months or less. The Act further limits the remaining term to maturity on all investments in obligations of the United States Treasury; obligations issued by U.S. government sponsored enterprises; and bonds, notes, and other evidence of indebtedness of political subdivisions of the State to five years. In addition, variable rate negotiable deposits and variable rate securities may not have a remaining term to final maturity exceeding three years.

As of June 30, 2025, the City's investments had the following maturities:

		Investment Maturities (in years)		
Investment Type	**Fair Value**	**Less than 1**	**1-5**	**6-10**
Debt Securities				
Utah Public Treasurers' Investment Fund	$ 8,062,587	$ 8,062,587	$ -	$ -
Total investments measured at fair value	$ 8,062,587	$ 8,062,587	$ -	$ -

3. TAXES RECEIVABLE AND ACCOUNTS RECEIVABLE

The City's taxes receivable and accounts receivable at June 30, 2025 consisted of the following:

Governmental activities		
Taxes receivable:		
General fund:		
Property taxes	$	413,895
Franchise taxes		24,516
Sales taxes		124,578
Total general fund	$	562,989
Accounts receivable:		
General fund:		
Class c road funds - restricted	$	40,341
Other		222,519
Total general fund	$	262,860
Special Revenue fund:		
Accounts receivable	$	855
Fiduciary Funds		
Cemetery		
Accounts receivable	$	3,316
Business-type activities		
Accounts receivable:		
Water utility fund services and fees, net of $2,500 allowance	$	136,571
Sewer utility fund services and fees, net of $2,500 allowance		132,554
Solid waste utility fund services and fees, net of $1,250 allowance		26,791
Total business-type activities	$	295,916

4. CAPITAL ASSETS

Capital asset changes occurring for the year ended June 30, 2025, were as follows:

	July 1, 2024	Additions	Deletions	June 30, 2025
Governmental activities:				
Capital assets not being depreciated:				
Land	$ 327,736	$ 17,552	$ -	$ 345,288
Construction in progress	69,706	-	69,706	-
Total capital assets not being depreciated	397,442	17,552	69,706	345,288
Capital assets being depreciated:				
Building and improvements	2,225,490	317,074	-	2,542,564
Equipment	2,126,208	30,501	46,079	2,110,630
Infrastructure	6,072,806	1,361,853	-	7,434,659
Total capital assets being depreciated	10,424,504	1,709,428	46,079	12,087,853
Accumulated depreciation	(6,226,210)	(389,128)	(28,428)	(6,586,910)
Total capital assets being depreciated, net	4,198,294	1,320,300	17,651	5,500,943
Total governmental activities capital assets, net	$ 4,595,736	$ 1,337,852	$ 87,357	$ 5,846,231
Business-type activities:				
Capital assets not being depreciated:				
Land and water rights	$ 1,793,186	$ 60,000	$ -	$ 1,853,186
Total capital assets not being depreciated	1,793,186	60,000	-	1,853,186
Capital assets being depreciated:				
Structures and systems	17,439,838	865,080	-	18,304,918
Accumulated depreciation for:				
Structures and systems	(10,115,568)	(628,632)	-	(10,744,200)
Total capital assets being depreciated, net	7,324,270	236,448	-	7,560,718
Total business-type activities capital assets, net	$ 9,117,456	$ 296,448	$ -	$ 9,413,904

Depreciation expense of governmental activities was charged to functions as follows:

General government	$ 35,439
Streets and highways	237,546
Public safety	36,168
Library	4,900
Culture, parks, and recreation	75,075
Total depreciation expense	$ 389,128

5. LONG-TERM OBLIGATIONS

Long-term liability activity for fiscal year ending June 30, 2025 was as follows:

	Beginning Balance	Additions	Reductions	Ending Balance	Due within one year
Business-type activities					
Bonds payable	$ 3,204,179	$ -	$ 334,000	$ 2,870,179	$ 188,000
Governmental activities					
Compensated absences*	$ 5,428	$ 8,590	$ -	$ 14,018	$ 7,009

*The change in the compensated absences is presented as a net change

Bonds Payable

Business-type activities bonds payable were comprised of the following:

$5,145,000 Water Revenue Bonds due to the Utah State Division of Finance Drinking Water in annual installments ranging from $96,000 to $281,000 at maturity on July 1, 2042, plus interest at 3.75 percent interest	$ 2,094,179
$3,316,000 Sewer Revenue Bonds due to the State of Utah, Department of Environmental Quality in annual installments ranging from $123,000 to $199,000 at maturity on June 1, 2029 with zero percent interest	776,000
Total business-type activities bonds payable	$ 2,870,179

In accordance with GASB 88, *Certain Disclosures Related to Debt, Including Direct Borrowings and Direct Placements,* the City has reported separately below the debt obligations, including direct placements. Direct placements have terms negotiated directly with the investor or lender and are not offered for public sale. All bonds presented below are direct placement. The annual requirements for bonds as of June 30, 2025, were as follows:

Year Ending June 30,	Principal	Interest	Total
2025	$ 188,000	$ -	$ 188,000
2026	347,000	78,532	425,532
2027	356,000	72,757	428,757
2028	365,000	66,757	431,757
2029	172,000	60,532	232,532
2030-2034	963,000	200,846	1,163,846
2035-2039	479,179	29,420	508,599
Totals	$ 2,870,179	$ 508,844	$ 3,379,023

The management of the City believes that as of June 30, 2025, it was in compliance with the debt covenant of the outstanding revenue bonds.

6. PENSION PLANS

General Information about the Pension Plan

Plan description – eligible plan participants are provided with pensions through the Utah Retirement Systems. Utah Retirement Systems are comprised of the following pension trust funds:

<u>*Defined Benefit Plans*</u>

- Public Employees Noncontributory Retirement System (Noncontributory System); is a multiple employer, cost sharing, public employee retirement system.
- Tier 2 Public Employees Contributory Retirement System (Tier 2 Public Employees System) is a multiple employer, cost sharing, public employee retirement system.

The Tier 2 Public Employees System became effective July 1, 2011. All eligible employees beginning on or after July 1, 2011, who have no previous service credit with any of the Utah Retirement Systems, are members of the Tier 2 Retirement System.

The Utah Retirement Systems (URS or Systems) are established and governed by the respective sections of Title 49 of the Utah Code Annotated 1953, as amended. The Systems' defined benefit plans are amended statutorily by the State Legislature. The Utah State Retirement Office Act in Title 49 provides for the administration of the Systems under the direction of the Utah State Retirement Board, whose members are appointed by the Governor. The Systems are fiduciary funds defined as pension (and other employee benefit) trust funds. URS is a component unit of the State of Utah. Title 49 of the Utah Code grants the authority to establish and amend the benefit terms.

URS issues a publicly available financial report that can be obtained by writing to Utah Retirement Systems, 560 East 200 South, Salt Lake City, Utah 84102 or by visiting the website: www.urs.org/general/publications.

6. PENSION PLANS – *continued*

Summary of Benefits by System:

Benefits provided: URS provides retirement, disability, and death benefits.

Retirement benefits are as follows:

System	Final Average Salary	Years of service required and/or age eligible for benefit	Benefit percent per year of service	COLA**
Noncontributory System	Highest 3 years	30 years any age 25 years any age* 20 years age 60* 10 years age 62* 4 years age 65	2.0% per year all years	Up to 4%
Tier 2 Public Employees System	Highest 5 years	35 years any age 20 years age 60* 10 years age 62* 4 years age 65	1.5% per year all years	Up to 2.5%

*actuarial reductions are applied

**all post-retirement cost-of-living adjustments are non-compounding and are based on the original benefit except for Judges, which is a compounding benefit. The cost-of-living adjustments are also limited to the actual Consumer Price Index (CPI) increase for the year, although unused CPI increases not met may be carried forward to subsequent years.

Contribution Rate Summary – As a condition of participation in the Systems, employers and/or employees are required to contribute certain percentages of salary and wages as authorized by statute and specified by the URS Board. Contributions are actuarially determined as an amount that, when combined with employee contributions (where applicable) is expected to finance the costs of benefits earned by employees during the year, with an additional amount to finance any unfunded actuarial accrued liability. Contribution rates as of June 30, 2025 were as follows:

Utah Retirement Systems	Employee	Employer	Employer 401(k)
Contributory System			
111- Local Governmental Division Tier 2	0.70%	15.19%	n/a
Noncontributory System			
15- Local Governmental Division Tier 1	n/a	16.97%	n/a
Tier 2 DC Only			
211- Local Government	n/a	5.19%	10.00%

6. PENSION PLANS – *continued*

Tier 2 rates include a statutory required contribution to finance the unfunded actuarial accrued liability of the Tier 1 plans.

For fiscal year ended June 30, 2025, the employer and employee contributions to the Systems were as follows:

System	Employer	Employee
Noncontributory System	$ 17,286	n/a
Tier 2 Public Employees System	72,196	3,327
Total Contributions	$ 89,482	$ 3,327

Contributions reported are the URS Board approved required contributions by system. Contributions in the Tier 2 Systems are used to finance the unfunded liabilities in the Tier 1 Systems.

Combined Pension Assets, Liabilities, Expense, and Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions

At June 30, 2025, the City reported a net pension asset of $0 and a net pension liability of $121,183.

	(Measurement Date): December 31, 2024				
	Net Pension Asset	Net Pension Liability	Proportionate Share	Proportionate Share 12/31/2023	Change (Decrease)
Noncontributory System	$ -	$ 76,173	0.0240209%	0.0268518%	-0.0028309%
Tier 2 Public Employees System	-	45,010	0.0150920%	0.0171249%	-0.0020329%
Total net pension asset/liability	$ -	$ 121,183			

The net pension asset and liability were measured as of December 31, 2024, and the total pension liability used to calculate the net pension asset and liability was determined by an actuarial valuation as of January 1, 2024 and rolled forward using generally accepted actuarial procedures. The proportion of the net pension asset and liability is equal to the ratio of the employer's actual contributions to the Systems during the plan year over the total of all employer contributions to the System during the plan year.

6. PENSION PLANS – *continued*

Combined Pension Assets, Liabilities, Expense, and Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions - ***continued***

For the year ended June 30, 2025, the City recognized pension expense of $119,717. At June 30, 2025, the City reported deferred outflows of resources and deferred inflows of resources related to pensions from the following sources:

	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	$ 64,846	$ 310
Changes in assumptions	21,334	5
Net difference between projected and actual earnings on pension plan investments	25,821	-
Changes in proportion and differences between contributions and proportionate share of contributions	7,222	437
Contributions subsequent to the measurement date	40,318	-
Total	$ 159,541	$ 752

$40,318 was reported as deferred outflows of resources related to pensions and results from contributions made by the City prior to fiscal year end, but subsequent to the measurement date of December 31, 2024. These contributions will be recognized as a reduction of the net pension liability in the upcoming fiscal year. Other amounts reported as deferred outflows of resources and deferred inflows of resources related to pensions will be recognized in pension expense as follows:

Year Ended December 31,	Deferred Outflows (Inflows) of Resources
2025	$ 49,383
2026	50,177
2027	(5,919)
2028	2,491
2029	9,969
Thereafter	12,373

6. PENSION PLANS – *continued*

Actuarial assumptions – The total pension liability in the December 31, 2024, actuarial valuation was determined using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.50%
Salary increases	3.50-9.50%, average, including inflation
Investment rate of Return	6.85%, net of pension plan investment expense, including inflation

Mortality rates were adopted from an actuarial experience study dated January 1, 2023. The retired mortality tables are developed using URS retiree experience and are based upon gender, occupation, and age as appropriate with projected improvement using the ultimate rates from the MP-2020 improvement scale using a base year of 2020. The mortality assumption for active members is the PUB-2010 Employees Mortality Table for public employees, teachers, and public safety members, respectively.

The actuarial assumptions used in the January 1, 2023 valuation were based on the results of an actuarial experience study for the period ending December 31, 2022.

The long term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class and is applied consistently to each defined benefit pension plan. These ranges are combined to produce the long term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation.

6. PENSION PLANS – *continued*

The target allocation and best estimates of arithmetic real rates of return for each major asset class are summarized in the following table:

	Expected Return Arithmetic Basis		
Asset class	Target Asset Allocation	Real Return Arithmetic Basis	Long term expected portfolio real rate of return
Equity securities	35%	7.01%	2.45%
Debt securities	20%	2.54%	0.51%
Real assets	18%	5.45%	0.98%
Private equity	12%	10.05%	1.21%
Absolute return	15%	4.36%	0.65%
Cash and cash equivalents	0%	0.49%	0.00%
Totals	100%		5.80%
Inflation			2.50%
Expected arithmetic nominal return			8.30%

The 6.85 percent assumed investment rate of return is comprised of an inflation rate of 2.50 percent, a real return of 4.35 percent that is net of investment expense.

Discount rate – The discount rate used to measure the total pension liability was 6.85 percent. The projection of cash flows used to determine the discount rate assumed that employee contributions will be made at the current contribution rate and that contributions from all participating employers will be made at contractually required rates that are actuarially determined and certified by the URS Board. Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current, active, and inactive employees. Therefore, the long term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability. The discount rate does not use the Municipal Bond Index Rate.

6. PENSION PLANS – *continued*

Sensitivity of the proportionate share of the net pension asset and liability to changes in the discount rate: The following presents the proportionate share of the net pension liability calculated using the discount rate of 6.85 percent, as well as what the proportionate share of the net pension liability/asset would be if it were calculated using a discount rate that is one percentage point lower (5.85 percent) or one percentage point higher (7.85 percent) than the current rate:

System	1% Decrease (5.85%)	Discount Rate (6.85%)	1% Increase (7.85%)
Noncontributory System	$ 322,149	$ 76,173	$ (130,121)
Tier 2 Public Employees System	134,435	45,010	(24,553)
Total	$ 456,584	$ 121,183	$ (154,674)

Defined Contribution Savings Plans

The Defined Contribution Savings Plans are administered by the Utah Retirement Systems Board and are generally supplemental plans to the basic retirement benefits for the Retirement Systems but may also be used as a primary retirement plan. These plans are voluntary tax-advantaged retirement savings programs authorized under sections 401(k), 457(b) and 408 of the Internal Revenue code. Detailed information regarding plan provisions is available in the separately issued URS financial report.

The City participates in the following Defined Contribution Savings Plans with Utah Retirement Systems:

- 401(k) Plan

Employee and employer contributions to the Utah Retirement Defined Contribution Savings Plans for fiscal year ended June 30, were as follows:

	2025	2024	2023
401(k) Plan			
Employer Contributions	$ -	$ 772	$ 703
Employee Contributions	$ 12,699	$ 8,558	$ 8,423

Pension plan fiduciary net position – Detailed information about the pension plan's fiduciary net position is available in the separately issued URS financial report.

7. RESTRICTED NET POSITION/RESTRICTED FUND EQUITY

Restricted net position and restricted fund equity represent balances required to be maintained to satisfy third-party agreements or legal requirements. The following schedule details restricted net position and restricted fund equity at June 30, 2025.

Governmental Activities	
General fund	
Class c and local road tax	$ 347,783
Business-type Activities	
Water utility fund	
Bond retirement	$ 291,537
Impact fees	1,175,139
Total restricted net assets	1,466,676
Sewer utility fund	
Bond retirement	200,167
Total restricted net assets	200,167
Total business-type restricted net assets	$ 1,666,843

The City assesses impact fees for water and sewer improvements as allowed by State law. These fees are not intended to recover impact costs for growth in areas not assessed by the City.

8. INTERFUND RECEIVABLES, PAYABLES, AND TRANSFERS

The composition of interfund balances as of June 30, 2025 was as follows:

Interfund Transfers:

Purpose	Amount	Transfer in	Transfer out
Operations	$ 25,000	Cub River Sports Complex	General
Capital projects	$ 483,280	Capital Projects	General

9. RISK MANAGEMENT

The City is exposed to various risks of loss related to torts, theft, damage to and destruction of assets, errors and omissions, and natural disasters. The City participates in the Utah Local Government Insurance Trust, a public entity risk pool to manage its risk of loss. The City pays an annual premium to the trust for its general insurance coverage. The Trust was created to be self-sustaining through member premiums and will reinsure through commercial companies for claims in excess of one million dollars for each insured event. There have been no claim settlements that exceeded the City's insurance coverage for the past three years.

10. MEMORANDUM TOTALS

Prior year total columns on the financial statements are captioned "memorandum only" to indicate that they are presented only to facilitate financial analysis. Data in these columns do not present financial position, results of operations, or changes in financial position in conformity with generally accepted accounting principles. Such data is also not comparable to a consolidation. Interfund eliminations have not been made in the aggregation of this data.

11. CHANGES IN ACCOUNTING PRINCIPLES

In 2025 the City adopted *GASB Statement No. 101– Compensated Absences*, which introduces a new model for recording obligations that arise from compensated absences. The new model focuses on recognizing liabilities for unused leave when it's more likely than not to be used or paid out. This was effective for the City as of July 1, 2025, and had no material impact on the City's financial statements.

The City also adopted *GASB Statement No. 102 – Certain Risk Disclosures*. This Statement establishes requirements to disclose certain risks faced by governments and defines concentrations and constraints. Risk disclosure under the new standard will provide timely information regarding certain concentrations or constraints and related events that have occurred or have begun to occur that make the City vulnerable to a substantial impact. This was effective for the city as of July 1, 2025, and had no material impact on the city's financial statements.

12. SUBSEQUENT EVENTS

In preparing these financial statements, the City has evaluated events and transactions for potential recognition or disclosure through October 8, 2025, the date the financial statements were available to be issued.

REQUIRED SUPPLEMENTARY INFORMATION

This page intentionally left blank.

RICHMOND CITY
Schedule of the Proportionate Share of the Net Pension Liability
Last 10 Fiscal Years

For the Year Ended June 30, 2025

	As of fiscal year ended June 30,	Proportion of the net pension liability (asset)	Proportionate share of the net pension liability (asset)	Covered-employee payroll	Proportionate share of the net pension liability (asset) as a percentage of its covered employee payroll	Plan fiduciary net position as a percentage of its covered-employee payroll
Noncontributory System	2016	0.0284044%	$ 160,726	$ 281,367	57.12%	87.80%
	2017	0.0273125%	175,380	272,896	64.27%	87.30%
	2018	0.2184020%	95,688	190,823	50.14%	91.90%
	2019	0.0262126%	193,023	226,336	85.28%	87.00%
	2020	0.0267592%	100,851	244,731	41.21%	93.70%
	2021	0.0271972%	13,951	246,460	5.66%	99.20%
	2022	0.0268609%	(153,835)	224,854	-68.42%	108.70%
	2023	0.0277452%	47,520	188,554	25.20%	97.50%
	2024	0.0268518%	62,284	158,592	39.27%	96.90%
	2025	0.0240209%	76,173	140,666	54.15%	96.02%
Tier 2 Public Employees System	2016	0.0047110%	$ (10)	$ 30,433	-0.03%	100.20%
	2017	0.0089154%	994	73,114	1.36%	95.10%
	2018	0.0144989%	1,278	141,788	0.90%	97.40%
	2019	0.0148036%	6,340	173,253	3.66%	90.80%
	2020	0.0123782%	2,784	172,045	1.62%	96.50%
	2021	0.0118645%	1,706	189,627	0.90%	96.30%
	2022	0.0111405%	(4,716)	206,721	-2.28%	103.80%
	2023	0.0147064%	16,014	320,552	5.00%	92.30%
	2024	0.0171249%	33,332	442,738	7.53%	89.58%
	2025	0.0150920%	45,010	446,872	10.07%	87.44%

*In accordance with paragraph 81.a of GASB 68, employers need to disclose a 10-year history of their proportionate share of the net pension liability (asset) in the RSI.

RICHMOND CITY
Schedule of Contributions
Last 10 Fiscal Years

For the Year Ended June 30, 2025

	As of fiscal year ended June 30,	Actuarial Determined Contributions	Contributions in relation to the contractually required contribution	Contribution deficiency (excess)	Covered employee payroll	Contributions as a percentage of covered employee payroll
Noncontributory System	2016	$ 43,461	$ 43,461	$ -	$ 277,290	15.67%
	2017	34,184	34,184	-	227,818	15.00%
	2018	31,829	31,829	-	211,377	15.06%
	2019	35,571	35,571	-	236,406	15.05%
	2020	37,693	37,693	-	249,492	15.11%
	2021	37,867	37,867	-	248,693	15.23%
	2022	35,698	35,698	-	196,644	18.15%
	2023	30,301	30,301	-	168,620	17.97%
	2024	26,923	26,923	-	149,824	17.97%
	2025	17,286	17,286	-	101,861	16.97%
Tier 2 Public Employees System	2016	$ 7,080	$ 7,080	$ -	$ 47,483	14.91%
	2017	15,299	15,299	-	102,606	14.91%
	2018	25,796	25,796	-	170,719	15.11%
	2019	25,822	25,822	-	166,165	15.54%
	2020	27,688	27,688	-	176,805	15.66%
	2021	31,183	31,183	-	197,363	15.80%
	2022	41,279	41,279	-	256,867	16.07%
	2023	62,494	62,494	-	390,345	16.01%
	2024	68,645	68,645	-	428,763	16.01%
	2025	72,196	72,196	-	475,287	15.19%

*Contributions in Tier 2 include an amortization rate to help fund the unfunded liabilities in the Tier 1 systems. Tier 2 systems were created effective July 1, 2011.

Paragraph 81.b of GASB 68 requires employers to disclose a 10-year history of contributions of RSI. Contributions as a percentage of covered payroll may be different than the board-certified rate due to rounding and other administrative practices.

1. Changes in Assumptions

June 30, 2025 -There were no changes in the actuarial assumptions or methods since the prior actuarial valuation.

June 30, 2024 - Changes include updates to the mortality improvement assumption, salary increase assumption, assumed retirement rates, and assumed termination rates, as recommended with the January 1, 2023 actuarial experience study.

June 30, 2023 -There were no changes in the actuarial assumptions or methods since the prior actuarial valuation.

June 30, 2022 -The investment return assumption was decreased by 0.10% to 6.85% for use in the January 1, 2021 actuarial valuation. This assumption change was based on analysis performed by the actuary and adopted by the Utah State Retirement Board. In aggregate, this assumption change resulted in a $509 million increase in the Total Pension Liability, which is about 1.3% of the Total Pension Liability as of December 31, 2020 for all systems combined. The demographic assumptions were reviewed and updated in the January 1, 2020 actuarial valuation and are currently scheduled to be reviewed in the year 2023.

June 30, 2021 -There were a number of demographic assumptions (e.g. rates of termination, disability, retirement, as well as an updated mortality and salary increase assumption) updated for use in the January 1, 2020 actuarial valuation. These assumption updates were adopted by the Utah State Retirement Board as a result of an Actuarial Experience Study performed for the Utah Retirement Systems. In aggregate, those assumption changes resulted in a $201 million increase in the Total Pension Liability, which is about 0.50% of the Total Pension Liability as of December 31, 2019 for all systems combined. The Actuarial Experience Study report as of December 31, 2019 provides detailed information regarding those assumption changes, which may be assessed online at newsroom.urs.org under the “Retirement Office” column using the “Reports and States” tab.

June 30, 2020 – As a result of the passage of SB 129, the retirement rates for members in the Tier 2 Public Safety and Firefighter Hybrid System have been modified to be the same as the assumption used to model the retirement pattern in the Tier 1 Public Safety and Firefighters Systems, except for a 10 percent load at first eligibility for unreduced retirement prior to age 65.

June 30, 2019 – The assumptions and methods used to calculate the Total Pension Liability remain unchanged from the prior year.

June 30, 2018 -As a result of an experience study conducted as of December 31, 2016, the Board adopted recommended changes to several economic and demographic assumptions that are used in the actuarial valuation. The assumption changes that had the largest impact on the Total Pension Liability (and actuarial accrued liability) include a decrease in the investment return assumption from 7.2 percent to 6.95 percent, a reduction in the price inflation assumption from 2.6 percent to 2.5 percent (which also resulted in a corresponding decrease in the cost-of-living-adjustment assumption for the funds with a 4.00 percent annual COLA max), and the adoption of an updated retiree mortality table that is developed using URS’s actual retiree mortality experience. There were changes to several other demographic assumptions, but those changes had a minimal impact on the Total Pension Liability (and actuarial accrued liability).

June 30, 2017 and 2016– The following assumption changes were adopted from the most recent actuarial experience study. There was a decrease in the wage inflation assumption for all employee groups from 3.75 percent to 3.5 percent. Also, there was a modification to the rate of salary increases for most groups. The payroll growth assumption was decreased from 3.5 percent to 3.25 percent. There was an improvement in the post-retirement mortality assumption for female educators and minor adjustments to the pre-retirement mortality assumption. There were additional changes to certain demographic assumptions that generally resulted in: (1) more members are anticipated to terminate employment prior to retirement, (2) slightly fewer members are expected to become disabled, and (3) members are expected to retire at a slightly later age.

This page intentionally left blank.

SUPPLEMENTARY INFORMATION

This page intentionally left blank.

RICHMOND CITY
Combining Balance Sheet
Nonmajor Governmental Funds

As of June 30, 2025

	Cub River Sports Complex	Total 2025	Memorandum Total 2024
Assets			
Pooled cash & cash equivalents	$ 15,408	$ 15,408	$ 31,678
Accounts receivable	855	855	276
Total assets	$ 16,263	$ 16,263	$ 31,954
Liabilities			
Current liabilities:			
Accounts payable	$ 2,047	$ 2,047	$ 3,445
Total current liabilities	2,047	2,047	3,445
Fund balance			
Assigned for Cub River	14,216	14,216	28,509
Total fund balance	14,216	14,216	28,509
Total liabilities & fund balance	$ 16,263	$ 16,263	$ 31,954

RICHMOND CITY
Combining Statement of Revenues, Expenditures, and Changes in Fund Balance
Nonmajor Governmental Funds

For the Year Ended June 30, 2025

	Cub River Sports Complex	Total 2025	Memorandum Total 2024
Revenues:			
Intergovernmental revenue	$ 25,000	$ 25,000	$ 10,000
Miscellaneous revenues	2,096	2,096	1,926
Total revenues	27,096	27,096	11,926
Expenditures:			
Parks, recreation and public property	66,389	66,389	12,015
Total expenditures	66,389	66,389	12,015
Excess of expenditures over revenues	(39,293)	(39,293)	(89)
Other financing sources:			
Transfers in	25,000	25,000	10,000
Total other financing sources	25,000	25,000	10,000
Net change in fund balances	(14,293)	(14,293)	9,911
Fund balances, beginning	28,509	28,509	18,598
Fund balances, ending	$ 14,216	$ 14,216	$ 28,509

RICHMOND CITY
Schedule of Additions and Deletions
Agency Fund

For the Year Ended June 30, 2025

	Richmond Cemetery Maintenance District
Additions:	
Property taxes	$ 106,650
Burial fees	40,800
Grave plot purchases	31,500
Interest	10,184
Other	-
Total additions	189,134
Deletions:	
Salaries and benefits	-
Other expenses	129,994
Total deletions	129,994
Net change in fund	$ 59,140

This page intentionally left blank.

RICHEY MAY

INDEPENDENT AUDITOR'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING AND ON COMPLIANCE AND OTHER MATTERS BASED ON AN AUDIT OF FINANCIAL STATEMENTS PERFORMED IN ACCORDANCE WITH *GOVERNMENT AUDITING STANDARDS*

Honorable Mayor and City Council
Richmond City
Richmond, Utah

We have audited, in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of the governmental activities, the business-type activities, the aggregate discretely presented component units, each major fund, and the aggregate remaining fund information of Richmond City as of and for the year ended June 30, 2025, and the related notes to the financial statements, which collectively comprise Richmond City's basic financial statements, and have issued our report thereon dated October 8, 2025.

Report on Internal Control Over Financial Reporting

In planning and performing our audit of the financial statements, we considered Richmond City's internal control over financial reporting (internal control) as a basis for designing procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of Richmond City's internal control. Accordingly, we do not express an opinion on the effectiveness of Richmond City's internal control.

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies and therefore, material weaknesses or significant deficiencies may exist that were not identified. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses or significant deficiencies may exist that were not identified.

Report on Compliance and Other Matters

As part of obtaining reasonable assurance about whether Richmond City's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the financial statements. However, providing an opinion on compliance with those provisions was not an objective of our audit and, accordingly, we do not express such an opinion. The results of our tests disclosed instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards*, and which are described in the accompanying Schedule of Findings and Recommendations as item 2025-01.

Richmond City's Response to Finding

Government Auditing Standards requires the auditor to perform limited procedures on Richmond City's response to the finding identified in our audit and described in the Schedule of Findings and Recommendations. Richmond City's response was not subjected to the other auditing procedures applied in the audit of the financial statements and, accordingly, we express no opinion on the response.

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the entity's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the entity's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

Diana Cannell

Richey, May & Co., LLP

North Logan, Utah
October 8, 2025

RICHEY MAY

INDEPENDENT AUDITOR'S REPORT ON COMPLIANCE AND REPORT ON INTERNAL CONTROL OVER COMPLIANCE AS REQUIRED BY THE *STATE COMPLIANCE AUDIT GUIDE*

Honorable Mayor and City Council
Richmond City
Richmond, Utah

Report On Compliance

We have audited Richmond City (the City)'s compliance with the following applicable state compliance requirements described in the *State Compliance Audit Guide,* issued by the Office of the Utah State Auditor, for the year ended June 30, 2025.

State compliance requirements were tested for the year ended June 30, 2025 in the following areas:

Budgetary Compliance
Fund Balance
Restricted Taxes and Other Related Restricted Revenue
Fraud Risk Assessment
Governmental Fees
Utah Retirement Systems
Crime Insurance for Public Treasurers

Opinion on Compliance

In our opinion, the City complied, in all material respects, with the state compliance requirements referred to above for the year ended June 30, 2025.

Basis for Opinion

We conducted our audit of compliance in accordance with auditing standards generally accepted in the United States of America (GAAS); the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States (*Government Auditing Standards*); and the *State Compliance Audit Guide* (Guide), issued by the Office of the Utah State Auditor. Our responsibilities under those standards and the *State Compliance Audit Guide* are further described in the Auditor's Responsibilities for the Audit of Compliance section of our report.

We are required to be independent of the City and to meet our other ethical responsibilities, in accordance with relevant ethical requirements relating to our audit. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion. Our audit does not provide a legal determination of the City's compliance with the compliance requirements referred to above.

Responsibilities of Management for Compliance

Management is responsible for compliance with the requirements referred to above and for the design, implementation, and maintenance of effective internal control over compliance with the requirements of laws, statutes, regulations, rules, and provisions of contracts or grant agreements applicable to the City's government programs.

Auditor's Responsibilities for the Audit of Compliance

Our objectives are to obtain reasonable assurance about whether material noncompliance with the compliance requirements referred to above occurred, whether due to fraud or error, and express an opinion on the City's compliance based on our audit. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS, *Government Auditing Standards*, and the Guide will always detect material noncompliance when it exists. The risk of not detecting material noncompliance resulting from fraud is higher than for that resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Noncompliance with the compliance requirements referred to above is considered material if there is a substantial likelihood that, individually or in the aggregate, it would influence the judgment made by a reasonable user of the report on compliance about the City's compliance with the requirements of the government program as a whole.

In performing an audit in accordance with GAAS, *Government Auditing Standards*, and the Guide, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material noncompliance, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the City's compliance with the compliance requirements referred to above and performing such other procedures as we considered necessary in the circumstances.
- Obtain an understanding of the City's internal control over compliance relevant to the audit in order to design audit procedures that are appropriate in the circumstances and to test and report on internal control over compliance in accordance with the *State Compliance Audit Guide* but not for the purpose of expressing an opinion on the effectiveness of the City's internal control over compliance. Accordingly, no such opinion is expressed.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and any significant deficiencies and material weaknesses in internal control over compliance that we identified during the audit.

Other Matters

The results of our auditing procedures disclosed an instance of noncompliance, which is required to be reported in accordance with the Guide and which is described in the accompanying Schedule of Findings and Recommendations as item 2025-01. Our opinion on compliance is not modified with respect to this matter.

Government Auditing Standards require the auditor to perform limited procedures on the City's response to the noncompliance finding identified in our audit described in the accompanying Schedule of Findings and Recommendations. The City's response was not subjected to the other auditing procedures applied in the audit of compliance and, accordingly, we express no opinion on the response.

Report On Internal Control over Compliance

A *deficiency in internal control over compliance* exists when the design or operation of a control over compliance does not allow management or employees, in the normal course of performing their assigned functions, to prevent or to detect and correct noncompliance with a state compliance requirement on a timely basis. *A material weakness in internal control over compliance* is a deficiency, or combination of deficiencies, in internal control over compliance, such that there is a reasonable possibility that material noncompliance with a state compliance requirement will not be prevented or detected and corrected on a timely basis. *A significant deficiency in internal control over compliance* is a deficiency, or a combination of deficiencies, in internal control over compliance with a state compliance requirement that is less severe than a material weakness in internal control over compliance, yet important enough to merit attention by those charged with governance.

Our consideration of internal control over compliance was for the limited purpose described in the Auditor's Responsibilities for the Audit of Compliance section above and was not designed to identify all deficiencies in internal control over compliance that might be material weaknesses or significant deficiencies in internal control over compliance. Given these limitations, during our audit we did not identify any deficiencies in internal control over compliance that we consider to be material weaknesses or significant deficiencies, as defined above. However, material weaknesses or significant deficiencies in internal control over compliance may exist that were not identified.

Our audit was not designed for the purpose of expressing an opinion on the effectiveness of internal control over compliance. Accordingly, no such opinion is expressed.

The purpose of this report on internal control over compliance is solely to describe the scope of our testing of internal control and compliance and the results of that testing based on the requirements of the Guide. Accordingly, this report is not suitable for any other purpose. However, pursuant to Utah Code Title 63G, Chapter 2, this report is a matter of public record, and as such, its distribution is not limited.

Diana Cannell

Richey, May & Co., LLP

North Logan, Utah
October 8, 2025

This page intentionally left blank.

SCHEDULE OF FINDINGS AND RECOMMENDATIONS

This page intentionally left blank.

2025-01: State Compliance – Fraud Risk Assessment

Criteria: City management is responsible to determine that internal controls ensure that compliance requirements described in the *State Compliance Audit Guide* are met.

Condition: The City completed the annual Fraud Risk Assessment and submitted to the City Counsel but did not document the 40 hours of formal training related to accounting, budgeting, or other financial areas that were completed during the year by a member of the management team.

Cause: Management was not aware of the requirement to track and document the training throughout the year.

Effect: The City was not in compliance with State regulations on Fraud Risk Assessment.

Recommendation: We recommend that the City review the requirements related to Fraud Risk Assessment and to retain documentation to support its risk assessment.

Views of Responsible Officials: Moving forward the City will track formal training for accounting and budgeting by noting when the training occurred, where it occurred, how long the training took place, and the subject of the training. Training will be tracked whether free or if a fee is paid.

RICHMOND CITY
Schedule of Findings and Recommendations
Prior Year

For the Year Ended June 30, 2025

No findings for the prior year.

City of Richmond, Utah

Collection System Master Plan

August 2025 Update

DRAFT

Prepared by

J-U-B ENGINEERS, Inc.
1047 South 100 West, Suite 180
Logan, Utah 84321
(435) 713-9514

Contents

Page

Works Cited

City of Richmond, Utah. "City of Richmond 2030 Comprehensive Plan" May 2010.

US Census Bureau. "State & County QuickFacts." July 1, 2015. 19 August 2016. <https://www.census.gov/quickfacts/table/PST045215/1652120,16001>.

US Census Bureau. "American FactFinder." Census 2000. 2 November 2016. <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>.

Appendices

Figures

Tables

List of Commonly Used Abbreviations

AC	Acre
CCTV	Closed-Circuit Television
CFS	Cubic foot per second
CIP	Capital Improvement Plan
CoF	Consequence of Failure
COMPASS	Community Planning Association
d/D	Depth over diameter
DU	Dwelling unit
ERU	Equivalent residential unit
FT	Feet
GIS	Geographical Information System
GPAD	Gallons per acre per day
GPDU	Gallons per dwelling unit
GPM	Gallons per minute
HGL	Hydraulic Grade Line
HP	Horsepower
IN	Inches
J-U-B	J-U-B ENGINEERS, Inc.
LoF	Likelihood of Failure
LS	Lift station
MGD	Million gallons per day
NASSCO	National Association of Sewer Service Companies
PACP	Pipeline Assessment and Certification Program
PER	Preliminary Engineering Report
PVC	Polyvinyl Chloride Pipe
SCADA	Supervisory Control and Data Acquisition
SCS	Soil Conservation Service
SSO	Sanitary Sewer Overflow
TAZ	Traffic Analysis Zone
UPRR	Union Pacific Railroad
VFD	Variable Frequency Drive
WWTP	Wastewater Treatment Plant

Executive Summary

ES-1 Purpose

The last comprehensive Collection System Master Plan for the City of Richmond was completed in 2011. Since then, the City has experienced growth and numerous modifications have been made to the 2011 Master Plan. The City authorized J-U-B Engineers, Inc. to undertake a comprehensive update of the previous master plan, with the following major goals:

- Calibrate the hydraulic model and update modelling assumptions, land use designations and unit flows.
- Create an updated collection system master plan layout of all trunk lines 10-inch and larger.
- Establish a comprehensive Capital Improvement Plan (CIP)

The sections below provide a brief summary of each component of the 2025 Sewer Collection System Master Plan and the associated results.

ES-2 Existing System Summary

The City of Richmond system is comprised of over 21 miles of gravity sewer. The City utilizes J-U-B Engineers to update their GIS as growth occurs and resolves identified data gaps in the system, providing an up-to-date dataset that is used for maintenance and operations, planning, and project concept development, and hydraulic modeling.

ES-3 Existing Model

An updated model was created utilizing the City's GIS dataset and the Aquanuity AquaTwin Sewer software. This model includes 8-inch and larger sanitary sewer lines along major sewer alignments within the collection system owned and maintained by the City of Richmond.

The Existing Model included a count of parcels connected to the existing system based on the most recent aerial imagery available. Unit flows identified from the previous master plan were used to establish flows for the updated parcel count. The model then utilized the previous flow monitoring data and current WWTP data to calibrate the model at several locations. See **Appendix C** for calibration results.

Figures A4 and **A5** show the resulting depth over diameter and reserve capacity of the existing collection system during a design storm event. No bottlenecks were identified in the system. However, one potential bottleneck is identified and described in **Section 3.5**. Model results from the Existing Model scenario are included in **Appendix D**.

ES-4 Population Growth and Boundaries

The study area is shown in **Figure A1**. The City has experienced significant growth in the past 25 years and the combined average annual growth rate of the historical and COMPASS projections are approximately 1.8%. If a 2.0% growth rate is maintained, the parcels identified to expand the collection system in this area are projected to fully build out by approximately the year 2082.

ES-5 10-Year Model

The 10-year Model scenario represents everything that the City intends to be constructed within ten years and generally includes all vacant parcels bordering parcels that are currently being served. Flows from parcels of property that were not already included in the Existing Model were developed using unit flows derived from the Existing Model. The current average daily flow for a single-family residential unit is 223.3 gpd (approximately 70 gallons per capita). The 10-year Model is a tool to guide growth and expansion of the collection system and identify potential future deficiencies in the existing collection system within a ten year time frame.

Figures A7 and **A8** show the resulting depth over diameter and reserve capacity of the existing collection system with 10-year flows during a design storm event. One bottleneck was identified under this scenario. No new potential bottlenecks were identified. Model results from the 10-year Model scenario are included in **Appendix D**.

ES-6 20-Year Model

The 20-year Model scenario represents everything that the City intends to be constructed within the next twenty years. This generally includes all 10-year parcels and additional parcels the City identified as potential areas to develop from the future land use map in the 2023 General Plan. Flows from parcels of property that were not already included in the Existing Model or 10-year Model were developed using unit flows derived from the Existing Model. The current average daily flow for a single-family residential unit is 223.3 gpd (approximately 70 gallons per capita). The 20-year Model is a tool to guide growth and expansion of the collection system and identify potential future deficiencies in the existing collection system within a twenty year time frame.

Figures A10 and **A11** show the resulting depth over diameter and reserve capacity of the existing collection system with 20-year flows during a design storm event. One additional bottleneck was identified under this scenario. No new potential bottlenecks were identified. Model results from the 20-year Model scenario are included in **Appendix D**.

ES-7 Build Out Model

The Build Out Model shows the results of full build out of the identified parcels to connect to the City's collection system. The Model also includes location, size, and depth required of master planned pipes to serve the extents of the study area.

Build out flows that were not already included in the Existing, 10-year, or 20-year Model were developed using unit flows derived from the Existing Model. The current average daily flow for a single-family residential unit is 223.3 gpd (approximately 70 gallons per capita). Future capital improvements were not included, allowing identification of all capital improvements needed to address collection system capacity. **Figures A16** and **A17** show the resulting depth over diameter and reserve capacity of the existing collection system with build out flows during a design storm event.

The specific depth required for each master plan line, along with the Build Out Model output, can be found in **Appendix D**. Three additional bottlenecks were identified under this scenario. No new potential bottlenecks were identified.

ES-8 Capital Improvement Plan

The CIP identifies and describes the improvements necessary to provide service to the study boundary. It also provides an approximate timeline for the implementation of these projects. **Table ES-1** lists the CIP projects that fall within the 0 to 5 year category. **Figure A18** shows the location and type of each project in the CIP. **Appendix E** contains a project summary for each CIP project.

Table ES-1 – CIP Projects (0-5 years)

ID	Figure #	Project	Capital Cost (1)
C.1	E2	Main Street Trunk Upsize Phase 1	$ 413,000
R.1	E7	W 470 S Replacement	$ 1,344,000

(1) *All capital costs are in 2025 dollars and are a Class 5 cost opinion (i.e., -50% to +100% per AACE)*

The costs associated with each CIP project were grouped by time and are summarized in **Table ES-2**. Reference **Appendix E** for summary figures of each project. The timeframes listed are intended to begin in Fiscal Year 2025. The CIP costs identified herein should be reviewed and integrated as budget permits. If this work cannot be budgeted for the identified timeframe, it should be budgeted as soon as possible afterwards.

Table ES-2 – CIP Cost Summary

CIP Project Timeframe	Capital Cost (1)
0 – 5 Years	$ 1,757,000
5 – 20 Years	$ 1,128,000
As Needed with Growth	$ 2,140,000
Totals	**$5,025,000**

(1) *All capital costs are in 2023 dollars and are a Class 5 cost opinion (i.e., -50% to +100% per AACE)*

ES-9 Summary

Overall, the existing collection system is in good condition and will have adequate capacity to convey current flows through master plan flows as the CIP is implemented. This is evidenced by the relatively few capacity issues within the existing system compared to necessary upgrades to accommodate growth beyond the City's current service limits.

The hydraulic model used in this analysis was created based on land use and zoning conditions at the time of the study, both of which will change over time. Since the models are based on these parameters, it is critical to keep them updated over time to reflect up-to-date conditions. The Master Plan will therefore require periodic updates to remain a current, accurate, and applicable tool in future evaluations. We recommend to update the Collection System Master Plan every five to ten years. Updates may be needed more frequently if there are significant changes to land use, study area boundary, collection system, or the rate of development.

ES-10 Acknowledgements

Many people were extremely helpful in providing documentation, information, and input throughout the course of this project. We wish, however, to especially thank the City of Richmond Utilities Department staff who contributed to this report including HollyJo Karren and Austin Hinckley. They were instrumental in collecting data, presenting improvement ideas, evaluating alternatives, expressing system concerns, and giving timely, pointed feedback. This assistance is gratefully acknowledged.

Chapter 1

Introduction

Chapter 1 – Introduction

1.1 Background

The City of Richmond (City) selected J-U-B Engineers, Inc. (J-U-B) to update the City's 2011 Sewer Collection System Master Plan. The Richmond sanitary sewer system was constructed in 1971 and collects sewer flows from homes, businesses, and industries within and bordering the current Richmond City limits. Originally constructed with a lagoon system, the collection system now delivers the wastewater to the City's wastewater treatment facility which is located west of Richmond City on the north side of State Road 142 (site of lagoon system).

Most of the collection system is made up of eight-inch diameter pipelines with a few ten-inch and twelve-inch lines near the treatment plant. Because of the smaller collection lines and recent growth, the city decided to be proactive and complete an update to their sanitary sewer collection system master plan. As part of this proactive approach, the city hired J-U-B ENGINEERS, Inc. to study the existing collection system capacities and to propose the alignment and sizes of future trunk lines. This master plan does not include an evaluation of the sewer treatment facilities.

1.2 Study Scope

The items specifically addressed in this sewer master plan update include:

- Transfer 2011 model data to new modeling software.
- Add new service areas that have developed since 2011.
- Update the existing land use and the existing system mapping layers.
- Evaluate treatment facility flow records.
- Update the existing model by adding the developments that have occurred since 2011 and system improvements that have been made.
- Add updated Pepperidge Farm flows.
- Calibrate model utilizing unit flows and diurnal curves identified for the 2011 master plan.
- Identify wet weather periods and estimate the increase in sewer system flows in the system. Add flows to the model to account for probable flow spikes during wet weather.
- Analyze existing model scenario results by identifying deficiencies in the existing collection system and plan pipe upgrades or additions needed to convey existing flows.
- Identify existing collection system level of service provided by the existing system based on the ratio peak flow to full pipe flow for use in the IFFP evaluation.
- Estimated the projected annual population growth based on input from City staff.
- Develop build-out model and identify future deficiencies and to provide a general layout for a trunk sewer system to serve the future growth areas. Identify the required pipe sizes for any pipes that need to be upsized in order to serve the City when the area within the planning boundary is fully developed.

- Develop a 10-year model scenario based on the planned land uses and estimated growth rate of the City that will occur in the next 10 years.
- Develop a 20-year model scenario based on the planned land uses and estimated growth rate of the City that will occur in the next 20 years.
- Develop a prioritized list of recommended collection system capital facility projects for the existing, 10-year, and build-out benchmarks, including conceptual opinions of probable costs.
- Develop an Impact Fee Facility Plan by establishing the existing level of service, documenting existing deficiencies, identifying deficiencies, identifying improvements, and assessing the value of existing excess capacity.

The Collection System Master Plan report is organized into the following chapters and appendices:

Chapter 2 – Existing System Summary

Provides a summary of the existing collection system including pipe size, pipe material and existing lift stations. A high-level overview of the City's current asset management program related to the collection system will also be provided.

Chapter 3 – Existing Model

Provides an overview of the hydraulic model and a summary of the model calibration. It also includes an analysis of the existing system capacity and identifies any existing capacity problems. The Existing Model represents the collection system in July 2025 and utilizes unit flows from the 2011 Master Plan.

Chapter 4 – Population Growth and Boundaries

The planning horizon for collection system master plans is usually on the order of 50 to 100 years and/or to a defined build out boundary. This chapter reviews past growth within the City, documents decisions made by City Planning in the 2023 General Plan relative to its build out service area and expected growth in the near term.

Chapter 5 – 10 -year Model

After the existing system is updated and evaluated, the model is modified to reflect an estimated ten years of growth within the City. This includes all vacant parcels within City limits and assumes housing and business vacancy is zero as well as parcels selected by the City as likely to develop in the next 10-years. The results of this evaluation show if there is sufficient capacity remaining in the collection system to service near-term growth.

Chapter 6 – 20 -year Model

Similar to Chapter 5, this chapter reflects an estimated 20-years of growth within the City. This includes all parcels added in the Existing and 10-Year Models and adds parcels that the City believes could be developed in the next 20 years. The results of this evaluation show whether there is sufficient capacity remaining in the collection system to service mid-term growth.

Chapter 7 – Build Out Model

The Build Out Model itself is a representative layout of the future sewer system that will serve the City to the delineated build out conditions and accommodate potential changes in land use within existing service areas. The model identifies probable sizing and alignments for future trunk lines, areas serviceable by gravity, preliminary design criteria for future lift stations, opportunities to remove existing lift stations, relief sewer routing alternatives through the existing collection system, and ultimately a list of long-term improvements for the existing system.

Chapter 8 – Capital Improvement Plan

The growth assumptions developed in **Chapter 4** are used in conjunction with the results from the Existing, 10 and 20-year Models, and Build Out Model to develop a Capital Improvement Plan (CIP) and long-term improvement plan.

Chapter 9 – Impact Fee Facility Plan

Establishing the existing level of service, documenting existing deficiencies, identifying deficiencies, identifying improvements, and assessing the value of existing excess capacity.

Chapter 10 – Report Summary

Conclusions from the Collection System Master Plan are summarized as well as recommendations regarding model and master plan maintenance.

Appendix A – Figures

In general, figures in the document are included in this appendix rather than immediately within the text. This allows figures to be grouped and accessed more readily by the user.

Appendix B – Model Assumptions

The hydraulic model consists of two main components: a system layer and a flow generation layer. Assumptions made regarding specific model parameters for each layer are documented here.

Appendix C – Model Calibration

Calibration of the model is summarized. Graphs are included for each flow monitoring site comparing the calibrated model output to the monitored flow.

Appendix D – Model Results

Results for the Existing, 10-year, 20-year, and Build Out Model scenarios are included in table format for trunk lines. Data consists of rim, invert, size, flow, velocity, depth over diameter, and reserve capacity. Rim and invert source information is also included. Results are not included for collectors less than 8 inches.

Appendix E – CIP Summary Sheets

The CIP summary sheets contain pertinent information for the improvements adopted by the City. The summary sheets include a brief narrative of the issue, maps, cost estimate, and projected timing.

1.3 Master Plan Goal

By implementing the recommendations outlined in this master plan, Richmond City will be better able to provide direction for future growth, and to provide adequate sanitary sewer collection service to the residents of the city. Future conditions (development patterns and densities) have been modeled using the planned land use densities that were used for the city's water master plan. Land use and other conditions may change and ultimately affect the master plan. The analysis and recommendations contained herein should be updated as necessary. This is especially true of the relatively undeveloped areas outside the city center. This document should be used as a guide for providing growth. The city should conduct an analysis during the detailed design of any sanitary sewer facilities to verify that growth is occurring according to the planned land uses.

Chapter 2

Existing System Summary

Chapter 2 – Existing System Summary

2.1 System Overview

As previously stated, the Richmond sanitary sewer system was constructed in 1971 in conjunction with the wastewater lagoons. Much of the initial sewer installed in the 1970's was constructed of concrete pipe. However, the majority of the collection system expansion occurred after PVC became the preferred pipe material. A breakdown of pipe materials in the collection system is summarized below:

- 56% - AC (Asbestos Cement)
- 44% - Plastic (PVC)

Richmond in located on the western slopes of the Bear River Mountain Range and generally speaking the east to west pipes have steep slopes and the north south pipes are constructed closer to minimum pipe slopes. The study boundary was determined with the City and is depicted in **Figure A1**.

Due to this configuration the system has been able to minimize the amount of gravity trunk lines 10-inch and greater. The current system is comprised of approximately 1.5 miles of gravity sewer mains 10-inch or larger and 19.8 miles of 8-inch collector pipes as shown in **Figure A2**. This infrastructure serves a population of approximately 3,100 people and one significant industrial user (SIU).

2.1 Lift Stations

The collection system includes two private lift stations which are not reported on in this master plan. However, the Pepperidge Farms lift station was entered into the model to imitate the peak industrial flows being discharged to the City's system.

2.2 Data Management

The previous master plan completed by J-U-B Engineers included a field survey of the lines that were identified as major lines or lines that could potentially serve large areas in the future. This survey was used to build the original GIS mapping and hydraulic model of the system. The City utilizes J-U-B Engineers to update their GIS as growth occurs and resolves identified data gaps in the system, providing an up-to-date dataset that is used for maintenance and operations, planning, and project concept development.

The City provided their GIS datasets involving the sewer collection system to be used for the hydraulic modeling presented in subsequent chapters. The lines that are mapped for reference only are minor eight-inch lines that serve small areas and do not generate enough flows to need a larger pipe. However, be cautioned that if the use of a major land area is changed, the modeling results and conclusions may be affected. This is the case for both the existing and future models.

Chapter 3

Existing Model

Chapter 3 – Existing Model

3.1 General

The City has utilized hydraulic models to analyze system capacity since 2011. The previous collection system models were all developed using Pizer's Hydra software. The new consolidated Existing Model has been developed using Aquanuity's AquaTwin Sewer modeling software. The City's collection system GIS data was used as the primary source of information for the updated model, with the previous models used as secondary sources. The Existing Model's primary purposes are as follows:

- Provide a snapshot of current system flows.
- Identify existing capacity issues.
- Calibrate unit flows for use in future model scenarios (10-year, 20-year, and Master Plan)
- Calibrate seasonal infiltration amounts and inflow responses.

The Existing Model consists of two layers – the System Layer and the Flow Generation Layer. Each layer includes multiple parameters and corresponding assumptions that characterize the area and system being modeled. The assumptions are based on the City's GIS data, record drawing data, 2011 flow monitoring, characteristics learned from the physical system, similar studies done in the region, and general and historical knowledge gained through previous work for the City. Key assumptions used to analyze the City sewer collection system in the Existing Model are documented in **Appendix B**. A summary table of these assumptions is also found in **Table 3-1** below.

Table 3-1 – Model Assumptions Summary

Parameter	2025 Plan	Brief Discussion
Manning's "n"	0.012	ASCE: low range of substandard installations of pipe sizes 6 to 60 inches
Pipe Sizing Methodology (future pipes)	Graduated, from 0.5 to 0.75 d/D	Graduated scale provides more realistic design criteria which accounts for highest variability of flow in smallest pipes
Capacity Criteria	100% Full	Restricts surcharging during dry weather flows. Will assess surcharging during wet weather flows on a case-by-case basis.
Pipe Slopes (future pipes)	Varies: Slope-based criteria, no slopes smaller than 0.10%	Velocity-based standards cannot account for constructability constraints. Modified Ten State Standards.
Sewer Connection Points (future pipes)	Match crowns of all connecting pipes	Prevents surcharging to the smaller upstream line.
Pipe Velocities	Gravity Pipes: 10 fps max. Force Mains: 2 fps min. 6 fps max.	Maintains minimum scouring velocity while balancing life span.
Allowable downstream diameter (future pipes)	New downstream pipe diameter to be equal or greater than upstream pipe diameter.	Decreases are not recommended due to the possibility of obstructions lodging at locations where trunk lines decrease in size. Decreases may be necessary when tying a master planned line into an existing trunk line, but the existing pipes will be flagged for upsizing in the future. Decreases should be avoided for future lines.
Distance Between Manholes (future pipes)	300 ft	Distances may vary but should be limited to a maximum of 400 ft for lines less than 18-in and 500 ft for lines 18-in and larger.
Pipe Depths (future pipes)	Typical = 8 ft., minimum = 5 ft., maximum = 20 ft.	Excessive depth or minimal depth preferred before lift station considered. These will be discussed with the City on a case-by-case basis.
Manhole Drop (future pipes)	0.1 feet every 300 feet of pipe	
Meander Factor (future pipes)	20% additional length from current alignment	Master plan alignments are conceptual, actual alignments anticipated to vary up to 20%
Manhole Losses	0.2 entrance, 0.4 exit	Based on FHA research on initial estimates for manhole losses.
Future Flows - Residential Unit Flows	223 gpdu or 70 gpcd	Selected high range (conservative) of observed Richmond residential flows
Future Flows – Commercial/Industrial Unit Flows	900 gpad	Estimated from aerial imagery and current land use maps
Future Residential Land Use - Densities	Res. Low = 1 DU/Ac Res. Med. = 4 DU/Ac; Res. High = 12 DU/Ac	Selected from the high range (conservative) of observed Richmond densities and are in accordance with the 2023 General Plan
Diurnal Curves	Aligned to land use types	Calibrating to land use types ensures future growth areas can be loaded according to land use
Inflow - Design Storm	Selected according to monitored storm profile	
Inflow – Rainfall dependent Infiltration	Infiltration assigned design storm	
Inflow – Groundwater Infiltration	Assigned to select basins	Calibrating by basin allows for accurate infiltration to be modeled by location.
Vertical Datum	NAVD 88	
Horizontal Datum	NAD 1983 Idaho Central State Plane US Feet	
Elevation Data for MP Area	2016 Cache Valley Lidar	

3.2 Existing Model System Layer

The System Layer for the Existing Model scenario is comprised of the manholes, gravity sewer pipes, force mains, diversions, and lift stations in the collection system. A map of the Existing System Layer and study area is depicted on **Figure A2**. It is representative of the collection system in July 2025.

3.2.1 City GIS

The City's GIS was used as the main source of information for rim elevations, invert elevations, pipe sizes, and pipe lengths. A review of the GIS data was completed to identify any missing or questionable rim elevations, invert elevations, or pipe sizes for major modeled lines 8 inches and larger. Missing or questionable data was reviewed with the City to determine the appropriate action to resolve the data gap. This resulted in a review of record drawings and field checks where possible. If record drawings or field data were unavailable, assumptions such as interpolating an invert elevation between two known points were made. All manholes and pipes in the model are tagged with the source for both rim and invert elevations.

Some collector pipes (8-inch and less) were included in the model to facilitate flow routing, since existing flows are injected using a parcel based method. Missing or questionable data for collectors was resolved by straight-grading pipe slopes. Since the collector's main purpose is to route the flow to the trunk lines so that peak attenuation through the trunk lines is represented correctly, this approach was deemed sufficient and appropriate.

3.2.2 Lift Stations

The City does not own or maintain any lift stations, if any were to be added as part of a future expansion they would be added to the appropriate model using GIS and record drawings as references, along with discussions with City staff as needed to ensure accuracy. Design operating points would be obtained from the City. Without information provided or for pumps with variable frequency drives (VFD's), lift stations will be modeled as "ideal pumps" (i.e., the flow rate at the discharge matches the influent flow, resulting in no storage in the wet well).

3.3 Existing Model Flow Generation Layer

The Flow Generation Layer for the Existing Model is comprised of sanitary flow, infiltration, and inflow. The quantity of each flow type is described in this section. The flow layer is representative of the system flows in July 2025.

3.3.1 Existing Land Use

A specific land use designation was assigned to each parcel served by the existing collection system. City land use maps were used as the primary source to determine the land use designation. An aerial home count provided additional parcel data to refine land use designations and determine the number of residential dwelling units associated with each parcel. The land use designations used in the Existing Model are summarized in **Table 3-2**. **Figure A3** shows the spatial distribution of land use as applied in the Existing Model.

Table 3-2 – Existing Model Land Use Designations

➢ Central Business District	➢ Public Use
➢ Commercial	➢ Residential
➢ Highway Commercial	➢ Residential Low Density
➢ Manufacturing Light Industrial	➢ Residential Medium Density
➢ Open Space	➢ Residential High Density

Residential land use was divided into the following three categories:

- Low Density: Typical residential parcels with one dwelling unit.
- Medium Density: Parcels with between two and four dwelling units. Includes townhomes, mobile homes and RV parks.
- High Density: Apartments and multi-family units with more than four dwelling units.

The existing land use types were assigned either a residential or commercial hourly diurnal pattern during the flow allocation process.

3.3.2 Sanitary Flows

The design criterion in UAC R317 consists of sanitary sewer flows of 100 gallons per capita per day (gpcd), with a peaking factor of 2.5 for all sewer interceptors. However, average sanitary flows for the Existing Model were generated from an aerial home count and unit flows determined by the 2011 hydraulic model. Residential land use types were assigned a unit flow of 70 gpcd. Based on data from the U.S. Census the average people per dwelling unit in Richmond is 3.19. This results in a unit flow of 223.3 gallons per day (gpd) per equivalent residential unit (ERU). Commercial land use types were assigned a unit flow of 900 gallons per acre per day (gpad). Therefore, the City determined to establish the Level of Service (LOS) based on 70 gpcd.

3.3.3 Infiltration and Inflow

Infiltration is groundwater entering the sewer through cracked pipes or other defects in the system. This can be from a high groundwater table or rainfall induced groundwater. Infiltration estimates were based on flow monitoring data collected in the summer of 2011 at five separate locations and previous modeling efforts. These estimates were then adjusted during model calibration**. Table 3-3** lists the estimated peak seasonal infiltration and relative density for each basin.

Table 3-3 – Existing Model Estimated Infiltration

Site # (Infiltration Basin)	Total Infiltration (GPD)	Infiltration Rate (GPAD)
Site 1	0	0
Site 2	36,000	268
Site 3	72,000	141
Site 4	50,400	109
WWTP	0	0

Inflow is the flow of storm water directly into the sewer during and after a rainfall event due to a direct connection to the sewer from storm drains, roof drains, parking lots, manhole lids, etc. Inflow in a system can be observed and estimated from flow monitoring and rainfall data. Quantifying inflow in the Cache Valley is difficult due to the semi-arid climate and costs of long-term flow monitoring. One storm event was captured on July 9^{th} during the 2011 flow monitoring efforts. Inflow estimates for individual basins were developed by using unique unit hydrographs for each basin.

3.3.4 Peaking Factors

The existing model utilized peaking factors to convert average usage data into hourly data for weekend flows.

Hourly peaking factors for the average sanitary flows were applied in the form of diurnal curves. Diurnal curves or hourly flow patterns (the typical 24-hour shape of the flow) were developed for each unique land use designation used in the model. The previous model identified weekdays as experiencing the peak flow due to industrial flows. However, since the previous model a significant amount of industrial flows were removed from the system. The diurnal curves were developed from historical modeling efforts for the City and throughout the Cache Valley. Diurnal curves used in the model can be found in **Appendix B**.

Typically, the highest average and peak residential flows usually occur on weekends, the majority of the trunk lines experience peak flows on the weekend. However, smaller basins with a high percentage of non-residential flows may experience peak flows during the weekdays. For example, a school generates the majority of its wastewater during the week. Due to the removal of some industrial flows and the fact that the majority of the City is characterized by residential flows, a weekend diurnal pattern was used to characterize the peak flows in the system.

3.3.5 Flow Allocation

The aerial home count was completed by creating a point shapefile and placing a point on each home connected to the existing system. Each point was linked to the served parcel and assigned the land use designated to that parcel. Average daily flows were then adjusted by the scaling factors described above to reflect weekend flows. The flows were then allocated into the Existing Model at the nearest manhole upstream of the service connection.

3.4 Existing Model Calibration

Calibration is the process of modifying various parameters and their assumed values in order to match model flows to actual flows in the system at multiple locations. Data for actual flows (flow monitoring) have limitations that prevent 'perfect' calibration between model output and real flows. Some of the factors affecting calibration include the level of uncertainty of the flow monitoring data and the assumed unit flows.

3.4.1 Dry Weather Calibration

Sewer flows are continually monitored at the WWTP by the City and were provided. However, due to the flow being split between the lagoons and the WWTP upstream of the meter the peak flows depicted by the WWTP flow meter are likely much lower than the actual flows entering the lagoons and WWTP. Flow monitoring was completed at 4 other locations from June 21, 2011 to July 14, 2011. In addition, monitoring was completed at the Blackhawk LS from August 30, 2019 to September 17, 2019. Flow monitoring locations are shown on **Figure C1** in **Appendix C**.

As discussed in **Section 3.3.4**, sanitary flows vary from weekday to weekend. As such, the model was calibrated to both weekend flows. Modeled flows were plotted to show the uncertainty and variability of flow at any given point in the system. Large service areas showed less variability in flow than smaller service areas due to the number of customers upstream. An average weekend diurnal determined by the previous hydraulic model was utilized from flow monitoring data. Days with rain events were removed and the model was calibrated to these average curves. The total peak seasonal infiltration was determined to be approximately 158,400 gpd.

The existing model results were plotted on top of the previous model results and flow monitoring to confirm calibration. This calibration provides confidence that the model will provide representative results for future model scenarios and alternative evaluations. An example calibration graph for one of the sites is shown in **Figure 3-1**. All individual calibration graphs for dry weather flows can be found in **Appendix C.**

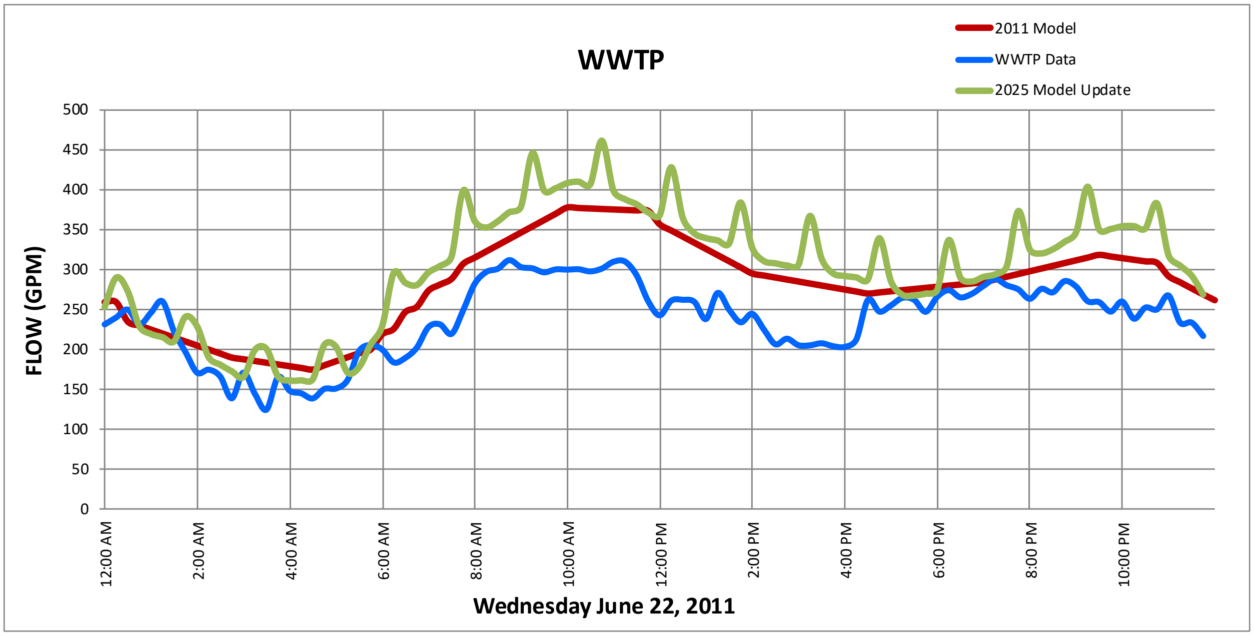


Figure 3-1 – Dry Weather Calibration Example

3.4.2 Wet Weather Calibration

The model uses a composite synthetic unit hydrograph to convert rainfall to inflow that enters the collection system. Three modeling parameters are modified during the calibration process, including R (effective rainfall volume), T (time to peak) and K (recession constant). Data from a storm event captured by flow monitoring on July 9, 2011 was used for the wet weather calibration. The calibrated average flow from the model at each monitored site was compared to the measured flow on the day of the storm event to estimate the inflow resulting from the storm.

A connected impervious area was estimated by calculated by estimating the total impervious area along the alignment of the collection system. The July 9th, 2011 storm resulted in a total storm depth of 0.3 inches. The total impervious area was estimated to be approximately 477 acres. A calibration graph showing the measured and the calibrated modeled storm inflow at each site is also included in **Appendix C**.

As described in **Section 3.3.2** a unit flow of 70 gpcd was used in the calibrated model. After running the model, a peaking factor of 2.13 closely matched the metered peak flows in the June 2011 flow analysis. Therefore, the City determined to establish the LOS based on 70 gpcd, with a peaking factor of 2.13.

3.5 Existing Model Analysis

To simulate a worst-case condition in the Existing Model, the peak inflow from the storm event was aligned with the peak in sanitary flow for weekend output. Peak seasonal infiltration was also applied to the model. This results in a larger net return period for the sewer event as compared to the storm event.

Figures A4 and **A5** show Depth over Diameter and Reserve Capacity for the Existing Model, illustrating any capacity issues. The reserve capacity figure can be used to identify individual pipes that could be the root cause of surcharging or limited capacity. This figure does not include backwater effects from downstream pipe segments, therefore, it does not indicate whether or not surcharging will occur. A negative value for reserve capacity ("over capacity") does not indicate surcharging, only that the flow depth increases faster than the pipe slope as you go up-stream. Pipes with a negative reserve capacity have the possibility of surcharge if they have sufficient length or are in sequence with other "over capacity" pipe sections. However, this is not always the case.

The depth over diameter figure can be used to identify the extents of surcharging, if any do occur. This figure includes the effects of backwater from downstream pipe segments, so it shows how full a pipe may get under the design conditions noted previously. Results are limited to major modeled lines. **Appendix D** contains complete model results from the Existing Model analysis. All Existing Model results and figures include the design storm event.

The City of Richmond has established a LOS for existing sewer pipes as a maximum d/D value of 1.0, meaning that pipes with a d/D value above 1.0 are considered to be deficient.

3.5.1 Existing Model Bottlenecks

The Existing Model analysis shows no locations in the system with surcharging (d/D > 1.0).

There is one potential bottleneck area with possible capacity issues (reserve capacity < 0.0) that do not result in surcharging under existing design conditions but could under higher flows. This potential bottleneck is the influent pipe at the WWTP. The existing pipe is 15-inches and has a d/D of 0.99. There are no connections close to this pipe and there are no current negative impacts of a full pipe. However, this potential bottleneck should be watched and will likely become a bottleneck with surcharging in future scenarios.

There are a couple of additional lines in the system that are near or over capacity. These are "flat" pipes that have very low slopes and show little or no reserve capacity. However, each "flat" pipe has significant reserve capacity both upstream and downstream. These isolated "flat" pipes do not result in any surcharging and are not considered potential bottlenecks with current flows.

Through discussion with the City, one CIP improvement project is planned to improve capacity limitations under existing model conditions:

- Main St. Upsize Ph.1 – See CIP project C.1

Chapter 4

Population Growth and Boundaries

Chapter 4 – Population Growth and Boundaries

4.1 Historical Population Data and Projections

The City has experienced steady growth since the 1990's with only brief periods of stagnation. US Census data and annual average growth rates since 1950 are summarized in **Table 4-1**. Projected population growth based on previous estimates made by J-U-B with input from the City are listed in **Table 4-2**.

Table 4-1 – US Census Bureau Population Data

Year	Richmond Population (1)	Average Annual Growth Rate over Prior Period	Cache County Population (1)	Average Annual Growth Rate from Prior Period
1950	1,091	-3.5%	33,536	12.5%
1960	977	-1.1%	35,788	6.7%
1970	1,000	0.2%	42,331	18.3%
1980	1,705	5.5%	57,176	35.1%
1990	1,955	1.4%	70,183	22.7%
2000	2,051	0.5%	91,391	30.2%
2010	2,470	1.9%	112,656	23.3%
2020	2,733	1%	133,154	18.2%
2025 (est.)	3113	2.6%	145,487	9.3%

(1) Population estimates from US Census Bureau

Table 4-2 – Population: Model Estimates

Scenario	Population
Existing	3,113
10-year	5,290
20-year	6,387
Buildout	9,539

4.2 Population Projections

The average annual growth rate from 2000 to 2025 in Richmond was 1.8%. Other similar planning studies have used a future annual growth rate of 2.75% for the City, which is similar to the growth rate from 2020 to 2025. **Figure 4-1** shows the historical population for Richmond, as well as future population projections using 1.5%, 2.0% and 3.0% average annual growth rates. The projected buildout population would be reached in approximately 2082 with an average annual growth rate of 2.0%.

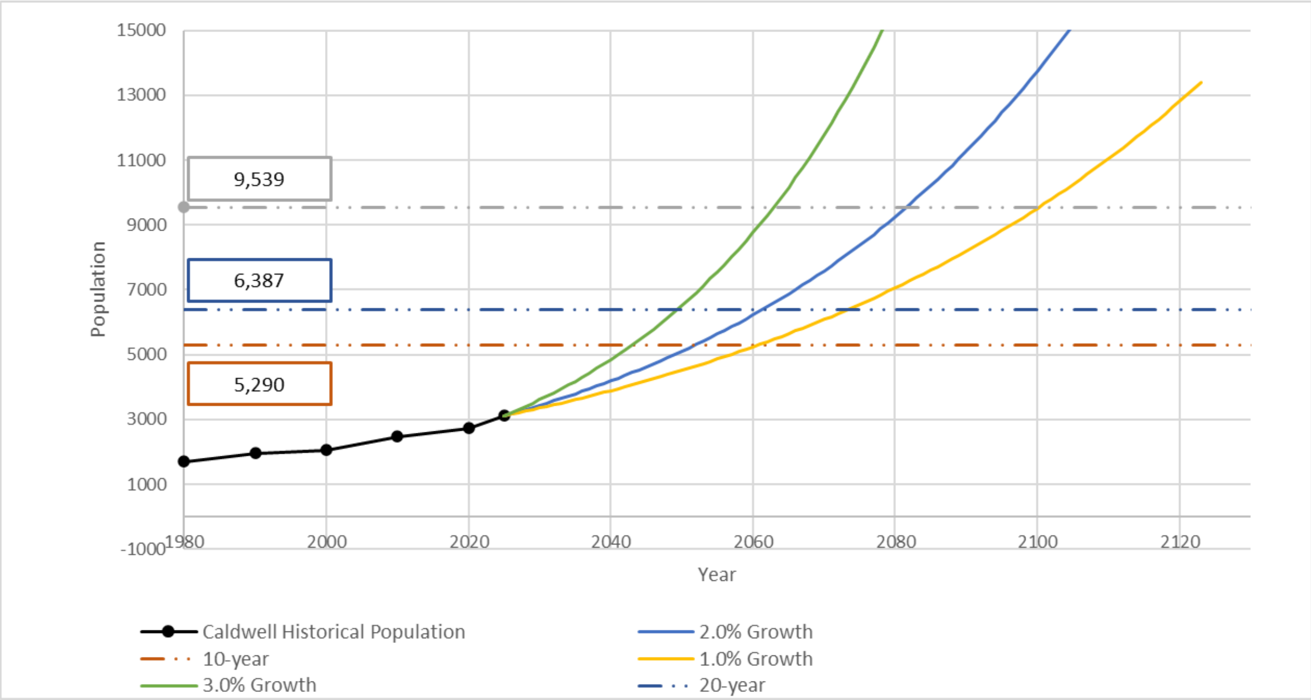


Figure 4-1 – Population Projections

Chapter 5

10-year Model

Chapter 5 – 10-year Model

5.1 General

The 10-year Model represents everything the City intends to be constructed within ten years and generally includes all vacant parcels bordering parcels that are currently being served. The 10-year Model is a tool to guide growth and expansion of the collection system and identify potential future deficiencies in the existing collection system within a ten year time frame. The 10-year Model's primary purposes include:

- Evaluation of the remaining capacity of the system in approximately 10 years.
- Identify potential capacity issues that may arise as the City develops areas already within the City limits.

5.2 10-year Model System Layer

The 10-year Model uses the same system layer as the Existing Model (see **Section 3.3**).

5.3 10-year Model Flow Generation Layer

The Existing Model Flow Generation Layer is used as the base for the 10-year Model Flow Generation Layer. New flows added to the 10-year Model come from two categories. First, all parcels identified by the City as anticipated to develop within 10 years were assigned flow. Second, all vacant parcels bordering currently served parcels were assigned flow.

5.3.1 Land Use and Unit Flows

Land use designations for new flows in the 10-year Model were assigned based on the future land use map included in the 2023 General Plan. **Figure A6** shows the land use for the new flows applied in the 10-year Model. The non-residential land use types used in the 10-year Model include: Central Business District, Highway Commercial, and Manufacturing Light Industrial. Each of these commercial land use types were assigned a gross unit flow of 900 gpad as determined from the calibration of the Existing Model.

Net unit flow for a parcel ***excludes*** right-of-way, open spaces, roads, parks, and landscape buffers. These unit flows are therefore higher than those reported on a gross basis. The gross unit flow for a parcel ***includes*** all developable land, some of which must be allocated for right-of-way, open spaces, roads, parks, and landscape buffers. Consequently, unit flows based on a gross basis are lower than those based on a net basis.

Table 5-1 lists the residential land use types used in the 10-year Model and the corresponding unit flows. The residential unit flows were developed by utilizing the planning density for each land use type as defined by the 2023 General Plan. For the purposes of this study, an equivalent residential unit (ERU) is defined as 223.3 GPD. Based on a people per dwelling unit of 3.19**,** the per capita flow is 70 GPCD.

Table 5-1 – 10-year Model Unit Flows – Residential

Land Use Type	Planning Density	Unit Flow (GPDU)
Residential Low Density	1.0	223.3
Residential Medium Density	4.0	223.3
Residential High Density	12.0	223.3

Vacancies in existing Residential Low Density parcels were filled in the 10-year Model using the unit flows from **Table 5-1**.

The unit flows and densities listed in Error! Reference source not found.**Table 5-1** represent average values for each land use. Specific developments that fall within a certain land use type may have flows that vary significantly from these averages. In such cases, the City should consider using a more representative unit flow value on a case-by-case basis when determining whether or not they can provide service to the development.

5.3.2 Flow Allocation

Each parcel that has been determined as a 10-year parcel is modeled by injecting flow into the nearest upstream manhole in the system layer. Since the current system layer has not been extended to all of the 10-year flow parcels, these 10-year flows are injected into the system at the manhole from which the system layer is planned to be extended, according to the master plan. Some large 10-year parcels were divided and injected into multiple locations to follow the master plan.

5.4 10-year Model Analysis

The 10-year Model analysis shows the results if all of the current 10-year flows are developed without the addition of any relief lines or correction of existing system deficiencies. This helps identify priorities for Capital Improvement Projects in subsequent chapters.

Figures A7 and **A8** show Depth over Diameter and Reserve Capacity for the 10-year Model, illustrating any capacity issues. The reserve capacity figure can be used to identify individual pipes that could be the root cause of surcharging or limited capacity. This figure does not include backwater effects from downstream pipe segments, therefore, it does not indicate whether or not surcharging will occur. A negative value for reserve capacity ("over capacity") does not indicate surcharging, only that the flow depth increases faster than the pipe slope as you go up-stream. Pipes with a negative reserve capacity have the possibility of surcharge if they have sufficient length or are in sequence with other "over capacity" pipe sections. However, this is not always the case.

The depth over diameter figure can be used to identify the extents of surcharging, if any do occur. This figure includes the effects of backwater from downstream pipe segments, so it shows how full a pipe may get under the design conditions noted previously. Results are limited to major modeled lines. **Appendix D** contains model results from the 10-year Model analysis. All 10-year Model results and figures include the existing design storm event.

5.4.1 10-year Model Bottlenecks

The 10-year Model analysis shows surcharging (d/D > 1.0) in one location within the system. This is the same location that was identified as a potential bottleneck in the Existing Model. Bottlenecks that result in surcharging under the Build Out Model scenario are documented further in **Section 7.4.1**. See **Section 8.2** for recommended improvements associated with these bottlenecks.

There are no additional potential bottleneck areas (reserve capacity < 0.0) that do not result in surcharging under committed design conditions but could under higher flows.

There are also several additional lines scattered throughout the system that are near or over capacity. These are "flat" pipes that have very low slopes and show little or no reserve capacity. However, each "flat" pipe has significant reserve capacity both upstream and downstream. These isolated "flat" pipes do not result in any surcharging and are not considered potential bottlenecks.

No additional CIP improvement projects are planned to improve capacity limitations under 10-year Model conditions.

Chapter 6

20-year Model

Chapter 6 –20-year Model

6.1 General

The 20-year Model uses the 10-year Model as a base and represents everything the City intends to develop in the next 20 years. This generally includes all 10-year parcels and additional parcels the City identified as potential areas to develop from the future land use map in the 2023 General Plan. The 20-year Model is a tool to guide growth and expansion of the collection system and identify potential future deficiencies in the existing collection system within a 20 year time frame. The 20-year Model's primary purposes include:

- Evaluation of the remaining capacity of the system in approximately 20 years.
- Identify potential capacity issues that may arise as the City develops areas already within the City limits.

6.2 20-year Model System Layer

The Committed Model uses the same system layer as the Existing Model (see **Section 3.3**).

6.3 20-year Model Flow Generation Layer

The 10-year Model Flow Generation Layer is used as the base for the 20-yr Model Flow Generation Layer. New flows added to the 20-year Model come undeveloped areas identified by the City as areas likely to develop in the next 20 years.

6.3.1 Land Use and Unit Flows

Land use designations for new flows in the 20-year Model were assigned based on the future land use map included in the 2023 General plan. **Figure A9** shows the land use for the new flows applied in the 20-year Model. The non-residential land use types used in the 20-year Model include: Central Business District, Highway Commercial, and Manufacturing Light Industrial. Each of these commercial land use types were assigned a gross unit flow of 900 gpad as determined from the calibration of the Existing Model.

Net unit flow for a parcel ***excludes*** right-of-way, open spaces, roads, parks, and landscape buffers. These unit flows are therefore higher than those reported on a gross basis. The gross unit flow for a parcel ***includes*** all developable land, some of which must be allocated for right-of-way, open spaces, roads, parks, and landscape buffers. Consequently, unit flows based on a gross basis are lower than those based on a net basis.

Table 5-1 lists the residential land use types used in the 20-year Model and the corresponding unit flows. The residential unit flows were developed by utilizing the planning density for each land use type as defined by the 2023 General Plan. For the purposes of this study, an equivalent residential unit (ERU) is defined as 223.3 GPD. Based on a people per dwelling unit of 3.19, the per capita flow is 70 GPD.

Table 6-1 – 20-year Model Unit Flows – Residential

Land Use Type	Planning Density	Unit Flow (GPDU)
Residential Low Density	1.0	223.3
Residential Medium Density	4.0	223.3
Residential High Density	12.0	223.3

The unit flows and densities listed in **Table 5-1** represent average values for each land use. Specific developments that fall within a certain land use type may have flows that vary significantly from these averages. In such cases, the City should consider using a more representative unit flow value on a case-by-case basis when determining whether or not they can provide service to the development.

6.3.2 Flow Allocation

Each parcel that has been committed is modeled by injecting flow into the nearest upstream manhole in the system layer. Since the current system layer has not been extended to all of the 20-year flow parcels, these 20-year flows are injected into the system at the manhole from which the system layer is planned to be extended, according to the master plan. Some large 20-year parcels were divided and injected into multiple locations in order to follow the master plan.

6.4 20-year Model Analysis

The 20-year Model analysis shows the results if all of the current 20-year flows are developed without the addition of any relief lines or correction of existing system deficiencies. This helps identify priorities for Capital Improvement Projects in subsequent chapters.

Figures A10 and **A11** show Depth over Diameter and Reserve Capacity for the Committed Model, illustrating any capacity issues. The reserve capacity figure can be used to identify individual pipes that could be the root cause of surcharging or limited capacity. This figure does not include backwater effects from downstream pipe segments, therefore, it does not indicate whether or not surcharging will occur. A negative value for reserve capacity (“over capacity”) does not indicate surcharging, only that the flow depth increases faster than the pipe slope as you go up-stream. Pipes with a negative reserve capacity have the possibility of surcharge if they have sufficient length or are in sequence with other “over capacity" pipe sections. However, this is not always the case.

The depth over diameter figure can be used to identify the extents of surcharging, if any do occur. This figure includes the effects of backwater from downstream pipe segments, so it shows how full a pipe may get under the design conditions noted previously. Results are limited to major modeled lines. **Appendix D** contains model results from the 20-year Model analysis. All 20-year Model results and figures include the design storm event.

6.4.1 20-year Model Bottlenecks

The 20-year Model analysis shows surcharging (d/D > 1.0) in several locations in the system. The surcharging shown in **Figure A10** is a result of trunk line capacity limitations and one pipe with a significant change in slope compared to the other pipes directly upstream and downstream. Bottlenecks that result in surcharging under the Build Out Model scenario are documented further in **Section 7.4.1**. See **Section 8.2** for recommended improvements associated with these bottlenecks.

There are no additional potential bottleneck areas (reserve capacity < 0.0) that do not result in surcharging under committed design conditions, but could under higher flows.

There are also several additional lines scattered throughout the system that are near or over capacity. These are “flat” pipes that have very low slopes and show little or no reserve capacity. However, each “flat” pipe has significant reserve capacity both upstream and downstream. These isolated “flat” pipes do not result in any surcharging and are not considered potential bottlenecks.

One additional CIP improvement project is planned to improve capacity limitations under 20-year Model conditions:

- S. 800 W. Upsize – See CIP project C.2

Chapter 7

Build Out Model

Chapter 7 – Build Out Model

7.1 General

The Build Out Model represents the full buildout of the study boundary. **Figure A1** shows the study boundary. The Build Out Model is a tool to guide growth and expansion of the collection system and also identify potential future deficiencies in the existing collection system. The Build Out Model's primary purposes are as follows:

- Provide the size, approximate location, and depth for future sewer lines over 10 inches in size.
- Identify how undeveloped areas can be provided with sewer service.
- Identify potential capacity issues that may arise in the existing collection system as the City develops the remaining area beyond the City limits within the study area.
- Develop a base model to use in evaluating future wastewater service scenarios.

7.2 Build Out Model System Layer

7.2.1 Build Out Trunk Lines

The master plan system layer was developed to take advantage of existing and future public right-of-way and the low-lying areas along natural drainages. During the development of the system, the following generalized criteria was taken into consideration:

- The prevailing topography in the study area slopes to the west, toward the Bear River.
- Current and future right-of-way is expected to be along section lines, quarter section lines, and extension of existing roads. With a few areas to cut across parcels in order to connect to the existing system.
- Previous master plan routing.

To reduce capital construction costs and operation and maintenance costs, the depth of major master plan lines was held as shallow as possible while still providing service and minimizing the number of lift stations. Service area "check lines" were included in the model to ensure that the trunk lines have sufficient depth to serve to the boundary of the associated service areas. In some cases, the check lines forced the trunk line deeper to help ensure serviceability.

Since the exact location of future sewer lines is unknown, a "meander" factor was added to allow for alignment flexibility as development occurs. This safety factor allows each trunk line to "meander" from the location shown in the master plan and add up to 20 percent to its length without compromising the integrity of the master plan.

Sizing of master planned lines was accomplished using the design parameters listed in **Table 7-1**. Some of the study area has sufficient slope to allow trunk lines to be constructed at steeper than minimum grade, possibly with reduced trunk line sizes. If trunks are designed and installed at reduced size and steeper slope, care must be taken to ensure master plan capacities or serviceability are not reduced. A separate and specific capacity and serviceability analysis should be completed for each case. In all cases, it is imperative that all identified and necessary master plan elevations are satisfied. **Appendix B** has further discussion of the parameters and methods used to develop the master plan system layer.

Appendix D lists the proposed sizes, inverts, and slopes of the master planned trunk lines, and denotes any trunk lines that require steeper than minimum slopes. **Figure A12** shows proposed sizes and locations for the master planned trunk lines.

Table 7-1 – Master Plan Pipe Design Parameters

Pipe Diameter (in)	Maximum Allowed Depth/Diameter	Minimum Slope
8	0.50	0.40%
10	0.55	0.28%
12	0.60	0.22%
15	0.65	0.15%
18	0.75	0.12%
≥21	0.75	0.10%

Since the previous master plan, several changes have been made to the master plan layout to accommodate growth, development and City direction. The current layout provides service to the study area extents, minimizes sewer depths and the number of lift stations. The model results indicate that many of the future trunk lines have depth in the ideal range of 10 to 15 feet below ground surface as shown in **Figure A13**. However, in two separate locations, the trunk depth reaches a maximum depth of around 21 feet. Along N 200 W the trunk reaches a maximum depth of 21.16 feet and along S 200 W the trunk reaches a maximum depth of 20.71 feet deep.

7.2.1 Diversions

As the collection system continues to expand to full buildout, one new diversion is planned to provide operational flexibility and to relieve a build out bottleneck. A summary of the diversion at buildout of the master plan is included in **Table 7-**.

Table 7-2 – Summary of Diversions for Build Out Model

Diversion Number	UNIT ID	Flow Control	Percent Diverted [1]	Trunk Diverted To
1	New Master Plan Diversion (W. 100 N. Diversion)		46%	21" Florida Avenue Relief Trunk (North)

1 – Estimated from Build Out Model

W. 100 N. Diversion

The existing collection system routes the sanitary flow produced upstream of the N. 200 W. and W. 100 N. intersection through the 8-inch gravity line running along N. 200 W. and E. 10600 N. At full buildout, the peak flow entering this intersection is approximately 0.52 MGD. Also, a new 15" planned trunk line coming from the north connects to the existing system at E. 10600 N. and N. 500 W. with a planned peak flow of approximately 0.94 MGD. The remaining capacity of the 12-inch trunk line downstream in N. 500 W. is approximately 0.69 MGD. To route the full buildout flows through this area, a diversion where the existing line turns north off W. 100 N. will be required to split the future flows and avoid capacity issues in the existing line in N. 500 W.

This diversion will route a portion of the future flows west through a planned 8-inch gravity line to connect to the 15-inch trunk line on N. 500 W. just before crossing the Union Pacific railway. The existing 8-inch line in E. 10600 N. is an old transite (asbestos cement) pipe and is in poor condition. This diversion will also create some redundancy to route flows from existing north east portion of the City.

7.3 Build Out Model Flow Generation Layer

The 20-year Model Flow Generation Layer is used as the base for the Build Out Model Flow Generation Layer. New flows added to the Build Out Model represent the remaining area inside of and beyond City limits within the study area.

7.3.1 Land Use and Unit Flows

Land use designations for the Build Out Model were determined by the Future Land Use Map from the City's General Plan. **Figure A14** shows the land use designations applied to the new flows in the Build Out Model. The non-residential land use types used in the Build Out Model include: Central Business District, Highway Commercial, and Manufacturing Light Industrial. Each of these commercial land use types were assigned a gross unit flow of 900 gpad as determined from the calibration of the Existing Model.

Residential unit flows developed in the 10 and 20-year Models were also applied to the Build Out Model. **Table 7-3** lists these unit flows along with the recommended gross densities for each residential land use designation. Gross densities were applied to parcels with an area greater than 2.0 acres to determine the number of dwelling units. Net densities were used for parcels under 2.0 acres. Residential densities were defined by the 2023 General Plan.

The unit flows and densities listed **Table 7-3** represent average values for each land use. Specific developments that fall within a certain land use type may have flows that vary significantly from these averages. In such cases, the City should consider using a more representative unit flow value on a case-by-case basis when determining whether or not they can provide service to the development.

Table 7-3 – Build Out Model Unit Flows & Densities – Residential

Land Use Type	Unit Flow (GPDU)	Gross Density (DU/AC)
Residential Low Density	223.3	1.0
Residential Medium Density	223.3	4.0
Residential High Density	223.3	12.0

7.3.2 Flow Allocation

Service areas were used to direct master plan flow injections into the system layer. Service areas were delineated based on topography, existing sewer lines, parcel lines and other political boundaries. Each service area injects all flows located within it to an existing or master plan manhole in the system layer. Some large master plan parcels were divided between service areas and injected into multiple locations based on topography and trunk line serviceability. In areas where existing pipes did not extend to 10 or 20 year flows, these flows were re-allocated to adjacent master plan lines in order to assure appropriate sizing of the master plan lines. **Figure A15** shows the service areas and injection locations for the Build Out Model.

It is important to note that the service area boundaries for each trunk line shown on the map are based on aerial mapping and 2016 Cache Valley lidar and are therefore approximate. The individual service area boundaries will likely change slightly as field survey is performed, and development occurs. While safety factors built into the model allow for these minor changes, significant proposed changes or the cumulative effect of minor changes should be analyzed to prevent over-allocation of trunk capacity in the future.

7.3.3 Infiltration and Inflow

The infiltration and inflow used in the Existing Model was used as the base for the Build Out Model. Additional infiltration (53,117 GPD) was added based on the parcel area of the new master plan flows at a rate of 100 GPAD (net unit flow). Total peak seasonal infiltration for the Build Out Model is estimated to be 211,517 GPD. Additional impervious area (325 AC) was allocated to the new master planned collection system to account for future inflow based on a density similar to areas of new construction. The total impervious area included in the Build Out Model is approximately 802 AC.

7.4 Build Out Model Analysis

The Build Out Model analysis shows the results if all of the master plan flows are developed without the addition of any relief lines or correction of existing system deficiencies. This helps identify the priorities for Capital Improvement Projects.

Figures A16 and **A17** show Depth over Diameter and Reserve Capacity for the existing pipes in the Build Out Model, illustrating any capacity issues in the existing collection system. The reserve capacity figure can be used to identify individual pipes that could be the root cause of surcharging or limited capacity. This figure does not include backwater effects from downstream pipe segments, therefore, it does not indicate whether or not surcharging will occur. A negative value for reserve capacity ("over capacity") does not indicate surcharging, only that the flow depth increases faster than the pipe slope as you go up-stream. Pipes with a negative reserve capacity have the possibility of surcharge if they have sufficient length or are in sequence with other "over capacity" pipe sections. However, this is not always the case.

The depth over diameter figure can be used to identify the extents of surcharging, if any do occur. This figure includes the effects of backwater from downstream pipe segments, so it shows how full a pipe may get under the design conditions noted previously. Results are limited to major modeled lines. **Appendix D** contains model results from the Build Out Model analysis. All Build Out Model results and figures include the design storm event.

7.4.1 Build Out Model Bottlenecks

The Build Out Model analysis shows five areas of surcharging ($d/D > 1.0$) in the system. Additional details for each bottleneck are included later in this section.

There are several additional lines scattered throughout the system that are near or over capacity. These are "flat" pipes that have very low slopes and show little or no reserve capacity. However, each "flat" pipe has significant reserve capacity both upstream and downstream. These isolated "flat" pipes do not result in any surcharging and are not considered potential bottlenecks.

Main Street Trunk Phase 1 Bottleneck

Between S 800 W and the WWTP, the Build Out Model shows the Main Street Trunk losing water out of manhole MS3. **Figure 7-1** shows a detailed view of the depth over diameter and reserve capacity for the upstream impacted sections of the North Trunk. **Figure 7-2** shows the hydraulic grade line (HGL) plot for the same section.

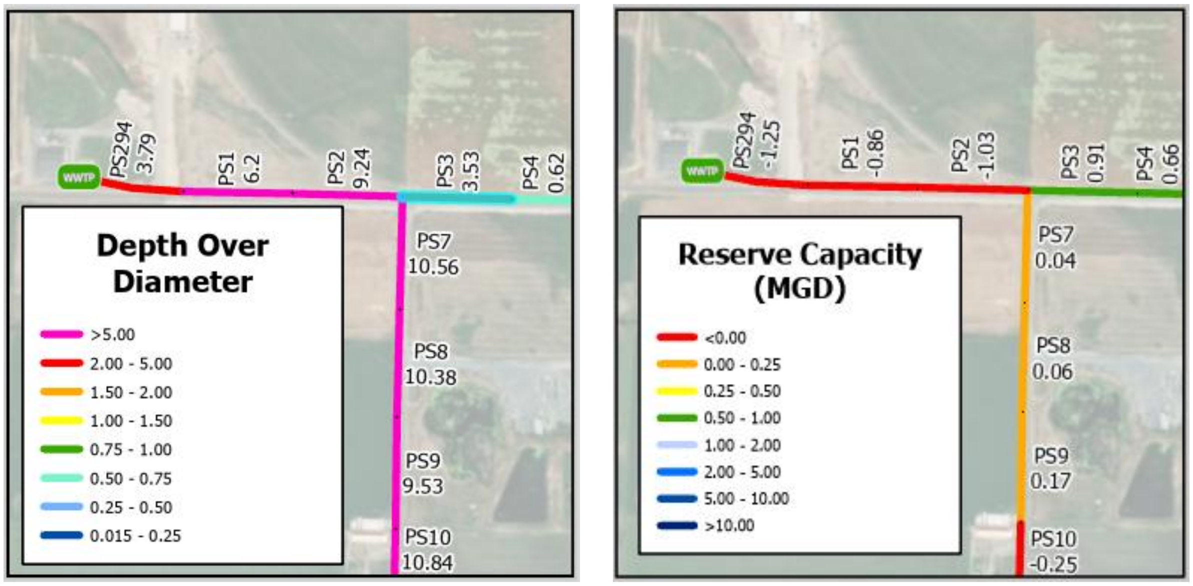


Figure 7-1 – Main Street Trunk Phase 1 – Master Plan d/D & Reserve Capacity

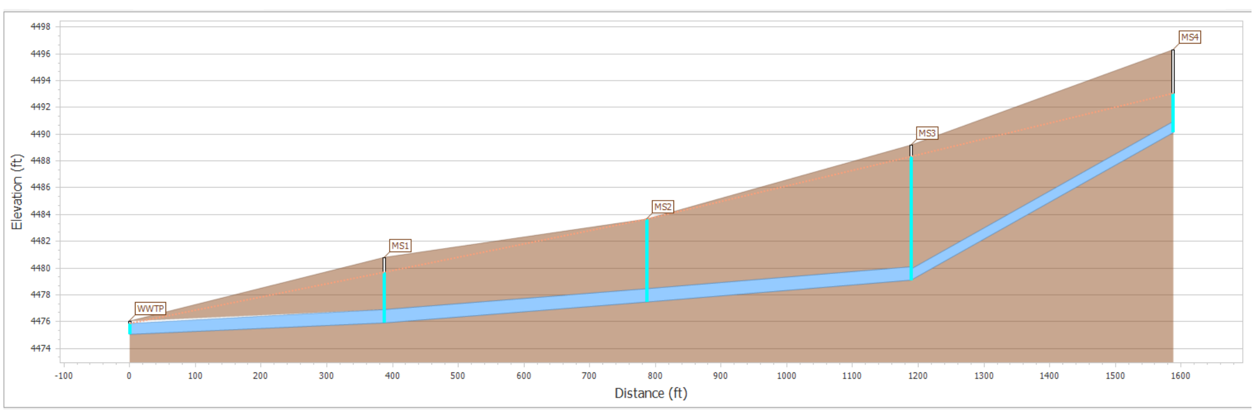


Figure 7-2 – Main Street Trunk Phase 1 – Master Plan HGL

The 12-inch and 10-inch lines in Main Street leading to the WWTP are over capacity. This causes the surcharging effects in the North and South Trunks. See **Section 8.2.1** for discussion on the improvements recommended to relieve this bottleneck.

S 800 W Trunk Bottleneck

The Build Out Model shows the S 800 W Trunk surcharging by about 94 inches. **Figure 7-3** shows a detailed view of the depth over diameter and reserve capacity for the impacted sections of the South Trunk and **Figure 7-4** shows the HGL plot.

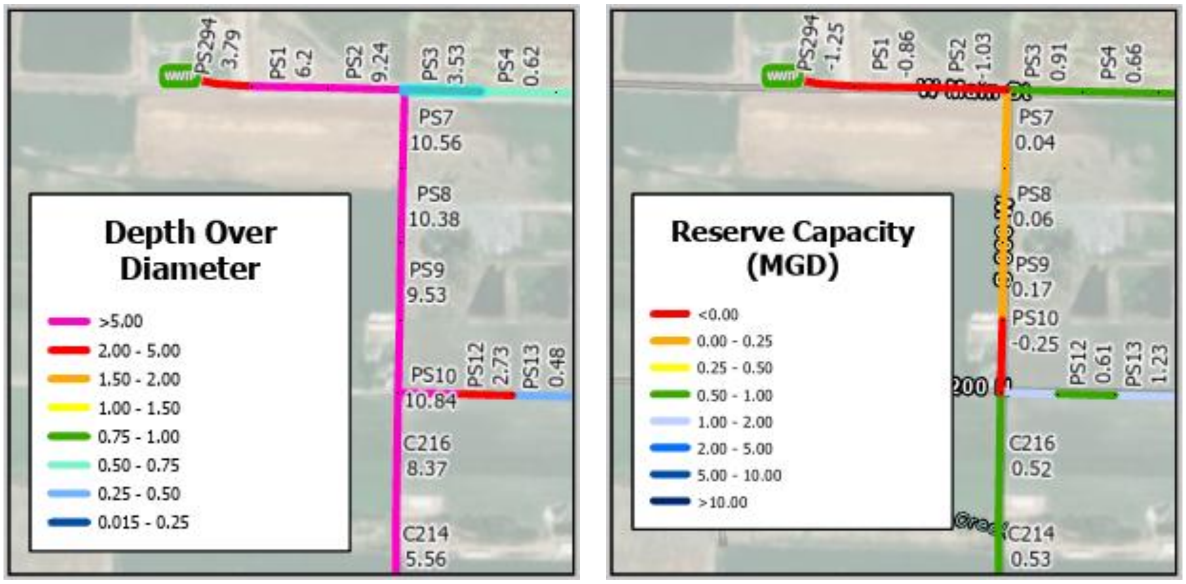


Figure 7-3 – S 800 W Trunk – Master Plan d/D & Reserve Capacity

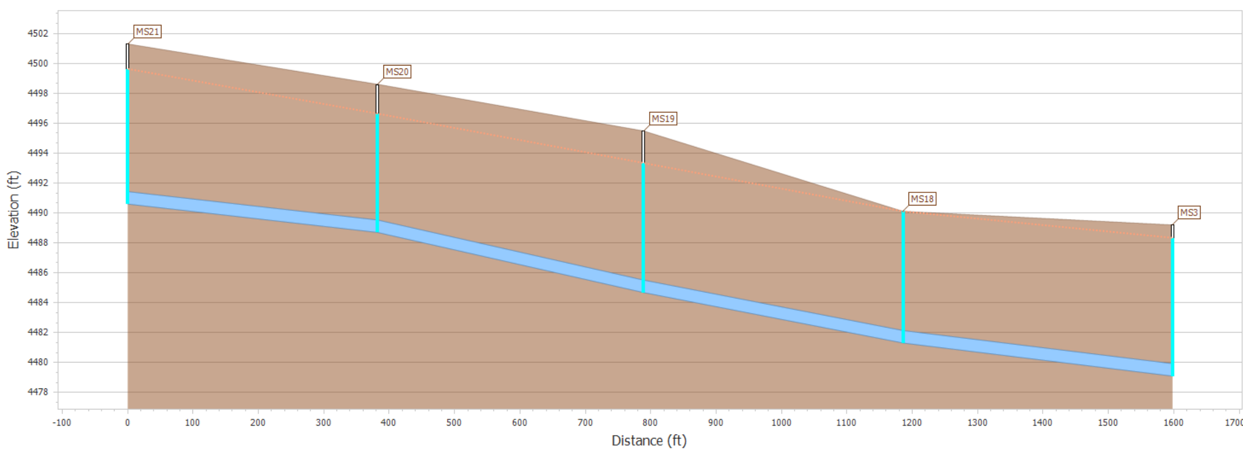


Figure 7-4 – S 800 W Trunk – Master Plan HGL

The 10-inch lines in S 800 W leading to Main Street are over capacity. This causes the surcharging effects in the South Trunk as seen in **Figure 7-3**. **Figure 7-4** shows the backwater in the lines along 200 S. See **Section 8.2.2** for discussion on the improvements recommended to relieve this bottleneck.

Main Street Trunk Phase 2 Trunk Bottleneck

The Build Out Model shows North Trunk surcharging by about 25 inches just before the line turns and parallels the railroad. **Figure 7-5** shows a detailed view of the depth over diameter and reserve capacity for the impacted sections of the North Trunk and **Figure 7-6** shows the HGL plot.

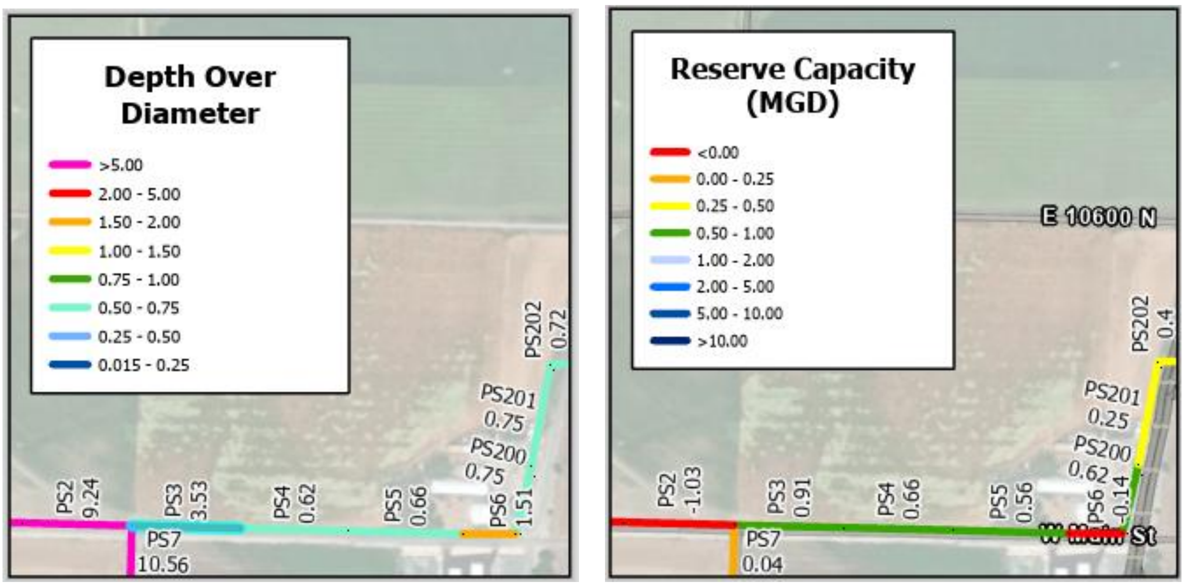


Figure 7-5 – Main Street Trunk Phase 2 – Master Plan d/D and Reserve Capacity

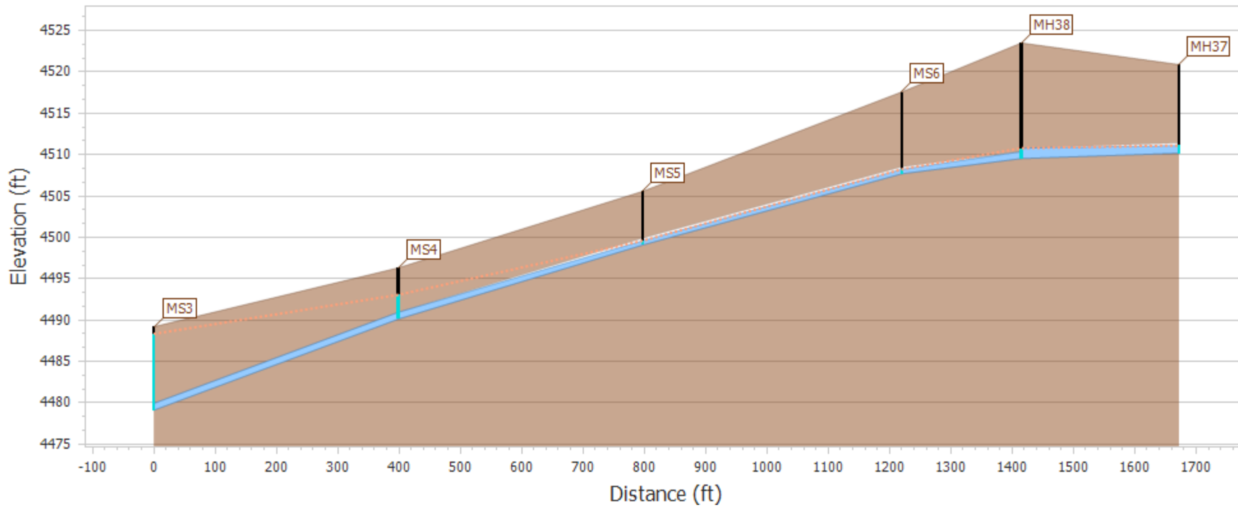


Figure 7-6 – Main Street Trunk Phase 2 – Master Plan HGL

W 100 N Trunk Bottleneck

Between E 10600 N and N 500 W, the Build Out Model shows the North Trunk surcharging by about 3 inches. **Figure 7-7** shows a detailed view of the depth over diameter and reserve capacity for the impacted sections of the North Trunk and **Figure 7-8** shows the HGL plot.

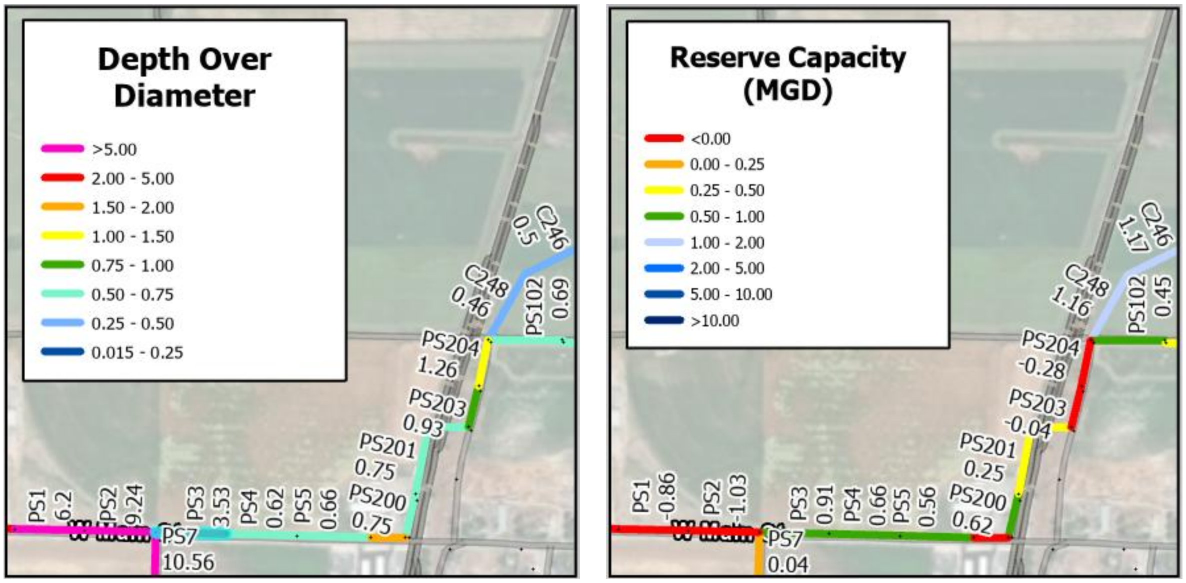


Figure 7-7 – W 100 N Trunk – Master Plan d/D & Reserve Capacity

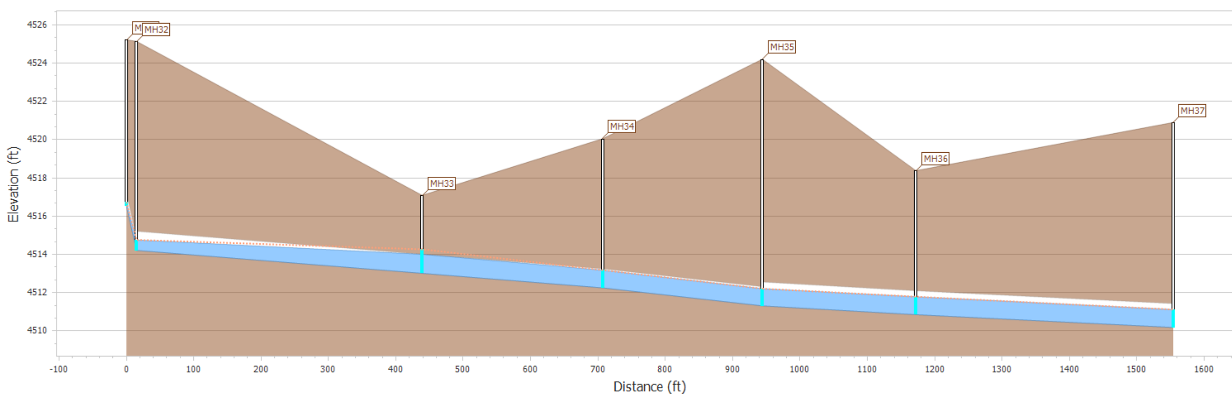


Figure 7-8 – W 100 N Trunk – Master Plan HGL

W 200 S Trunk Bottleneck

Between 300 W and 400 W, the Build Out Model shows the South surcharging by about 16 inches. **Figure 7-9** shows a detailed view of the depth over diameter and reserve capacity for the impacted sections of the South Trunk and **Figure 7-10** shows the HGL plot.

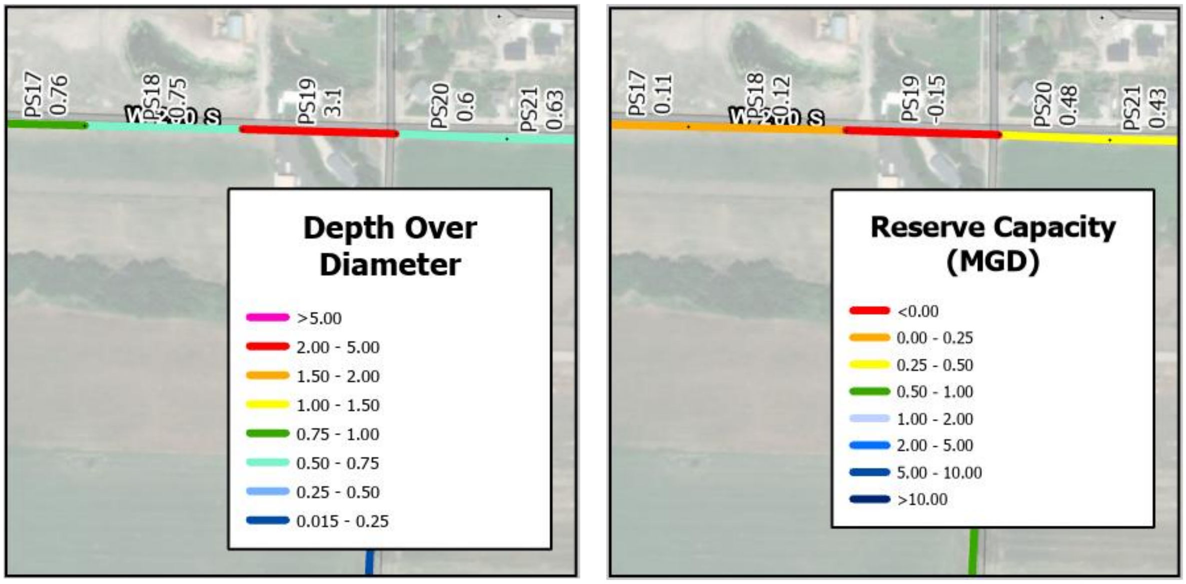


Figure 7-9 – W 200 S Trunk – Master Plan d/D & Reserve Capacity

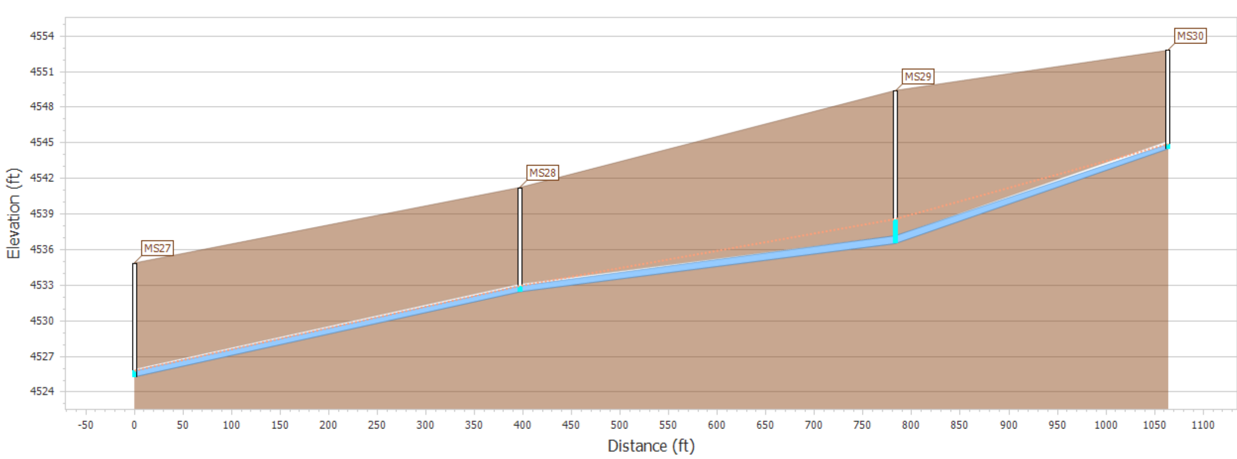


Figure 7-10 – W 200 S Trunk – Master Plan HGL

This bottleneck is due to the change of slope in the trunk line. This bottleneck does not have a specific project to relieve the surcharging in this report, and it is recommended that the grade of the pipe listed in the GIS data be confirmed through field survey.

Chapter 8

Capital Improvement Plan

Chapter 8 – Capital Improvement Plan

8.1 Overview

The Capital Improvement Plan (CIP) prioritizes improvements that are necessary to relieve current and future capacity issues, replace deteriorated components and expand the City's wastewater service area as the City grows and infills. The CIP has the following five categories:

- **Capacity** – Projects required to remove bottlenecks in the system that propagate significant surcharging.
- **Key Infrastructure** – Projects to facilitate abandonment of temporary lift stations, direct growth in specific areas, or otherwise accomplish the City's goals.
- **Master Plan Extensions** – Projects required to expand service to new areas as driven by annexed development.
- **Rehabilitation/Replacement** – Projects to maintain the integrity of the existing system and manage associated risks.
- **Lift Station Phasing** – Overview of the planned improvements and associated constraints.

Appendix E contains summary figures for specific CIP projects. Costs are in 2025 dollars and were developed as a Class 5 cost opinion (i.e., -50% to +100% per AACE). Further refinement of the cost opinions will be required during subsequent preliminary engineering and design phases.

The timeframe for implementing specific CIP projects not related to rehabilitation or replacement ultimately depends on growth. Since the rate and location of growth are largely unpredictable, specific timeframes are unknown. A general timeframe can be estimated from the anticipated growth rate of discussed in **Chapter 4** and results of each model scenario. However, high growth in localized areas may accelerate implementation of capacity related CIP improvements. **Table 8-1** summarizes the projected average flows, ERUs, and time to build out of each model scenario.

Table 8-1 – Projected Timeframe to Buildout of Each Model Scenario

Model Scenario	Average Day Flow (MGD)	Approximate ERUs [(1)]	Anticipated Growth Rate[(2)]	Approximate Year
Existing	276,800	1,240	-	2025
10-year	533,200	2,390	5.4%	2035
20-year	686,800	3,080	1.9%	2045
Build Out	1,618,200	7,250	2.0%	2065

(1) *Based on city wide 2.0% annual growth*

(2) *Based on infill and parcels selected to develop by the City and land use densities as defined in the 2023 General Plan*

The following general categories will be used to describe the implementation timeframes for specific CIP projects:

- **Current Project**: These projects are presently in various stages of design or construction.
- **0 to 10 Years**: Issues identified in the Existing Model Scenario represent problems that could be realized today if a design event occurred and should therefore be addressed within the first CIP planning period. Also includes rehabilitation/replacement projects.
- **10 to 20 Years**: Issues identified in the 10 and 20-year Models represent likely problems as currently annexed land fully develops. Based on the estimated ERUs in **Table 8-1** and the assumed growth this is estimated to occur within the next twenty years or so.
- **As Needed with Growth**: Issues identified under the Master Plan Model will not become critical until growth occurs in the corresponding areas.

See **Figure E1** for the general location of each CIP project.

8.2 Capacity Projects

Capacity projects are required to relieve surcharging caused by bottlenecks in the system. The implementation timeframes vary for each project and are estimated below.

8.2.1 (C.1) Main Street Upsize Phase 1

Under peak master plan flow conditions, a portion of the Main Street Trunk (manhole MH38 to the headworks building) is at or over capacity resulting in a loss of water out of MS3. The recommended solution is replacing the existing 10 and 12-inch trunk line from the headworks building to manhole MS3 with a larger 18-inch pipe. This larger gravity trunk will relieve the bottleneck in Main Street. See **Figure E2** for a summary of the issue and recommended solution.

Implementation Timeframe: 0-10 years

8.2.2 (C.2) S 800 W Pipe Upsize

The trunk line from W Main St to 200 S is over capacity, resulting in surcharging of up to 94 inches under peak master plan flow conditions. The recommended solution is replacing the existing 10-inch trunk line from manhole MS21 to manhole MS3, where project C.1 ended, with a larger 12-inch pipe. This new gravity trunk line will relieve the bottleneck along S 800 W. See **Figure E3** for a summary of the issue and recommended solution.

Implementation Timeframe: 10-20 years

8.2.3 (C.3) Main Street Upsize Phase 2

The trunk line, further along W Main St, from the Union Pacific Railroad to S 800 W is over capacity, resulting in surcharging of up to 25 inches under peak master plan flow conditions. The recommended solution is replacing the existing trunk line from manhole MH38 to MS3, where projects C.1 and C.2 ended, with a larger 15-inch pipe. See **Figure E4** for a summary of the issue and recommended solution.

Implementation Timeframe: 10-20 years

8.2.4 (C.4) W 100 N Relief

Due to the planned 15-inch trunk line connecting to the existing 12-inch trunk at the intersection of 10600 N and 500 W a significant increase in flows enter the system at manhole MH33. The trunkline at that point becomes bottlenecked due to the extra flows under the build out conditions. The recommended solution is to construct a new diversion structure and 8-inch gravity line from the intersection of 200 W and 100 N at manhole MS54 to the 15-inch trunk line on 500 W at MH35. See **Figure E5** for a summary of the issue and recommended solution.

Implementation Timeframe: As needed with growth

8.3 Key Infrastructure Projects

Key infrastructure projects are not required due to capacity bottlenecks but fulfill two main purposes. First, they help the City accomplish its goals for the collection system by facilitating lift station abandonment. Second, they facilitate growth by extending the collection system into areas that were either on septic systems or undeveloped. See **Appendix E** for additional details and **Figure E1** for the general location.

8.3.1 (K.1) North Trunk Extension

For future development on the north side of Richmond a new trunk line needs to be built to connect the future lines to the existing system. The previous plan for this extension was modified to decrease the length of trunk line and to avoid parcels that were unlikely to annex into the City. This project includes replacing MH33 and installing approximately 4050 linear feet of 15-inch gravity trunk and 637 linear feet of 8-inch pipe. See **Figure E6** for the location and summary of the project.

Implementation Timeframe: As needed with growth

8.4 Master Plan Extensions

Master plan extensions are required in order to expand service to new areas within the study area boundary. Master plan extensions are typically installed by developers as the system is expanded. This CIP does not include any Master Plan Extension projects at this time.

8.5 Rehabilitation and Replacement

The City actively seeks to identify and correct collection system deficiencies. Projects are identified as the City completes maintenance and finds issues and then the issues are then programmed for rehabilitation or replacement.

8.5.1 W 470 S Replacement

The pipes along 470 S and 410 S are in poor condition and run through several residential yards making maintenance difficult, this area would benefit from being relocated. The water master plan also identified another project to replace the existing water lines on these streets. It is recommended that these two projects be combined to lower the overall construction cost and disturbance to the area. This replacement will require abandoning in place 9 sanitary sewer manholes, 3,632 of sanitary pipe, the placement of 9 new sanitary sewer manholes, and the placement of approximately 3,632 linear feet of new 8-inch sanitary pipe. See **Figure E7** for the location and description of the project.

Implementation Timeframe: 0-10 years

8.6 Regional Lift Station Phasing Plans

The master plan has not identified any lift stations that have been or will be built in phases over time as the associated service areas are fully built out.

8.7 Budgeting CIP Projects

The estimated costs associated with each CIP project are summarized in **Table 8-2** and are grouped by projected type. **Table 8-3** provides a summary of projected costs for each CIP timeframe. See **Appendix E** for summary figures and additional details for each project. The timeframes listed begin in FY 2025.

Table 8-2 – CIP Projects

ID	Figure #	Project Name	Implementation Time Frame	Opinion of Probable Cost (1)
C.1	E2	Main Street Upsize Phase 1	0-10 Years	$413,000
C.2	E3	S 800 W Pipe Upsize	10 – 20 Years	$547,000
C.3	E4	Main Street Upsize Phase 2	10 – 20 Years	$581,000
C.4	E5	W 100 N Relief	As needed with growth	$632,000
K.1	E6	Northern Trunkline Extension	As needed with growth	$1,508,000
R.1	E7	470 S Replacement	0-10 Years	$1,344,000

(1) *All opinions of probable cost are in 2025 dollars and are a Class 5 cost opinion (i.e., -50% to +100% per AACE).*

Table 8-3 – CIP Cost Summary

CIP Project Timeframe	Opinion of Probable Cost (1)
0 – 10 Years	$ 1,757,000
10 – 20 Years	$ 1,128,000
As Needed with Growth	$ 2,140,000
Totals	**$5,025,000**

(1) *All opinions of probable cost are in 2025 dollars and are a Class 5 cost opinion (i.e., -50% to +100% per AACE).*

Chapter 9

Impact Fee Facility Plan (IFFP)

Chapter 9 – Impact Fee Facility Plan

9.1 Introduction

The purpose of the Sanitary Sewer Impact Fee Facilities Plan (IFFP) is to determine the impacts placed on the sewer system from future development, as outlined in Utah Administrative Code (UAC) Title 11 Chapter 36a-301 and 36a-302. The IFFP outlines which improvements in the Capital Improvement Plan (CIP) can be funded through impact fees. **Appendix E** contains the detailed requirements for the IFFP, as listed in UAC. This IFFP utilizes information from the collection system model and the CIP to provide the information that becomes the foundation for the Impact Fee Analysis (IFA).

Table 9-1 lists the flow values per Equivalent Residential Unit (ERU) that were determined during the modeling process and are used for the collection related aspects of this IFFP.

Table 9-1 – Sewer Collection Peak Flows per ERU

Description	Value
People per ERU	3.19
[1]Peak Flow per Person (gpd)	149 (0.10 gpm)
Peak Flow per ERU (gpd)	476 (0.33 gpm)

(1) *70 gallons per capita per day (gpcd) with a peaking factor of 2.13.*

9.2 Required IFFP Elements

The following general tasks and elements are required as part of the IFFP:

- Identify the existing Level of Service (LOS).
- Establish a proposed LOS.
- Identify any excess capacity to accommodate future growth at the proposed LOS.
- Identify demands placed upon the existing system by new development activity at the proposed LOS and the means by which the City will meet those growth demands.
- Consider potential revenue sources to finance the recommended collection system improvements.

9.3 Existing LOS

The following section provides the performance standard, or the LOS, required for the collection system pipes. Also provided is a description of how the existing system meets the LOS.

9.3.1 Collection System Pipes

The LOS for the collection system pipes is determined based on the ratio of the maximum water depth in the pipe during peak hour (d) to the diameter of the pipe (D), or d/D. The d/D value must be less than or equal to 1.0. A d/D value of 1.0 represents a pipe flowing at full capacity. **Figure 4** in **Appendix A** shows the existing system pipe capacity based on the d/D values for the collection system with the modeled existing flows.

There are currently no areas in the existing collection system that exceed the established LOS on a peak day. No collection system improvements will be needed.

The existing d/D values are based on the hydraulic computer model, using a flow of 70 gpcd, with a peaking factor of 2.13.

9.4 Proposed LOS

The proposed LOS for the collection system pipes is the same as the existing LOS provided in **Section 3.5**.

9.5 Excess Capacity

9.5.1 Collection System Pipes

The flows from future development will be accommodated through a combination of available excess capacity in the existing collection system pipes and improvements to the existing system that will add capacity.

The excess capacity available in the existing collection system pipes was evaluated based on a weighted average of the d/D values for the modeled pipe segments. The system d/D values were then converted to percent utilization based on the maximum allowable d/D value of 1.0. **Table 9-2** lists the calculated utilization for the modeled pipes at years 2025 and 2035.

Table 9-2 – Collection System Pipe Utilization

Year	System Utilization (d/D)	Percent Utilization
Existing (2025)	0.284	28.4%
10-year (2035)	.324	32.4%

The amount of available capacity in the existing collection system that will be utilized by the projected 10-year growth is 4.0%.

9.6 Improvements To Meet Future Growth Demands

The previous sections of this master plan outline the assumptions and methods used to quantify the existing flows in the system and the flows projected for the future. Future deficiencies were identified by creating future model scenarios. The existing and future deficiencies are based on the established LOS criteria.

9.7 2035 Improvement Plan

Only the projects that need to be constructed in the next 10 years (prior to 2035) will be included in the calculation of the sewer impact fee. Projects planned to serve development that will occur after 2035 is not eligible for reimbursement through current impact fees. The costs for each of the projects have been split into the following three categories:

1. The portion of the project that current City residents should pay (Cost to Existing).
2. The portion of the project that can be paid for through new development impacts that are projected for the next 10 years (Cost to 10-year Growth).
3. The portion of the project that is needed to serve the growth that is anticipated beyond 10 years (Cost to Growth After 2035). Impact fees established in a future IFA can be calculated and assessed to help pay for the projects.

9.7.1 Collection System Project Plan

Table 9-3 lists the collection projects needed between now and 2035 along with the opinion of probable cost for each project. For the pipe projects, it was assumed that existing users will pay for the portion of the pipe materials that is equivalent to the percentage of the pipe capacity that will be used by existing users. New sewer connection users will pay for the remainder of the costs because the new pipes are not needed if no new growth occurs.

Table 9-3 – 10-Year Collection Project Cost Allocation

Project #	Project Name	TOTAL PROJECT COST	COST TO EXISTING	COST TO 10-YEAR GROWTH	COST TO GROWTH AFTER 2029
C.1	Main Street Upsize Phase 1	$ 413,000	$ 41,754	$ 7,039	$ 364,207
C.2	S 800 W Pipe Upsize	$ 547,000	$ -	$ -	$ 547,000
C.3	Main Street Upsize Phase 2	$ 581,000	$ -	$ -	$ 581,000
C.4	W 100 N Relief	$ 632,000	$ -	$ -	$ 632,000
K.1	Northern Trunkline Extension	$ 1,508,000	$ -	$ -	$ 1,508,000
R.1	470 S Replacement	$ 1,344,000	$ -	$ -	$ -
		$ 5,025,000	**$ 41,754**	**$ 7,039**	**$ 3,632,207**

1 - Project R.1 is considered an operations and maintenance project and is Impact Fees do not apply.

A more detailed table of the 10-Year projects that provides the cost split for materials and for construction for each time frame by project is provided in **Appendix E**.

9.8 Consideration of Revenue Sources To Finance Improvements

Section 302 (2) of the Impact Fee Act requires the City to "generally consider all revenue sources, including impact fees and anticipated dedication of system improvements, to finance the impacts on system improvements." By doing so, the City ensures fair and equitable treatment among users and concludes whether impact fees are the most appropriate method to fund the growth.

There are a number of potential revenue sources to consider including:

- Grants
- Bonds
- Impact Fees
- Anticipated or Accepted Dedications of System Improvements

9.8.1 Grants

Impact fees may not reimburse projects funded through grants. No grants have been included in the project costs. If grants are received, costs will be adjusted accordingly.

9.8.2 Bonds

The City could issue bonds in the future in order to fund their sewer system. No bonds are planned and therefore no costs associated with bond issuance have been included in the calculation of impact fees.

9.8.3 Impact Fees

Because of the growth anticipated to occur in the City, impact fees are a viable means of allowing new development to pay for the impacts that it places on the existing system. This IFFP is developed in accordance with legal guidelines so that an Impact Fee Analysis for the sewer system may be prepared and the City may charge impact fees. This will prevent existing users from subsidizing new growth.

9.8.4 Anticipated or Accepted Dedications of System Improvements

Any item that a developer funds, must be included in the IFFP if a credit against impact fees is to be issued, and must be agreed upon with the City before construction of the improvements.

9.9 IFFP Certification

This IFFP has been prepared in accordance with Utah Code Title 11 Chapter 36a, Impact Fee Act. In accordance with Utah Code Title 11-36a-306(1), J-U-B Engineers, Inc. makes the following certification.

"I certify that the attached impact fee facilities plan:

1. includes only the costs of public facilities that are:
    a. allowed under the Impact Fees Act; and
    b. actually incurred; or
    c. projected to be incurred or encumbered within six years after the day on which each impact fee is paid;
2. does not include:
    a. costs of operation and maintenance of public facilities;
    b. or costs for qualifying public facilities that will raise the level of service for the facilities, through impact fees, above the level of service that is supported by existing residents; and
3. complies in each and every relevant respect with the Impact Fees Act."

____

Dated:
J-U-B ENGINEERS, INC.

Chapter 10

Report Summary

Chapter 10 – Report Summary

10.1 Summary and Recommendations

Overall, the existing collection system is in good condition with adequate capacity to convey current flows through master plan flows as the CIP is implemented. This Collection System Master Plan provides the City with a planning tool to guide the expansion of the sewer system. The following recommendations will help ensure that the City is able to provide service to the entire study area and that the master plan is implemented as intended.

- Follow the recommendations contained in the CIP.
- Utilize the 10-year Model to check downstream capacity for new development.
- Continue to review proposed changes to the master plan (routing, service area and/or densities) for upstream and downstream impacts.

To maintain and improve the quality of future Collection System Master Plan updates, the following is recommended:

- Consider adding an asset management program to create a system prioritization schedule.
- Continue to maintain a current and robust collection system GIS dataset.
- Continue periodic system flow monitoring.
- Evaluate future high-water contributors.

The Collection System Master Plan requires periodic updates to remain a current, accurate, and applicable tool in future evaluations. As part of this ongoing maintenance, we recommend the City plan to update the 10-year Model scenario every year with a full update of the Collection System Master Plan every five to ten years. Additional or more frequent updates may be necessary if there are significant changes to land use, impact area, collection system, or the rate of development.

10.2 Report Limitations

The hydraulic model used in this analysis was created based on land use and zoning conditions at the time of the study, both of which will change over time. Since the model is based on these parameters, it is critical to maintain it over time to reflect up-to-date conditions. The model is considered sufficiently accurate for its intended purpose on the date this report was submitted.

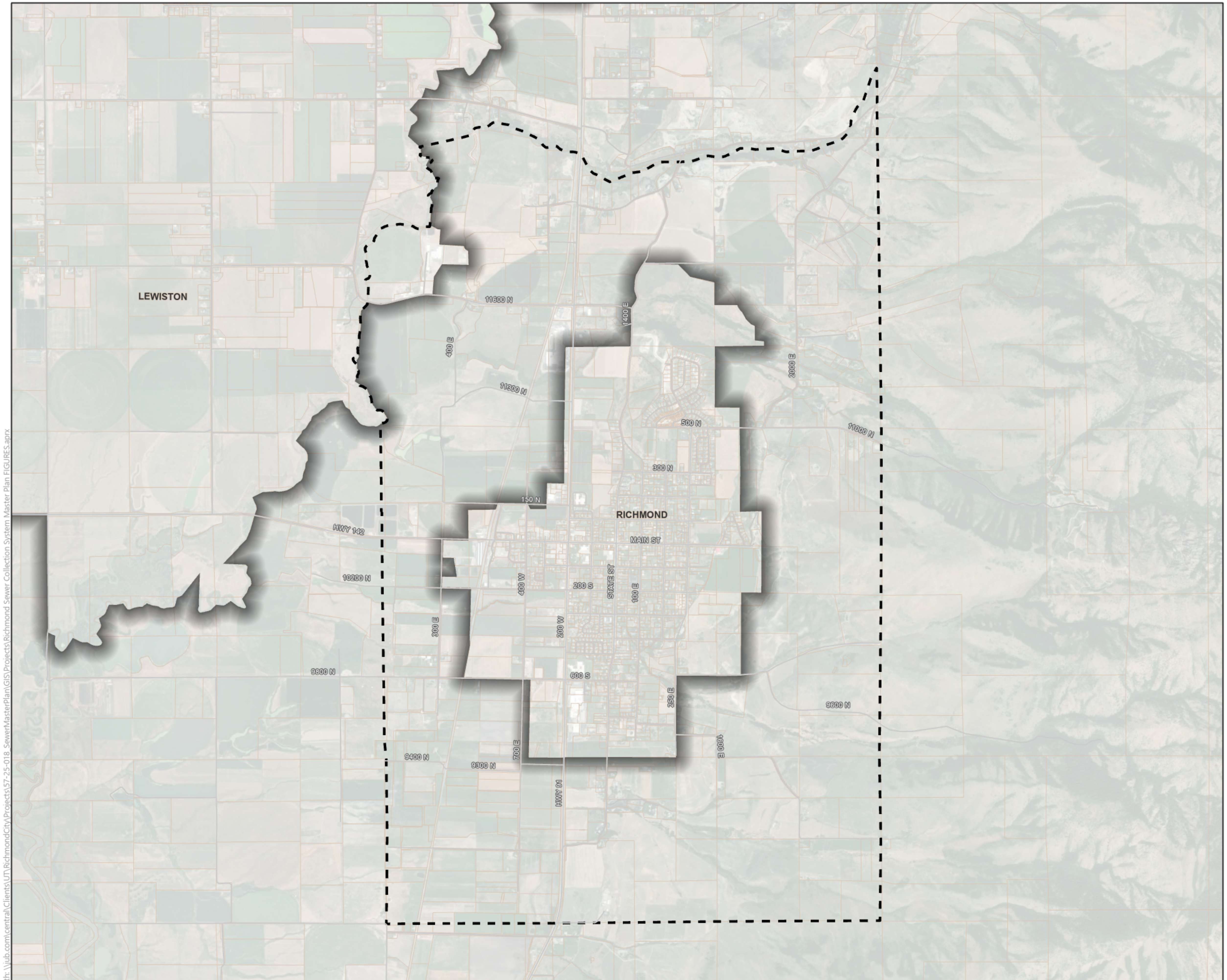
The pipe slopes used for the existing pipes are based on City's GIS data from 2024 with supplemental information gathered through the course of this project. Remaining unknown rim and invert elevations were supplemented with previous model data or straight graded. Pipe slopes and depths for the master planned pipes are based on 2016 Cache Valley lidar supplemented by visual field investigation. Flows and pipe capacities for all models and recommended CIP projects are, therefore, approximate and are intended to be used for planning purposes only. Field verification of all data must be performed prior to preliminary and final design of any system improvements.

It is important to emphasize the intent of master plan, alignments, depths, and invert elevations. The Collection System Master Plan is a planning tool to guide system improvements, but the master plan elevations are not intended to serve as final design elevations. Service depths in the model should be considered as minimums only and may be affected by several factors, including the accuracy of base mapping or variations in sewer alignments, development patterns, utility conflicts, physical features and other assumptions made throughout this study.

Appendices

Appendix A

Figures



Path: \\jub.com\central\Clients\UT\RichmondCity\Projects\57-25-018 SewerMasterPlan\GIS\Projects\Richmond Sewer Collection System Master Plan FIGURES.aprx

RICHMOND
UTAH
Sewer Master Plan

Figure A1

Study Area

Parcel

Study Boundary

City Limits

0 3,000 6,000

Feet

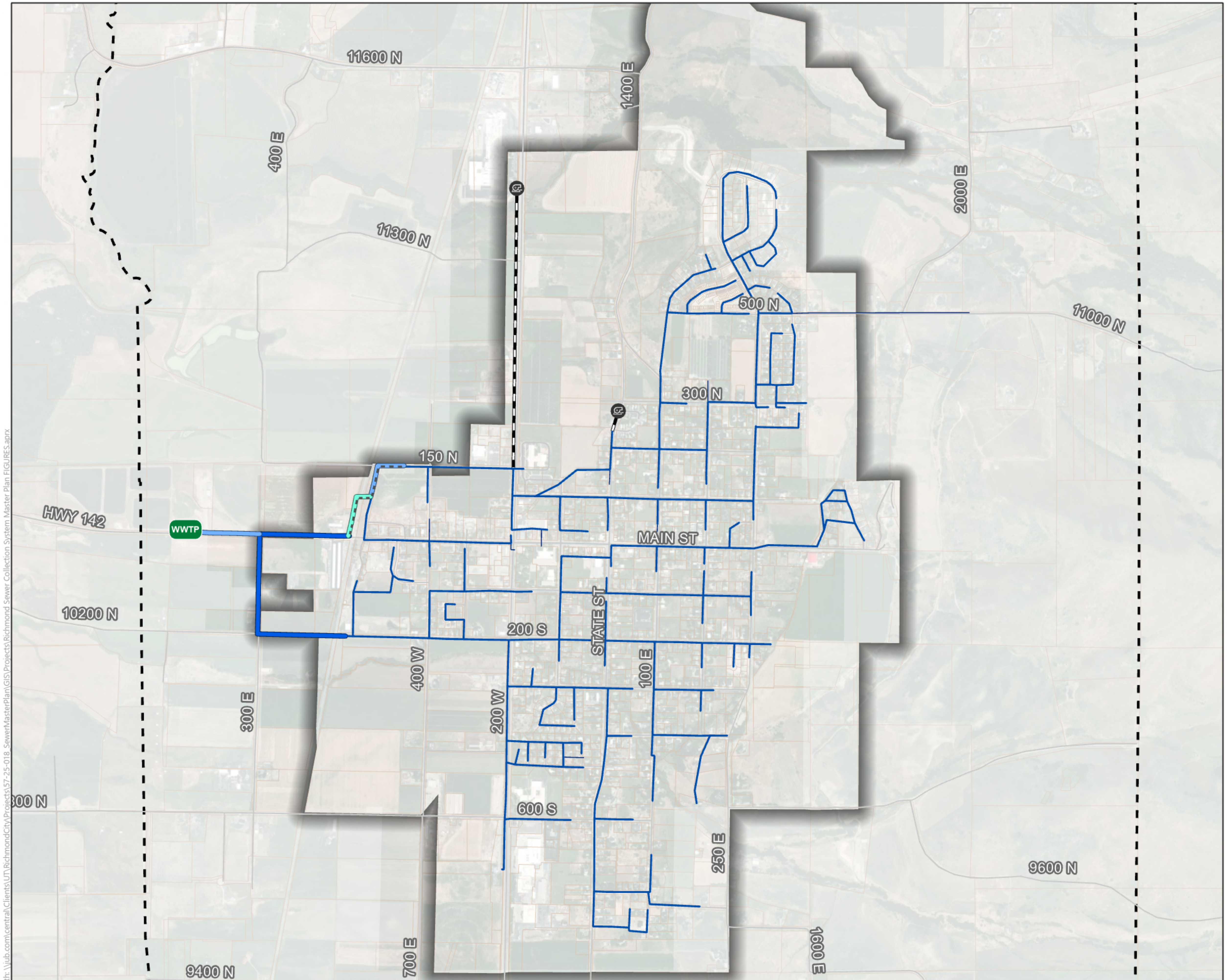
N

J-U-B ENGINEERS, INC.

THE LANGDON GROUP | GATEWAY MAPPING INC.

J-U-B FAMILY OF COMPANIES

Date Printed: 8/25/2025



RICHMOND
UTAH
Sewer Master Plan

Figure A2
Existing Pipe Sizes

Existing Pipe Sizes
- 15 Inch
- 12 Inch
- 10 Inch
- 8 Inch
- 6 Inch
- Abandoned Pipes
- Force Main
- WWTP
- Private Lift Station
- Parcel
- Study Boundary
- Richmond City Limits

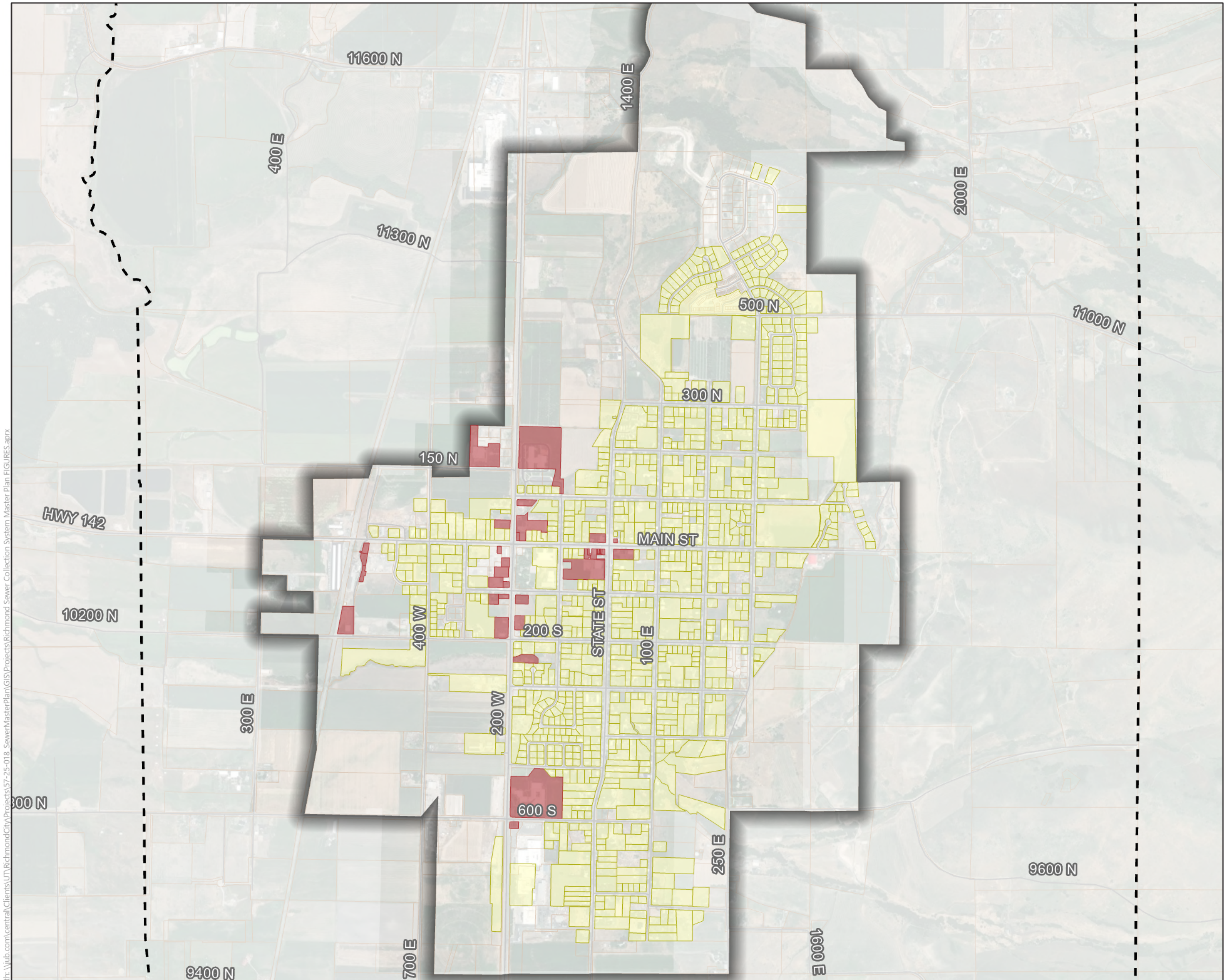
0 1,500 3,000
Feet

N

J-U-B ENGINEERS, INC.
THE LANGDON GROUP
GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 8/25/2025

Path: \\jub.com\central\Clients\UT\RichmondCity\Projects\57-25-018 SewerMasterPlan\GIS\Projects\Richmond Sewer Collection System Master Plan FIGURES.aprx



RICHMOND
UTAH
Sewer Master Plan

Figure A3

Existing Model Land Use

Existing Land Use

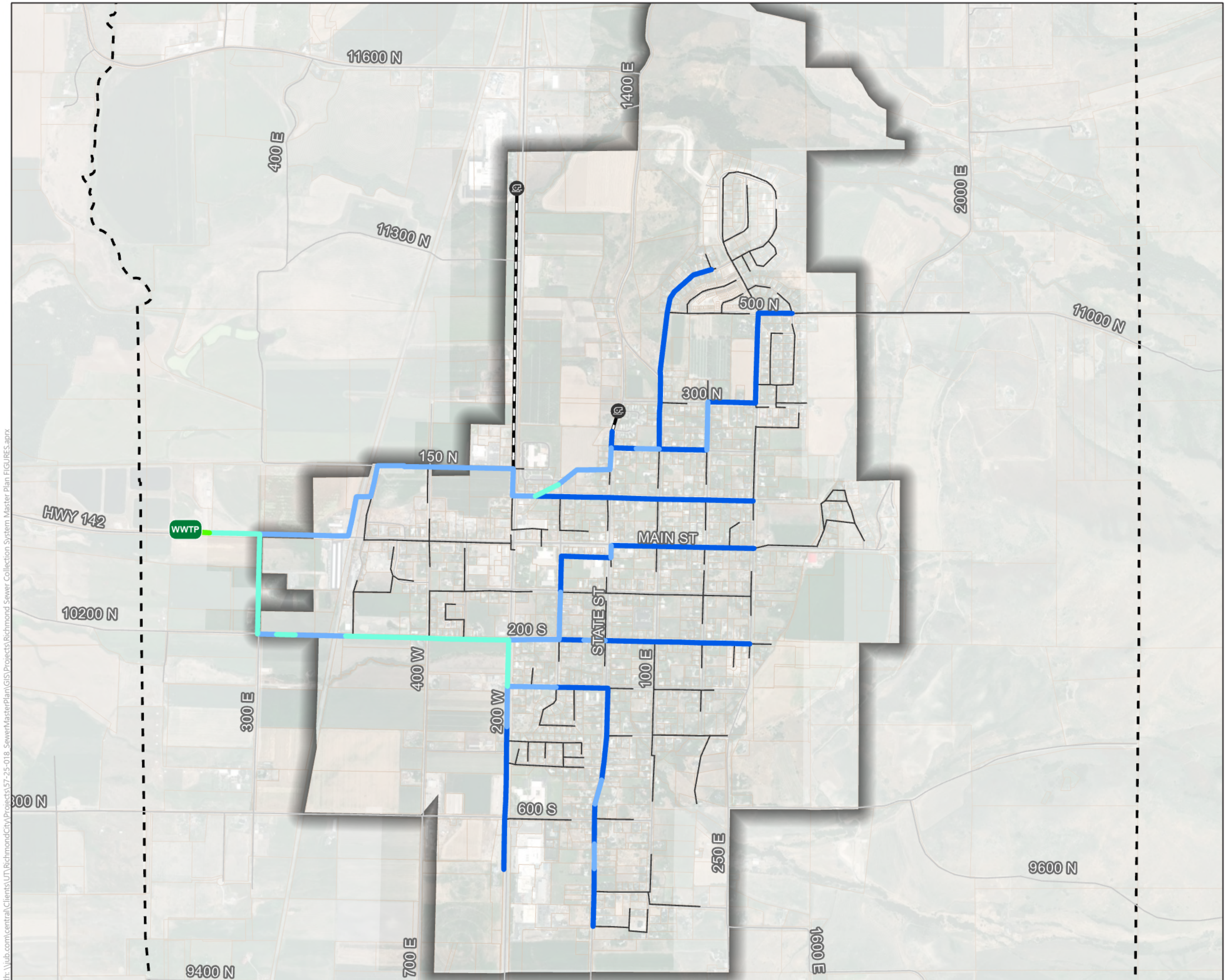
- Residential
- Commercial
- Parcel
- Study Boundary
- Richmond City Limits

0 1,500 3,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 8/25/2025



RICHMOND
UTAH
Sewer Master Plan

Figure A4
Existing Model Depth Over Diameter (d/D)

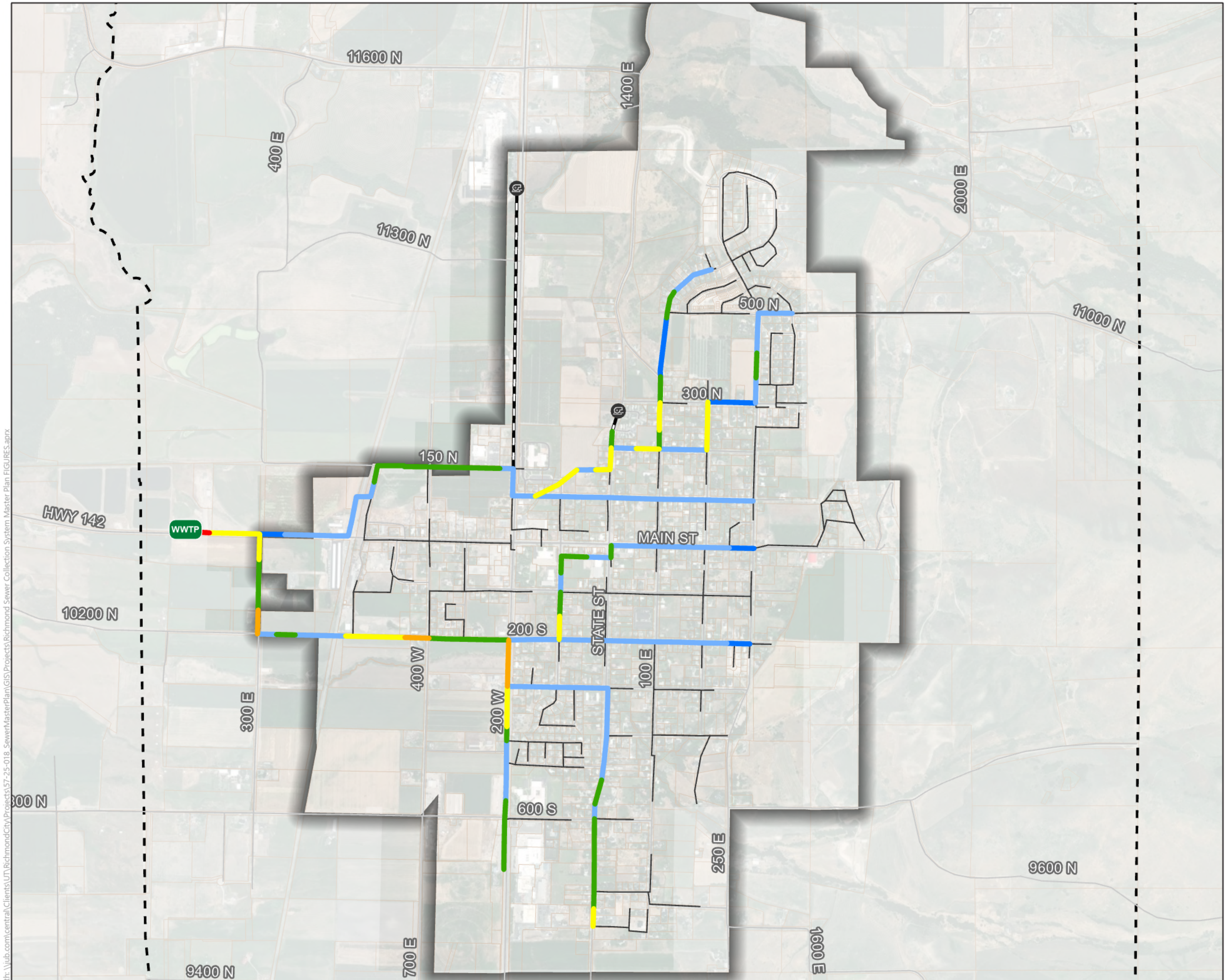
Depth Over Diameter
- 0.00 - 0.25
- 0.26 - 0.50
- 0.51 - 0.75
- 0.76 - 1.00
- 1.01 - 1.25
- 1.26 - 2.00
- 2.01 - 5.00
- >5.00
- Collector
- Force Main
- WWTP
- Private Lift Station
- Parcel
- Study Boundary
- Richmond City Limits

0 1,500 3,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 8/25/2025



RICHMOND
UTAH
Sewer Master Plan

Figure A5

Existing Model Reserve Capacity

Reserve Capacity (MGD)

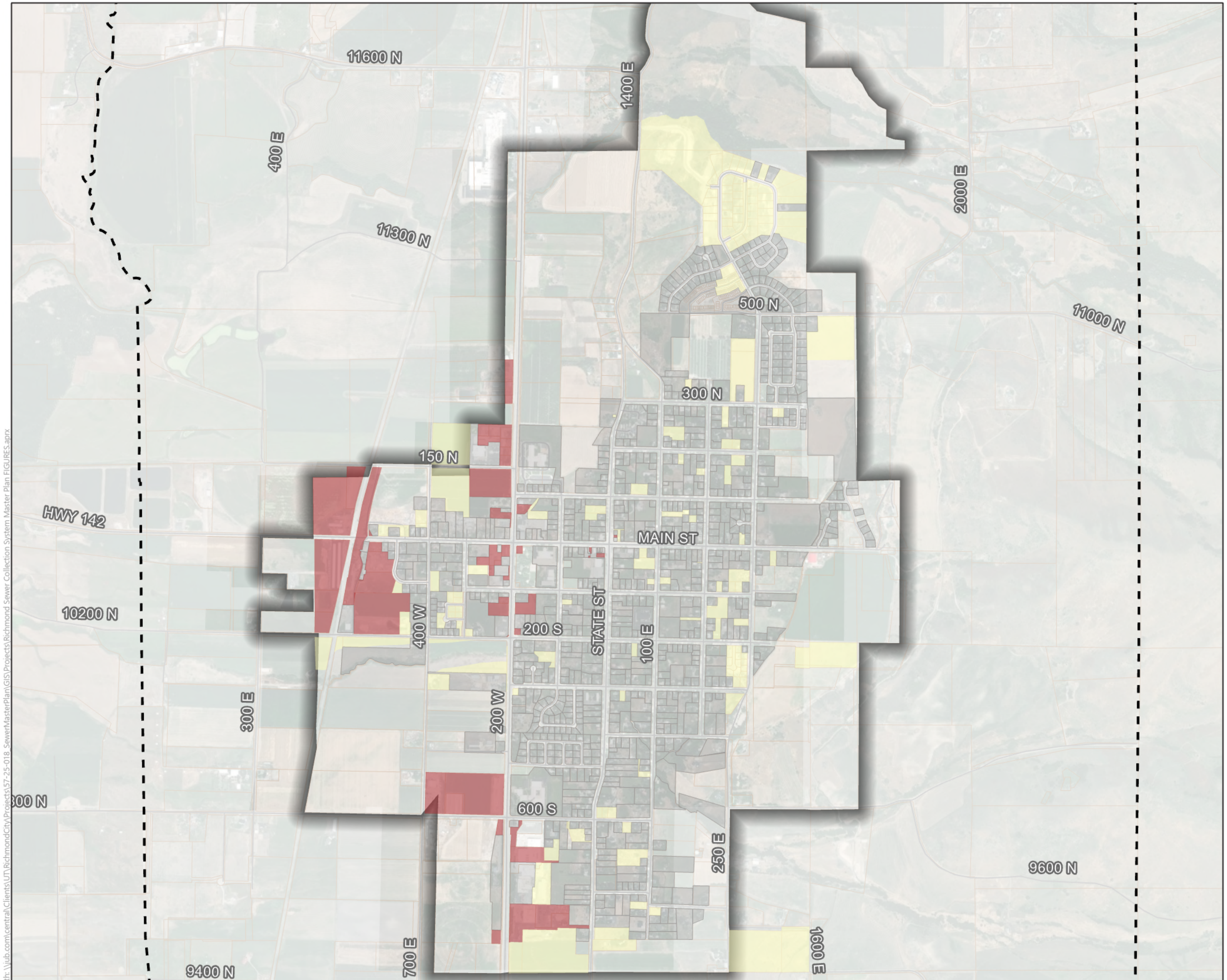
- Over Capacity
- 0.00 - 0.25
- 0.26 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 5.00
- 5.01 - 10.00
- >10.00
- Collector
- Force Main
- WWTP
- Private Lift Station
- Parcel
- Study Boundary
- Richmond City Limits

0 1,500 3,000
Feet

N

J-U-B ENGINEERS, INC. | THE LANGDON GROUP | GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 8/25/2025



RICHMOND
UTAH
Sewer Master Plan

Figure A6

10 Year Model Land Use

10 Year Land Use

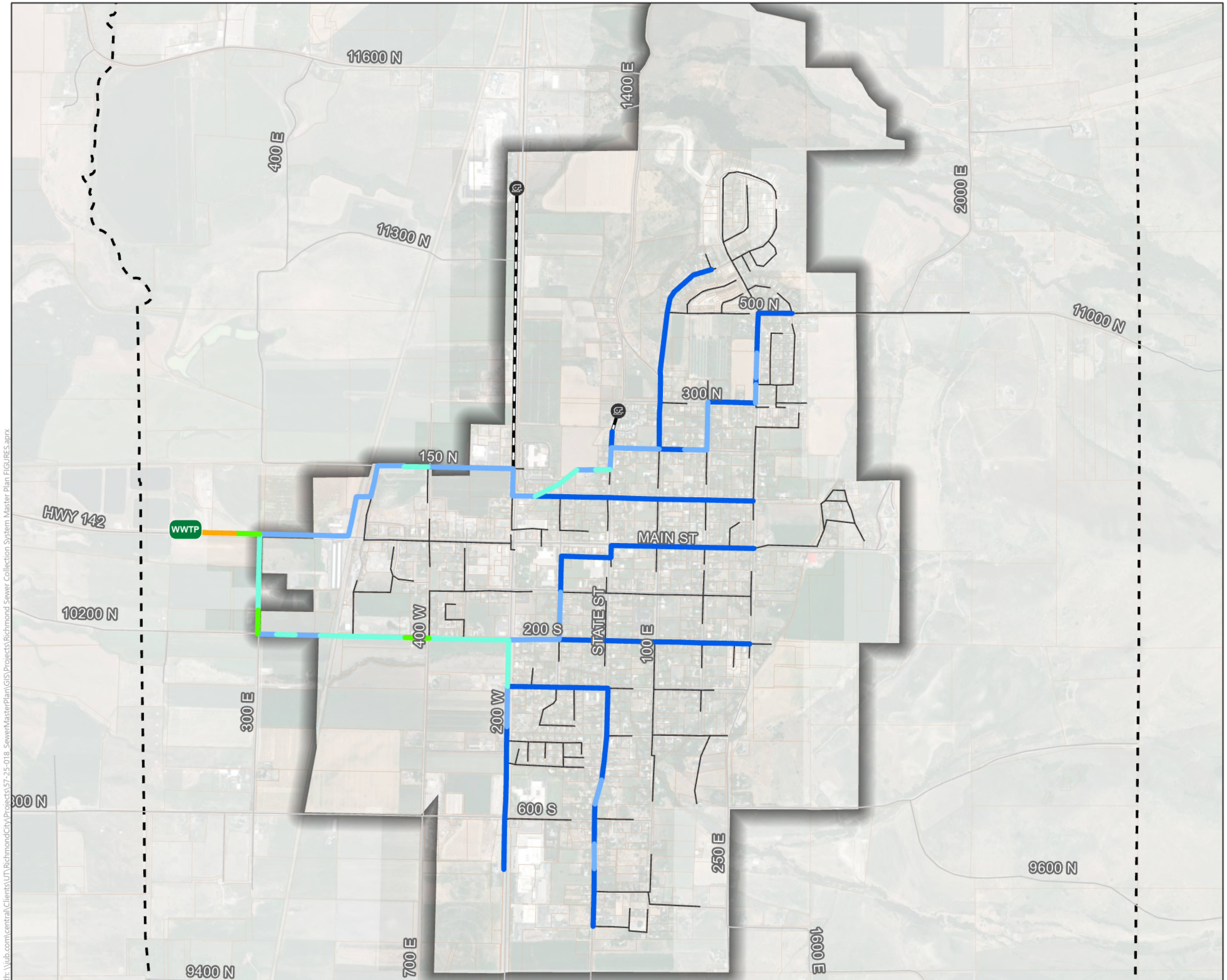
- Residential
- Commercial
- Existing Land Use
- Richmond City Limits
- Study Boundary
- Parcel

0 1,500 3,000
Feet

N

J-U-B ENGINEERS, INC.
THE LANGDON GROUP
GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 8/25/2025



RICHMOND
UTAH
Sewer Master Plan

Figure A7
10 Year Model Depth Over Diameter (d/D)

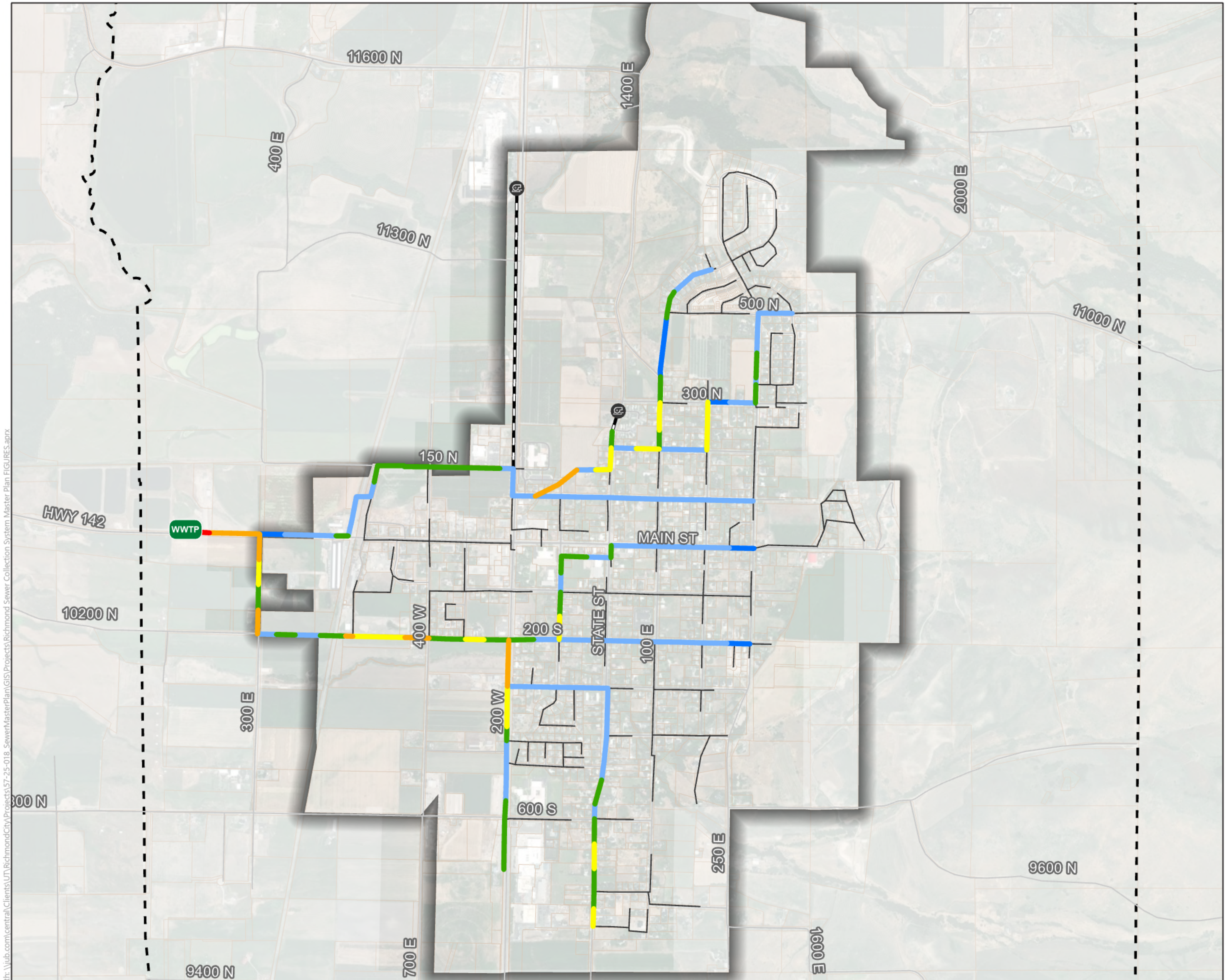
Depth Over Diameter
- 0.00 - 0.25
- 0.26 - 0.50
- 0.51 - 0.75
- 0.76 - 1.00
- 1.01 - 1.25
- 1.26 - 2.00
- 2.01 - 5.00
- >5.00
- Collector
- Force Main
- Private Lift Station
- WWTP
- Parcel
- Study Boundary
- Richmond City Limits

0 1,500 3,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 8/25/2025



RICHMOND
UTAH
Sewer Master Plan

Figure A8

10 Year Model Reserve Capacity

Reserve Capacity (MGD)

- Over Capacity
- 0.00 - 0.25
- 0.26 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 5.00
- 5.01 - 10.00
- >10.00
- Collector
- Force Main
- WWTP
- Private Lift Station
- Parcel
- Study Boundary
- Richmond City Limits

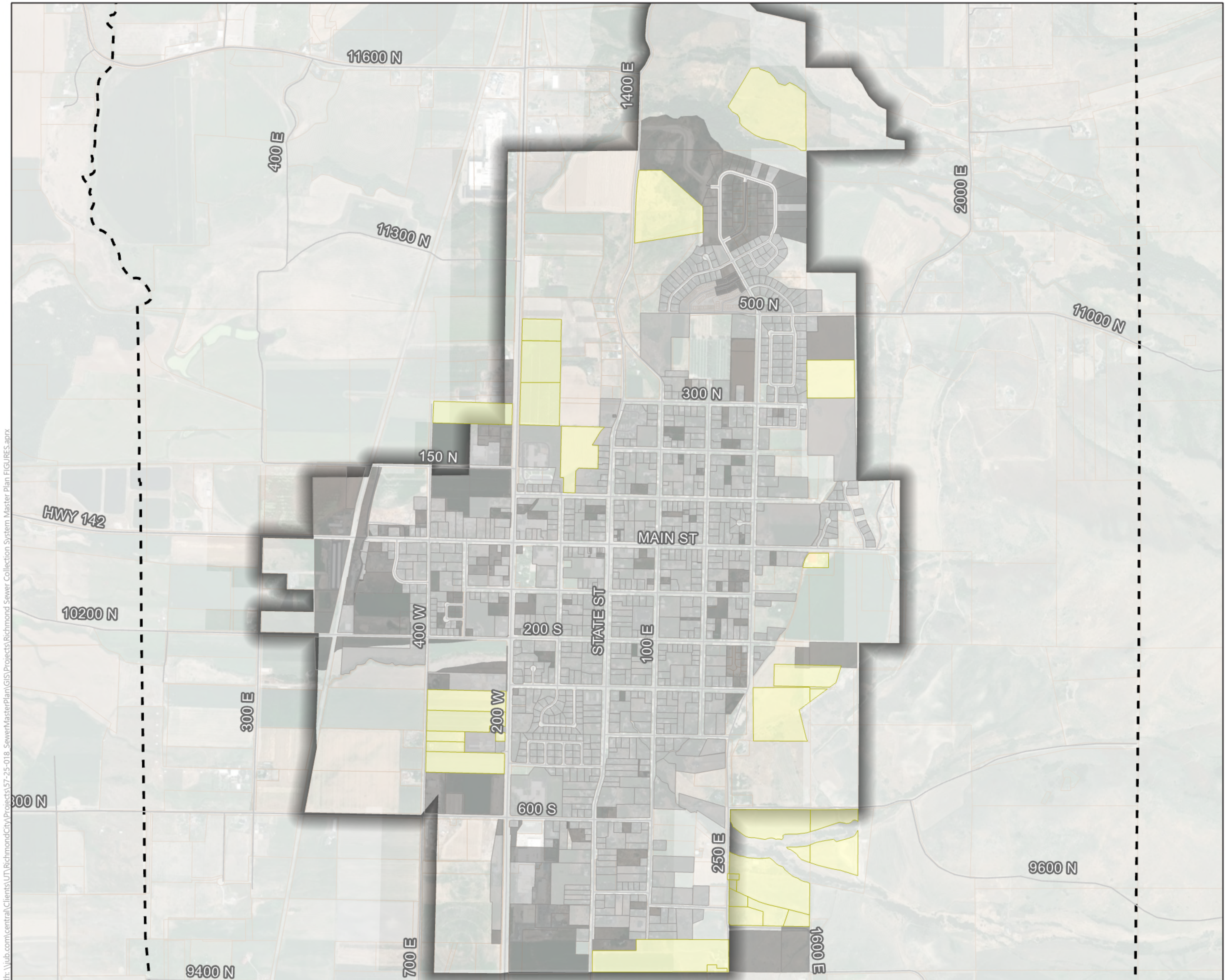
0 1,500 3,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 8/25/2025

Path: \\jub.com\central\Clients\UT\RichmondCity\Projects\57-25-018 SewerMasterPlan\GIS\Projects\Richmond Sewer Collection System Master Plan FIGURES.aprx



RICHMOND
UTAH
Sewer Master Plan

Figure A9

20 Year Model Land Use

20 Year Land Use

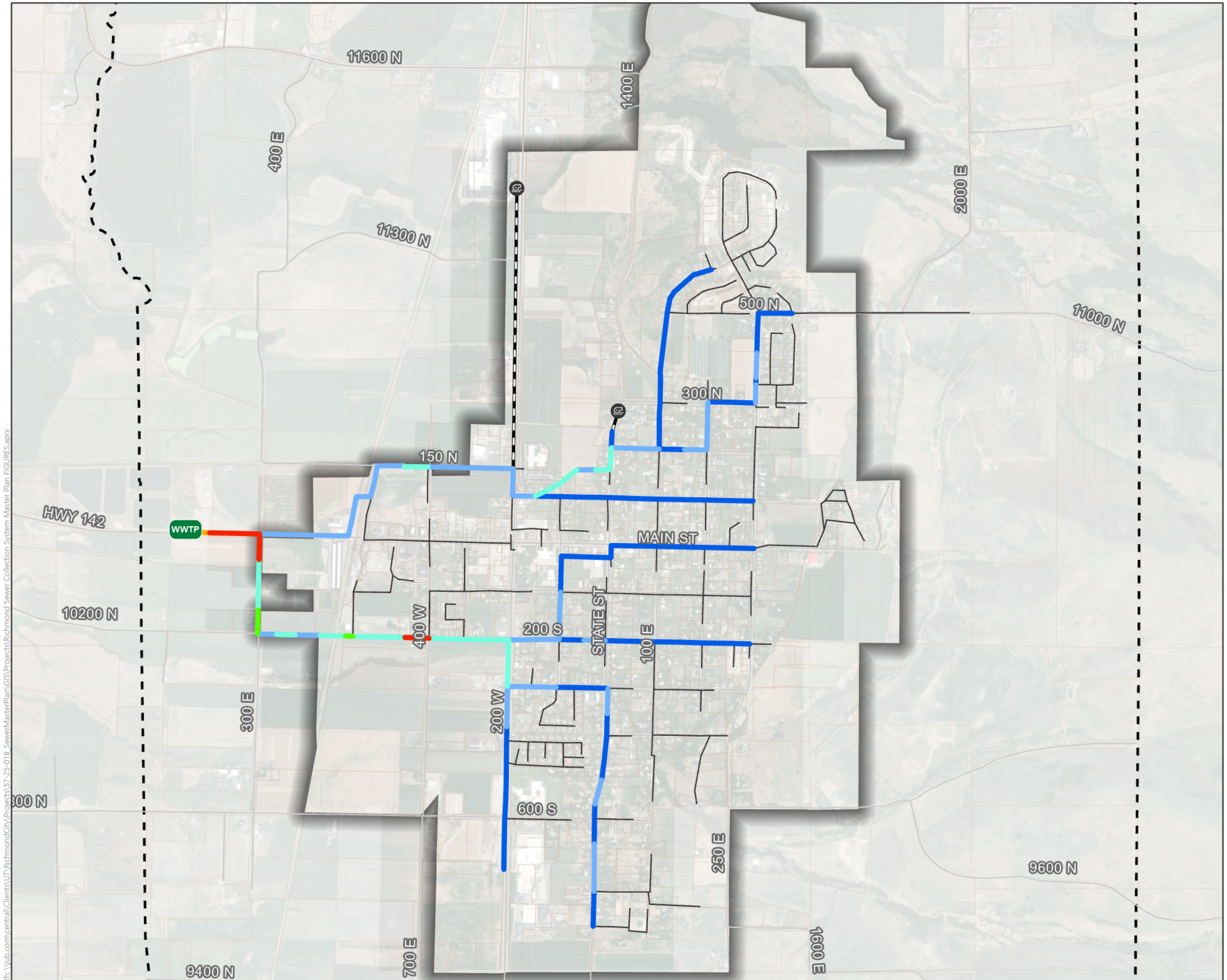
- Residential
- Commercial
- 10 Year Land Use
- Existing Land Use
- Richmond City Limits
- Study Boundary
- Parcel

0 1,500 3,000
Feet

N

J-U-B ENGINEERS, INC.
THE LANGDON GROUP
GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 8/25/2025



RICHMOND
UTAH
Sewer Master Plan

Figure A10

20 Year Model Depth Over Diameter (d/D)

Depth Over Diameter

- 0.00 - 0.25
- 0.26 - 0.50
- 0.51 - 0.75
- 0.76 - 1.00
- 1.01 - 1.25
- 1.26 - 2.00
- 2.01 - 5.00
- >5.00
- Collector
- Force Main
- WWTP
- Private Lift Station
- Richmond City Limits
- Study Boundary
- Parcel

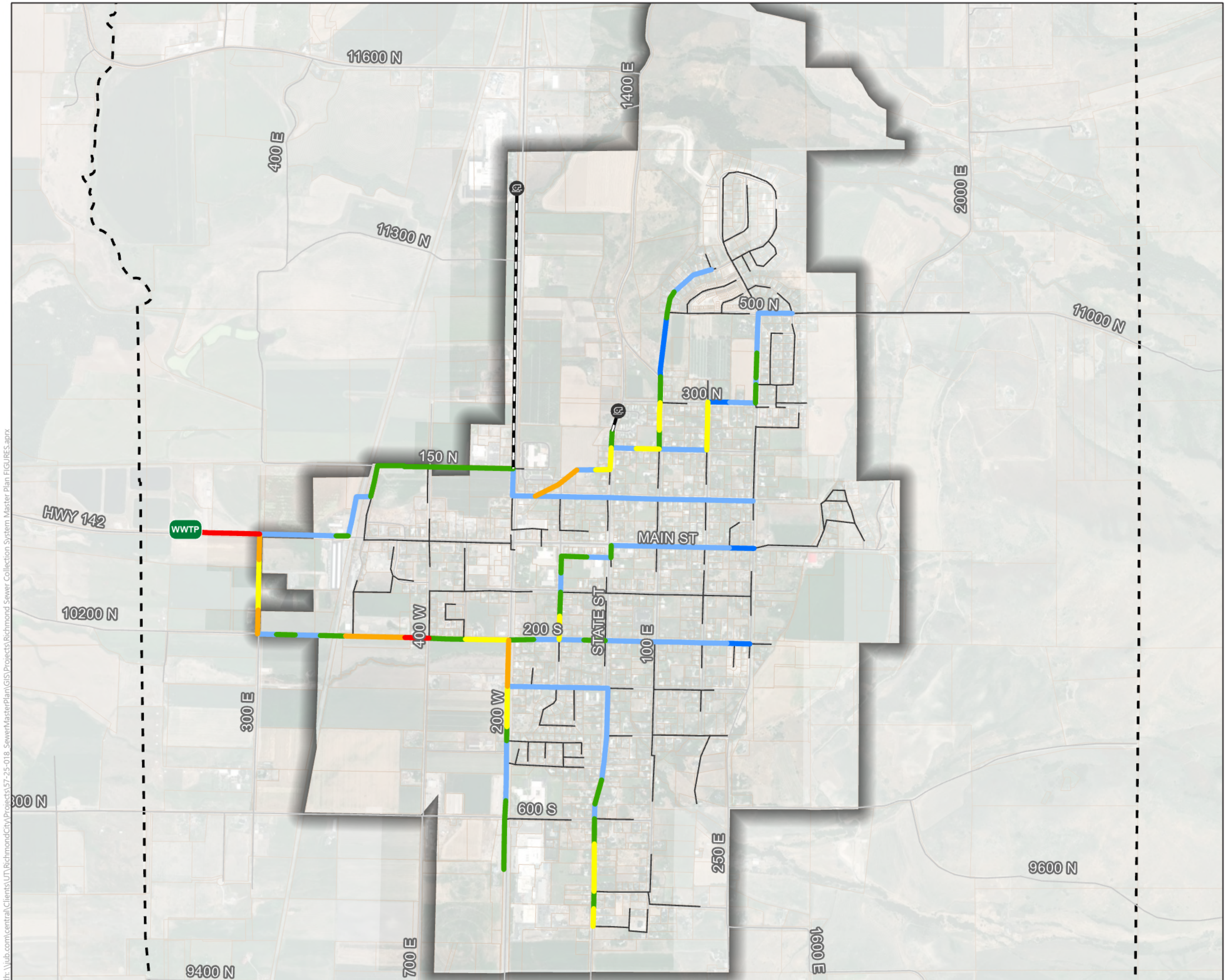
0 1,500 3,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 8/25/2025

Path: \\jub.com\central\Clients\UT\RichmondCity\Projects\57-25-018 SewerMasterPlan\GIS\Projects\Richmond Sewer Collection System Master Plan FIGURES.aprx



RICHMOND
UTAH
Sewer Master Plan

Figure A11

20 Year Model Reserve Capacity

Reserve Capacity (MGD)

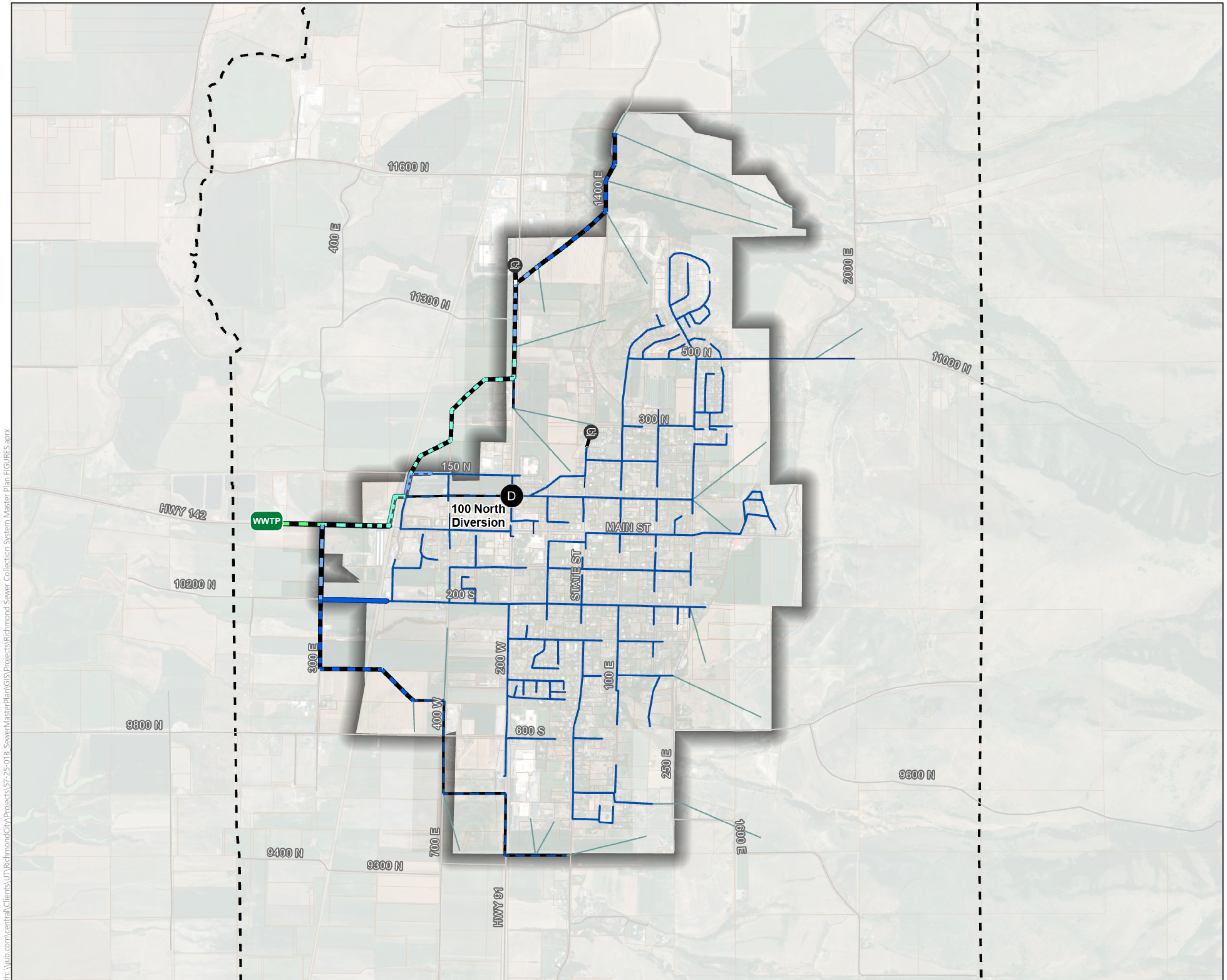
- Over Capacity
- 0.00 - 0.25
- 0.26 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 5.00
- 5.01 - 10.00
- >10.00
- WWTP
- Private Lift Station
- Collector
- Force Main
- Parcel
- Study Boundary
- Richmond City Limits

0 1,500 3,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 8/25/2025



RICHMOND UTAH

Sewer Master Plan

Figure A12

Buildout Model Pipe Sizes

Master Plan Lines

18 Inch
15 Inch
12 Inch
10 Inch
8 Inch

Existing Pipe Sizes

15 Inch
12 Inch
10 Inch
8 Inch
6 Inch
Abandoned Pipes

Force Main
Check Line
Private Lift Station
DiversionPoint
WWTP
Parcel
Study Boundary
Richmond City Limits

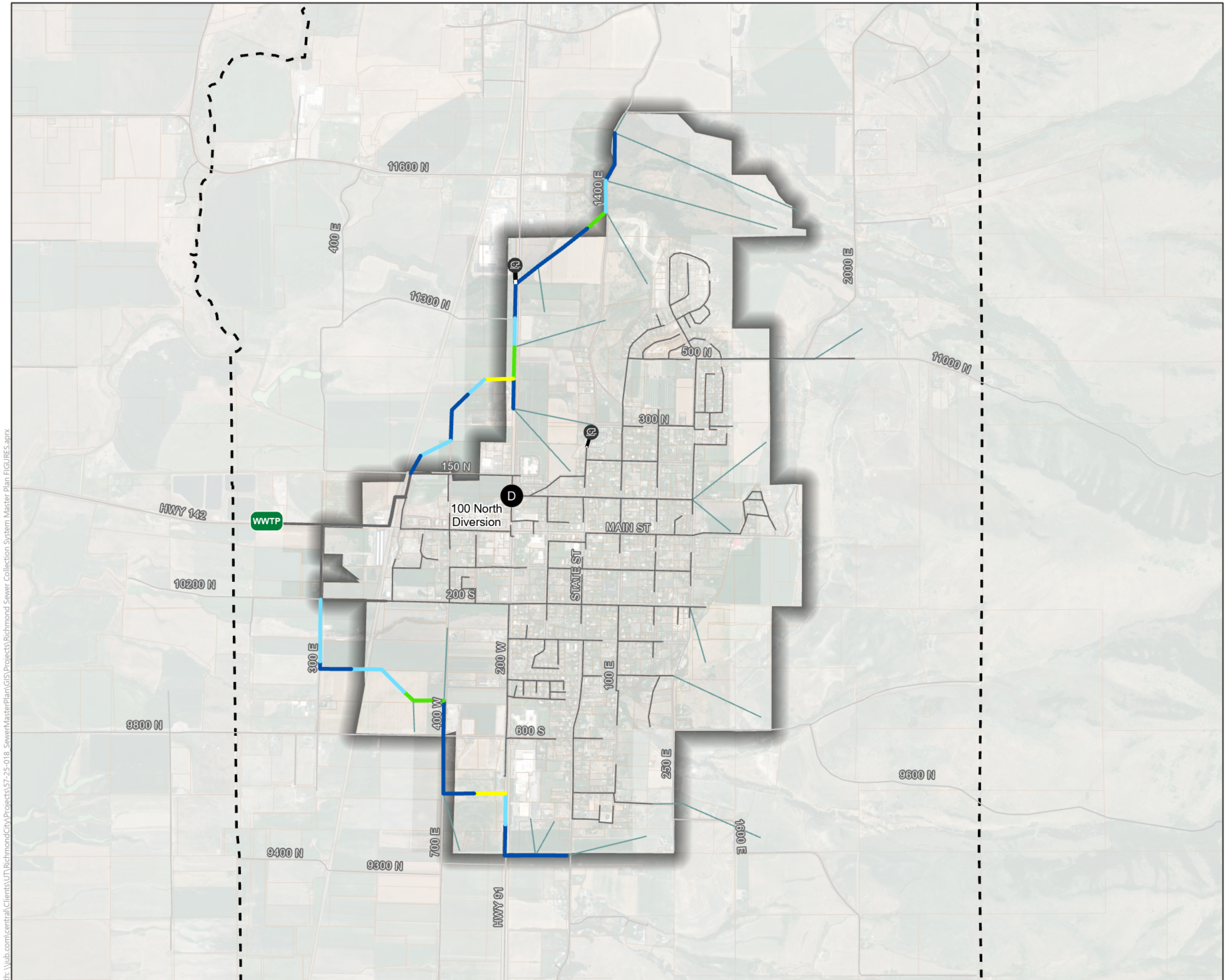
NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 2,000 4,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025



RICHMOND
UTAH
Sewer Master Plan

Figure A13

Buildout Model Trunk Depths

TrunkDepth

- 0.0 - 10.0
- 10.01 - 15.0
- 15.01 - 20.0
- 20.01 - 25.0
- 25.01 - 30.0

Existing Pipe

- Collector Line
- Trunk Line
- Force Main
- Checkline
- D DiversionPoint
- WWTP
- Private Lift Station
- Parcel
- Study Boundary
- Richmond City Limits

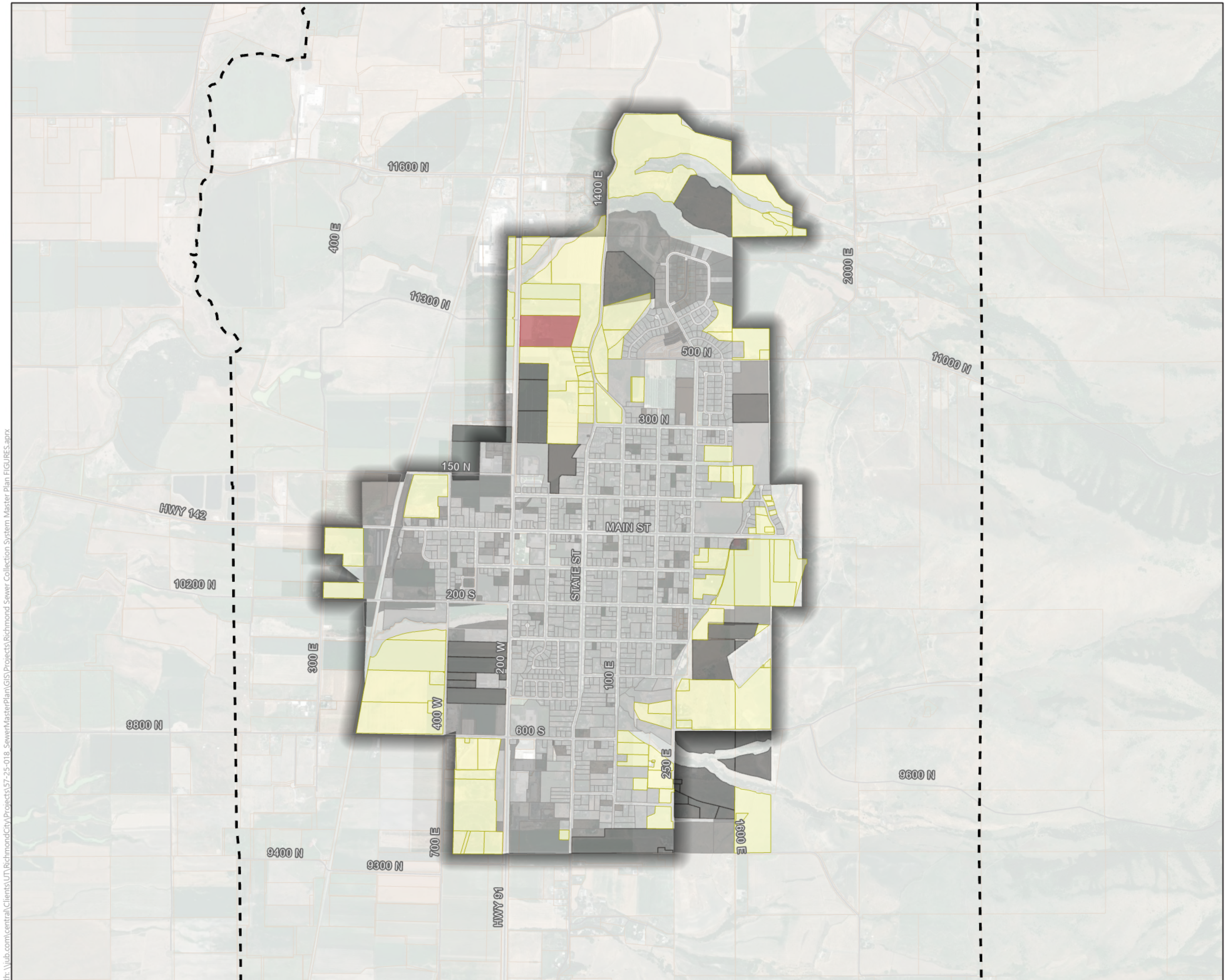
NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 2,000 4,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025



RICHMOND
UTAH
Sewer Master Plan

Figure A14

Buildout Model Land Use

Buildout Model Land Use

- Commercial
- Residential
- 20 Year Land Use
- 10 Year Land Use
- Existing Land Use
- Richmond City Limits
- Study Boundary
- Parcel

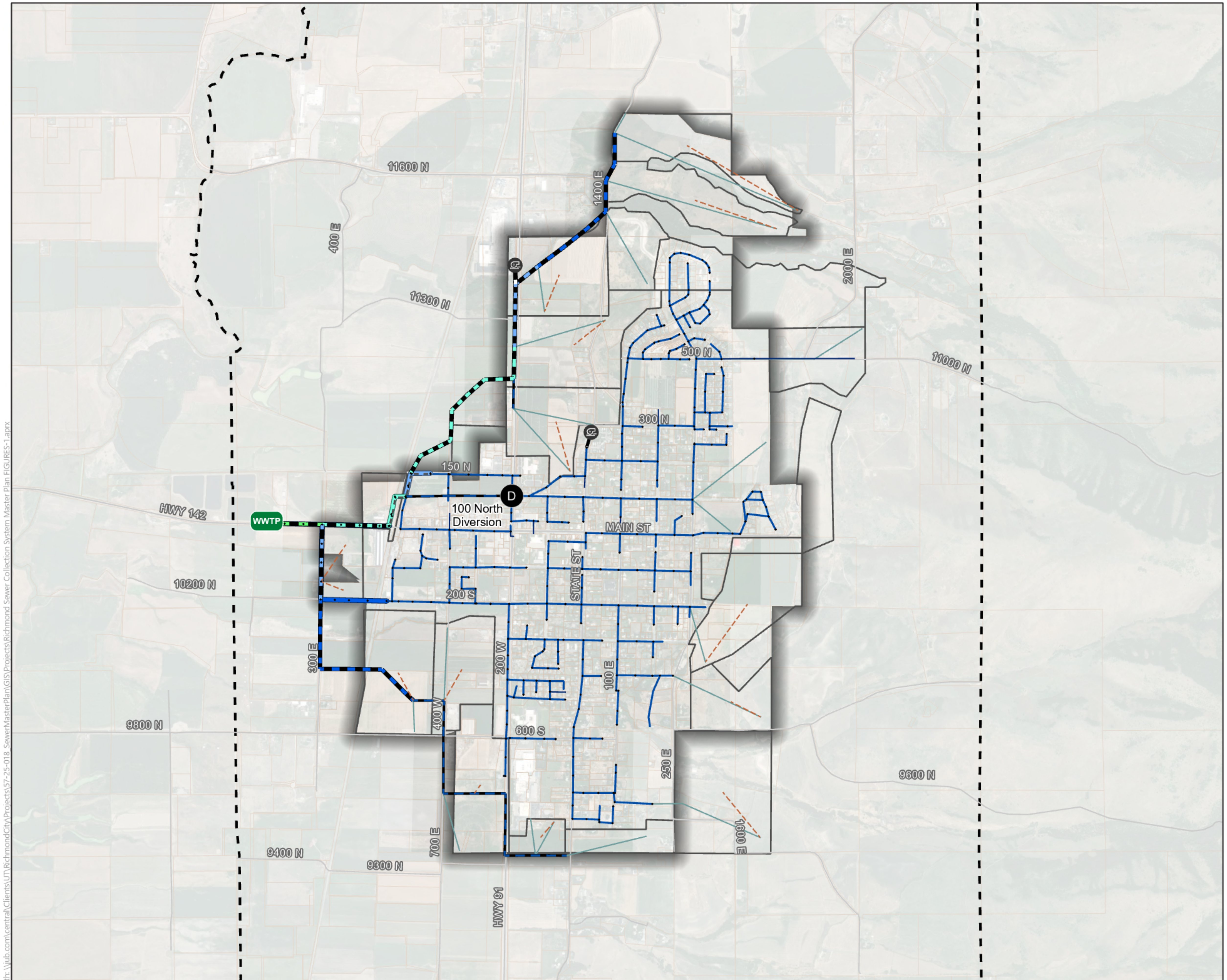
NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 2,000 4,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025



RICHMOND
UTAH
Sewer Master Plan

Figure A15

Buildout Model Service Areas & Injection Points

Master Plan Line
- 18 Inch
- 15 Inch
- 12 Inch
- 10 Inch
- 8 Inch
- Check Line
- Force Main
- Future Injection Line
- Service Areas
- Parcel
- Richmond City Limits

Existing Pipe Sizes
- 15 Inch
- 12 Inch
- 10 Inch
- 8 Inch
- 6 Inch
- Abandoned Pipes
- Diversion Point
- WWTP
- Private Lift Station
- Manhole
- Study Boundary

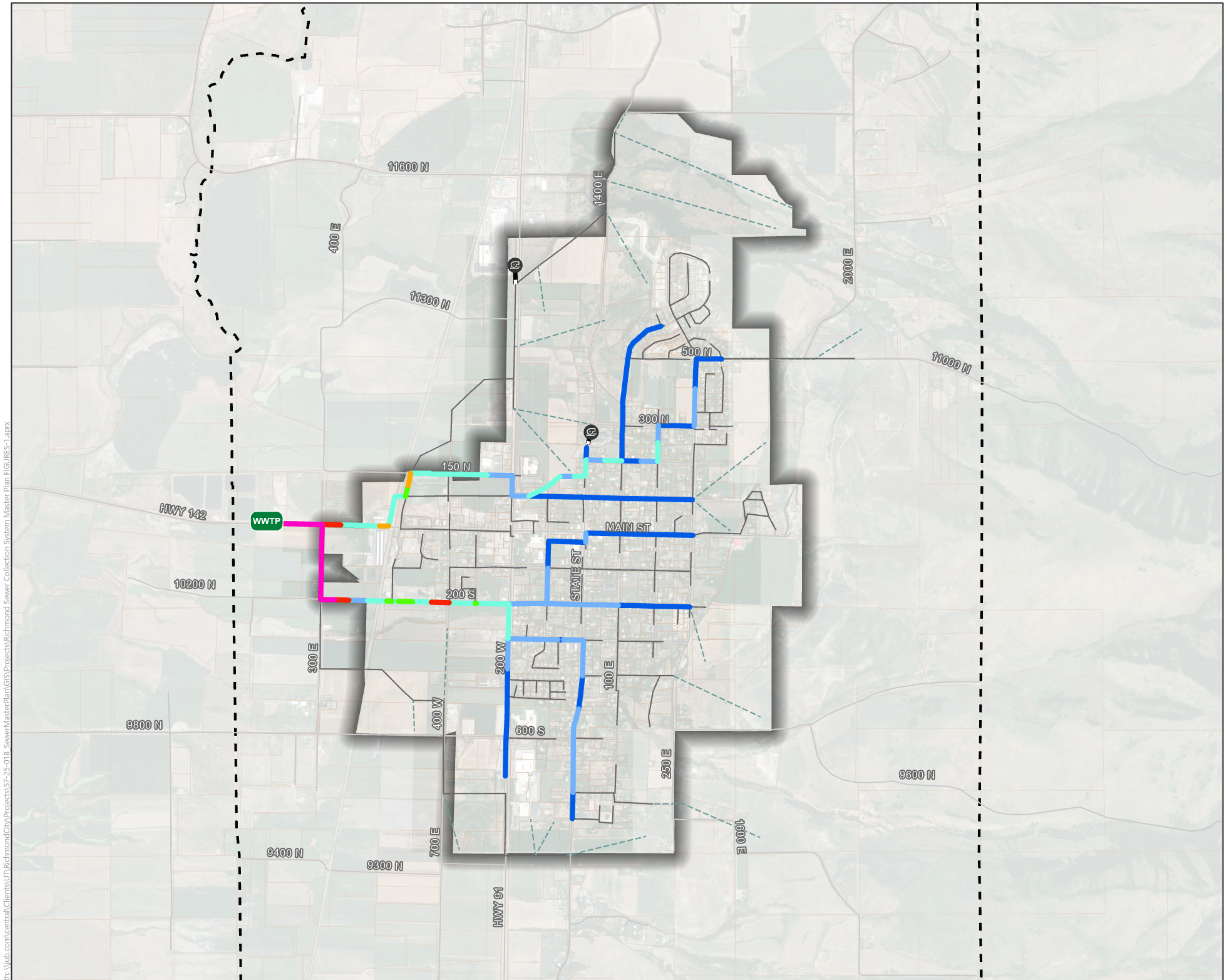
NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 2,000 4,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025



RICHMOND
UTAH
Sewer Master Plan

Figure A16

Buildout Model Depth Over Diameter (d/D)

Depth Over Diameter

- 0.00 - 0.25
- 0.26 - 0.50
- 0.51 - 0.75
- 0.76 - 1.00
- 1.01 - 1.25
- 1.26 - 2.00
- 2.01 - 5.00
- >5.00
- Checkline
- Collector
- Trunkline
- Force Main
- WWTP
- Private Lift Station
- Richmond City Limits
- Study Boundary
- Parcel

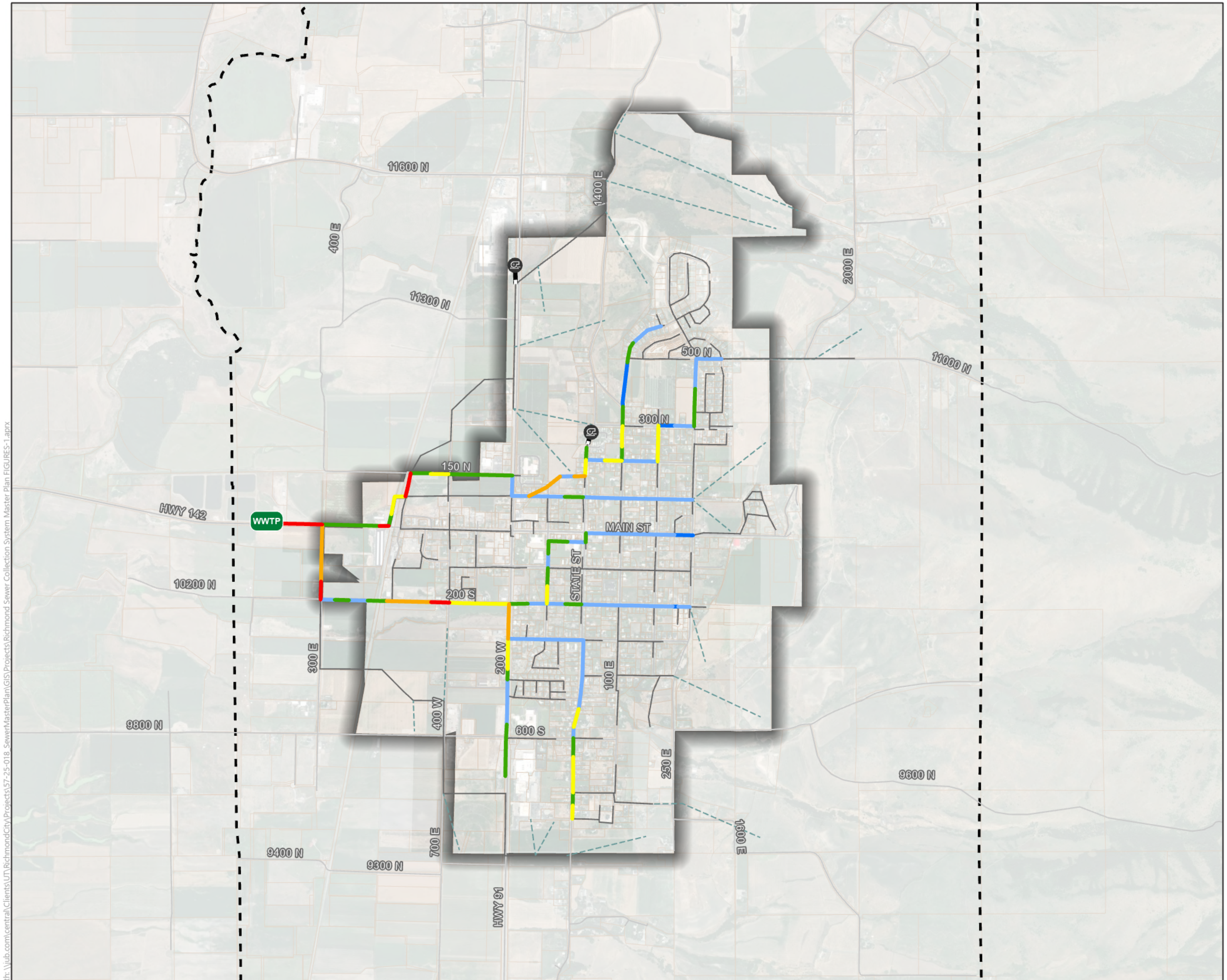
NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 2,000 4,000
Feet

N

J-U-B ENGINEERS, INC.
THE LANGDON GROUP
GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025



RICHMOND UTAH Sewer Master Plan

Figure A17

Buildout Model Reserve Capacity

Reseve Capacity

- Over Capacity
- 0.00 - 0.25
- 0.26 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 5.00
- 5.01 - 10.00
- >10.00
- Force Main
- Checkline
- Collector
- Trunkline
- WWTP
- Private Lift Station
- Richmond City Limits
- Study Boundary
- Parcel

NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

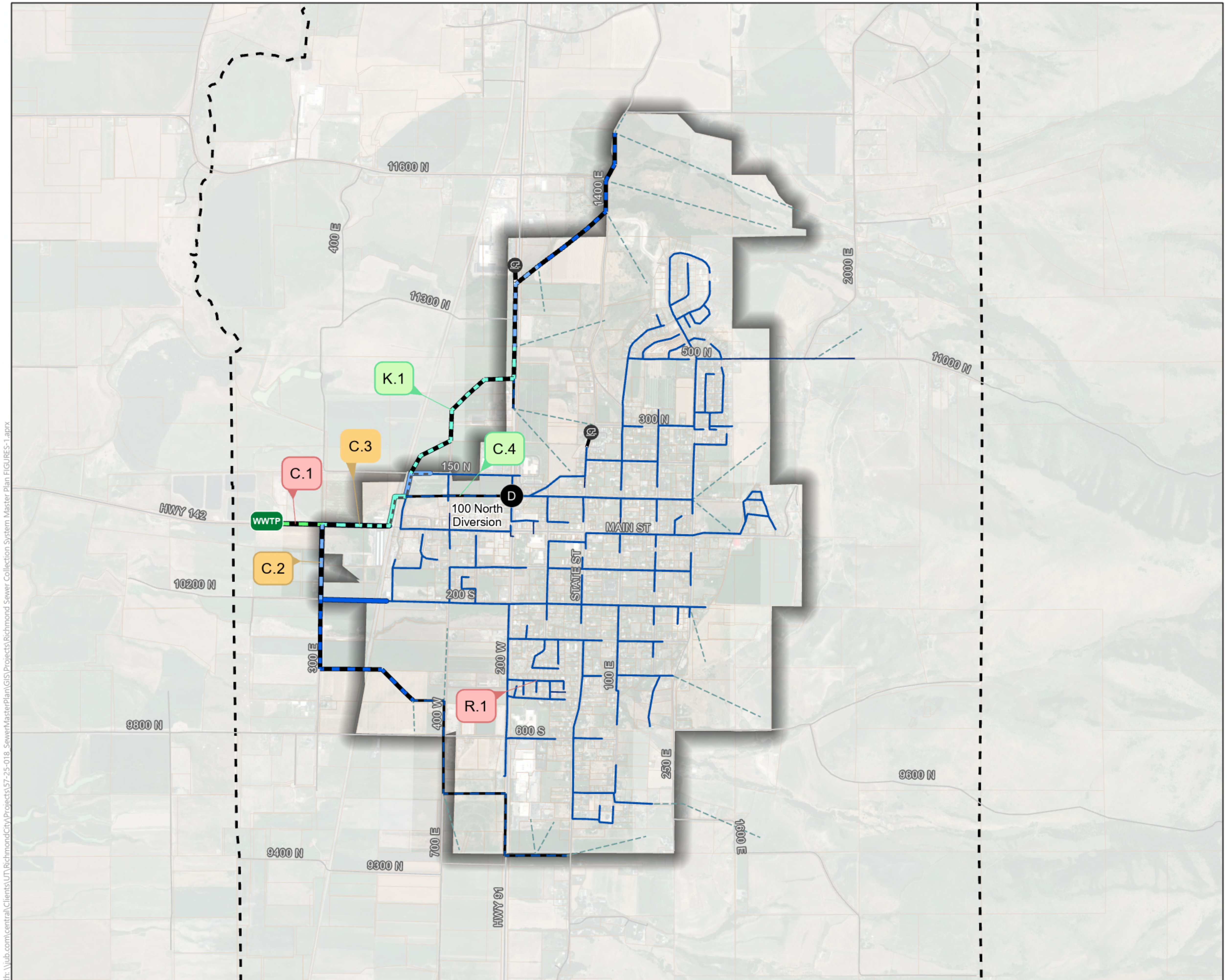
0 2,000 4,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025

Path: \\jub.com\central\Clients\UT\RichmondCity\Projects\57-25-018_SewerMasterPlan\GIS\Projects\Richmond Sewer Collection System Master Plan FIGURES-1.aprx



RICHMOND UTAH

Sewer Master Plan

Figure A18

CIP Summary Map

NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025

Appendix B

Model Assumptions

Contents

TABLES

APPENDIX B – MODEL ASSUMPTIONS

B.1 Introduction

A hydraulic model of a sewer system is based on assumptions that characterize the area and system under study. The assumptions used in a model are typically based on flow monitoring, learned characteristics of the system, discussions with City staff, and a general knowledge of sewer flow characteristics gained through past experience with monitoring flows and modeling other sewer systems.

B.2 Model Assumptions

This section summarizes the assumptions used for the updated model analysis and criteria for deficiencies. It is assumed that any violation of the criteria is reviewed with the City to determine on a case-by-case basis if something should be changed and what improvements will be recommended.

B.2.1 System Layer

Parameter: Manning's "n"

Discussion:	The roughness factor used in the Manning's formula $Q = (1.49/n)AR^{2/3}S_o^{1/2}$. The Manning's formula relates flow in a pipe with the depth of flow, diameter of the pipe and the slope of the pipe. Typical "n" values range from 0.009 for very smooth glass or plastic to greater than 0.016 for unfinished concrete. For sewer pipes, however, a slime layer develops on any sewer material in contact with sewage and provides relatively consistent roughness regardless of material. ASCE provides ranges of recommended Manning's "n" values based on size and condition. For pipes installed and maintained with 'extra care' they suggest a Manning's "n" range from 0.0092 to 0.0107 for sizes 6" to 60" respectively. For 'typical' installations Manning's "n" range from 0.0106 to 0.0123 for sizes 6" to 60" respectively. For 'substandard' installations Manning's "n" range from 0.0120 to 0.0139 for sizes 6" to 60" respectively.
Applies to:	Existing and future master planned pipes.
Richmond 2025 Model:	Use a Manning's "n" of 0.012 regardless of pipe material, size, and age.

Parameter: Pipe Sizing Methodology

Discussion:	The maximum depth over diameter (d/D) is an indicator of how much of the pipe capacity is being used. When the flow in a pipe reaches the point where the d/D is greater than the maximum allowed percent, the pipe diameter will increase to the next size. Flows from the Master Plan will be used to size future sewer lines. A graduated scale for maximum allowed percent full dependent on the size of the pipe is recommended as shown below. The scale is based on

ASCE recommendations for master planning sewer systems at a d/D of less than 0.5 for sewers less than 18 inches in diameter and 0.75 for larger sewers. This allows for a safety factor for smaller sewers where variations in land use and extensions of the service area can have large impacts on the available capacity of the sewer. The larger sewer lines have a smaller safety factor because variations in land use tend to balance out over the larger area served by the large sewer.

Applies to: Future master planned pipes.

Richmond 2025 Model: **Use the graduated scale for the maximum percent full for all new pipes as shown in Table B-1 during wet weather flows. Allow no surcharge above the crown of future pipes during wet weather flows.**

Table B-1 – Depth over Diameter (d/D) Ratios for Pipes

Size	Max d/D	Resultant Safety Factor
8”	0.50	2.00
10”	0.55	1.71
12”	0.60	1.49
15”	0.65	1.32
≥ 18”	0.75	1.10

Parameter: Capacity Criteria

Discussion: Many communities don’t allow surcharging to occur above the top of the pipe to minimize the possibility of a sewer service backup. The City has decided to allow no surcharging for dry weather flows, and will address surcharging on a case-by-case basis for wet weather flows.

Applies to: Existing pipes.

Richmond 2025 Model: ***Dry weather flows have a max percent full = 100%. Surcharging during wet weather flows will be assessed on a case-by-case basis.***

Parameter: Pipe Slopes

Discussion: The State of Utah has adopted the minimum pipe slopes outlined in “Ten State Standards”. The use of a minimum velocity to determine slope may result in Master Plan slopes that differ from the slopes used in final design and construction of the Master Plan line which would typically be designed to the “Ten State Standards”. Minimum slopes for pipes larger than 21-inch are recommended to be 0.10%. For slopes less than 0.10%, constructability becomes difficult.

Applies to: Future master planned pipes.

Richmond 2025 Model:	Use Ten State Standards minimum slopes as modified and shown below in Table B-2.

Table B-2 – Minimum Slopes for Design Pipes

Size	Slope
8"	0.40%
10"	0.28%
12"	0.22%
15"	0.15%
18”	0.12%
≥21"	0.10%

Parameter: Sewer Pipe Connection Point

Discussion:	When two sewer lines of different sizes meet, the connection point (vertically) can affect pipe hydraulics. Convention and some sewer standards require the design to match the pipe crowns or to match the design depths of the sewers to keep from surcharging the smaller upstream line.
Applies to:	Future master planned pipes.
Richmond 2025 Model:	Match the crowns of the two pipes.

Parameter: Pipe Velocities

Discussion:	Typically, the surcharge depth will control velocity through a pipe, but in a few cases where this does not occur, velocity should still be limited through the system to help preserve the longevity of the pipe system. A minimum scouring velocity of 2 fps is a common design point for force mains. As the velocities increase, the total dynamic head and pumping costs also increase. Higher operating velocities can also shorten the life span of force mains. Smaller and/or shorter force mains can be designed to maximum velocities up to 6 fps without increasing costs significantly. Higher pressure class pipe becomes a cost factor as diameter and length increase. Large diameter force mains typically target maximum design velocities of 4 fps.
Applies to:	Existing and future master planned pipes.
Richmond 2025 Model:	*Gravity Pipes: 10 ft/second maximum velocity* *Force Mains: 2 ft/second minimum velocity*

6 ft/second maximum velocity

Drop lines may have a higher velocity with specific design to handle higher velocities.

Parameter: Allowable Downstream Pipe Diameters

Discussion:	Smaller diameter pipes can be constructed downstream of larger diameter pipes and provide adequate hydraulic capacity if there is sufficient slope in the smaller diameter pipe, and surcharging is not expected. However, decreases are not recommended in pipes less than 24 inches in diameter due to the possibility of obstructions lodging at locations where trunk lines decrease in size, and because of the decreased hydraulic capacity in a surcharged condition if allowed. Decreases may be necessary when tying a master planned line into an existing trunk line, but should be avoided for future lines. For master planning, pipes generally smaller than 24 inch will be noted as needing a larger size when they are replaced.
Applies to:	Future master planned pipes.
Richmond 2025 Model:	Downstream pipe diameters shall be equal to or greater than the immediate upstream pipe diameter for future pipes. Existing downstream pipes that decrease in diameter from upstream pipes will be discussed for replacement consideration, and downstream pipes smaller than 24 inches will generally be flagged to be replaced with a larger pipe if upstream pipes are already larger. This replacement does not need to be completed unless the pipe condition is poor.

Parameter: Distance Between Manholes

Discussion:	The distances between manholes may vary, but according to the 10 State Standards, should be limited to a maximum of 400 feet for lines less than 18 inches in diameter and 500 feet for lines 18 inches and larger. The average modeled distance between manholes in an existing system tends to be around 300 feet.
Applies to:	Future master planned pipes.
Richmond 2025 Model:	Use 300 feet as the distance between manholes. Provide 0.1 feet of drop across each master planned manhole.

Parameter: Pipe Depths

Discussion:	In order to minimize construction costs for future sewer it is desirable to keep the depth of master plan lines to a minimum, while still providing sufficient depth to serve the associated service area. The minimum cover provides sufficient depth for service laterals to connect to the main sewer line. Service area “check lines” are included in the model so that the master plan trunk lines (10-inch and larger) are planned at the correct depth. Check lines start with the minimum cover (at the most difficult portion of the

service area to serve) and have a minimum slope of 0.45 percent (0.05 percent greater than the minimum required slope to account for manhole drops and meandering of the sewer.

Sufficient separation between sewer lines and the inverts of waterway crossings is necessary to ensure that the future trunk lines have the depth necessary to go under the waterway without disturbing the crossing.

Applies to: Future master planned pipes.

Richmond 2025 Model:

	Trunk lines (10” and larger):	8 feet typical cover
	Check lines:	5 feet minimum cover (3 feet minimum cover allowed, as an exception to avoid new lift stations)
	Waterway crossings:	3 feet minimum cover
	Maximum Depth:	20 feet depth to invert (Depths over 20 feet will be discussed with the City on a case-by-case basis)

Parameter: Manhole Drop and Meander Factor

Discussion: The invert drop through manholes allows for head loss in manholes. Standard drop in a manhole is 0.10 feet. To account for meander in design pipes, additional drop is added to the manholes to account for lengthened pipe and construction on curved roads that differ slightly from the master planned alignments. Additional drop is considered so that minimum slope criteria are also not violated. However, even though minimum slopes can be kept, if overall pipe length varies from the master planned pipe lengths, the hydraulic grade line (HGL) will increase at the upstream end which may be a violation greater than 1 foot over the crown. The master plan accounts for a 20% meander factor. If actual designs vary more than this, pipe sizes and slopes may be affected.

Applies to: Future master planned pipes.

Richmond 2025 Model: Total drop included in the master planned manholes consists of two parts:
1) 0.10 feet for every 300 feet of pipe.
2) Drop for an additional 20% of length of the upstream pipe at minimum slopes (see Table B-2).

Parameter: Manhole losses

Discussion: Head loss occurs in most manholes unless the manhole is built over an existing pipe with the top of the pipe cut out. The loss comes from the change in geometry as flow enters the manhole and exits to the next pipe. This head loss is approximated by using a loss coefficient multiplied by the velocity head in the upstream pipe.

The Federal Highway Administration published a methodology in Hydraulic Engineering Circular 22 based on research on these loss coefficients which includes initial estimates and a more elaborate and iterative process to determine loss. As a first initial estimate for outlet control conditions 0.2 is recommended for a pipe entrance loss, and 0.4 for pipe exit loss under inlet or outlet conditions. On new pipelines, due to the potential for meander during actual design, an adjustment also needs to be made to increase these values to account for additional manholes that could occur with the meander. A higher loss coefficient in master planning also provides sufficient provision for up to an additional 20 percent meander length in design in conjunction with the lengthening described above. This additional length will cause additional friction loss and a subsequent hydraulic grade line increase.

Applies to:	Existing and Future master planned pipes.
Richmond 2025 Model:	Entrance Loss Coefficient: 0.2 Exist Loss Coefficient: 0.4

B.2.2 Flow Generation

Future Flows

Parameter: Residential Unit Flows

Discussion:	A selected unit flow on the high end of flows observed in Richmond is expected to capture expected flows for future planning. Using a higher value also helps account for some higher density housing that may occur.
Applies to:	Future areas currently planned with a residentialresidential land use and other areas not zoned commercial or industrial. This loading applies to areas not currently being serviced by the City.
Richmond 2025 Model:	223 gpd per dwelling unit (1 EDU) = 70 gpcd (3.19 people per dwelling unit)

Parameter: Non-Residential Unit Flows (Excluding Permitted Users)

Discussion: The loading (gpad) for each non-residential land use type was estimated from the unit flows defined in the previous master plan, zoning data, acreage, and discussions with the City.

Non-residential unit flows for Richmond are as follows:

- Aggregated commercial/industrial areas are typically 900 gpad on a gross area basis

As noted above, commercial flows as an aggregate are generally not as high as some particular individual business flows; however, to

	accommodate the possibility of some higher use a commercial value is selected. Industrial flows are typically very low except for water use businesses or permitted industries.
Applies to:	Future areas zoned commercial or industrial.
Richmond 2025 Model:	Commercial: 900 gpad

Parameter: Existing Permitted Industrial Flows

Discussion:	Large Permitted Industries have a permitted value and maximum value with no penalty. A consistent value is needed for the model.
Applies to:	Existing Permitted Industrial Users.
Richmond 2025 Model:	The flows for Pepperidge Farms were determined by the 2011 flow meter data. Industrial flows from Lower Foods do not enter the City's collection system.

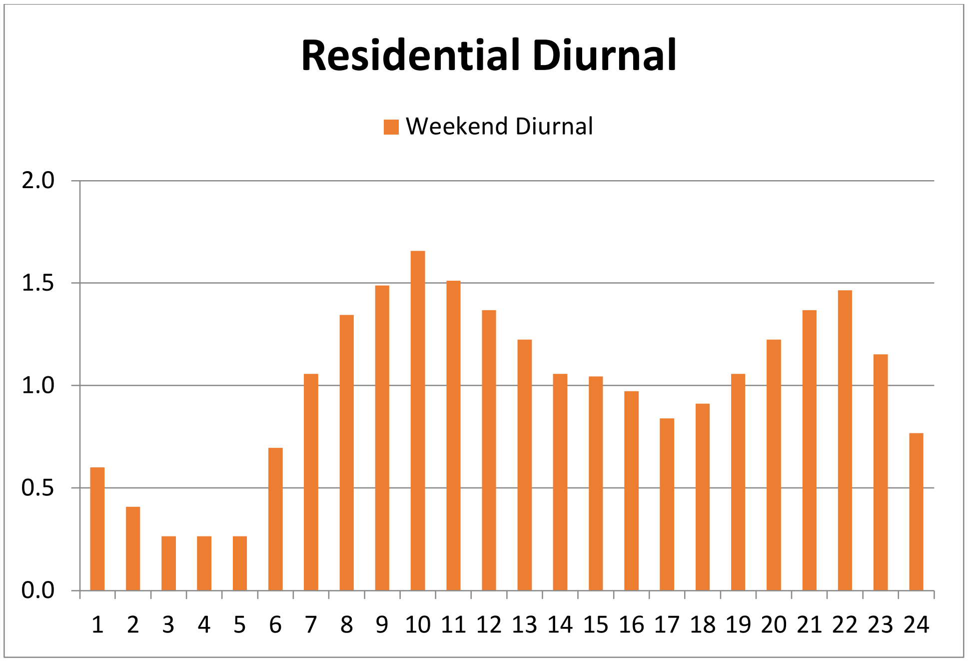
Parameter: Future Residential Land Use – Densities

Discussion:	Residential land use density assumptions are important to accurately plan for the future areas and the needed utilities. Generally these assumptions are selected from the high range (conservative) of observed Richmond densities and are in accordance with the draft Comprehensive Plan.
Applies to:	Future areas zoned residential
Richmond 2025 Model:	Residential Low = 1 DU/Ac Residential Medium = 4 DU/Ac Residential High = 12 DU/Ac

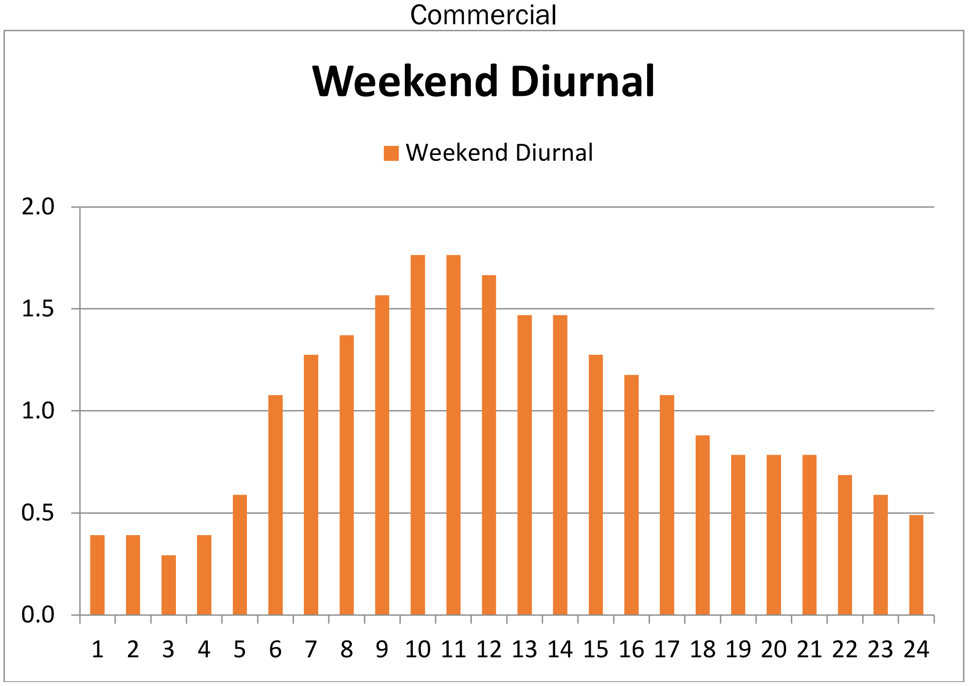
Parameter: Diurnal Curves

Discussion:	A diurnal curve describes the shape of sanitary flow contribution to the collection system over a 24-hour period. Diurnal curves differ for each type of land use. Diurnal curves are modified and refined during the calibration process by comparison to flow monitoring data. For calibration, permitted commercial diurnal curves were developed to best reflect the flow monitoring data collected.
Model Assumption:	Hourly diurnal curves for the major land use types are listed below and are described in terms of weekend hourly multipliers (W) on the average unit flows. It should be noted that these are not the peak flows applied.

Residential



Commercial



B.2.3 Infiltration and Inflow

Parameter: Design Storm for Inflow

Discussion: A design storm will be used to simulate a rainfall event. Typical storm patterns for northern Utah are a Type II SCS design storm. The storm peak will be aligned with the sanitary peak to evaluate the worst case scenario. Aligning these peaks significantly increases the return period for the storm.

Applies to: Existing Pipes: 200 foot buffer area around pipes (100 feet on each side of the pipe)
Future Areas: 60% of the area

Richmond 2025 Model: 24-hr Type II SCS design storm with 0.3 inches of precipitation to match the monitored storm from the 2011 model.

Parameter: Infiltration

Discussion: Infiltration describes the groundwater or rainfall that enters the sewer system through imperfections in the pipes and manholes.

Infiltration values from rainfall are estimated for large basins from flow monitoring data. It is described in terms of the wet weather Unit Hydrograph to account for infiltration associated with the rainfall events if applicable.

Richmond 2025 Model: Infiltration from rain associated with a wet weather unit hydrograph. This is assumed to be a part of inflow discussed above.
Infiltration from groundwater was assigned to select basins based on the 2011 flow metering effort to match the previous model, see Table B-3.

Table B-3 – Existing Model Estimated Infiltration

Site # (Infiltration Basin)	Total Infiltration (GPD)	Infiltration Rate (GPAD)
Site 1	0	0
Site 2	36,000	268
Site 3	72,000	141
Site 4	50,400	109
WWTP	0	0

B.2.4 Elevation and Datum Assumptions

Parameter: Vertical Datum

Discussion: A vertical datum defines where a point in space is located vertically. A different vertical datum can cause differences in elevations at the same point by several feet or more.

Applies to: All GIS and model layers

Richmond 2025 Model: NAVD 88 Vertical Datum

Parameter: Coordinate System

Discussion: A coordinate system defines where a point in space is located. The same X, Y coordinates in different coordinate systems can be in different locations. The North American Datum of 1983 (NAD 83) is the base for many coordinate systems. The NAD 83 State Plane system consists of several coordinate systems for each state. The City uses the NAD 1983 Utah North State Plane US Feet coordinate system.

Applies to:	All GIS and model layers
Richmond 2025 Model:	NAD 1983 State Plane Utah North FIPS 4301 (US Feet)

Parameter: Elevation Data for Master Planned Area

Discussion:	Surface elevation data is an important piece of data needed to accurately project sewer pipes to future areas within the Facility Plan's boundary. Surface data is used in generally flat areas to determine whether an area is serviceable or how far can the gravity lines be extended while meeting minimum slope. This data is also used in steep areas to determine how steep pipes will need to be and to confirm that the future flows are within the minimum and maximum design velocities.
Applies to:	All future pipes, manholes, and lift stations.
Richmond 2025 Model:	2016 Cache Valley Lidar hosted by raster.utah.gov and is a 0.5 meter Bare Earth DEM.

B.3 Model Assumptions Summary

Table B-4 – Model Assumptions Summary

Parameter	2025 Plan	Brief Discussion
Manning's "n"	0.012	ASCE: low range of substandard installations of pipe sizes 6 to 60 inches
Pipe Sizing Methodology (future pipes)	Graduated, from 0.5 to 0.75 d/D	Graduated scale provides more realistic design criteria which accounts for highest variability of flow in smallest pipes
Capacity Criteria	100% Full	Restricts surcharging during dry weather flows. Will assess surcharging during wet weather flows on a case-by-case basis.
Pipe Slopes (future pipes)	Varies: Slope-based criteria, no slopes smaller than 0.10%	Velocity-based standards cannot account for constructability constraints. Modified Ten State Standards.
Sewer Connection Points (future pipes)	Match crowns of all connecting pipes	Prevents surcharging to the smaller upstream line.
Pipe Velocities	Gravity Pipes: 10 fps max. Force Mains: 2 fps min. 6 fps max.	Maintains minimum scouring velocity while balancing life span.
Allowable downstream diameter (future pipes)	New downstream pipe diameter to be equal or greater than upstream pipe diameter.	Decreases are not recommended due to the possibility of obstructions lodging at locations where trunk lines decrease in size. Decreases may be necessary when tying a master planned line into an existing trunk line, but the existing pipes will be flagged for upsizing in the future. Decreases should be avoided for future lines.
Distance Between Manholes (future pipes)	300 ft	Distances may vary but should be limited to a maximum of 400 ft for lines less than 18-in and 500 ft for lines 18-in and larger.
Pipe Depths (future pipes)	Typical = 8 ft., minimum = 5 ft., maximum = 20 ft.	Excessive depth or minimal depth preferred before lift station considered. These will be discussed with the City on a case-by-case basis.
Manhole Drop (future pipes)	0.1 feet every 300 feet of pipe	
Meander Factor (future pipes)	20% additional length from current alignment	Master plan alignments are conceptual, actual alignments anticipated to vary up to 20%
Manhole Losses	0.2 entrance, 0.4 exit	Based on FHA research on initial estimates for manhole losses.
Future Flows - Residential Unit Flows	223 gpdu or 70 gpcd	Selected high range (conservative) of observed Richmond residential flows
Future Flows – Commercial/Industrial Unit Flows	900 gpad	Estimated from aerial imagery and current land use maps
Future Residential Land Use - Densities	Res. Low = 1 DU/Ac Res. Med. = 4 DU/Ac; Res. High = 12 DU/Ac	Selected from the high range (conservative) of observed Richmond densities and are in accordance with the 2023 General Plan
Diurnal Curves	Aligned to land use types	Calibrating to land use types ensures future growth areas can be loaded according to land use
Inflow - Design Storm	Selected according to monitored storm profile	
Inflow – Rainfall dependent Infiltration	Infiltration assigned design storm	
Inflow – Groundwater Infiltration	Assigned to select basins	Calibrating by basin allows for accurate infiltration to be modeled by location.
Vertical Datum	NAVD 88	
Horizontal Datum	NAD 1983 Idaho Central State Plane US Feet	
Elevation Data for MP Area	2016 Cache Valley Lidar	

Appendix C

Model Calibration

Contents

APPENDIX C – MODEL CALIBRATION

C.1 Introduction

This Appendix provides graphs for each calibration site that show raw flow data for each day during the calibration period, average flow data over the entire period and the modeled flow. This model update did not include flow metering and utilized the flow monitoring, as shown in Figure C-1. from the 2011 master plan efforts. The raw data from the calibration period was collected from June 21, 2011 to July 14, 2011. Flow records from the sewer treatment plat for the same period were also utilized to calibrate the model. Data from the 2025 model has been added to the original calibration graphs for this report.

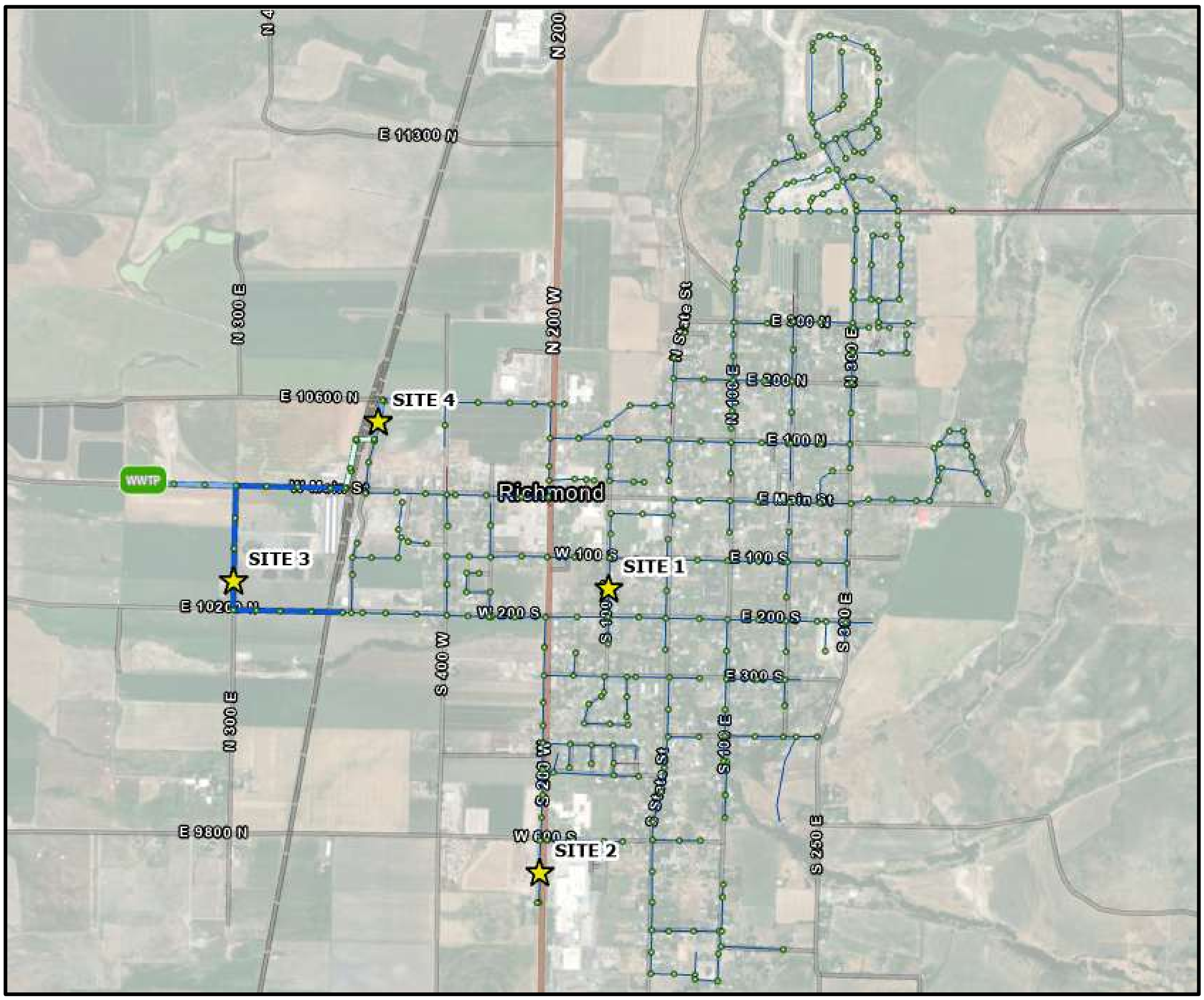


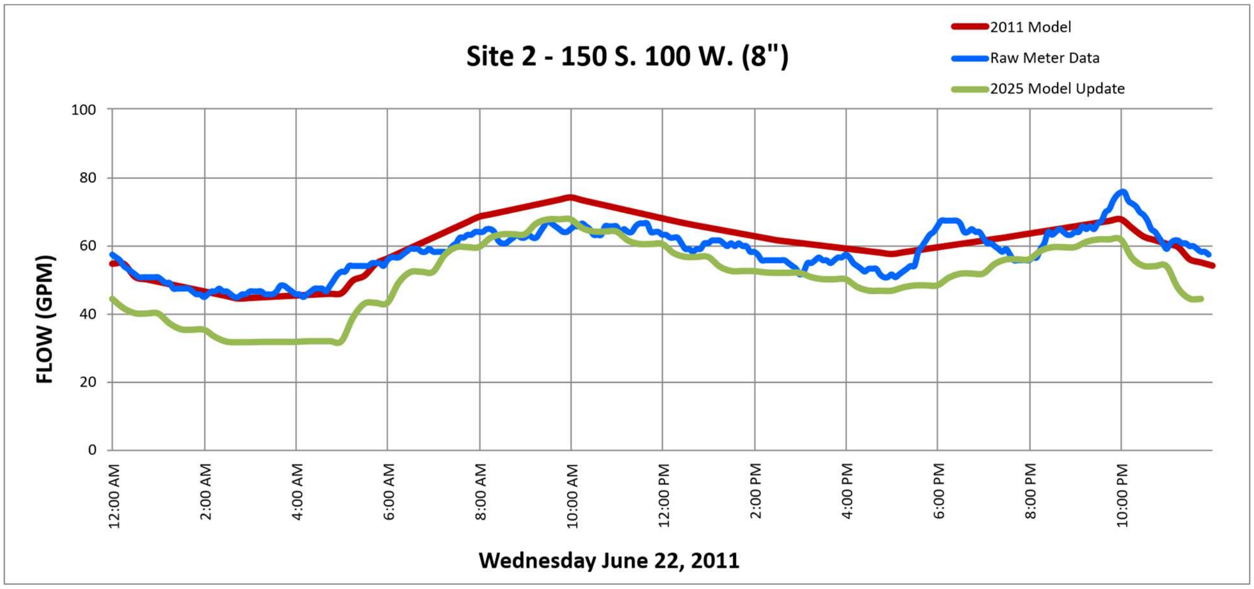
Figure C-1- Flow Monitoring Sites

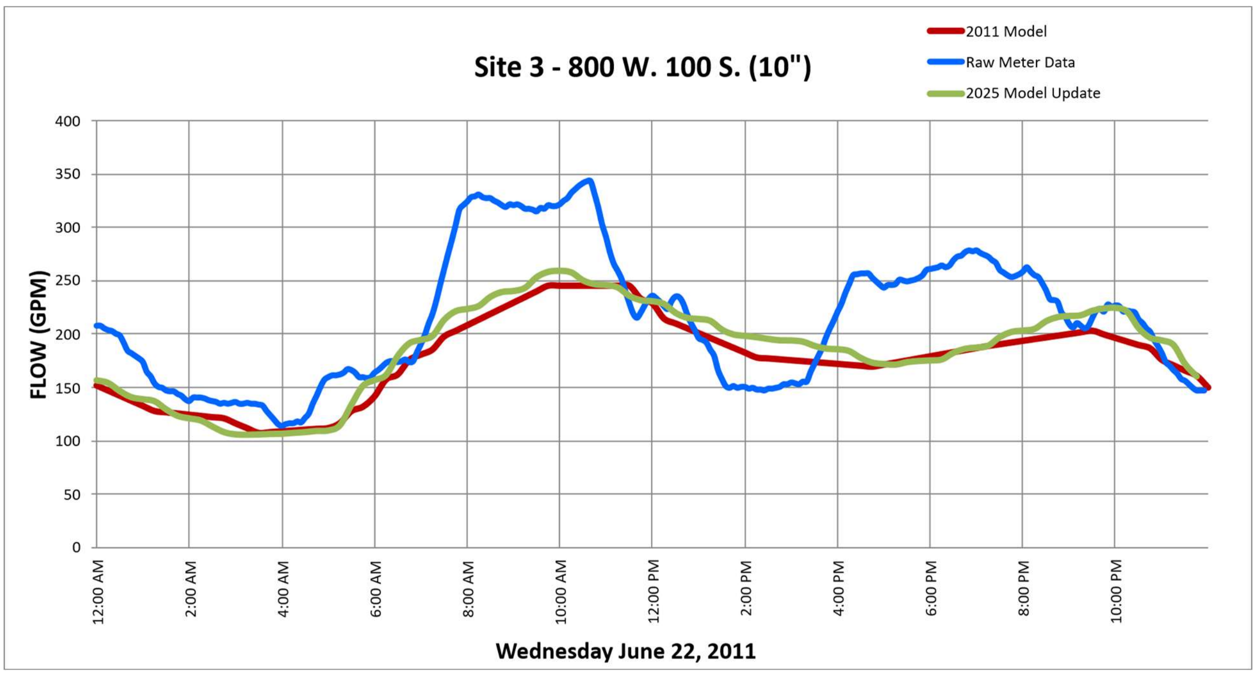
The dry weather calibration helps determine the amount of infiltration at each site and verifies the diurnal curves used in the hydraulic model. Wet weather calibration is used to develop a similar inflow response in the collection system to a storm event. The wet weather graphs include a storm event from July 9th, 2011, with a cumulative precipitation of 0.3 inches. The 2025 model mimics the captured inflow from this same storm.

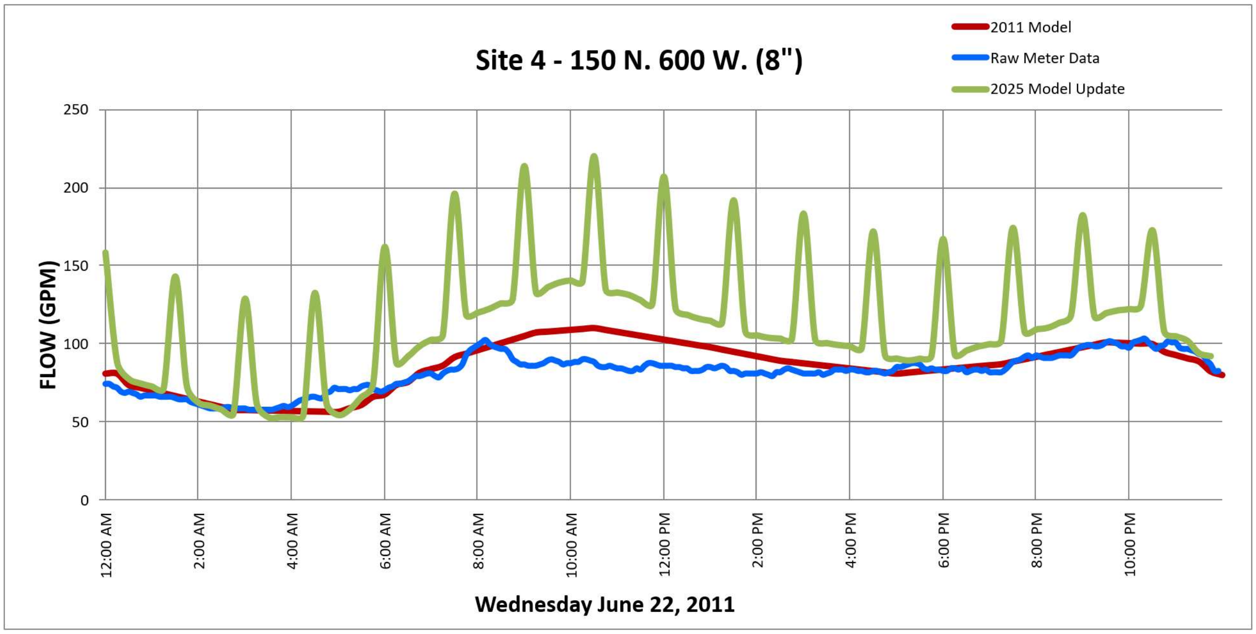
Between 2011 and 2025 Lower Foods updated their treatment process and removed their industrial flows from Richmond's collection system. Site 1 from the flow monitoring in 2011 was just downstream of Lower Foods and due to the removal of the industrial flows at this point the flow monitoring is not representative of the current flows at this location. The graphs for Site 1 will not be provided due to this change in flow.

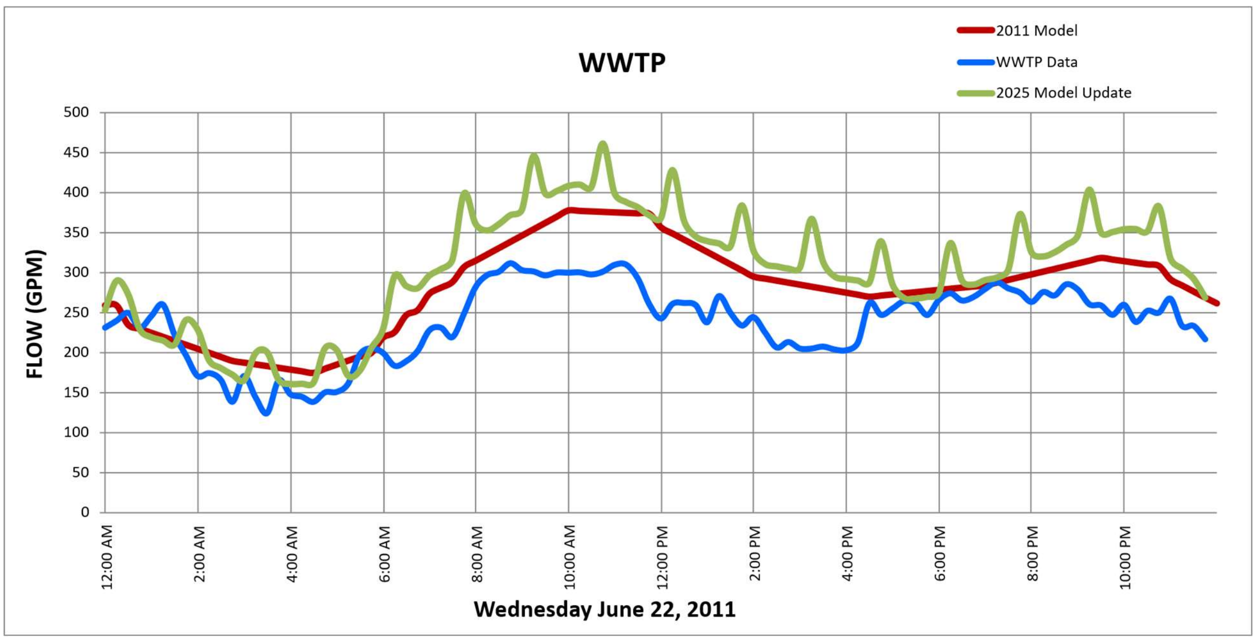
Also, due to the WWTP meter being downstream of where flow is split between the headworks building and the lagoons, the model shows peak flows higher than the metered data. There is no meter on the flows that go to the lagoon and so the WWTP wet weather graph below shows the modeled flows quite a bit higher than the metered flows.

C.1.1 Dry Weather Calibration Graphs

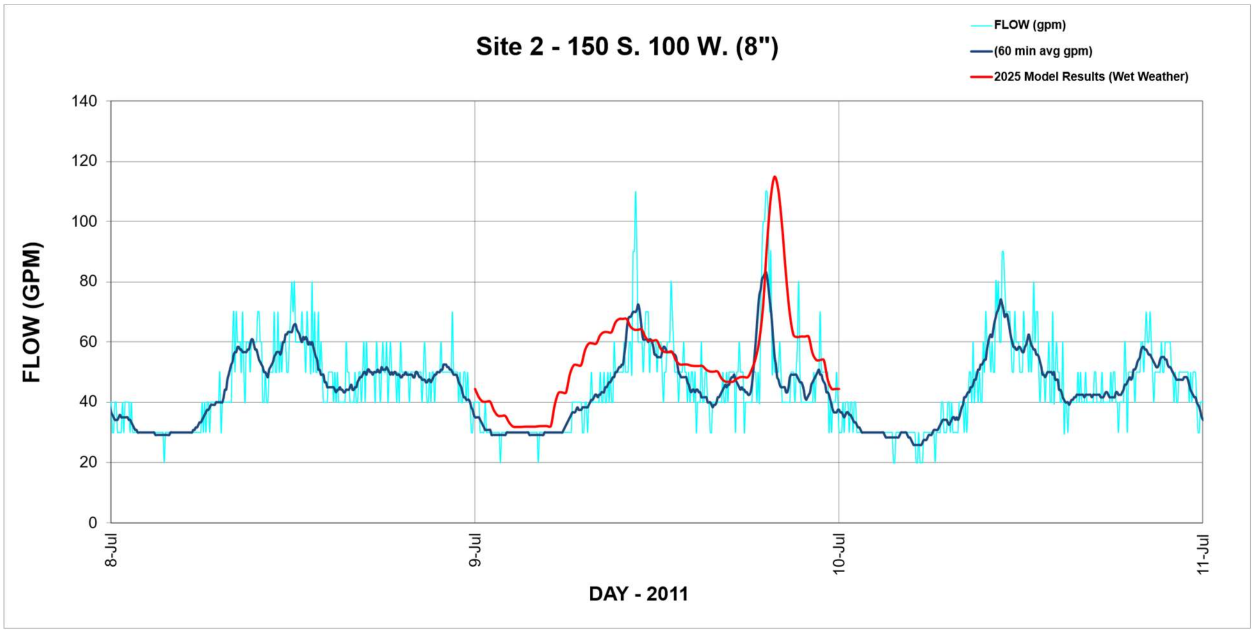


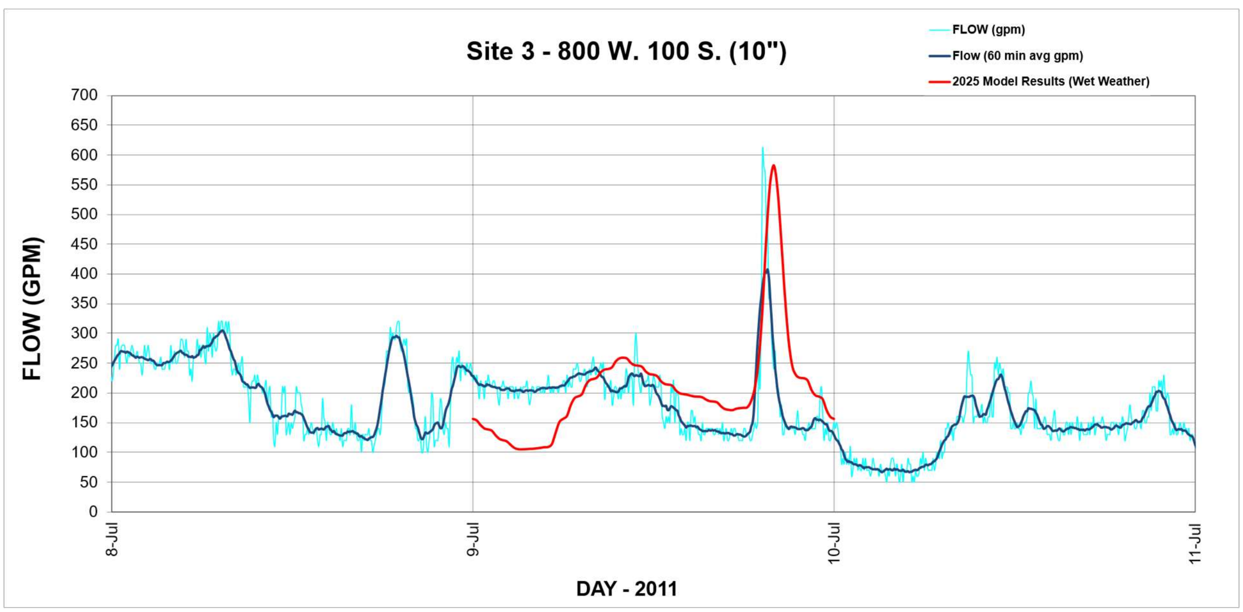


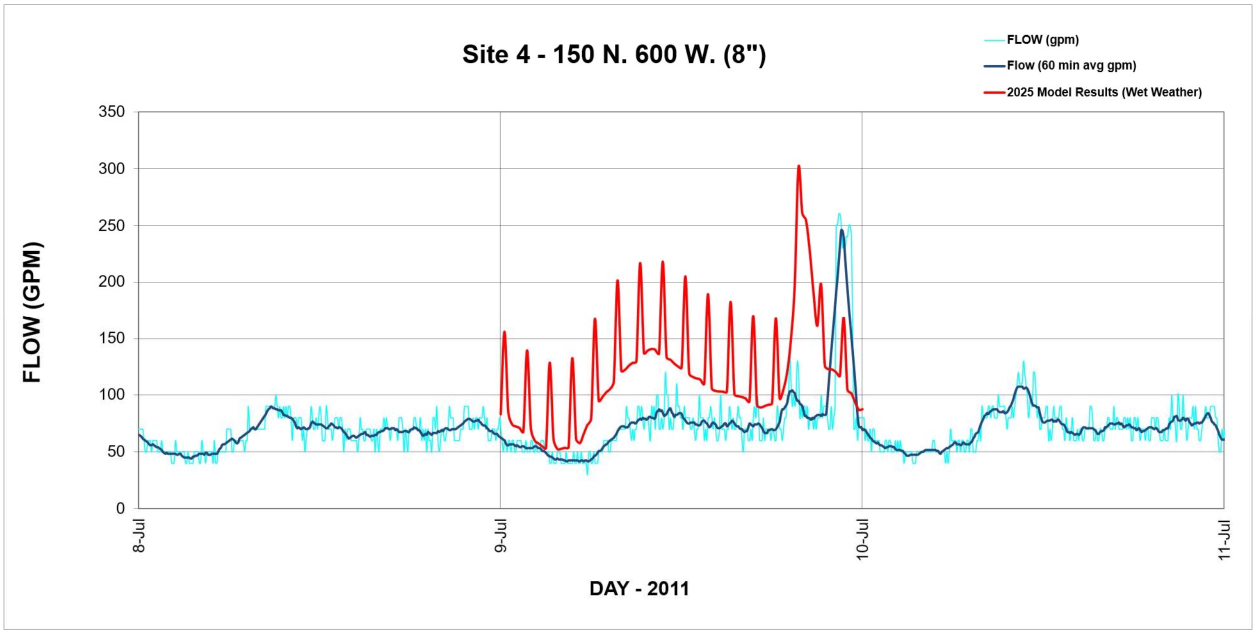

Site 4 - 150 N. 600 W. (8")
2011 Model
Raw Meter Data
2025 Model Update
FLOW (GPM)
250
200
150
100
50
0
12:00 AM
2:00 AM
4:00 AM
6:00 AM
8:00 AM
10:00 AM
12:00 PM
2:00 PM
4:00 PM
6:00 PM
8:00 PM
10:00 PM
Wednesday June 22, 2011

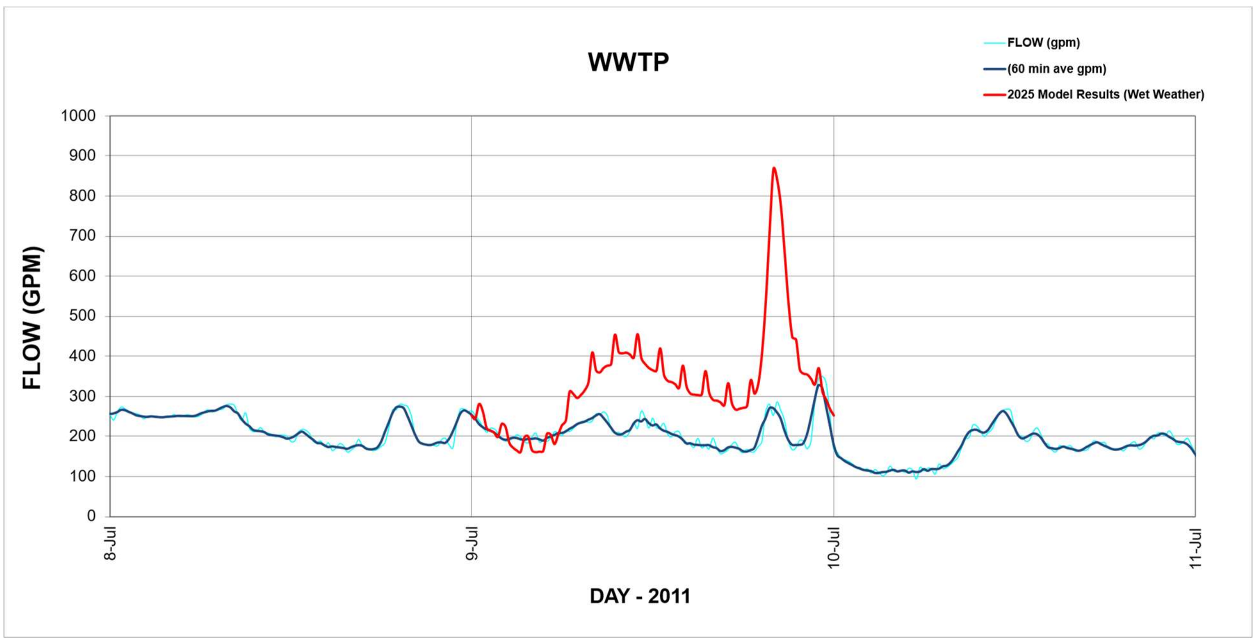

WWTP
2011 Model
WWTP Data
2025 Model Update
FLOW (GPM)
500
450
400
350
300
250
200
150
100
50
0
12:00 AM
2:00 AM
4:00 AM
6:00 AM
8:00 AM
10:00 AM
12:00 PM
2:00 PM
4:00 PM
6:00 PM
8:00 PM
10:00 PM
Wednesday June 22, 2011

C.1.2 Wet Weather Calibration Graphs






Site 4 - 150 N. 600 W. (8")
FLOW (gpm)
Flow (60 min avg gpm)
2025 Model Results (Wet Weather)
FLOW (GPM)
350
300
250
200
150
100
50
0
8-Jul
9-Jul
10-Jul
11-Jul
DAY - 2011


WWTP
FLOW (gpm)
(60 min ave gpm)
2025 Model Results (Wet Weather)
FLOW (GPM)
1000
900
800
700
600
500
400
300
200
100
0
8-Jul
9-Jul
10-Jul
11-Jul
DAY - 2011

Appendix D

Model Results

J-U-B ENGINEERS, INC.

J-U-B ENGINEERS, INC.

ENGINEERS SURVEYORS PLANNERS

City of Richmond - 2025 Sewer Master Plan Update

Appendix D - Existing Model Results

Upstream Manhole	US Rim Source	US Inv Source	Downstream Manhole	DS Rim Source	DS Inv Source	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
MS2	2012 JUB Survey	2012 JUB Survey	MS1	2012 JUB Survey	2012 JUB Survey	400.00	12.00	4483.67	4477.47	4475.90	6.20	0.004	1.26	2.82	0.68	0.30
MS21	2012 JUB Survey	2012 JUB Survey	MS20	2012 JUB Survey	2012 JUB Survey	382.00	10.00	4501.30	4490.60	4488.70	10.70	0.005	0.83	3.43	0.70	0.25
MS50	2012 JUB Survey	2012 JUB Survey	MS49	2012 JUB Survey	2012 JUB Survey	400.00	8.00	4543.43	4534.13	4525.47	9.30	0.022	0.45	5.03	0.42	0.80
MS49	2012 JUB Survey	2012 JUB Survey	MS206	2012 JUB Survey	2012 JUB Survey	28.00	8.00	4535.27	4525.47	4524.60	9.80	0.031	0.45	4.86	0.37	1.04
MS206	2012 JUB Survey	2012 JUB Survey	MS48	2012 JUB Survey	2012 JUB Survey	381.00	8.00	4534.70	4524.60	4516.52	10.10	0.021	0.45	6.09	0.48	0.78
MS58	2012 JUB Survey	2012 JUB Survey	MS57	2012 JUB Survey	2012 JUB Survey	391.00	8.00	4633.75	4623.15	4616.58	10.60	0.017	0.07	2.93	0.18	1.03
MS57	2012 JUB Survey	2012 JUB Survey	MS56	2012 JUB Survey	2012 JUB Survey	363.00	8.00	4626.98	4616.58	4604.34	10.40	0.034	0.07	3.26	0.15	1.48
MS56	2012 JUB Survey	2012 JUB Survey	MS55	2012 JUB Survey	2012 JUB Survey	400.00	8.00	4614.34	4604.34	4592.47	10.00	0.030	0.09	2.34	0.16	1.37
MS55	2012 JUB Survey	2012 JUB Survey	MS54	2012 JUB Survey	2012 JUB Survey	364.00	8.00	4595.27	4592.47	4576.05	2.80	0.045	0.33	5.82	0.28	1.47
MS64	2012 JUB Survey	2012 JUB Survey	MS63	2012 JUB Survey	2012 JUB Survey	372.00	8.00	4716.72	4702.52	4685.36	14.20	0.046	0.03	2.66	0.09	1.79
MS63	2012 JUB Survey	2012 JUB Survey	MS62	2012 JUB Survey	2012 JUB Survey	387.00	8.00	4694.66	4685.36	4669.36	9.30	0.041	0.03	2.46	0.09	1.69
MS22	2012 JUB Survey	2012 JUB Survey	MS21	2012 JUB Survey	2012 JUB Survey	302.00	10.00	4505.56	4496.46	4490.60	9.10	0.019	0.83	4.08	0.43	1.30
MS62	2012 JUB Survey	2012 JUB Survey	MS61	2012 JUB Survey	2012 JUB Survey	374.00	8.00	4680.46	4669.36	4657.57	11.10	0.032	0.04	2.70	0.12	1.46
MS61	2012 JUB Survey	2012 JUB Survey	MS60	2012 JUB Survey	2012 JUB Survey	391.00	8.00	4667.17	4657.57	4647.79	9.60	0.025	0.05	2.75	0.13	1.29
MS60	2012 JUB Survey	2012 JUB Survey	MS59	2012 JUB Survey	2012 JUB Survey	386.00	8.00	4656.09	4647.79	4635.88	8.30	0.031	0.06	3.05	0.13	1.43
MS59	2012 JUB Survey	2012 JUB Survey	MS58	2012 JUB Survey	2012 JUB Survey	419.00	8.00	4643.48	4635.88	4623.15	7.60	0.030	0.06	2.64	0.13	1.42
MS23	2012 JUB Survey	2012 JUB Survey	MS22	2012 JUB Survey	2012 JUB Survey	301.00	10.00	4510.43	4500.33	4496.46	10.10	0.013	0.83	5.04	0.52	0.91
MS89	2012 JUB Survey	2012 JUB Survey	MS71	2012 JUB Survey	2012 JUB Survey	300.00	8.00	4637.79	4630.59	4629.09	7.20	0.005	0.07	1.14	0.22	0.53
MS88	2012 JUB Survey	2012 JUB Survey	MS89	2012 JUB Survey	2012 JUB Survey	280.00	8.00	4636.66	4631.76	4630.59	4.90	0.004	0.06	1.63	0.24	0.48
MS66	2012 JUB Survey	2012 JUB Survey	MS65	2012 JUB Survey	2012 JUB Survey	375.00	8.00	4600.65	4595.85	4594.29	4.80	0.004	0.24	2.21	0.46	0.31
MS67	2012 JUB Survey	2012 JUB Survey	MS66	2012 JUB Survey	2012 JUB Survey	300.00	8.00	4618.07	4608.47	4595.85	9.60	0.042	0.24	3.30	0.25	1.50
MS68	2012 JUB Survey	2012 JUB Survey	MS67	2012 JUB Survey	2012 JUB Survey	231.00	8.00	4626.44	4609.74	4608.47	16.70	0.005	0.24	2.57	0.43	0.39
MS65	2012 JUB Survey	2012 JUB Survey	MS55	2012 JUB Survey	2012 JUB Survey	414.00	8.00	4598.99	4594.29	4592.47	4.70	0.004	0.25	2.89	0.51	0.32
MS73	2012 JUB Survey	2012 JUB Survey	MS72	2012 JUB Survey	2012 JUB Survey	358.00	8.00	4674.68	4659.98	4651.14	14.70	0.025	0.13	4.12	0.22	1.20
MS72	2012 JUB Survey	2012 JUB Survey	MS71	2012 JUB Survey	2012 JUB Survey	404.00	8.00	4660.64	4651.14	4629.09	9.50	0.055	0.14	2.60	0.18	1.84
MS24	2012 JUB Survey	2012 JUB Survey	MS23	2012 JUB Survey	2012 JUB Survey	399.00	10.00	4517.95	4509.45	4500.33	8.50	0.023	0.82	5.16	0.41	1.49
MS71	2012 JUB Survey	2012 JUB Survey	MS70	2012 JUB Survey	2012 JUB Survey	368.00	8.00	4646.49	4629.09	4626.81	17.40	0.006	0.21	2.61	0.39	0.45
MS70	2012 JUB Survey	2012 JUB Survey	MS69	2012 JUB Survey	2012 JUB Survey	398.00	8.00	4632.81	4626.81	4611.86	6.00	0.038	0.22	3.38	0.24	1.42
MS77	2012 JUB Survey	2012 JUB Survey	MS78	2012 JUB Survey	2012 JUB Survey	367.00	8.00	4677.13	4663.13	4661.68	14.00	0.004	0.12	1.82	0.33	0.41
MS78	2012 JUB Survey	2012 JUB Survey	MS73	2012 JUB Survey	2012 JUB Survey	402.00	8.00	4674.28	4661.68	4659.98	12.60	0.004	0.13	2.36	0.36	0.42
MS251	2012 JUB Survey	2012 JUB Survey	MS79	2012 JUB Survey	2012 JUB Survey	412.00	8.00	4728.60	4717.50	4690.75	11.10	0.065	0.11	5.15	0.16	2.04
MS79	2012 JUB Survey	2012 JUB Survey	MS77	2012 JUB Survey	2012 JUB Survey	349.00	8.00	4699.25	4690.75	4663.13	8.50	0.079	0.12	2.86	0.15	2.26
MS149	2012 JUB Survey	2012 JUB Survey	MS104	2012 JUB Survey	2012 JUB Survey	340.00	8.00	4649.25	4636.85	4627.71	12.40	0.027	0.08	2.39	0.16	1.31
MS25	2012 JUB Survey	2012 JUB Survey	MS24	2012 JUB Survey	2012 JUB Survey	404.00	10.00	4524.44	4515.14	4509.45	9.30	0.014	0.82	4.98	0.48	1.00
MS93	2012 JUB Survey	2012 JUB Survey	MS149	2012 JUB Survey	2012 JUB Survey	388.00	8.00	4662.43	4651.43	4636.85	11.00	0.038	0.08	3.41	0.15	1.57
MS150	2012 JUB Survey	2012 JUB Survey	MS93	2012 JUB Survey	2012 JUB Survey	361.00	8.00	4672.65	4662.25	4651.43	10.40	0.030	0.07	3.27	0.15	1.40
MS151	2012 JUB Survey	2012 JUB Survey	MS150	2012 JUB Survey	2012 JUB Survey	403.00	8.00	4686.18	4677.68	4662.25	8.50	0.038	0.06	3.19	0.13	1.60
MS152	2012 JUB Survey	2012 JUB Survey	MS151	2012 JUB Survey	2012 JUB Survey	395.00	8.00	4698.41	4688.81	4677.68	9.60	0.028	0.05	2.79	0.12	1.38
MS153	2012 JUB Survey	2012 JUB Survey	MS152	2012 JUB Survey	2012 JUB Survey	395.00	8.00	4722.33	4713.64	4688.81	8.69	0.063	0.03	2.69	0.09	2.09
MS201	2012 JUB Survey	2012 JUB Survey	MS25	2012 JUB Survey	2012 JUB Survey	117.00	8.00	4526.47	4517.37	4515.14	9.10	0.019	0.81	5.44	0.66	0.36
MS105	2012 JUB Survey	2012 JUB Survey	MS148	2012 JUB Survey	2012 JUB Survey	386.00	8.00	4635.01	4626.41	4618.62	8.60	0.020	0.09	2.86	0.19	1.11
MS148	2012 JUB Survey	2012 JUB Survey	MS124	2012 JUB Survey	2012 JUB Survey	406.00	8.00	4627.12	4618.62	4613.33	8.50	0.013	0.10	2.55	0.22	0.87
MS26	2012 JUB Survey	2012 JUB Survey	MS201	2012 JUB Survey	2012 JUB Survey	137.00	8.00	4529.48	4519.98	4517.37	9.50	0.019	0.78	5.19	0.60	0.39
MS112	2012 JUB Survey	2012 JUB Survey	MS111	2012 JUB Survey	2012 JUB Survey	408.00	8.00	4646.20	4634.80	4626.12	11.40	0.021	0.14	3.59	0.22	1.10
MS113	2012 JUB Survey	2012 JUB Survey	MS112	2012 JUB Survey	2012 JUB Survey	353.00	8.00	4656.78	4643.88	4634.80	12.90	0.026	0.13	3.59	0.21	1.23
MS114	2012 JUB Survey	2012 JUB Survey	MS113	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4674.54	4663.84	4643.88	10.70	0.050	0.12	4.00	0.16	1.78
MS115	2012 JUB Survey	2012 JUB Survey	MS114	2012 JUB Survey	2012 JUB Survey	309.00	8.00	4685.54	4673.74	4663.84	11.80	0.032	0.11	4.07	0.18	1.40
MS116	2012 JUB Survey	2012 JUB Survey	MS115	2012 JUB Survey	2012 JUB Survey	400.00	8.00	4691.44	4676.34	4673.74	15.10	0.007	0.10	2.56	0.28	0.58

Upstream Manhole	US Rim Source	US Inv Source	Downstream Manhole	DS Rim Source	DS Inv Source	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
MS117	2012 JUB Survey	2012 JUB Survey	MS116	2012 JUB Survey	2012 JUB Survey	234.00	8.00	4694.09	4682.19	4676.34	11.90	0.025	0.10	2.43	0.18	1.24
MS118	2012 JUB Survey	2012 JUB Survey	MS117	2012 JUB Survey	2012 JUB Survey	402.00	8.00	4703.23	4688.33	4682.19	14.90	0.015	0.09	2.86	0.19	0.96
MS27	2012 JUB Survey	2012 JUB Survey	MS26	2012 JUB Survey	2012 JUB Survey	299.00	8.00	4534.89	4525.29	4519.98	9.60	0.018	0.78	5.32	0.63	0.35
MS119	Interpolated	Interpolated	MS118	2012 JUB Survey	2012 JUB Survey	397.00	8.00	0.00	4690.24	4688.33	-4690.24	0.005	0.08	2.01	0.25	0.51
MS120	2012 JUB Survey	2012 JUB Survey	MS119	Interpolated	Interpolated	362.00	8.00	4703.29	4691.99	4690.24	11.30	0.005	0.07	1.64	0.24	0.52
MS121	2012 JUB Survey	2012 JUB Survey	MS120	2012 JUB Survey	2012 JUB Survey	276.00	8.00	4701.69	4693.19	4691.99	8.50	0.004	0.03	0.94	0.15	0.53
MS28	2012 JUB Survey	2012 JUB Survey	MS27	2012 JUB Survey	2012 JUB Survey	397.00	8.00	4541.25	4532.46	4525.29	8.79	0.018	0.77	5.29	0.61	0.37
MS111	2012 JUB Survey	2012 JUB Survey	MS163	2012 JUB Survey	2012 JUB Survey	425.00	8.00	4636.72	4626.12	4612.44	10.60	0.032	0.16	4.33	0.22	1.36
MS163	2012 JUB Survey	2012 JUB Survey	MS269	2012 JUB Survey	2012 JUB Survey	116.00	8.00	4622.94	4612.44	4607.20	10.50	0.045	0.16	4.72	0.21	1.64
MS269	2012 JUB Survey	2012 JUB Survey	MS162	2012 JUB Survey	2012 JUB Survey	285.00	8.00	4619.50	4607.20	4595.63	12.30	0.041	0.17	4.36	0.21	1.53
MS162	2012 JUB Survey	2012 JUB Survey	MS161	2012 JUB Survey	2012 JUB Survey	400.00	8.00	4607.83	4595.63	4583.53	12.20	0.030	0.20	4.52	0.25	1.27
MS161	2012 JUB Survey	2012 JUB Survey	MS133	2012 JUB Survey	2012 JUB Survey	379.00	8.00	4592.03	4583.53	4571.29	8.50	0.032	0.21	2.28	0.25	1.31
MS29	2012 JUB Survey	2012 JUB Survey	MS28	2012 JUB Survey	2012 JUB Survey	386.00	8.00	4549.41	4536.51	4532.46	12.90	0.010	0.77	4.29	0.75	0.10
MS3	2012 JUB Survey	2012 JUB Survey	MS2	2012 JUB Survey	2012 JUB Survey	402.00	12.00	4489.20	4479.10	4477.47	10.10	0.004	1.26	3.40	0.69	0.33
MS30	2012 JUB Survey	2012 JUB Survey	MS29	2012 JUB Survey	2012 JUB Survey	281.00	8.00	4552.80	4544.50	4536.51	8.30	0.028	0.72	4.87	0.51	0.70
MH37	Richmond GIS Data	Richmond GIS Data	MH38	Richmond GIS Data	Richmond GIS Data	257.00	15.00	4520.90	4510.18	4509.54	10.72	0.002	0.46	2.39	0.32	1.80
MH36	Richmond GIS Data	Richmond GIS Data	MH37	Richmond GIS Data	Richmond GIS Data	382.00	15.00	4518.38	4510.85	4510.18	7.53	0.002	0.46	2.02	0.34	1.43
MH35	Richmond GIS Data	Richmond GIS Data	MH36	Richmond GIS Data	Richmond GIS Data	228.00	15.00	4524.21	4511.31	4510.85	12.90	0.002	0.46	1.99	0.33	1.57
MH34	Richmond GIS Data	Richmond GIS Data	MH35	Richmond GIS Data	Richmond GIS Data	237.00	12.00	4520.05	4512.25	4511.31	7.80	0.004	0.46	2.51	0.37	1.12
MH33	Richmond GIS Data	Richmond GIS Data	MH34	Richmond GIS Data	Richmond GIS Data	268.00	12.00	4517.09	4513.01	4512.25	4.08	0.003	0.45	2.47	0.42	0.87
MH32	Richmond GIS Data	Richmond GIS Data	MH33	Richmond GIS Data	Richmond GIS Data	424.00	12.00	4525.14	4514.21	4513.01	10.93	0.003	0.46	2.34	0.40	0.87
MS48	2012 JUB Survey	2012 JUB Survey	MH32	Richmond GIS Data	Richmond GIS Data	15.00	8.00	4525.22	4516.52	4514.21	8.70	0.154	0.46	4.95	0.25	2.87
MS263	Interpolated	Interpolated	MS69	2012 JUB Survey	2012 JUB Survey	261.00	8.00	0.00	4612.83	4611.86	-4612.83	0.004	0.01	0.44	0.10	0.50
MS227	2012 JUB Survey	2012 JUB Survey	MS88	2012 JUB Survey	2012 JUB Survey	162.00	8.00	4637.79	4632.29	4631.76	5.50	0.003	0.06	1.46	0.24	0.43
MH1	Interpolated	Interpolated	MS30	2012 JUB Survey	2012 JUB Survey	269.00	8.00	4565.04	4551.63	4544.50	13.41	0.027	0.72	6.14	0.52	0.66
MS31	2012 JUB Survey	2012 JUB Survey	MH1	Interpolated	Interpolated	30.00	8.00	4561.32	4552.42	4551.63	8.90	0.026	0.71	5.23	0.63	0.66
MS32	2012 JUB Survey	2012 JUB Survey	MS31	2012 JUB Survey	2012 JUB Survey	299.00	8.00	4568.25	4558.75	4552.42	9.50	0.021	0.70	5.13	0.54	0.53
MS250A	Interpolated	Interpolated	MS251	2012 JUB Survey	2012 JUB Survey	295.00	8.00	0.00	4723.22	4717.50	-4723.22	0.019	0.11	3.68	0.22	1.07
MS250	2012 JUB Survey	2012 JUB Survey	MS250A	Interpolated	Interpolated	107.00	8.00	4735.63	4725.33	4723.22	10.30	0.020	0.08	2.44	0.16	1.11
MS249	2012 JUB Survey	2012 JUB Survey	MS250	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4742.23	4731.03	4725.33	11.20	0.014	0.07	2.67	0.18	0.94
MS216	2012 JUB Survey	2012 JUB Survey	MS249	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4757.78	4748.08	4731.03	9.70	0.043	0.07	2.96	0.13	1.68
MS246	2012 JUB Survey	2012 JUB Survey	MS216	2012 JUB Survey	2012 JUB Survey	237.00	8.00	4769.33	4755.23	4748.08	14.10	0.030	0.07	3.28	0.15	1.41
MS33	2012 JUB Survey	2012 JUB Survey	MS32	2012 JUB Survey	2012 JUB Survey	393.00	8.00	4580.27	4568.27	4558.75	12.00	0.024	0.70	5.75	0.51	0.62
MS215	2012 JUB Survey	2012 JUB Survey	MS246	2012 JUB Survey	2012 JUB Survey	540.00	8.00	4791.56	4780.66	4755.23	10.90	0.047	0.01	1.18	0.06	1.83
MS233	2012 JUB Survey	2012 JUB Survey	MS232	2012 JUB Survey	2012 JUB Survey	304.00	8.00	4755.94	4740.94	4733.42	15.00	0.025	0.01	1.44	0.06	1.33
MS232	2012 JUB Survey	2012 JUB Survey	MS231	2012 JUB Survey	2012 JUB Survey	407.00	8.00	4744.52	4733.42	4718.34	11.10	0.037	0.01	1.55	0.06	1.62
MS231	2012 JUB Survey	2012 JUB Survey	MS230	2012 JUB Survey	2012 JUB Survey	120.00	8.00	4729.94	4718.34	4717.25	11.60	0.009	0.02	1.38	0.10	0.79
MS230	2012 JUB Survey	2012 JUB Survey	MS229	2012 JUB Survey	2012 JUB Survey	229.00	8.00	4728.55	4717.25	4714.83	11.30	0.011	0.02	1.31	0.10	0.85
MS297A	2012 JUB Survey	2012 JUB Survey	MS297	2012 JUB Survey	2012 JUB Survey	177.00	8.00	4669.12	4659.42	4642.57	9.70	0.095	0.05	4.00	0.09	2.57
MS297B	2012 JUB Survey	2012 JUB Survey	MS297A	2012 JUB Survey	2012 JUB Survey	325.00	8.00	4689.34	4678.84	4659.42	10.50	0.060	0.04	3.89	0.10	2.03
MS297C	2012 JUB Survey	2012 JUB Survey	MS297B	2012 JUB Survey	2012 JUB Survey	350.00	8.00	4722.91	4713.81	4678.84	9.10	0.100	0.04	3.88	0.09	2.64
MS229	2012 JUB Survey	2012 JUB Survey	MS297C	2012 JUB Survey	2012 JUB Survey	91.00	8.00	4726.23	4714.83	4713.81	11.40	0.011	0.04	2.50	0.16	0.85
MS202	2012 JUB Survey	2012 JUB Survey	MS140	2012 JUB Survey	2012 JUB Survey	397.00	8.00	4610.58	4601.07	4599.05	9.51	0.005	0.01	0.70	0.09	0.60
MS203	2012 JUB Survey	2012 JUB Survey	MS202	2012 JUB Survey	2012 JUB Survey	401.00	8.00	4614.46	4603.16	4601.07	11.30	0.005	0.00	0.61	0.06	0.61
MS264	2012 JUB Survey	2012 JUB Survey	MS121	2012 JUB Survey	2012 JUB Survey	284.00	8.00	4696.89	4693.79	4693.19	3.10	0.002	0.02	0.96	0.18	0.37
MS227A	2012 JUB Survey	2012 JUB Survey	MS227	2012 JUB Survey	2012 JUB Survey	415.00	8.00	4643.80	4635.90	4632.29	7.90	0.009	0.05	1.55	0.18	0.74
MS297	2012 JUB Survey	2012 JUB Survey	MS227A	2012 JUB Survey	2012 JUB Survey	93.00	8.00	4650.97	4642.57	4635.90	8.40	0.072	0.05	2.66	0.10	2.22
MS1	2012 JUB Survey	2012 JUB Survey	WWTP	Straight Graded	Straight Graded	387.00	12.00	4480.80	4475.90	4475.05	4.90	0.002	1.25	2.90	0.99	-0.08
MS4	2012 JUB Survey	2012 JUB Survey	MS3	2012 JUB Survey	2012 JUB Survey	399.00	10.00	4496.33	4490.13	4479.10	6.20	0.028	0.45	2.49	0.29	2.09
MS5	2012 JUB Survey	2012 JUB Survey	MS4	2012 JUB Survey	2012 JUB Survey	398.00	10.00	4505.57	4499.07	4490.13	6.50	0.022	0.45	5.19	0.31	1.84
MS54	2012 JUB Survey	2012 JUB Survey	MS53	2012 JUB Survey	2012 JUB Survey	433.00	8.00	4587.15	4576.05	4559.51	11.10	0.038	0.35	5.62	0.31	1.31
MS6	2012 JUB Survey	2012 JUB Survey	MS5	2012 JUB Survey	2012 JUB Survey	423.00	10.00	4517.59	4507.69	4499.07	9.90	0.020	0.45	4.87	0.31	1.73
MS34	2012 JUB Survey	2012 JUB Survey	MS33	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4589.25	4578.55	4568.27	10.70	0.026	0.36	3.82	0.34	1.00

Upstream Manhole	US Rim Source	US Inv Source	Downstream Manhole	DS Rim Source	DS Inv Source	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
MS35	2012 JUB Survey	2012 JUB Survey	MS34	2012 JUB Survey	2012 JUB Survey	406.00	8.00	4604.93	4594.53	4578.55	10.40	0.039	0.35	5.38	0.31	1.33
MS36	2012 JUB Survey	2012 JUB Survey	MS35	2012 JUB Survey	2012 JUB Survey	394.00	8.00	4617.21	4609.11	4594.53	8.10	0.037	0.17	3.63	0.22	1.46
MS37	2012 JUB Survey	2012 JUB Survey	MS36	2012 JUB Survey	2012 JUB Survey	344.00	8.00	4626.94	4615.84	4609.11	11.10	0.020	0.17	3.69	0.25	1.02
MS140	2012 JUB Survey	2012 JUB Survey	MS139	2012 JUB Survey	2024 JUB Dip	302.00	8.00	4607.15	4599.05	4595.94	8.10	0.010	0.03	1.73	0.12	0.83
MS139	2012 JUB Survey	2024 JUB Dip	MS138	2012 JUB Survey	2012 JUB Survey	292.00	8.00	4604.64	4595.94	4589.88	8.70	0.021	0.04	2.32	0.12	1.18
MS138	2012 JUB Survey	2012 JUB Survey	MS137	2012 JUB Survey	2012 JUB Survey	318.00	8.00	4600.60	4589.88	4583.67	10.72	0.020	0.05	2.17	0.13	1.13
MH38	Richmond GIS Data	Richmond GIS Data	MS6	2012 JUB Survey	2012 JUB Survey	195.00	10.00	4523.51	4509.54	4507.69	13.97	0.009	0.46	3.72	0.39	1.03
MS137	2012 JUB Survey	2012 JUB Survey	MS136	2012 JUB Survey	2012 JUB Survey	345.00	8.00	4594.58	4583.67	4576.78	10.91	0.020	0.08	2.55	0.18	1.11
MS136	2012 JUB Survey	2012 JUB Survey	MS135	2012 JUB Survey	2024 JUB Dip	223.00	8.00	4588.38	4576.78	4574.00	11.60	0.012	0.10	2.13	0.22	0.84
MS135	2012 JUB Survey	2024 JUB Dip	MS134	2012 JUB Survey	2024 JUB Dip	294.00	8.00	4584.36	4574.00	4572.85	10.36	0.004	0.11	1.83	0.31	0.42
MS134	2012 JUB Survey	2024 JUB Dip	MS133	2012 JUB Survey	2012 JUB Survey	352.00	8.00	4581.81	4572.85	4571.29	8.96	0.004	0.11	1.14	0.30	0.45
MS133	2012 JUB Survey	2012 JUB Survey	MS132	2012 JUB Survey	2024 JUB Dip	357.00	8.00	4581.99	4571.29	4570.00	10.70	0.004	0.33	2.38	0.60	0.18
MS132	2012 JUB Survey	2024 JUB Dip	MS33	2012 JUB Survey	2012 JUB Survey	385.00	8.00	4580.92	4570.00	4568.27	10.92	0.004	0.34	2.66	0.57	0.23
MS124	2012 JUB Survey	2012 JUB Survey	MS125	2012 JUB Survey	2012 JUB Survey	270.00	8.00	4619.93	4613.33	4610.79	6.60	0.009	0.10	2.49	0.24	0.72
MS125	2012 JUB Survey	2012 JUB Survey	MS126	2012 JUB Survey	2012 JUB Survey	305.00	8.00	4618.59	4610.79	4602.23	7.80	0.028	0.11	2.89	0.19	1.31
MS126	2012 JUB Survey	2012 JUB Survey	MS127	2012 JUB Survey	2012 JUB Survey	383.00	8.00	4613.83	4602.23	4596.27	11.60	0.016	0.16	2.58	0.25	0.90
MS127	2012 JUB Survey	2012 JUB Survey	MS35	2012 JUB Survey	2012 JUB Survey	375.00	8.00	4607.27	4596.27	4594.53	11.00	0.005	0.17	2.24	0.37	0.41
MS18	2012 JUB Survey	2012 JUB Survey	MS3	2012 JUB Survey	2012 JUB Survey	412.00	10.00	4490.11	4481.31	4479.10	8.80	0.005	0.84	3.05	0.65	0.28
MS38	2012 JUB Survey	2012 JUB Survey	MS37	2012 JUB Survey	2012 JUB Survey	430.00	8.00	4637.86	4626.36	4615.84	11.50	0.024	0.14	3.51	0.22	1.18
MS39	2012 JUB Survey	2012 JUB Survey	MS38	2012 JUB Survey	2012 JUB Survey	360.00	8.00	4652.37	4643.07	4626.36	9.30	0.046	0.14	4.15	0.18	1.69
MS40	2012 JUB Survey	2012 JUB Survey	MS39	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4665.15	4656.75	4643.07	8.40	0.034	0.04	2.09	0.12	1.52
MS41	2012 JUB Survey	2012 JUB Survey	MS40	2012 JUB Survey	2012 JUB Survey	357.00	8.00	4680.12	4671.42	4656.75	8.70	0.041	0.04	2.82	0.10	1.68
MS42	2012 JUB Survey	2012 JUB Survey	MS41	2012 JUB Survey	2012 JUB Survey	398.00	8.00	4698.70	4691.30	4671.42	7.40	0.050	0.02	2.38	0.07	1.87
MH3	Richmond GIS Data	Richmond GIS Data	MS42	2012 JUB Survey	2012 JUB Survey	119.00	8.00	4711.60	4704.55	4691.30	7.05	0.111	0.02	2.83	0.06	2.81
MS43	2012 JUB Survey	2012 JUB Survey	MH3	Richmond GIS Data	Richmond GIS Data	246.00	8.00	4728.25	4719.94	4704.55	8.31	0.063	0.01	2.33	0.06	2.11
MS19	2012 JUB Survey	2012 JUB Survey	MS18	2012 JUB Survey	2012 JUB Survey	397.00	10.00	4495.48	4484.68	4481.31	10.80	0.008	0.84	3.81	0.55	0.57
MS104	2012 JUB Survey	2012 JUB Survey	MS105	2012 JUB Survey	2012 JUB Survey	196.00	8.00	4637.11	4627.71	4626.41	9.40	0.007	0.09	2.35	0.25	0.60
MS69	2012 JUB Survey	2012 JUB Survey	MS68	2012 JUB Survey	2012 JUB Survey	349.00	8.00	4620.36	4611.86	4609.74	8.50	0.006	0.23	2.58	0.40	0.43
MS20	2012 JUB Survey	2012 JUB Survey	MS19	2012 JUB Survey	2012 JUB Survey	407.00	10.00	4498.60	4488.70	4484.68	9.90	0.010	0.84	4.29	0.53	0.68
MS53	2012 JUB Survey	2012 JUB Survey	MS52	2012 JUB Survey	2012 JUB Survey	214.00	8.00	4568.41	4559.51	4552.30	8.90	0.034	0.44	5.75	0.36	1.11
MS52	2012 JUB Survey	2012 JUB Survey	MS51	2012 JUB Survey	2012 JUB Survey	319.00	8.00	4559.50	4552.30	4543.09	7.20	0.029	0.45	5.33	0.37	0.99
MS51	2012 JUB Survey	2012 JUB Survey	MS50	2012 JUB Survey	2012 JUB Survey	402.00	8.00	4549.89	4543.09	4534.13	6.80	0.022	0.45	5.07	0.42	0.82

J-U-B ENGINEERS, INC.
ENGINEERS SURVEYORS PLANNERS
City of Richmond - 2025 Sewer Master Plan Update
Appendix D - Existing Model Results

Upstream Manhole	US Rim Source	US Inv Source	Downstream Manhole	DS Rim Source	DS Inv Source	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
Dummy-Pepperidge1	<Null>	<Null>	Pepperidge	<Null>	<Null>	552.41	8.00	<Null>	4535.20	4533.00	#VALUE!	0.004	0.02	1.16	0.13	0.52
MS2	2012 JUB Survey	2012 JUB Survey	MS1	2012 JUB Survey	2012 JUB Survey	400.00	12.00	4483.67	4477.47	4475.90	6.20	0.004	1.46	2.92	1.29	0.10
MS21	2012 JUB Survey	2012 JUB Survey	MS20	2012 JUB Survey	2012 JUB Survey	382.00	10.00	4501.30	4490.60	4488.70	10.70	0.005	0.95	3.51	0.79	0.13
MS50	2012 JUB Survey	2012 JUB Survey	MS49	2012 JUB Survey	2012 JUB Survey	400.00	8.00	4543.43	4534.13	4525.47	9.30	0.022	0.50	5.18	0.45	0.75
MS49	2012 JUB Survey	2012 JUB Survey	MS206	2012 JUB Survey	2012 JUB Survey	28.00	8.00	4535.27	4525.47	4524.60	9.80	0.031	0.52	5.03	0.40	0.97
MS206	2012 JUB Survey	2012 JUB Survey	MS48	2012 JUB Survey	2012 JUB Survey	381.00	8.00	4534.70	4524.60	4516.52	10.10	0.021	0.52	6.28	0.52	0.71
MS58	2012 JUB Survey	2012 JUB Survey	MS57	2012 JUB Survey	2012 JUB Survey	391.00	8.00	4633.75	4623.15	4616.58	10.60	0.017	0.07	2.98	0.18	1.02
MS57	2012 JUB Survey	2012 JUB Survey	MS56	2012 JUB Survey	2012 JUB Survey	363.00	8.00	4626.98	4616.58	4604.34	10.40	0.034	0.08	3.26	0.15	1.48
MS56	2012 JUB Survey	2012 JUB Survey	MS55	2012 JUB Survey	2012 JUB Survey	400.00	8.00	4614.34	4604.34	4592.47	10.00	0.030	0.10	2.16	0.18	1.36
MS55	2012 JUB Survey	2012 JUB Survey	MS54	2012 JUB Survey	2012 JUB Survey	364.00	8.00	4595.27	4592.47	4576.05	2.80	0.045	0.43	6.29	0.33	1.37
MS64	2012 JUB Survey	2012 JUB Survey	MS63	2012 JUB Survey	2012 JUB Survey	372.00	8.00	4716.72	4702.52	4685.36	14.20	0.046	0.03	2.80	0.09	1.79
MS63	2012 JUB Survey	2012 JUB Survey	MS62	2012 JUB Survey	2012 JUB Survey	387.00	8.00	4694.66	4685.36	4669.36	9.30	0.041	0.03	2.58	0.10	1.69
MS22	2012 JUB Survey	2012 JUB Survey	MS21	2012 JUB Survey	2012 JUB Survey	302.00	10.00	4505.56	4496.46	4490.60	9.10	0.019	0.95	4.13	0.47	1.18
MS62	2012 JUB Survey	2012 JUB Survey	MS61	2012 JUB Survey	2012 JUB Survey	374.00	8.00	4680.46	4669.36	4657.57	11.10	0.032	0.05	2.78	0.12	1.46
MS61	2012 JUB Survey	2012 JUB Survey	MS60	2012 JUB Survey	2012 JUB Survey	391.00	8.00	4667.17	4657.57	4647.79	9.60	0.025	0.05	2.82	0.13	1.29
MS60	2012 JUB Survey	2012 JUB Survey	MS59	2012 JUB Survey	2012 JUB Survey	386.00	8.00	4656.09	4647.79	4635.88	8.30	0.031	0.06	3.12	0.13	1.43
MS59	2012 JUB Survey	2012 JUB Survey	MS58	2012 JUB Survey	2012 JUB Survey	419.00	8.00	4643.48	4635.88	4623.15	7.60	0.030	0.06	2.70	0.13	1.41
MS23	2012 JUB Survey	2012 JUB Survey	MS22	2012 JUB Survey	2012 JUB Survey	301.00	10.00	4510.43	4500.33	4496.46	10.10	0.013	0.95	5.20	0.56	0.79
MS89	2012 JUB Survey	2012 JUB Survey	MS71	2012 JUB Survey	2012 JUB Survey	300.00	8.00	4637.79	4630.59	4629.09	7.20	0.005	0.07	0.96	0.22	0.53
MS88	2012 JUB Survey	2012 JUB Survey	MS89	2012 JUB Survey	2012 JUB Survey	280.00	8.00	4636.66	4631.76	4630.59	4.90	0.004	0.07	1.64	0.24	0.48
MS66	2012 JUB Survey	2012 JUB Survey	MS65	2012 JUB Survey	2012 JUB Survey	375.00	8.00	4600.65	4595.85	4594.29	4.80	0.004	0.33	2.38	0.57	0.21
MS67	2012 JUB Survey	2012 JUB Survey	MS66	2012 JUB Survey	2012 JUB Survey	300.00	8.00	4618.07	4608.47	4595.85	9.60	0.042	0.33	3.57	0.30	1.41
MS68	2012 JUB Survey	2012 JUB Survey	MS67	2012 JUB Survey	2012 JUB Survey	231.00	8.00	4626.44	4609.74	4608.47	16.70	0.005	0.33	2.81	0.52	0.30
MS65	2012 JUB Survey	2012 JUB Survey	MS55	2012 JUB Survey	2012 JUB Survey	414.00	8.00	4598.99	4594.29	4592.47	4.70	0.004	0.34	3.14	0.63	0.22
MS73	2012 JUB Survey	2012 JUB Survey	MS72	2012 JUB Survey	2012 JUB Survey	358.00	8.00	4674.68	4659.98	4651.14	14.70	0.025	0.22	4.78	0.28	1.11
MS72	2012 JUB Survey	2012 JUB Survey	MS71	2012 JUB Survey	2012 JUB Survey	404.00	8.00	4660.64	4651.14	4629.09	9.50	0.055	0.23	3.20	0.22	1.75
MS24	2012 JUB Survey	2012 JUB Survey	MS23	2012 JUB Survey	2012 JUB Survey	399.00	10.00	4517.95	4509.45	4500.33	8.50	0.023	0.94	5.33	0.44	1.37
MS71	2012 JUB Survey	2012 JUB Survey	MS70	2012 JUB Survey	2012 JUB Survey	368.00	8.00	4646.49	4629.09	4626.81	17.40	0.006	0.31	2.86	0.48	0.36
MS70	2012 JUB Survey	2012 JUB Survey	MS69	2012 JUB Survey	2012 JUB Survey	398.00	8.00	4632.81	4626.81	4611.86	6.00	0.038	0.31	3.74	0.30	1.33
MS77	2012 JUB Survey	2012 JUB Survey	MS78	2012 JUB Survey	2012 JUB Survey	367.00	8.00	4677.13	4663.13	4661.68	14.00	0.004	0.21	2.10	0.43	0.33
MS78	2012 JUB Survey	2012 JUB Survey	MS73	2012 JUB Survey	2012 JUB Survey	402.00	8.00	4674.28	4661.68	4659.98	12.60	0.004	0.21	2.69	0.46	0.34
MS251	2012 JUB Survey	2012 JUB Survey	MS79	2012 JUB Survey	2012 JUB Survey	412.00	8.00	4728.60	4717.50	4690.75	11.10	0.065	0.20	6.09	0.21	1.96
MS79	2012 JUB Survey	2012 JUB Survey	MS77	2012 JUB Survey	2012 JUB Survey	349.00	8.00	4699.25	4690.75	4663.13	8.50	0.079	0.20	3.33	0.19	2.18
MS149	2012 JUB Survey	2012 JUB Survey	MS104	2012 JUB Survey	2012 JUB Survey	340.00	8.00	4649.25	4636.85	4627.71	12.40	0.027	0.08	2.39	0.16	1.31
MS25	2012 JUB Survey	2012 JUB Survey	MS24	2012 JUB Survey	2012 JUB Survey	404.00	10.00	4524.44	4515.14	4509.45	9.30	0.014	0.94	5.15	0.52	0.88
MS93	2012 JUB Survey	2012 JUB Survey	MS149	2012 JUB Survey	2012 JUB Survey	388.00	8.00	4662.43	4651.43	4636.85	11.00	0.038	0.08	3.42	0.15	1.56
MS150	2012 JUB Survey	2012 JUB Survey	MS93	2012 JUB Survey	2012 JUB Survey	361.00	8.00	4672.65	4662.25	4651.43	10.40	0.030	0.07	3.28	0.15	1.40
MS151	2012 JUB Survey	2012 JUB Survey	MS150	2012 JUB Survey	2012 JUB Survey	403.00	8.00	4686.18	4677.68	4662.25	8.50	0.038	0.06	3.20	0.13	1.60
MS152	2012 JUB Survey	2012 JUB Survey	MS151	2012 JUB Survey	2012 JUB Survey	395.00	8.00	4698.41	4688.81	4677.68	9.60	0.028	0.05	2.81	0.12	1.38
MS153	2012 JUB Survey	2012 JUB Survey	MS152	2012 JUB Survey	2012 JUB Survey	395.00	8.00	4722.33	4713.64	4688.81	8.69	0.063	0.04	2.70	0.09	2.09
MS201	2012 JUB Survey	2012 JUB Survey	MS25	2012 JUB Survey	2012 JUB Survey	117.00	8.00	4526.47	4517.37	4515.14	9.10	0.019	0.93	5.58	0.75	0.24
MS105	2012 JUB Survey	2012 JUB Survey	MS148	2012 JUB Survey	2012 JUB Survey	386.00	8.00	4635.01	4626.41	4618.62	8.60	0.020	0.09	2.86	0.19	1.11
MS148	2012 JUB Survey	2012 JUB Survey	MS124	2012 JUB Survey	2012 JUB Survey	406.00	8.00	4627.12	4618.62	4613.33	8.50	0.013	0.10	2.55	0.22	0.87
MS26	2012 JUB Survey	2012 JUB Survey	MS201	2012 JUB Survey	2012 JUB Survey	137.00	8.00	4529.48	4519.98	4517.37	9.50	0.019	0.87	5.22	0.64	0.30
MS112	2012 JUB Survey	2012 JUB Survey	MS111	2012 JUB Survey	2012 JUB Survey	408.00	8.00	4646.20	4634.80	4626.12	11.40	0.021	0.16	3.73	0.24	1.08
MS113	2012 JUB Survey	2012 JUB Survey	MS112	2012 JUB Survey	2012 JUB Survey	353.00	8.00	4656.78	4643.88	4634.80	12.90	0.026	0.15	3.74	0.22	1.21
MS114	2012 JUB Survey	2012 JUB Survey	MS113	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4674.54	4663.84	4643.88	10.70	0.050	0.14	4.18	0.18	1.76
MS115	2012 JUB Survey	2012 JUB Survey	MS114	2012 JUB Survey	2012 JUB Survey	309.00	8.00	4685.54	4673.74	4663.84	11.80	0.032	0.13	4.25	0.19	1.39

Upstream Manhole	US Rim Source	US Inv Source	Downstream Manhole	DS Rim Source	DS Inv Source	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
MS116	2012 JUB Survey	2012 JUB Survey	MS115	2012 JUB Survey	2012 JUB Survey	400.00	8.00	4691.44	4676.34	4673.74	15.10	0.007	0.12	2.68	0.31	0.56
MS117	2012 JUB Survey	2012 JUB Survey	MS116	2012 JUB Survey	2012 JUB Survey	234.00	8.00	4694.09	4682.19	4676.34	11.90	0.025	0.12	2.56	0.19	1.22
MS118	2012 JUB Survey	2012 JUB Survey	MS117	2012 JUB Survey	2012 JUB Survey	402.00	8.00	4703.23	4688.33	4682.19	14.90	0.015	0.10	3.04	0.21	0.94
MS27	2012 JUB Survey	2012 JUB Survey	MS26	2012 JUB Survey	2012 JUB Survey	299.00	8.00	4534.89	4525.29	4519.98	9.60	0.018	0.87	5.43	0.67	0.26
MS119	Interpolated	Interpolated	MS118	2012 JUB Survey	2012 JUB Survey	397.00	8.00	0.00	4690.24	4688.33	-4690.24	0.005	0.10	2.14	0.28	0.49
MS120	2012 JUB Survey	2012 JUB Survey	MS119	Interpolated	Interpolated	362.00	8.00	4703.29	4691.99	4690.24	11.30	0.005	0.08	1.69	0.25	0.51
MS121	2012 JUB Survey	2012 JUB Survey	MS120	2012 JUB Survey	2012 JUB Survey	276.00	8.00	4701.69	4693.19	4691.99	8.50	0.004	0.04	1.03	0.18	0.52
MS28	2012 JUB Survey	2012 JUB Survey	MS27	2012 JUB Survey	2012 JUB Survey	397.00	8.00	4541.25	4532.46	4525.29	8.79	0.018	0.86	5.41	0.66	0.27
MS111	2012 JUB Survey	2012 JUB Survey	MS163	2012 JUB Survey	2012 JUB Survey	425.00	8.00	4636.72	4626.12	4612.44	10.60	0.032	0.18	4.48	0.22	1.35
MS163	2012 JUB Survey	2012 JUB Survey	MS269	2012 JUB Survey	2012 JUB Survey	116.00	8.00	4622.94	4612.44	4607.20	10.50	0.045	0.18	4.88	0.21	1.62
MS269	2012 JUB Survey	2012 JUB Survey	MS162	2012 JUB Survey	2012 JUB Survey	285.00	8.00	4619.50	4607.20	4595.63	12.30	0.041	0.19	4.51	0.22	1.51
MS162	2012 JUB Survey	2012 JUB Survey	MS161	2012 JUB Survey	2012 JUB Survey	400.00	8.00	4607.83	4595.63	4583.53	12.20	0.030	0.22	4.64	0.25	1.25
MS161	2012 JUB Survey	2012 JUB Survey	MS133	2012 JUB Survey	2012 JUB Survey	379.00	8.00	4592.03	4583.53	4571.29	8.50	0.032	0.23	2.23	0.25	1.29
MS29	2012 JUB Survey	2012 JUB Survey	MS28	2012 JUB Survey	2012 JUB Survey	386.00	8.00	4549.41	4536.51	4532.46	12.90	0.010	0.86	4.32	0.84	0.01
MS3	2012 JUB Survey	2012 JUB Survey	MS2	2012 JUB Survey	2012 JUB Survey	402.00	12.00	4489.20	4479.10	4477.47	10.10	0.004	1.48	3.44	0.87	0.11
MS30	2012 JUB Survey	2012 JUB Survey	MS29	2012 JUB Survey	2012 JUB Survey	281.00	8.00	4552.80	4544.50	4536.51	8.30	0.028	0.80	4.86	0.54	0.63
MH37	Richmond GIS Data	Richmond GIS Data	MH38	Richmond GIS Data	Richmond GIS Data	257.00	15.00	4520.90	4510.18	4509.54	10.72	0.002	0.55	2.51	0.35	1.71
MH36	Richmond GIS Data	Richmond GIS Data	MH37	Richmond GIS Data	Richmond GIS Data	382.00	15.00	4518.38	4510.85	4510.18	7.53	0.002	0.55	2.11	0.38	1.35
MH35	Richmond GIS Data	Richmond GIS Data	MH36	Richmond GIS Data	Richmond GIS Data	228.00	15.00	4524.21	4511.31	4510.85	12.90	0.002	0.54	2.06	0.35	1.50
MH34	Richmond GIS Data	Richmond GIS Data	MH35	Richmond GIS Data	Richmond GIS Data	237.00	12.00	4520.05	4512.25	4511.31	7.80	0.004	0.52	2.60	0.40	1.05
MH33	Richmond GIS Data	Richmond GIS Data	MH34	Richmond GIS Data	Richmond GIS Data	268.00	12.00	4517.09	4513.01	4512.25	4.08	0.003	0.52	2.56	0.45	0.81
MH32	Richmond GIS Data	Richmond GIS Data	MH33	Richmond GIS Data	Richmond GIS Data	424.00	12.00	4525.14	4514.21	4513.01	10.93	0.003	0.52	2.42	0.44	0.81
MS48	2012 JUB Survey	2012 JUB Survey	MH32	Richmond GIS Data	Richmond GIS Data	15.00	8.00	4525.22	4516.52	4514.21	8.70	0.154	0.52	5.16	0.27	2.80
MS263	Interpolated	Interpolated	MS69	2012 JUB Survey	2012 JUB Survey	261.00	8.00	0.00	4612.83	4611.86	-4612.83	0.004	0.01	0.30	0.10	0.50
MS227	2012 JUB Survey	2012 JUB Survey	MS88	2012 JUB Survey	2012 JUB Survey	162.00	8.00	4637.79	4632.29	4631.76	5.50	0.003	0.06	1.47	0.24	0.42
MH1	Interpolated	Interpolated	MS30	2012 JUB Survey	2012 JUB Survey	269.00	8.00	4565.04	4551.63	4544.50	13.41	0.027	0.79	6.28	0.55	0.59
MS31	2012 JUB Survey	2012 JUB Survey	MH1	Interpolated	Interpolated	30.00	8.00	4561.32	4552.42	4551.63	8.90	0.026	0.78	5.31	0.67	0.59
MS32	2012 JUB Survey	2012 JUB Survey	MS31	2012 JUB Survey	2012 JUB Survey	299.00	8.00	4568.25	4558.75	4552.42	9.50	0.021	0.78	5.21	0.57	0.46
MS250A	Interpolated	Interpolated	MS251	2012 JUB Survey	2012 JUB Survey	295.00	8.00	0.00	4723.22	4717.50	-4723.22	0.019	0.19	4.35	0.30	0.99
MS250	2012 JUB Survey	2012 JUB Survey	MS250A	Interpolated	Interpolated	107.00	8.00	4735.63	4725.33	4723.22	10.30	0.020	0.16	3.20	0.24	1.03
MS249	2012 JUB Survey	2012 JUB Survey	MS250	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4742.23	4731.03	4725.33	11.20	0.014	0.15	3.34	0.27	0.86
MS216	2012 JUB Survey	2012 JUB Survey	MS249	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4757.78	4748.08	4731.03	9.70	0.043	0.15	3.74	0.19	1.60
MS246	2012 JUB Survey	2012 JUB Survey	MS216	2012 JUB Survey	2012 JUB Survey	237.00	8.00	4769.33	4755.23	4748.08	14.10	0.030	0.15	4.15	0.21	1.33
MS33	2012 JUB Survey	2012 JUB Survey	MS32	2012 JUB Survey	2012 JUB Survey	393.00	8.00	4580.27	4568.27	4558.75	12.00	0.024	0.77	5.89	0.55	0.55
MS215	2012 JUB Survey	2012 JUB Survey	MS246	2012 JUB Survey	2012 JUB Survey	540.00	8.00	4791.56	4780.66	4755.23	10.90	0.047	0.03	1.39	0.09	1.81
MS233	2012 JUB Survey	2012 JUB Survey	MS232	2012 JUB Survey	2012 JUB Survey	304.00	8.00	4755.94	4740.94	4733.42	15.00	0.025	0.01	1.44	0.06	1.33
MS232	2012 JUB Survey	2012 JUB Survey	MS231	2012 JUB Survey	2012 JUB Survey	407.00	8.00	4744.52	4733.42	4718.34	11.10	0.037	0.01	1.55	0.06	1.62
MS231	2012 JUB Survey	2012 JUB Survey	MS230	2012 JUB Survey	2012 JUB Survey	120.00	8.00	4729.94	4718.34	4717.25	11.60	0.009	0.02	1.38	0.10	0.79
MS230	2012 JUB Survey	2012 JUB Survey	MS229	2012 JUB Survey	2012 JUB Survey	229.00	8.00	4728.55	4717.25	4714.83	11.30	0.011	0.02	1.26	0.10	0.85
MS297A	2012 JUB Survey	2012 JUB Survey	MS297	2012 JUB Survey	2012 JUB Survey	177.00	8.00	4669.12	4659.42	4642.57	9.70	0.095	0.05	4.05	0.09	2.57
MS297B	2012 JUB Survey	2012 JUB Survey	MS297A	2012 JUB Survey	2012 JUB Survey	325.00	8.00	4689.34	4678.84	4659.42	10.50	0.060	0.05	3.94	0.10	2.03
MS297C	2012 JUB Survey	2012 JUB Survey	MS297B	2012 JUB Survey	2012 JUB Survey	350.00	8.00	4722.91	4713.81	4678.84	9.10	0.100	0.04	3.93	0.09	2.63
MS229	2012 JUB Survey	2012 JUB Survey	MS297C	2012 JUB Survey	2012 JUB Survey	91.00	8.00	4726.23	4714.83	4713.81	11.40	0.011	0.04	2.52	0.16	0.85
MS202	2012 JUB Survey	2012 JUB Survey	MS140	2012 JUB Survey	2012 JUB Survey	397.00	8.00	4610.58	4601.07	4599.05	9.51	0.005	0.07	1.77	0.22	0.54
MS203	2012 JUB Survey	2012 JUB Survey	MS202	2012 JUB Survey	2012 JUB Survey	401.00	8.00	4614.46	4603.16	4601.07	11.30	0.005	0.07	1.77	0.22	0.55
MS264	2012 JUB Survey	2012 JUB Survey	MS121	2012 JUB Survey	2012 JUB Survey	284.00	8.00	4696.89	4693.79	4693.19	3.10	0.002	0.03	1.04	0.19	0.36
MS227A	2012 JUB Survey	2012 JUB Survey	MS227	2012 JUB Survey	2012 JUB Survey	415.00	8.00	4643.80	4635.90	4632.29	7.90	0.009	0.05	1.56	0.18	0.74
MS297	2012 JUB Survey	2012 JUB Survey	MS227A	2012 JUB Survey	2012 JUB Survey	93.00	8.00	4650.97	4642.57	4635.90	8.40	0.072	0.05	2.69	0.10	2.22
MS1	2012 JUB Survey	2012 JUB Survey	WWTP	Straight Graded	Straight Graded	387.00	12.00	4480.80	4475.90	4475.05	4.90	0.002	1.46	3.27	1.37	-0.29
MS4	2012 JUB Survey	2012 JUB Survey	MS3	2012 JUB Survey	2012 JUB Survey	399.00	10.00	4496.33	4490.13	4479.10	6.20	0.028	0.54	2.84	0.31	2.00
MS5	2012 JUB Survey	2012 JUB Survey	MS4	2012 JUB Survey	2012 JUB Survey	398.00	10.00	4505.57	4499.07	4490.13	6.50	0.022	0.54	5.45	0.34	1.75
MS54	2012 JUB Survey	2012 JUB Survey	MS53	2012 JUB Survey	2012 JUB Survey	433.00	8.00	4587.15	4576.05	4559.51	11.10	0.038	0.45	6.03	0.36	1.21
MS6	2012 JUB Survey	2012 JUB Survey	MS5	2012 JUB Survey	2012 JUB Survey	423.00	10.00	4517.59	4507.69	4499.07	9.90	0.020	0.54	5.12	0.35	1.64

Upstream Manhole	US Rim Source	US Inv Source	Downstream Manhole	DS Rim Source	DS Inv Source	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
MS34	2012 JUB Survey	2012 JUB Survey	MS33	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4589.25	4578.55	4568.27	10.70	0.026	0.38	3.79	0.36	0.98
MS35	2012 JUB Survey	2012 JUB Survey	MS34	2012 JUB Survey	2012 JUB Survey	406.00	8.00	4604.93	4594.53	4578.55	10.40	0.039	0.37	5.47	0.31	1.31
MS36	2012 JUB Survey	2012 JUB Survey	MS35	2012 JUB Survey	2012 JUB Survey	394.00	8.00	4617.21	4609.11	4594.53	8.10	0.037	0.18	3.68	0.22	1.45
MS37	2012 JUB Survey	2012 JUB Survey	MS36	2012 JUB Survey	2012 JUB Survey	344.00	8.00	4626.94	4615.84	4609.11	11.10	0.020	0.18	3.74	0.25	1.01
MS140	2012 JUB Survey	2012 JUB Survey	MS139	2012 JUB Survey	2024 JUB Dip	302.00	8.00	4607.15	4599.05	4595.94	8.10	0.010	0.07	2.35	0.19	0.79
MS139	2012 JUB Survey	2024 JUB Dip	MS138	2012 JUB Survey	2012 JUB Survey	292.00	8.00	4604.64	4595.94	4589.88	8.70	0.021	0.09	3.07	0.18	1.13
MS138	2012 JUB Survey	2012 JUB Survey	MS137	2012 JUB Survey	2012 JUB Survey	318.00	8.00	4600.60	4589.88	4583.67	10.72	0.020	0.10	3.05	0.19	1.09
MH38	Richmond GIS Data	Richmond GIS Data	MS6	2012 JUB Survey	2012 JUB Survey	195.00	10.00	4523.51	4509.54	4507.69	13.97	0.009	0.55	3.90	0.42	0.95
MS137	2012 JUB Survey	2012 JUB Survey	MS136	2012 JUB Survey	2012 JUB Survey	345.00	8.00	4594.58	4583.67	4576.78	10.91	0.020	0.12	3.02	0.21	1.08
MS136	2012 JUB Survey	2012 JUB Survey	MS135	2012 JUB Survey	2024 JUB Dip	223.00	8.00	4588.38	4576.78	4574.00	11.60	0.012	0.14	2.31	0.25	0.81
MS135	2012 JUB Survey	2024 JUB Dip	MS134	2012 JUB Survey	2024 JUB Dip	294.00	8.00	4584.36	4574.00	4572.85	10.36	0.004	0.14	1.98	0.36	0.39
MS134	2012 JUB Survey	2024 JUB Dip	MS133	2012 JUB Survey	2012 JUB Survey	352.00	8.00	4581.81	4572.85	4571.29	8.96	0.004	0.15	1.39	0.34	0.42
MS133	2012 JUB Survey	2012 JUB Survey	MS132	2012 JUB Survey	2024 JUB Dip	357.00	8.00	4581.99	4571.29	4570.00	10.70	0.004	0.38	2.45	0.67	0.12
MS132	2012 JUB Survey	2024 JUB Dip	MS33	2012 JUB Survey	2012 JUB Survey	385.00	8.00	4580.92	4570.00	4568.27	10.92	0.004	0.39	2.78	0.64	0.18
MS124	2012 JUB Survey	2012 JUB Survey	MS125	2012 JUB Survey	2012 JUB Survey	270.00	8.00	4619.93	4613.33	4610.79	6.60	0.009	0.11	2.49	0.24	0.72
MS125	2012 JUB Survey	2012 JUB Survey	MS126	2012 JUB Survey	2012 JUB Survey	305.00	8.00	4618.59	4610.79	4602.23	7.80	0.028	0.11	2.82	0.19	1.31
MS126	2012 JUB Survey	2012 JUB Survey	MS127	2012 JUB Survey	2012 JUB Survey	383.00	8.00	4613.83	4602.23	4596.27	11.60	0.016	0.17	2.63	0.27	0.89
MS127	2012 JUB Survey	2012 JUB Survey	MS35	2012 JUB Survey	2012 JUB Survey	375.00	8.00	4607.27	4596.27	4594.53	11.00	0.005	0.18	2.28	0.39	0.40
MS18	2012 JUB Survey	2012 JUB Survey	MS3	2012 JUB Survey	2012 JUB Survey	412.00	10.00	4490.11	4481.31	4479.10	8.80	0.005	0.96	3.12	0.71	0.16
MS38	2012 JUB Survey	2012 JUB Survey	MS37	2012 JUB Survey	2012 JUB Survey	430.00	8.00	4637.86	4626.36	4615.84	11.50	0.024	0.15	3.58	0.22	1.17
MS39	2012 JUB Survey	2012 JUB Survey	MS38	2012 JUB Survey	2012 JUB Survey	360.00	8.00	4652.37	4643.07	4626.36	9.30	0.046	0.15	4.24	0.19	1.68
MS40	2012 JUB Survey	2012 JUB Survey	MS39	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4665.15	4656.75	4643.07	8.40	0.034	0.05	2.35	0.12	1.52
MS41	2012 JUB Survey	2012 JUB Survey	MS40	2012 JUB Survey	2012 JUB Survey	357.00	8.00	4680.12	4671.42	4656.75	8.70	0.041	0.05	3.06	0.12	1.67
MS42	2012 JUB Survey	2012 JUB Survey	MS41	2012 JUB Survey	2012 JUB Survey	398.00	8.00	4698.70	4691.30	4671.42	7.40	0.050	0.03	2.74	0.09	1.86
MH3	Richmond GIS Data	Richmond GIS Data	MS42	2012 JUB Survey	2012 JUB Survey	119.00	8.00	4711.60	4704.55	4691.30	7.05	0.111	0.03	3.30	0.07	2.80
MS43	2012 JUB Survey	2012 JUB Survey	MH3	Richmond GIS Data	Richmond GIS Data	246.00	8.00	4728.25	4719.94	4704.55	8.31	0.063	0.02	3.00	0.07	2.10
MS19	2012 JUB Survey	2012 JUB Survey	MS18	2012 JUB Survey	2012 JUB Survey	397.00	10.00	4495.48	4484.68	4481.31	10.80	0.008	0.96	3.91	0.60	0.45
MS104	2012 JUB Survey	2012 JUB Survey	MS105	2012 JUB Survey	2012 JUB Survey	196.00	8.00	4637.11	4627.71	4626.41	9.40	0.007	0.09	2.35	0.25	0.60
MS69	2012 JUB Survey	2012 JUB Survey	MS68	2012 JUB Survey	2012 JUB Survey	349.00	8.00	4620.36	4611.86	4609.74	8.50	0.006	0.33	2.80	0.49	0.33
MS20	2012 JUB Survey	2012 JUB Survey	MS19	2012 JUB Survey	2012 JUB Survey	407.00	10.00	4498.60	4488.70	4484.68	9.90	0.010	0.96	4.42	0.58	0.56
MS53	2012 JUB Survey	2012 JUB Survey	MS52	2012 JUB Survey	2012 JUB Survey	214.00	8.00	4568.41	4559.51	4552.30	8.90	0.034	0.49	5.91	0.39	1.07
MS52	2012 JUB Survey	2012 JUB Survey	MS51	2012 JUB Survey	2012 JUB Survey	319.00	8.00	4559.50	4552.30	4543.09	7.20	0.029	0.49	5.51	0.40	0.95
MS51	2012 JUB Survey	2012 JUB Survey	MS50	2012 JUB Survey	2012 JUB Survey	402.00	8.00	4549.89	4543.09	4534.13	6.80	0.022	0.49	5.18	0.43	0.77

J-U-B ENGINEERS, INC.

J-U-B ENGINEERS, INC.

ENGINEERS SURVEYORS PLANNERS

City of Richmond - 2025 Sewer Master Plan Update

Appendix D - Existing Model Results

Upstream Manhole	US Rim Source	US Inv Source	Downstream Manhole	DS Rim Source	DS Inv Source	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
Dummy-Pepperidge2	<Null>	<Null>	Pepperidge	<Null>	<Null>	552.41	8.00	<Null>	4535.200	4533.00	#VALUE!	0.004	0.02	1.16	0.130	0.52
MS2	2012 JUB Survey	2012 JUB Survey	MS1	2012 JUB Survey	2012 JUB Survey	400.00	8.00	4483.67	4477.470	4475.90	6.20	0.004	1.67	3.30	2.150	-0.11
MS21	2012 JUB Survey	2012 JUB Survey	MS20	2012 JUB Survey	2012 JUB Survey	382.00	10.00	4501.30	4490.600	4488.70	10.70	0.005	1.03	3.54	0.860	0.05
MS50	2012 JUB Survey	2012 JUB Survey	MS49	2012 JUB Survey	2012 JUB Survey	400.00	10.00	4543.43	4534.130	4525.47	9.30	0.022	0.61	5.46	0.490	0.63
MS49	2012 JUB Survey	2012 JUB Survey	MS206	2012 JUB Survey	2012 JUB Survey	28.00	10.00	4535.27	4525.470	4524.60	9.80	0.031	0.63	5.29	0.450	0.85
MS206	2012 JUB Survey	2012 JUB Survey	MS48	2012 JUB Survey	2012 JUB Survey	381.00	12.00	4534.70	4524.600	4516.52	10.10	0.021	0.63	6.55	0.600	0.60
MS58	2012 JUB Survey	2012 JUB Survey	MS57	2012 JUB Survey	2012 JUB Survey	391.00	10.00	4633.75	4623.150	4616.58	10.60	0.017	0.07	2.98	0.180	1.02
MS57	2012 JUB Survey	2012 JUB Survey	MS56	2012 JUB Survey	2012 JUB Survey	363.00	10.00	4626.98	4616.580	4604.34	10.40	0.034	0.08	3.26	0.150	1.48
MS56	2012 JUB Survey	2012 JUB Survey	MS55	2012 JUB Survey	2012 JUB Survey	400.00	10.00	4614.34	4604.340	4592.47	10.00	0.030	0.10	2.14	0.180	1.36
MS55	2012 JUB Survey	2012 JUB Survey	MS54	2012 JUB Survey	2012 JUB Survey	364.00	10.00	4595.27	4592.470	4576.05	2.80	0.045	0.44	6.31	0.330	1.36
MS64	2012 JUB Survey	2012 JUB Survey	MS63	2012 JUB Survey	2012 JUB Survey	372.00	8.00	4716.72	4702.520	4685.36	14.20	0.046	0.03	2.80	0.090	1.79
MS63	2012 JUB Survey	2012 JUB Survey	MS62	2012 JUB Survey	2012 JUB Survey	387.00	8.00	4694.66	4685.360	4669.36	9.30	0.041	0.03	2.58	0.100	1.69
MS22	2012 JUB Survey	2012 JUB Survey	MS21	2012 JUB Survey	2012 JUB Survey	302.00	8.00	4505.56	4496.460	4490.60	9.10	0.019	1.03	4.16	0.490	1.11
MS62	2012 JUB Survey	2012 JUB Survey	MS61	2012 JUB Survey	2012 JUB Survey	374.00	8.00	4680.46	4669.360	4657.57	11.10	0.032	0.05	2.78	0.120	1.46
MS61	2012 JUB Survey	2012 JUB Survey	MS60	2012 JUB Survey	2012 JUB Survey	391.00	8.00	4667.17	4657.570	4647.79	9.60	0.025	0.05	2.82	0.130	1.29
MS60	2012 JUB Survey	2012 JUB Survey	MS59	2012 JUB Survey	2012 JUB Survey	386.00	8.00	4656.09	4647.790	4635.88	8.30	0.031	0.06	3.12	0.130	1.43
MS59	2012 JUB Survey	2012 JUB Survey	MS58	2012 JUB Survey	2012 JUB Survey	419.00	8.00	4643.48	4635.880	4623.15	7.60	0.030	0.06	2.70	0.130	1.41
MS23	2012 JUB Survey	2012 JUB Survey	MS22	2012 JUB Survey	2012 JUB Survey	301.00	8.00	4510.43	4500.330	4496.46	10.10	0.013	1.03	5.29	0.590	0.71
MS89	2012 JUB Survey	2012 JUB Survey	MS71	2012 JUB Survey	2012 JUB Survey	300.00	8.00	4637.79	4630.590	4629.09	7.20	0.005	0.07	0.95	0.220	0.53
MS88	2012 JUB Survey	2012 JUB Survey	MS89	2012 JUB Survey	2012 JUB Survey	280.00	8.00	4636.66	4631.760	4630.59	4.90	0.004	0.07	1.64	0.240	0.48
MS66	2012 JUB Survey	2012 JUB Survey	MS65	2012 JUB Survey	2012 JUB Survey	375.00	8.00	4600.65	4595.850	4594.29	4.80	0.004	0.34	2.39	0.570	0.21
MS67	2012 JUB Survey	2012 JUB Survey	MS66	2012 JUB Survey	2012 JUB Survey	300.00	8.00	4618.07	4608.470	4595.85	9.60	0.042	0.34	3.59	0.300	1.40
MS68	2012 JUB Survey	2012 JUB Survey	MS67	2012 JUB Survey	2012 JUB Survey	231.00	8.00	4626.44	4609.740	4608.47	16.70	0.005	0.34	2.82	0.540	0.29
MS65	2012 JUB Survey	2012 JUB Survey	MS55	2012 JUB Survey	2012 JUB Survey	414.00	8.00	4598.99	4594.290	4592.47	4.70	0.004	0.34	3.15	0.640	0.22
MS73	2012 JUB Survey	2012 JUB Survey	MS72	2012 JUB Survey	2012 JUB Survey	358.00	8.00	4674.68	4659.980	4651.14	14.70	0.025	0.23	4.82	0.300	1.10
MS72	2012 JUB Survey	2012 JUB Survey	MS71	2012 JUB Survey	2012 JUB Survey	404.00	8.00	4660.64	4651.140	4629.09	9.50	0.055	0.23	3.25	0.220	1.74
MS24	2012 JUB Survey	2012 JUB Survey	MS23	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4517.95	4509.450	4500.33	8.50	0.023	1.02	5.43	0.470	1.30
MS71	2012 JUB Survey	2012 JUB Survey	MS70	2012 JUB Survey	2012 JUB Survey	368.00	8.00	4646.49	4629.090	4626.81	17.40	0.006	0.31	2.88	0.490	0.35
MS70	2012 JUB Survey	2012 JUB Survey	MS69	2012 JUB Survey	2012 JUB Survey	398.00	8.00	4632.81	4626.810	4611.86	6.00	0.038	0.32	3.76	0.300	1.33
MS77	2012 JUB Survey	2012 JUB Survey	MS78	2012 JUB Survey	2012 JUB Survey	367.00	8.00	4677.13	4663.130	4661.68	14.00	0.004	0.21	2.12	0.430	0.32
MS78	2012 JUB Survey	2012 JUB Survey	MS73	2012 JUB Survey	2012 JUB Survey	402.00	8.00	4674.28	4661.680	4659.98	12.60	0.004	0.22	2.71	0.480	0.33
MS251	2012 JUB Survey	2012 JUB Survey	MS79	2012 JUB Survey	2012 JUB Survey	412.00	8.00	4728.60	4717.500	4690.75	11.10	0.065	0.21	6.14	0.210	1.95
MS79	2012 JUB Survey	2012 JUB Survey	MS77	2012 JUB Survey	2012 JUB Survey	349.00	8.00	4699.25	4690.750	4663.13	8.50	0.079	0.21	3.35	0.190	2.17
MS149	2012 JUB Survey	2012 JUB Survey	MS104	2012 JUB Survey	2012 JUB Survey	340.00	8.00	4649.25	4636.850	4627.71	12.40	0.027	0.08	2.40	0.160	1.30
MS25	2012 JUB Survey	2012 JUB Survey	MS24	2012 JUB Survey	2012 JUB Survey	404.00	10.00	4524.44	4515.140	4509.45	9.30	0.014	1.02	5.24	0.540	0.80
MS93	2012 JUB Survey	2012 JUB Survey	MS149	2012 JUB Survey	2012 JUB Survey	388.00	10.00	4662.43	4651.430	4636.85	11.00	0.038	0.08	3.44	0.150	1.56
MS150	2012 JUB Survey	2012 JUB Survey	MS93	2012 JUB Survey	2012 JUB Survey	361.00	10.00	4672.65	4662.250	4651.43	10.40	0.030	0.07	3.30	0.150	1.40
MS151	2012 JUB Survey	2012 JUB Survey	MS150	2012 JUB Survey	2012 JUB Survey	403.00	10.00	4686.18	4677.680	4662.25	8.50	0.038	0.06	3.22	0.130	1.60
MS152	2012 JUB Survey	2012 JUB Survey	MS151	2012 JUB Survey	2012 JUB Survey	395.00	10.00	4698.41	4688.810	4677.68	9.60	0.028	0.05	2.83	0.120	1.37
MS153	2012 JUB Survey	2012 JUB Survey	MS152	2012 JUB Survey	2012 JUB Survey	395.00	10.00	4722.33	4713.640	4688.81	8.69	0.063	0.04	2.74	0.090	2.09
MS201	2012 JUB Survey	2012 JUB Survey	MS25	2012 JUB Survey	2012 JUB Survey	117.00	10.00	4526.47	4517.370	4515.14	9.10	0.019	1.01	5.63	0.810	0.16
MS105	2012 JUB Survey	2012 JUB Survey	MS148	2012 JUB Survey	2012 JUB Survey	386.00	8.00	4635.01	4626.410	4618.62	8.60	0.020	0.10	2.87	0.190	1.11
MS148	2012 JUB Survey	2012 JUB Survey	MS124	2012 JUB Survey	2012 JUB Survey	406.00	8.00	4627.12	4618.620	4613.33	8.50	0.013	0.10	2.56	0.220	0.87
MS26	2012 JUB Survey	2012 JUB Survey	MS201	2012 JUB Survey	2012 JUB Survey	137.00	8.00	4529.48	4519.980	4517.37	9.50	0.019	0.95	5.27	0.690	0.22
MS112	2012 JUB Survey	2012 JUB Survey	MS111	2012 JUB Survey	2012 JUB Survey	408.00	8.00	4646.20	4634.800	4626.12	11.40	0.021	0.20	4.00	0.270	1.04
MS113	2012 JUB Survey	2012 JUB Survey	MS112	2012 JUB Survey	2012 JUB Survey	353.00	8.00	4656.78	4643.880	4634.80	12.90	0.026	0.19	4.04	0.250	1.17
MS114	2012 JUB Survey	2012 JUB Survey	MS113	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4674.54	4663.840	4643.88	10.70	0.050	0.18	4.55	0.210	1.72
MS115	2012 JUB Survey	2012 JUB Survey	MS114	2012 JUB Survey	2012 JUB Survey	309.00	8.00	4685.54	4673.740	4663.84	11.80	0.032	0.17	4.64	0.240	1.34

Upstream Manhole	US Rim Source	US Inv Source	Downstream Manhole	DS Rim Source	DS Inv Source	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
MS116	2012 JUB Survey	2012 JUB Survey	MS115	2012 JUB Survey	2012 JUB Survey	400.00	12.00	4691.44	4676.340	4673.74	15.10	0.007	0.16	2.92	0.360	0.52
MS117	2012 JUB Survey	2012 JUB Survey	MS116	2012 JUB Survey	2012 JUB Survey	234.00	12.00	4694.09	4682.190	4676.34	11.90	0.025	0.16	2.81	0.220	1.18
MS118	2012 JUB Survey	2012 JUB Survey	MS117	2012 JUB Survey	2012 JUB Survey	402.00	15.00	4703.23	4688.330	4682.19	14.90	0.015	0.15	3.39	0.250	0.90
MS27	2012 JUB Survey	2012 JUB Survey	MS26	2012 JUB Survey	2012 JUB Survey	299.00	15.00	4534.89	4525.290	4519.98	9.60	0.018	0.94	5.51	0.720	0.18
MS119	Interpolated	Interpolated	MS118	2012 JUB Survey	2012 JUB Survey	397.00	15.00	0.00	4690.240	4688.33	-4690.24	0.005	0.14	2.38	0.340	0.45
MS120	2012 JUB Survey	2012 JUB Survey	MS119	Interpolated	Interpolated	362.00	15.00	4703.29	4691.990	4690.24	11.30	0.005	0.13	1.92	0.310	0.46
MS121	2012 JUB Survey	2012 JUB Survey	MS120	2012 JUB Survey	2012 JUB Survey	276.00	15.00	4701.69	4693.190	4691.99	8.50	0.004	0.05	1.07	0.190	0.51
MS28	2012 JUB Survey	2012 JUB Survey	MS27	2012 JUB Survey	2012 JUB Survey	397.00	15.00	4541.25	4532.460	4525.29	8.79	0.018	0.94	5.52	0.700	0.20
MS111	2012 JUB Survey	2012 JUB Survey	MS163	2012 JUB Survey	2012 JUB Survey	425.00	15.00	4636.72	4626.120	4612.44	10.60	0.032	0.22	4.76	0.250	1.30
MS163	2012 JUB Survey	2012 JUB Survey	MS269	2012 JUB Survey	2012 JUB Survey	116.00	8.00	4622.94	4612.440	4607.20	10.50	0.045	0.22	5.22	0.240	1.58
MS269	2012 JUB Survey	2012 JUB Survey	MS162	2012 JUB Survey	2012 JUB Survey	285.00	12.00	4619.50	4607.200	4595.63	12.30	0.041	0.24	4.81	0.250	1.47
MS162	2012 JUB Survey	2012 JUB Survey	MS161	2012 JUB Survey	2012 JUB Survey	400.00	10.00	4607.83	4595.630	4583.53	12.20	0.030	0.26	4.90	0.280	1.21
MS161	2012 JUB Survey	2012 JUB Survey	MS133	2012 JUB Survey	2012 JUB Survey	379.00	8.00	4592.03	4583.530	4571.29	8.50	0.032	0.27	2.39	0.280	1.25
MS29	2012 JUB Survey	2012 JUB Survey	MS28	2012 JUB Survey	2012 JUB Survey	386.00	8.00	4549.41	4536.510	4532.46	12.90	0.010	0.94	4.32	2.010	-0.07
MS3	2012 JUB Survey	2012 JUB Survey	MS2	2012 JUB Survey	2012 JUB Survey	402.00	8.00	4489.20	4479.100	4477.47	10.10	0.004	1.67	3.46	2.430	-0.08
MS30	2012 JUB Survey	2012 JUB Survey	MS29	2012 JUB Survey	2012 JUB Survey	281.00	8.00	4552.80	4544.500	4536.51	8.30	0.028	0.86	4.82	0.550	0.57
MH37	Richmond GIS Data	Richmond GIS Data	MH38	Richmond GIS Data	Richmond GIS Data	257.00	8.00	4520.90	4510.180	4509.54	10.72	0.002	0.69	2.68	0.390	1.57
MH36	Richmond GIS Data	Richmond GIS Data	MH37	Richmond GIS Data	Richmond GIS Data	382.00	8.00	4518.38	4510.850	4510.18	7.53	0.002	0.69	2.25	0.420	1.21
MH35	Richmond GIS Data	Richmond GIS Data	MH36	Richmond GIS Data	Richmond GIS Data	228.00	8.00	4524.21	4511.310	4510.85	12.90	0.002	0.66	2.17	0.390	1.37
MH34	Richmond GIS Data	Richmond GIS Data	MH35	Richmond GIS Data	Richmond GIS Data	237.00	8.00	4520.05	4512.250	4511.31	7.80	0.004	0.64	2.75	0.440	0.94
MH33	Richmond GIS Data	Richmond GIS Data	MH34	Richmond GIS Data	Richmond GIS Data	268.00	8.00	4517.09	4513.010	4512.25	4.08	0.003	0.63	2.69	0.500	0.69
MH32	Richmond GIS Data	Richmond GIS Data	MH33	Richmond GIS Data	Richmond GIS Data	424.00	10.00	4525.14	4514.210	4513.01	10.93	0.003	0.63	2.56	0.490	0.69
MS48	2012 JUB Survey	2012 JUB Survey	MH32	Richmond GIS Data	Richmond GIS Data	15.00	8.00	4525.22	4516.520	4514.21	8.70	0.154	0.63	5.51	0.300	2.69
MS263	Interpolated	Interpolated	MS69	2012 JUB Survey	2012 JUB Survey	261.00	8.00	0.00	4612.830	4611.86	-4612.83	0.004	0.01	0.29	0.100	0.50
MS227	2012 JUB Survey	2012 JUB Survey	MS88	2012 JUB Survey	2012 JUB Survey	162.00	8.00	4637.79	4632.290	4631.76	5.50	0.003	0.06	1.47	0.240	0.42
MH1	Interpolated	Interpolated	MS30	2012 JUB Survey	2012 JUB Survey	269.00	8.00	4565.04	4551.630	4544.50	13.41	0.027	0.85	6.38	0.580	0.53
MS31	2012 JUB Survey	2012 JUB Survey	MH1	Interpolated	Interpolated	30.00	10.00	4561.32	4552.420	4551.63	8.90	0.026	0.84	5.35	0.720	0.53
MS32	2012 JUB Survey	2012 JUB Survey	MS31	2012 JUB Survey	2012 JUB Survey	299.00	8.00	4568.25	4558.750	4552.42	9.50	0.021	0.83	5.25	0.600	0.40
MS250A	Interpolated	Interpolated	MS251	2012 JUB Survey	2012 JUB Survey	295.00	8.00	0.00	4723.220	4717.50	-4723.22	0.019	0.20	4.39	0.300	0.98
MS250	2012 JUB Survey	2012 JUB Survey	MS250A	Interpolated	Interpolated	107.00	8.00	4735.63	4725.330	4723.22	10.30	0.020	0.16	3.15	0.240	1.03
MS249	2012 JUB Survey	2012 JUB Survey	MS250	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4742.23	4731.030	4725.33	11.20	0.014	0.15	3.34	0.270	0.86
MS216	2012 JUB Survey	2012 JUB Survey	MS249	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4757.78	4748.080	4731.03	9.70	0.043	0.15	3.74	0.190	1.60
MS246	2012 JUB Survey	2012 JUB Survey	MS216	2012 JUB Survey	2012 JUB Survey	237.00	8.00	4769.33	4755.230	4748.08	14.10	0.030	0.15	4.15	0.210	1.33
MS33	2012 JUB Survey	2012 JUB Survey	MS32	2012 JUB Survey	2012 JUB Survey	393.00	8.00	4580.27	4568.270	4558.75	12.00	0.024	0.83	5.99	0.570	0.49
MS215	2012 JUB Survey	2012 JUB Survey	MS246	2012 JUB Survey	2012 JUB Survey	540.00	8.00	4791.56	4780.660	4755.23	10.90	0.047	0.03	1.39	0.090	1.81
MS233	2012 JUB Survey	2012 JUB Survey	MS232	2012 JUB Survey	2012 JUB Survey	304.00	10.00	4755.94	4740.940	4733.42	15.00	0.025	0.01	1.44	0.060	1.33
MS232	2012 JUB Survey	2012 JUB Survey	MS231	2012 JUB Survey	2012 JUB Survey	407.00	8.00	4744.52	4733.420	4718.34	11.10	0.037	0.01	1.55	0.060	1.62
MS231	2012 JUB Survey	2012 JUB Survey	MS230	2012 JUB Survey	2012 JUB Survey	120.00	8.00	4729.94	4718.340	4717.25	11.60	0.009	0.02	1.38	0.100	0.79
MS230	2012 JUB Survey	2012 JUB Survey	MS229	2012 JUB Survey	2012 JUB Survey	229.00	8.00	4728.55	4717.250	4714.83	11.30	0.011	0.02	1.26	0.100	0.85
MS297A	2012 JUB Survey	2012 JUB Survey	MS297	2012 JUB Survey	2012 JUB Survey	177.00	8.00	4669.12	4659.420	4642.57	9.70	0.095	0.05	4.05	0.090	2.57
MS297B	2012 JUB Survey	2012 JUB Survey	MS297A	2012 JUB Survey	2012 JUB Survey	325.00	8.00	4689.34	4678.840	4659.42	10.50	0.060	0.05	3.94	0.100	2.03
MS297C	2012 JUB Survey	2012 JUB Survey	MS297B	2012 JUB Survey	2012 JUB Survey	350.00	8.00	4722.91	4713.810	4678.84	9.10	0.100	0.04	3.93	0.090	2.63
MS229	2012 JUB Survey	2012 JUB Survey	MS297C	2012 JUB Survey	2012 JUB Survey	91.00	8.00	4726.23	4714.830	4713.81	11.40	0.011	0.04	2.52	0.160	0.85
MS202	2012 JUB Survey	2012 JUB Survey	MS140	2012 JUB Survey	2012 JUB Survey	397.00	10.00	4610.58	4601.070	4599.05	9.51	0.005	0.07	1.77	0.220	0.54
MS203	2012 JUB Survey	2012 JUB Survey	MS202	2012 JUB Survey	2012 JUB Survey	401.00	8.00	4614.46	4603.160	4601.07	11.30	0.005	0.07	1.77	0.220	0.55
MS264	2012 JUB Survey	2012 JUB Survey	MS121	2012 JUB Survey	2012 JUB Survey	284.00	8.00	4696.89	4693.790	4693.19	3.10	0.002	0.04	1.17	0.240	0.35
MS227A	2012 JUB Survey	2012 JUB Survey	MS227	2012 JUB Survey	2012 JUB Survey	415.00	8.00	4643.80	4635.900	4632.29	7.90	0.009	0.05	1.56	0.180	0.74
MS297	2012 JUB Survey	2012 JUB Survey	MS227A	2012 JUB Survey	2012 JUB Survey	93.00	8.00	4650.97	4642.570	4635.90	8.40	0.072	0.05	2.69	0.100	2.22
MS1	2012 JUB Survey	2012 JUB Survey	WWTP	Straight Graded	Straight Graded	387.00	8.00	4480.80	4475.900	4475.05	4.90	0.002	1.67	3.66	1.820	-0.50
MS4	2012 JUB Survey	2012 JUB Survey	MS3	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4496.33	4490.130	4479.10	6.20	0.028	0.68	3.03	0.350	1.86
MS5	2012 JUB Survey	2012 JUB Survey	MS4	2012 JUB Survey	2012 JUB Survey	398.00	8.00	4505.57	4499.070	4490.13	6.50	0.022	0.69	5.80	0.380	1.61
MS54	2012 JUB Survey	2012 JUB Survey	MS53	2012 JUB Survey	2012 JUB Survey	433.00	8.00	4587.15	4576.050	4559.51	11.10	0.038	0.45	5.67	0.360	1.20
MS6	2012 JUB Survey	2012 JUB Survey	MS5	2012 JUB Survey	2012 JUB Survey	423.00	8.00	4517.59	4507.690	4499.07	9.90	0.020	0.69	5.45	0.380	1.50

Upstream Manhole	US Rim Source	US Inv Source	Downstream Manhole	DS Rim Source	DS Inv Source	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
MS34	2012 JUB Survey	2012 JUB Survey	MS33	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4589.25	4578.550	4568.27	10.70	0.026	0.39	3.75	0.360	0.97
MS35	2012 JUB Survey	2012 JUB Survey	MS34	2012 JUB Survey	2012 JUB Survey	406.00	8.00	4604.93	4594.530	4578.55	10.40	0.039	0.38	5.53	0.330	1.30
MS36	2012 JUB Survey	2012 JUB Survey	MS35	2012 JUB Survey	2012 JUB Survey	394.00	8.00	4617.21	4609.110	4594.53	8.10	0.037	0.20	3.81	0.240	1.43
MS37	2012 JUB Survey	2012 JUB Survey	MS36	2012 JUB Survey	2012 JUB Survey	344.00	8.00	4626.94	4615.840	4609.11	11.10	0.020	0.19	3.82	0.270	1.00
MS140	2012 JUB Survey	2012 JUB Survey	MS139	2012 JUB Survey	2024 JUB Dip	302.00	8.00	4607.15	4599.050	4595.94	8.10	0.010	0.07	2.35	0.190	0.79
MS139	2012 JUB Survey	2024 JUB Dip	MS138	2012 JUB Survey	2012 JUB Survey	292.00	8.00	4604.64	4595.940	4589.88	8.70	0.021	0.09	3.07	0.180	1.13
MS138	2012 JUB Survey	2012 JUB Survey	MS137	2012 JUB Survey	2012 JUB Survey	318.00	8.00	4600.60	4589.880	4583.67	10.72	0.020	0.10	3.05	0.190	1.09
MH38	Richmond GIS Data	Richmond GIS Data	MS6	2012 JUB Survey	2012 JUB Survey	195.00	8.00	4523.51	4509.540	4507.69	13.97	0.009	0.69	4.14	0.480	0.80
MS137	2012 JUB Survey	2012 JUB Survey	MS136	2012 JUB Survey	2012 JUB Survey	345.00	8.00	4594.58	4583.670	4576.78	10.91	0.020	0.12	3.02	0.210	1.08
MS136	2012 JUB Survey	2012 JUB Survey	MS135	2012 JUB Survey	2024 JUB Dip	223.00	8.00	4588.38	4576.780	4574.00	11.60	0.012	0.14	2.32	0.250	0.81
MS135	2012 JUB Survey	2024 JUB Dip	MS134	2012 JUB Survey	2024 JUB Dip	294.00	8.00	4584.36	4574.000	4572.85	10.36	0.004	0.14	1.98	0.360	0.39
MS134	2012 JUB Survey	2024 JUB Dip	MS133	2012 JUB Survey	2012 JUB Survey	352.00	8.00	4581.81	4572.850	4571.29	8.96	0.004	0.15	1.26	0.340	0.42
MS133	2012 JUB Survey	2012 JUB Survey	MS132	2012 JUB Survey	2024 JUB Dip	357.00	8.00	4581.99	4571.290	4570.00	10.70	0.004	0.43	2.49	0.720	0.08
MS132	2012 JUB Survey	2024 JUB Dip	MS33	2012 JUB Survey	2012 JUB Survey	385.00	8.00	4580.92	4570.000	4568.27	10.92	0.004	0.43	2.85	0.690	0.14
MS124	2012 JUB Survey	2012 JUB Survey	MS125	2012 JUB Survey	2012 JUB Survey	270.00	8.00	4619.93	4613.330	4610.79	6.60	0.009	0.11	2.50	0.240	0.71
MS125	2012 JUB Survey	2012 JUB Survey	MS126	2012 JUB Survey	2012 JUB Survey	305.00	8.00	4618.59	4610.790	4602.23	7.80	0.028	0.11	2.83	0.190	1.31
MS126	2012 JUB Survey	2012 JUB Survey	MS127	2012 JUB Survey	2012 JUB Survey	383.00	8.00	4613.83	4602.230	4596.27	11.60	0.016	0.17	2.64	0.270	0.89
MS127	2012 JUB Survey	2012 JUB Survey	MS35	2012 JUB Survey	2012 JUB Survey	375.00	8.00	4607.27	4596.270	4594.53	11.00	0.005	0.18	2.29	0.390	0.40
MS18	2012 JUB Survey	2012 JUB Survey	MS3	2012 JUB Survey	2012 JUB Survey	412.00	12.00	4490.11	4481.310	4479.10	8.80	0.005	1.02	3.01	2.560	0.10
MS38	2012 JUB Survey	2012 JUB Survey	MS37	2012 JUB Survey	2012 JUB Survey	430.00	8.00	4637.86	4626.360	4615.84	11.50	0.024	0.17	3.68	0.240	1.16
MS39	2012 JUB Survey	2012 JUB Survey	MS38	2012 JUB Survey	2012 JUB Survey	360.00	15.00	4652.37	4643.070	4626.36	9.30	0.046	0.16	4.36	0.190	1.66
MS40	2012 JUB Survey	2012 JUB Survey	MS39	2012 JUB Survey	2012 JUB Survey	399.00	15.00	4665.15	4656.750	4643.07	8.40	0.034	0.07	2.83	0.130	1.50
MS41	2012 JUB Survey	2012 JUB Survey	MS40	2012 JUB Survey	2012 JUB Survey	357.00	15.00	4680.12	4671.420	4656.75	8.70	0.041	0.06	3.33	0.130	1.66
MS42	2012 JUB Survey	2012 JUB Survey	MS41	2012 JUB Survey	2012 JUB Survey	398.00	12.00	4698.70	4691.300	4671.42	7.40	0.050	0.05	3.14	0.100	1.85
MH3	Richmond GIS Data	Richmond GIS Data	MS42	2012 JUB Survey	2012 JUB Survey	119.00	12.00	4711.60	4704.550	4691.30	7.05	0.111	0.04	3.78	0.090	2.78
MS43	2012 JUB Survey	2012 JUB Survey	MH3	Richmond GIS Data	Richmond GIS Data	246.00	12.00	4728.25	4719.940	4704.55	8.31	0.063	0.04	3.77	0.090	2.08
MS19	2012 JUB Survey	2012 JUB Survey	MS18	2012 JUB Survey	2012 JUB Survey	397.00	8.00	4495.48	4484.680	4481.31	10.80	0.008	1.03	3.93	0.680	0.39
MS104	2012 JUB Survey	2012 JUB Survey	MS105	2012 JUB Survey	2012 JUB Survey	196.00	8.00	4637.11	4627.710	4626.41	9.40	0.007	0.09	2.36	0.250	0.60
MS69	2012 JUB Survey	2012 JUB Survey	MS68	2012 JUB Survey	2012 JUB Survey	349.00	8.00	4620.36	4611.860	4609.74	8.50	0.006	0.33	2.81	0.510	0.33
MS20	2012 JUB Survey	2012 JUB Survey	MS19	2012 JUB Survey	2012 JUB Survey	407.00	8.00	4498.60	4488.700	4484.68	9.90	0.010	1.03	4.48	0.600	0.49
MS53	2012 JUB Survey	2012 JUB Survey	MS52	2012 JUB Survey	2012 JUB Survey	214.00	8.00	4568.41	4559.510	4552.30	8.90	0.034	0.58	6.20	0.420	0.98
MS52	2012 JUB Survey	2012 JUB Survey	MS51	2012 JUB Survey	2012 JUB Survey	319.00	8.00	4559.50	4552.300	4543.09	7.20	0.029	0.58	5.80	0.430	0.86
MS51	2012 JUB Survey	2012 JUB Survey	MS50	2012 JUB Survey	2012 JUB Survey	402.00	8.00	4549.89	4543.090	4534.13	6.80	0.022	0.58	5.37	0.480	0.68

J-U-B ENGINEERS, INC.

ENGINEERS SURVEYORS PLANNERS

City of Richmond - 2025 Sewer Master Plan Update

Appendix D - Existing Model Results

Upstream Manhole	US Rim Source	US Inv Source	Downstream Manhole	DS Rim Source	DS Inv Source	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
Dummy-Pepperidge	0.000	0.00	Pepperidge	0.00	0.000	552.41	8.00	0.00	4535.20	4533.00	-4535.20	0.004	0.02	1.160	0.13	0.517
MS57	2012 JUB Survey	2012 JUB Survey	MS56	2012 JUB Survey	2012 JUB Survey	363.00	8.00	4626.98	4616.58	4604.34	10.40	0.034	0.11	3.680	0.18	1.446
MS56	2012 JUB Survey	2012 JUB Survey	MS55	2012 JUB Survey	2012 JUB Survey	400.00	8.00	4614.34	4604.34	4592.47	10.00	0.030	0.13	2.460	0.19	1.332
MS55	2012 JUB Survey	2012 JUB Survey	MS54	2012 JUB Survey	2012 JUB Survey	364.00	8.00	4595.27	4592.47	4576.05	2.80	0.045	0.52	6.630	0.37	1.279
MS64	2012 JUB Survey	2012 JUB Survey	MS63	2012 JUB Survey	2012 JUB Survey	372.00	8.00	4716.72	4702.52	4685.36	14.20	0.046	0.06	3.590	0.12	1.757
MS63	2012 JUB Survey	2012 JUB Survey	MS62	2012 JUB Survey	2012 JUB Survey	387.00	8.00	4694.66	4685.36	4669.36	9.30	0.041	0.07	3.310	0.13	1.655
MS22	2012 JUB Survey	2012 JUB Survey	MS21	2012 JUB Survey	2012 JUB Survey	302.00	10.00	4505.56	4496.46	4490.60	9.10	0.019	1.09	3.850	5.59	1.042
MS62	2012 JUB Survey	2012 JUB Survey	MS61	2012 JUB Survey	2012 JUB Survey	374.00	8.00	4680.46	4669.36	4657.57	11.10	0.032	0.08	3.300	0.15	1.425
MS61	2012 JUB Survey	2012 JUB Survey	MS60	2012 JUB Survey	2012 JUB Survey	391.00	8.00	4667.17	4657.57	4647.79	9.60	0.025	0.08	3.300	0.16	1.256
MS60	2012 JUB Survey	2012 JUB Survey	MS59	2012 JUB Survey	2012 JUB Survey	386.00	8.00	4656.09	4647.79	4635.88	8.30	0.031	0.09	3.590	0.16	1.396
MS59	2012 JUB Survey	2012 JUB Survey	MS58	2012 JUB Survey	2012 JUB Survey	419.00	8.00	4643.48	4635.88	4623.15	7.60	0.030	0.10	3.090	0.18	1.380
MS23	2012 JUB Survey	2012 JUB Survey	MS22	2012 JUB Survey	2012 JUB Survey	301.00	10.00	4510.43	4500.33	4496.46	10.10	0.013	1.12	5.340	2.73	0.615
MS89	2012 JUB Survey	2012 JUB Survey	MS71	2012 JUB Survey	2012 JUB Survey	300.00	8.00	4637.79	4630.59	4629.09	7.20	0.005	0.07	0.920	0.24	0.528
MS88	2012 JUB Survey	2012 JUB Survey	MS89	2012 JUB Survey	2012 JUB Survey	280.00	8.00	4636.66	4631.76	4630.59	4.90	0.004	0.07	1.670	0.24	0.477
MS66	2012 JUB Survey	2012 JUB Survey	MS65	2012 JUB Survey	2012 JUB Survey	375.00	8.00	4600.65	4595.85	4594.29	4.80	0.004	0.39	2.470	0.63	0.158
MS67	2012 JUB Survey	2012 JUB Survey	MS66	2012 JUB Survey	2012 JUB Survey	300.00	8.00	4618.07	4608.47	4595.85	9.60	0.042	0.39	3.690	0.31	1.350
MS68	2012 JUB Survey	2012 JUB Survey	MS67	2012 JUB Survey	2012 JUB Survey	231.00	8.00	4626.44	4609.74	4608.47	16.70	0.005	0.38	2.930	0.58	0.245
MS65	2012 JUB Survey	2012 JUB Survey	MS55	2012 JUB Survey	2012 JUB Survey	414.00	8.00	4598.99	4594.29	4592.47	4.70	0.004	0.39	3.220	0.69	0.168
MS73	2012 JUB Survey	2012 JUB Survey	MS72	2012 JUB Survey	2012 JUB Survey	358.00	8.00	4674.68	4659.98	4651.14	14.70	0.025	0.28	5.070	0.33	1.055
MS72	2012 JUB Survey	2012 JUB Survey	MS71	2012 JUB Survey	2012 JUB Survey	404.00	8.00	4660.64	4651.14	4629.09	9.50	0.055	0.28	3.410	0.25	1.699
MS24	2012 JUB Survey	2012 JUB Survey	MS23	2012 JUB Survey	2012 JUB Survey	399.00	10.00	4517.95	4509.45	4500.33	8.50	0.023	1.08	5.760	0.48	1.234
MS71	2012 JUB Survey	2012 JUB Survey	MS70	2012 JUB Survey	2012 JUB Survey	368.00	8.00	4646.49	4629.09	4626.81	17.40	0.006	0.36	2.980	0.54	0.305
MS70	2012 JUB Survey	2012 JUB Survey	MS69	2012 JUB Survey	2012 JUB Survey	398.00	8.00	4632.81	4626.81	4611.86	6.00	0.038	0.37	3.900	0.31	1.277
MS77	2012 JUB Survey	2012 JUB Survey	MS78	2012 JUB Survey	2012 JUB Survey	367.00	8.00	4677.13	4663.13	4661.68	14.00	0.004	0.26	2.230	0.49	0.273
MS78	2012 JUB Survey	2012 JUB Survey	MS73	2012 JUB Survey	2012 JUB Survey	402.00	8.00	4674.28	4661.68	4659.98	12.60	0.004	0.26	2.840	0.54	0.286
MS251	2012 JUB Survey	2012 JUB Survey	MS79	2012 JUB Survey	2012 JUB Survey	412.00	8.00	4728.60	4717.50	4690.75	11.10	0.065	0.25	6.520	0.24	1.907
MS79	2012 JUB Survey	2012 JUB Survey	MS77	2012 JUB Survey	2012 JUB Survey	349.00	8.00	4699.25	4690.75	4663.13	8.50	0.079	0.26	3.530	0.22	2.128
MS149	2012 JUB Survey	2012 JUB Survey	MS104	2012 JUB Survey	2012 JUB Survey	340.00	8.00	4649.25	4636.85	4627.71	12.40	0.027	0.09	2.460	0.18	1.297
MS25	2012 JUB Survey	2012 JUB Survey	MS24	2012 JUB Survey	2012 JUB Survey	404.00	10.00	4524.44	4515.14	4509.45	9.30	0.014	1.08	5.320	0.56	0.740
MS93	2012 JUB Survey	2012 JUB Survey	MS149	2012 JUB Survey	2012 JUB Survey	388.00	8.00	4662.43	4651.43	4636.85	11.00	0.038	0.09	3.530	0.15	1.557
MS150	2012 JUB Survey	2012 JUB Survey	MS93	2012 JUB Survey	2012 JUB Survey	361.00	8.00	4672.65	4662.25	4651.43	10.40	0.030	0.08	3.400	0.15	1.391
MS151	2012 JUB Survey	2012 JUB Survey	MS150	2012 JUB Survey	2012 JUB Survey	403.00	8.00	4686.18	4677.68	4662.25	8.50	0.038	0.07	3.330	0.13	1.589
MS152	2012 JUB Survey	2012 JUB Survey	MS151	2012 JUB Survey	2012 JUB Survey	395.00	8.00	4698.41	4688.81	4677.68	9.60	0.028	0.06	2.980	0.13	1.367
MS153	2012 JUB Survey	2012 JUB Survey	MS152	2012 JUB Survey	2012 JUB Survey	395.00	8.00	4722.33	4713.64	4688.81	8.69	0.063	0.04	2.940	0.10	2.080
MS201	2012 JUB Survey	2012 JUB Survey	MS25	2012 JUB Survey	2012 JUB Survey	117.00	8.00	4526.47	4517.37	4515.14	9.10	0.019	1.08	5.640	0.87	0.094
MS105	2012 JUB Survey	2012 JUB Survey	MS148	2012 JUB Survey	2012 JUB Survey	386.00	8.00	4635.01	4626.41	4618.62	8.60	0.020	0.10	2.940	0.19	1.101
MS148	2012 JUB Survey	2012 JUB Survey	MS124	2012 JUB Survey	2012 JUB Survey	406.00	8.00	4627.12	4618.62	4613.33	8.50	0.013	0.11	2.610	0.22	0.858
MS26	2012 JUB Survey	2012 JUB Survey	MS201	2012 JUB Survey	2012 JUB Survey	137.00	8.00	4529.48	4519.98	4517.37	9.50	0.019	1.03	5.330	0.72	0.144
MS112	2012 JUB Survey	2012 JUB Survey	MS111	2012 JUB Survey	2012 JUB Survey	408.00	8.00	4646.20	4634.80	4626.12	11.40	0.021	0.23	4.170	0.30	1.006
MS113	2012 JUB Survey	2012 JUB Survey	MS112	2012 JUB Survey	2012 JUB Survey	353.00	8.00	4656.78	4643.88	4634.80	12.90	0.026	0.22	4.250	0.27	1.134
MS114	2012 JUB Survey	2012 JUB Survey	MS113	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4674.54	4663.84	4643.88	10.70	0.050	0.22	4.900	0.22	1.678
MS115	2012 JUB Survey	2012 JUB Survey	MS114	2012 JUB Survey	2012 JUB Survey	309.00	8.00	4685.54	4673.74	4663.84	11.80	0.032	0.21	4.960	0.25	1.304
MS116	2012 JUB Survey	2012 JUB Survey	MS115	2012 JUB Survey	2012 JUB Survey	400.00	8.00	4691.44	4676.34	4673.74	15.10	0.007	0.21	3.120	0.42	0.474
MS117	2012 JUB Survey	2012 JUB Survey	MS116	2012 JUB Survey	2012 JUB Survey	234.00	8.00	4694.09	4682.19	4676.34	11.90	0.025	0.21	3.030	0.27	1.135
MS118	2012 JUB Survey	2012 JUB Survey	MS117	2012 JUB Survey	2012 JUB Survey	402.00	8.00	4703.23	4688.33	4682.19	14.90	0.015	0.20	3.780	0.31	0.845
MS27	2012 JUB Survey	2012 JUB Survey	MS26	2012 JUB Survey	2012 JUB Survey	299.00	8.00	4534.89	4525.29	4519.98	9.60	0.018	1.02	5.560	0.76	0.106
MS119	Interpolated	Interpolated	MS118	2012 JUB Survey	2012 JUB Survey	397.00	8.00	0.00	4690.24	4688.33	-4690.24	0.005	0.20	2.630	0.42	0.389
MS120	2012 JUB Survey	2012 JUB Survey	MS119	Interpolated	Interpolated	362.00	8.00	4703.29	4691.99	4690.24	11.30	0.005	0.15	1.870	0.34	0.445

Upstream Manhole	US Rim Source	US Inv Source	Downstream Manhole	DS Rim Source	DS Inv Source	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
MS121	2012 JUB Survey	2012 JUB Survey	MS120	2012 JUB Survey	2012 JUB Survey	276.00	8.00	4701.69	4693.19	4691.99	8.50	0.004	0.05	0.980	0.19	0.510
MS28	2012 JUB Survey	2012 JUB Survey	MS27	2012 JUB Survey	2012 JUB Survey	397.00	8.00	4541.25	4532.46	4525.29	8.79	0.018	1.02	5.550	0.75	0.119
MS111	2012 JUB Survey	2012 JUB Survey	MS163	2012 JUB Survey	2012 JUB Survey	425.00	8.00	4636.72	4626.12	4612.44	10.60	0.032	0.25	4.930	0.27	1.274
MS163	2012 JUB Survey	2012 JUB Survey	MS269	2012 JUB Survey	2012 JUB Survey	116.00	8.00	4622.94	4612.44	4607.20	10.50	0.045	0.25	5.410	0.25	1.551
MS269	2012 JUB Survey	2012 JUB Survey	MS162	2012 JUB Survey	2012 JUB Survey	285.00	8.00	4619.50	4607.20	4595.63	12.30	0.041	0.26	5.010	0.27	1.448
MS162	2012 JUB Survey	2012 JUB Survey	MS161	2012 JUB Survey	2012 JUB Survey	400.00	8.00	4607.83	4595.63	4583.53	12.20	0.030	0.28	4.990	0.30	1.195
MS161	2012 JUB Survey	2012 JUB Survey	MS133	2012 JUB Survey	2012 JUB Survey	379.00	8.00	4592.03	4583.53	4571.29	8.50	0.032	0.29	2.570	0.30	1.238
MS29	2012 JUB Survey	2012 JUB Survey	MS28	2012 JUB Survey	2012 JUB Survey	386.00	8.00	4549.41	4536.51	4532.46	12.90	0.010	1.02	4.620	3.10	-0.147
MS3	2012 JUB Survey	2012 JUB Survey	MS2	2012 JUB Survey	2012 JUB Survey	402.00	12.00	4489.20	4479.10	4477.47	10.10	0.004	2.62	5.160	9.24	-1.026
MS30	2012 JUB Survey	2012 JUB Survey	MS29	2012 JUB Survey	2012 JUB Survey	281.00	8.00	4552.80	4544.50	4536.51	8.30	0.028	0.95	4.920	0.60	0.478
MH37	Richmond GIS Data	Richmond GIS Data	MH38	Richmond GIS Data	Richmond GIS Data	257.00	15.00	4520.90	4510.18	4509.54	10.72	0.002	1.63	2.960	0.75	0.624
MH36	Richmond GIS Data	Richmond GIS Data	MH37	Richmond GIS Data	Richmond GIS Data	382.00	15.00	4518.38	4510.85	4510.18	7.53	0.002	1.64	2.740	0.75	0.252
MH35	Richmond GIS Data	Richmond GIS Data	MH36	Richmond GIS Data	Richmond GIS Data	228.00	15.00	4524.21	4511.31	4510.85	12.90	0.002	1.63	2.600	0.72	0.401
MH34	Richmond GIS Data	Richmond GIS Data	MH35	Richmond GIS Data	Richmond GIS Data	237.00	12.00	4520.05	4512.25	4511.31	7.80	0.004	1.61	3.310	0.93	-0.039
MH33	Richmond GIS Data	Richmond GIS Data	MH34	Richmond GIS Data	Richmond GIS Data	268.00	12.00	4517.09	4513.01	4512.25	4.08	0.003	1.61	3.210	1.26	-0.281
MH32	Richmond GIS Data	Richmond GIS Data	MH33	Richmond GIS Data	Richmond GIS Data	424.00	12.00	4525.14	4514.21	4513.01	10.93	0.003	0.78	1.850	0.55	0.544
MS48	2012 JUB Survey	2012 JUB Survey	MH32	Richmond GIS Data	Richmond GIS Data	15.00	8.00	4525.22	4516.52	4514.21	8.70	0.154	0.78	5.780	0.33	2.545
MS263	Interpolated	Interpolated	MS69	2012 JUB Survey	2012 JUB Survey	261.00	8.00	0.00	4612.83	4611.86	-4612.83	0.004	0.01	0.280	0.10	0.504
MS227	2012 JUB Survey	2012 JUB Survey	MS88	2012 JUB Survey	2012 JUB Survey	162.00	8.00	4637.79	4632.29	4631.76	5.50	0.003	0.07	1.500	0.25	0.420
MH1	Interpolated	Interpolated	MS30	2012 JUB Survey	2012 JUB Survey	269.00	8.00	4565.04	4551.63	4544.50	13.41	0.027	0.95	6.530	0.63	0.432
MS31	2012 JUB Survey	2012 JUB Survey	MH1	Interpolated	Interpolated	30.00	8.00	4561.32	4552.42	4551.63	8.90	0.026	0.94	5.420	0.81	0.431
MS32	2012 JUB Survey	2012 JUB Survey	MS31	2012 JUB Survey	2012 JUB Survey	299.00	8.00	4568.25	4558.75	4552.42	9.50	0.021	0.94	5.320	0.64	0.297
MS250A	Interpolated	Interpolated	MS251	2012 JUB Survey	2012 JUB Survey	295.00	8.00	0.00	4723.22	4717.50	-4723.22	0.019	0.25	4.650	0.33	0.935
MS250	2012 JUB Survey	2012 JUB Survey	MS250A	Interpolated	Interpolated	107.00	8.00	4735.63	4725.33	4723.22	10.30	0.020	0.20	3.450	0.28	0.987
MS249	2012 JUB Survey	2012 JUB Survey	MS250	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4742.23	4731.03	4725.33	11.20	0.014	0.20	3.610	0.31	0.812
MS216	2012 JUB Survey	2012 JUB Survey	MS249	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4757.78	4748.08	4731.03	9.70	0.043	0.20	4.050	0.22	1.555
MS246	2012 JUB Survey	2012 JUB Survey	MS216	2012 JUB Survey	2012 JUB Survey	237.00	8.00	4769.33	4755.23	4748.08	14.10	0.030	0.19	4.490	0.25	1.278
MS33	2012 JUB Survey	2012 JUB Survey	MS32	2012 JUB Survey	2012 JUB Survey	393.00	8.00	4580.27	4568.27	4558.75	12.00	0.024	0.93	6.140	0.61	0.387
MS215	2012 JUB Survey	2012 JUB Survey	MS246	2012 JUB Survey	2012 JUB Survey	540.00	8.00	4791.56	4780.66	4755.23	10.90	0.047	0.07	2.450	0.13	1.765
MS233	2012 JUB Survey	2012 JUB Survey	MS232	2012 JUB Survey	2012 JUB Survey	304.00	8.00	4755.94	4740.94	4733.42	15.00	0.025	0.01	1.440	0.06	1.325
MS232	2012 JUB Survey	2012 JUB Survey	MS231	2012 JUB Survey	2012 JUB Survey	407.00	8.00	4744.52	4733.42	4718.34	11.10	0.037	0.01	1.550	0.06	1.617
MS231	2012 JUB Survey	2012 JUB Survey	MS230	2012 JUB Survey	2012 JUB Survey	120.00	8.00	4729.94	4718.34	4717.25	11.60	0.009	0.02	1.380	0.10	0.789
MS230	2012 JUB Survey	2012 JUB Survey	MS229	2012 JUB Survey	2012 JUB Survey	229.00	8.00	4728.55	4717.25	4714.83	11.30	0.011	0.02	1.130	0.10	0.852
MS297A	2012 JUB Survey	2012 JUB Survey	MS297	2012 JUB Survey	2012 JUB Survey	177.00	8.00	4669.12	4659.42	4642.57	9.70	0.095	0.05	4.150	0.09	2.563
MS297B	2012 JUB Survey	2012 JUB Survey	MS297A	2012 JUB Survey	2012 JUB Survey	325.00	8.00	4689.34	4678.84	4659.42	10.50	0.060	0.05	4.030	0.10	2.022
MS297C	2012 JUB Survey	2012 JUB Survey	MS297B	2012 JUB Survey	2012 JUB Survey	350.00	8.00	4722.91	4713.81	4678.84	9.10	0.100	0.05	4.030	0.09	2.630
MS229	2012 JUB Survey	2012 JUB Survey	MS297C	2012 JUB Survey	2012 JUB Survey	91.00	8.00	4726.23	4714.83	4713.81	11.40	0.011	0.05	2.580	0.18	0.849
MS202	2012 JUB Survey	2012 JUB Survey	MS140	2012 JUB Survey	2012 JUB Survey	397.00	8.00	4610.58	4601.07	4599.05	9.51	0.005	0.07	1.770	0.22	0.539
MS203	2012 JUB Survey	2012 JUB Survey	MS202	2012 JUB Survey	2012 JUB Survey	401.00	8.00	4614.46	4603.16	4601.07	11.30	0.005	0.07	1.770	0.22	0.545
MS264	2012 JUB Survey	2012 JUB Survey	MS121	2012 JUB Survey	2012 JUB Survey	284.00	8.00	4696.89	4693.79	4693.19	3.10	0.002	0.04	1.180	0.24	0.347
MS227A	2012 JUB Survey	2012 JUB Survey	MS227	2012 JUB Survey	2012 JUB Survey	415.00	8.00	4643.80	4635.90	4632.29	7.90	0.009	0.06	1.600	0.18	0.732
MS297	2012 JUB Survey	2012 JUB Survey	MS227A	2012 JUB Survey	2012 JUB Survey	93.00	8.00	4650.97	4642.57	4635.90	8.40	0.072	0.06	2.740	0.10	2.213
MS1	2012 JUB Survey	2012 JUB Survey	WWTP	Straight Graded	Straight Graded	387.00	12.00	4480.80	4475.90	4475.05	4.90	0.002	2.42	4.990	3.79	-1.250
MS4	2012 JUB Survey	2012 JUB Survey	MS3	2012 JUB Survey	2012 JUB Survey	399.00	10.00	4496.33	4490.13	4479.10	6.20	0.028	1.63	4.640	3.53	0.915
MS5	2012 JUB Survey	2012 JUB Survey	MS4	2012 JUB Survey	2012 JUB Survey	398.00	10.00	4505.57	4499.07	4490.13	6.50	0.022	1.63	6.670	0.62	0.663
MS54	2012 JUB Survey	2012 JUB Survey	MS53	2012 JUB Survey	2012 JUB Survey	433.00	8.00	4587.15	4576.05	4559.51	11.10	0.038	0.53	5.970	0.39	1.121
MS6	2012 JUB Survey	2012 JUB Survey	MS5	2012 JUB Survey	2012 JUB Survey	423.00	10.00	4517.59	4507.69	4499.07	9.90	0.020	1.63	6.720	0.66	0.556
MS34	2012 JUB Survey	2012 JUB Survey	MS33	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4589.25	4578.55	4568.27	10.70	0.026	0.52	4.330	0.43	0.839
MS35	2012 JUB Survey	2012 JUB Survey	MS34	2012 JUB Survey	2012 JUB Survey	406.00	8.00	4604.93	4594.53	4578.55	10.40	0.039	0.51	6.010	0.37	1.166
MS36	2012 JUB Survey	2012 JUB Survey	MS35	2012 JUB Survey	2012 JUB Survey	394.00	8.00	4617.21	4609.11	4594.53	8.10	0.037	0.31	4.790	0.30	1.319
MS37	2012 JUB Survey	2012 JUB Survey	MS36	2012 JUB Survey	2012 JUB Survey	344.00	8.00	4626.94	4615.84	4609.11	11.10	0.020	0.30	4.370	0.34	0.881
MS140	2012 JUB Survey	2012 JUB Survey	MS139	2012 JUB Survey	2024 JUB Dip	302.00	8.00	4607.15	4599.05	4595.94	8.10	0.010	0.07	2.350	0.19	0.790
MS139	2012 JUB Survey	2024 JUB Dip	MS138	2012 JUB Survey	2012 JUB Survey	292.00	8.00	4604.64	4595.94	4589.88	8.70	0.021	0.09	3.070	0.18	1.129

Upstream Manhole	US Rim Source	US Inv Source	Downstream Manhole	DS Rim Source	DS Inv Source	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
MS138	2012 JUB Survey	2012 JUB Survey	MS137	2012 JUB Survey	2012 JUB Survey	318.00	8.00	4600.60	4589.88	4583.67	10.72	0.020	0.10	3.050	0.19	1.085
MH38	Richmond GIS Data	Richmond GIS Data	MS6	2012 JUB Survey	2012 JUB Survey	195.00	10.00	4523.51	4509.54	4507.69	13.97	0.009	1.63	4.810	1.51	-0.142
MS137	2012 JUB Survey	2012 JUB Survey	MS136	2012 JUB Survey	2012 JUB Survey	345.00	8.00	4594.58	4583.67	4576.78	10.91	0.020	0.11	3.020	0.21	1.085
MS136	2012 JUB Survey	2012 JUB Survey	MS135	2012 JUB Survey	2024 JUB Dip	223.00	8.00	4588.38	4576.78	4574.00	11.60	0.012	0.11	2.210	0.24	0.833
MS135	2012 JUB Survey	2024 JUB Dip	MS134	2012 JUB Survey	2024 JUB Dip	294.00	8.00	4584.36	4574.00	4572.85	10.36	0.004	0.12	1.890	0.33	0.415
MS134	2012 JUB Survey	2024 JUB Dip	MS133	2012 JUB Survey	2012 JUB Survey	352.00	8.00	4581.81	4572.85	4571.29	8.96	0.004	0.12	1.100	0.31	0.446
MS133	2012 JUB Survey	2012 JUB Survey	MS132	2012 JUB Survey	2024 JUB Dip	357.00	8.00	4581.99	4571.29	4570.00	10.70	0.004	0.40	2.500	0.70	0.104
MS132	2012 JUB Survey	2024 JUB Dip	MS33	2012 JUB Survey	2012 JUB Survey	385.00	8.00	4580.92	4570.00	4568.27	10.92	0.004	0.41	2.730	0.64	0.161
MS124	2012 JUB Survey	2012 JUB Survey	MS125	2012 JUB Survey	2012 JUB Survey	270.00	8.00	4619.93	4613.33	4610.79	6.60	0.009	0.11	2.540	0.25	0.708
MS125	2012 JUB Survey	2012 JUB Survey	MS126	2012 JUB Survey	2012 JUB Survey	305.00	8.00	4618.59	4610.79	4602.23	7.80	0.028	0.12	2.820	0.19	1.301
MS126	2012 JUB Survey	2012 JUB Survey	MS127	2012 JUB Survey	2012 JUB Survey	383.00	8.00	4613.83	4602.23	4596.27	11.60	0.016	0.19	2.720	0.28	0.865
MS127	2012 JUB Survey	2012 JUB Survey	MS35	2012 JUB Survey	2012 JUB Survey	375.00	8.00	4607.27	4596.27	4594.53	11.00	0.005	0.20	2.360	0.42	0.380
MS18	2012 JUB Survey	2012 JUB Survey	MS3	2012 JUB Survey	2012 JUB Survey	412.00	10.00	4490.11	4481.31	4479.10	8.80	0.005	1.09	3.090	10.56	0.036
MS38	2012 JUB Survey	2012 JUB Survey	MS37	2012 JUB Survey	2012 JUB Survey	430.00	8.00	4637.86	4626.36	4615.84	11.50	0.024	0.29	4.430	0.31	1.034
MS39	2012 JUB Survey	2012 JUB Survey	MS38	2012 JUB Survey	2012 JUB Survey	360.00	8.00	4652.37	4643.07	4626.36	9.30	0.046	0.29	5.190	0.27	1.540
MS40	2012 JUB Survey	2012 JUB Survey	MS39	2012 JUB Survey	2012 JUB Survey	399.00	8.00	4665.15	4656.75	4643.07	8.40	0.034	0.16	3.880	0.22	1.406
MS41	2012 JUB Survey	2012 JUB Survey	MS40	2012 JUB Survey	2012 JUB Survey	357.00	8.00	4680.12	4671.42	4656.75	8.70	0.041	0.16	4.580	0.21	1.557
MS42	2012 JUB Survey	2012 JUB Survey	MS41	2012 JUB Survey	2012 JUB Survey	398.00	8.00	4698.70	4691.30	4671.42	7.40	0.050	0.15	4.800	0.19	1.740
MH3	Richmond GIS Data	Richmond GIS Data	MS42	2012 JUB Survey	2012 JUB Survey	119.00	8.00	4711.60	4704.55	4691.30	7.05	0.111	0.15	5.710	0.15	2.676
MS43	2012 JUB Survey	2012 JUB Survey	MH3	Richmond GIS Data	Richmond GIS Data	246.00	8.00	4728.25	4719.94	4704.55	8.31	0.063	0.15	5.780	0.18	1.970
MS19	2012 JUB Survey	2012 JUB Survey	MS18	2012 JUB Survey	2012 JUB Survey	397.00	10.00	4495.48	4484.68	4481.31	10.80	0.008	1.35	3.840	10.38	0.061
MS104	2012 JUB Survey	2012 JUB Survey	MS105	2012 JUB Survey	2012 JUB Survey	196.00	8.00	4637.11	4627.71	4626.41	9.40	0.007	0.10	2.410	0.27	0.594
MS69	2012 JUB Survey	2012 JUB Survey	MS68	2012 JUB Survey	2012 JUB Survey	349.00	8.00	4620.36	4611.86	4609.74	8.50	0.006	0.38	2.900	0.54	0.279
MS20	2012 JUB Survey	2012 JUB Survey	MS19	2012 JUB Survey	2012 JUB Survey	407.00	10.00	4498.60	4488.70	4484.68	9.90	0.010	1.35	4.270	9.53	0.171
MS53	2012 JUB Survey	2012 JUB Survey	MS52	2012 JUB Survey	2012 JUB Survey	214.00	8.00	4568.41	4559.51	4552.30	8.90	0.034	0.64	6.330	0.45	0.918
MS52	2012 JUB Survey	2012 JUB Survey	MS51	2012 JUB Survey	2012 JUB Survey	319.00	8.00	4559.50	4552.30	4543.09	7.20	0.029	0.64	5.880	0.46	0.799
MS51	2012 JUB Survey	2012 JUB Survey	MS50	2012 JUB Survey	2012 JUB Survey	402.00	8.00	4549.89	4543.09	4534.13	6.80	0.022	0.65	5.440	0.51	0.619

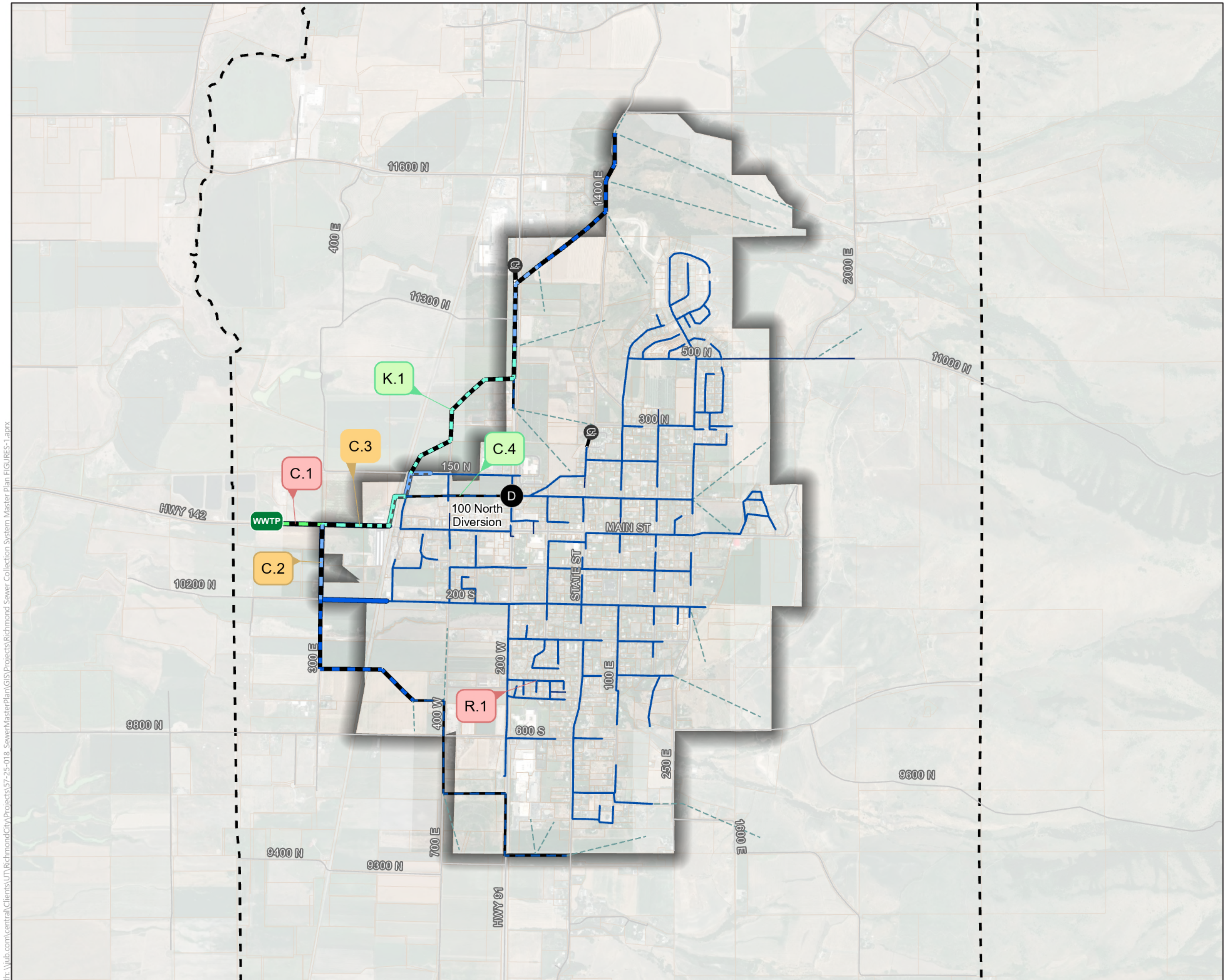
Appendix D - Master Plan Model Results (Master Plan Pipes)

Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Design Slope	10 State Standard Min. Slope	Required Master Plan Min.Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
J104	J106	1764.74	8.04	4736.00	4730.33	4611.21	5.67	6.75%	0.40%	0.40%	0.01	2.39	0.04	2.19
J106	J108	532.83	9.96	4617.00	4600.01	4582.16	16.99	3.35%	0.28%	0.28%	0.45	5.84	0.28	2.35
J108	J110	660.03	9.96	4591.00	4582.16	4559.12	8.84	3.49%	0.28%	0.28%	0.45	5.76	0.26	2.41
J110	J112	660.43	9.96	4568.00	4559.12	4538.12	8.88	3.18%	0.28%	0.28%	0.46	5.76	0.28	2.27
J112	J114	658.72	12.00	4547.00	4537.61	4525.95	9.39	1.77%	0.22%	0.22%	0.55	3.32	0.28	2.77
J142	J144	4244.49	9.96	4880.00	4871.17	4608.01	8.83	6.20%	0.28%	0.28%	0.42	4.37	0.23	3.40
J144	J146	667.86	9.96	4617.00	4608.01	4604.07	8.99	0.59%	0.28%	0.28%	0.42	2.51	0.42	0.75
J146	J148	395.84	9.96	4613.00	4604.07	4602.96	8.93	0.28%	0.28%	0.28%	0.42	2.45	0.56	0.39
J148	J106	660.75	9.96	4617.00	4602.56	4600.71	14.44	0.28%	0.28%	0.28%	0.45	2.48	0.58	0.36
J150	J144	469.62	8.04	4616.00	4610.33	4608.22	5.67	0.45%	0.40%	0.40%	0.01	0.64	0.09	0.56
J152	J148	3773.77	8.04	4842.00	4836.33	4611.04	5.67	5.97%	0.40%	0.40%	0.03	3.12	0.07	2.04
J164	J112	975.77	8.04	4548.00	4542.33	4537.94	5.67	0.45%	0.40%	0.40%	0.09	1.88	0.27	0.48
J168	J170	1797.89	8.04	4611.00	4605.33	4540.25	5.67	3.62%	0.40%	0.40%	0.13	3.95	0.19	1.48
J170	J256	636.92	8.04	4546.00	4540.20	4536.31	5.80	0.61%	0.40%	0.40%	0.13	2.29	0.31	0.53
J178	J254	2010.88	8.04	4645.00	4639.33	4533.16	5.67	5.28%	0.40%	0.40%	0.22	5.70	0.22	1.73
J182	J184	1195.34	8.04	5052.00	5046.33	4998.52	5.67	4.00%	0.40%	0.40%	0.01	1.70	0.04	1.69
J184	J186	665.34	8.04	5006.00	4998.52	4931.32	7.48	10.10%	0.40%	0.40%	0.01	2.76	0.04	2.68
J186	J188	665.34	8.04	4937.00	4931.32	4858.13	5.68	11.00%	0.40%	0.40%	0.02	3.32	0.06	2.79
J188	MS215	644.89	8.04	4864.00	4858.13	4785.26	5.87	11.30%	0.40%	0.40%	0.03	4.02	0.07	2.82
J194	MS64	1984.21	8.04	4857.00	4853.33	4710.47	3.67	7.20%	0.40%	0.40%	0.02	3.32	0.07	2.25
J196	MS64	1046.45	8.04	4770.00	4766.33	4708.78	3.67	5.50%	0.40%	0.40%	0.01	2.11	0.04	1.98
J198	MS43	1218.06	8.04	4821.00	4817.33	4723.54	3.67	7.70%	0.40%	0.40%	0.11	5.37	0.15	2.24
J200	J202	1739.36	8.04	4828.00	4823.33	4672.01	4.67	8.70%	0.40%	0.40%	0.01	1.69	0.04	2.49
J202	J204	664.05	8.04	4680.00	4672.01	4640.27	7.99	4.78%	0.40%	0.40%	0.01	2.46	0.06	1.84
J204	J206	656.49	8.04	4645.00	4639.73	4606.25	5.27	5.10%	0.40%	0.40%	0.04	1.97	0.10	1.87
J206	J208	663.61	8.04	4610.00	4606.25	4603.26	3.75	0.45%	0.40%	0.40%	0.05	1.37	0.19	0.52
J208	J210	660.88	8.04	4618.00	4603.26	4600.29	14.74	0.45%	0.40%	0.40%	0.05	2.00	0.22	0.51
J210	J212	666.10	8.04	4621.00	4600.29	4572.24	20.71	4.21%	0.40%	0.40%	0.06	3.16	0.13	1.68
J212	J214	659.63	8.04	4576.00	4572.24	4538.93	3.76	5.05%	0.40%	0.40%	0.10	4.43	0.15	1.81
J214	J216	664.54	8.04	4543.00	4537.07	4534.08	5.93	0.45%	0.40%	0.40%	0.12	1.96	0.31	0.45
J216	J218	660.21	8.04	4542.00	4534.08	4531.11	7.92	0.45%	0.40%	0.40%	0.13	1.98	0.31	0.44
J218	J220	655.68	8.04	4540.00	4531.11	4528.16	8.89	0.45%	0.40%	0.40%	0.13	2.04	0.33	0.44
J220	J222	655.55	8.04	4544.00	4528.16	4524.35	15.84	0.58%	0.40%	0.40%	0.15	2.31	0.33	0.50
J222	J224	269.77	9.96	4530.00	4514.58	4513.82	15.42	0.28%	0.28%	0.28%	0.25	2.14	0.41	0.56
J224	J226	669.30	9.96	4525.00	4513.52	4511.65	11.48	0.28%	0.28%	0.28%	0.25	2.15	0.41	0.56
J226	J228	652.27	9.96	4524.00	4510.95	4506.06	13.05	0.75%	0.28%	0.28%	0.26	3.17	0.31	1.07
J228	J230	665.58	9.96	4515.00	4506.06	4496.07	8.94	1.50%	0.28%	0.28%	0.26	2.59	0.25	1.61

Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	US Rim (ft)	US Invert (ft)	DS Invert (ft)	US Depth (ft)	Design Slope	10 State Standard Min. Slope	Required Master Plan Min.Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
J230	J232	157.23	9.96	4506.00	4496.07	4495.63	9.93	0.28%	0.28%	0.28%	0.27	2.10	4.86	0.54
J232	J234	662.23	9.96	4508.00	4495.43	4493.58	12.57	0.28%	0.28%	0.28%	0.28	2.06	5.56	0.53
J234	MS21	659.04	9.96	4506.00	4492.88	4491.03	13.12	0.28%	0.28%	0.28%	0.30	1.92	8.37	0.52
J236	J204	815.13	8.04	4677.00	4672.33	4639.73	4.67	4.00%	0.40%	0.40%	0.01	1.70	0.06	1.68
J238	J204	782.91	8.04	4647.00	4643.33	4639.81	3.67	0.45%	0.40%	0.40%	0.01	0.93	0.09	0.56
J240	J214	1251.34	8.04	4556.00	4550.33	4537.07	5.67	1.06%	0.40%	0.40%	0.02	0.54	0.09	0.86
J242	J220	1544.77	8.04	4554.00	4548.33	4532.89	5.67	1.00%	0.40%	0.40%	0.01	1.13	0.06	0.84
J244	J222	659.02	8.04	4527.00	4521.33	4514.74	5.67	1.00%	0.40%	0.40%	0.01	0.71	0.06	0.84
J246	MS120	4307.04	8.04	5061.00	5057.33	4699.42	3.67	8.31%	0.40%	0.40%	0.04	3.92	0.09	2.41
J248	MS39	4744.64	8.04	5090.00	5086.33	4647.45	3.67	9.25%	0.40%	0.40%	0.09	5.38	0.13	2.49
J114	J252	725.48	12.00	4534.00	4525.95	4524.35	8.05	0.22%	0.22%	0.22%	0.63	2.84	0.49	0.77
J252	J254	613.22	12.00	4537.00	4524.05	4522.70	12.95	0.22%	0.22%	0.22%	0.63	2.84	0.49	0.77
J254	J256	675.22	15.00	4539.00	4522.15	4521.14	16.85	0.15%	0.15%	0.15%	0.83	2.70	0.46	1.27
J256	J258	624.94	15.00	4542.00	4520.84	4519.90	21.16	0.15%	0.15%	0.15%	0.95	2.81	0.50	1.16
J258	J260	476.60	15.00	4531.00	4519.40	4518.69	11.60	0.15%	0.15%	0.15%	0.95	2.82	0.50	1.15
J260	J262	474.57	15.00	4528.00	4518.29	4517.15	9.71	0.24%	0.15%	0.15%	0.95	2.70	0.42	1.71
J262	J264	653.10	15.00	4525.00	4517.15	4516.17	7.85	0.15%	0.15%	0.15%	0.94	2.79	0.50	1.16
J264	J266	718.10	15.00	4530.00	4515.67	4514.59	14.33	0.15%	0.15%	0.15%	0.94	2.79	0.50	1.17
J266	MH33	428.55	15.00	4520.00	4513.99	4513.35	6.01	0.15%	0.15%	0.15%	0.94	2.52	0.46	1.16
J268	J170	1720.33	8.04	4609.00	4603.33	4540.20	5.67	3.67%	0.40%	0.40%	0.01	0.37	0.04	1.94

Appendix E

CIP Summary Sheets



RICHMOND
UTAH
Sewer Master Plan

Figure E1

CIP Summary Map

Master Plan Lines
- 18 Inch
- 15 Inch
- 12 Inch
- 10 Inch
- 8 Inch

Timeframe
- 0 - 10 Years
- 10 - 20 years
- As needed with growth
- Diversion Point
- Private Lift Station

Existing Pipe Sizes
- 15 Inch
- 12 Inch
- 10 Inch
- 8 Inch
- 6 Inch
- Abandoned Pipes
- Force Main
- Check Line
- Study Boundary
- Parcel
- Richmond City Limits
- WWTP

NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

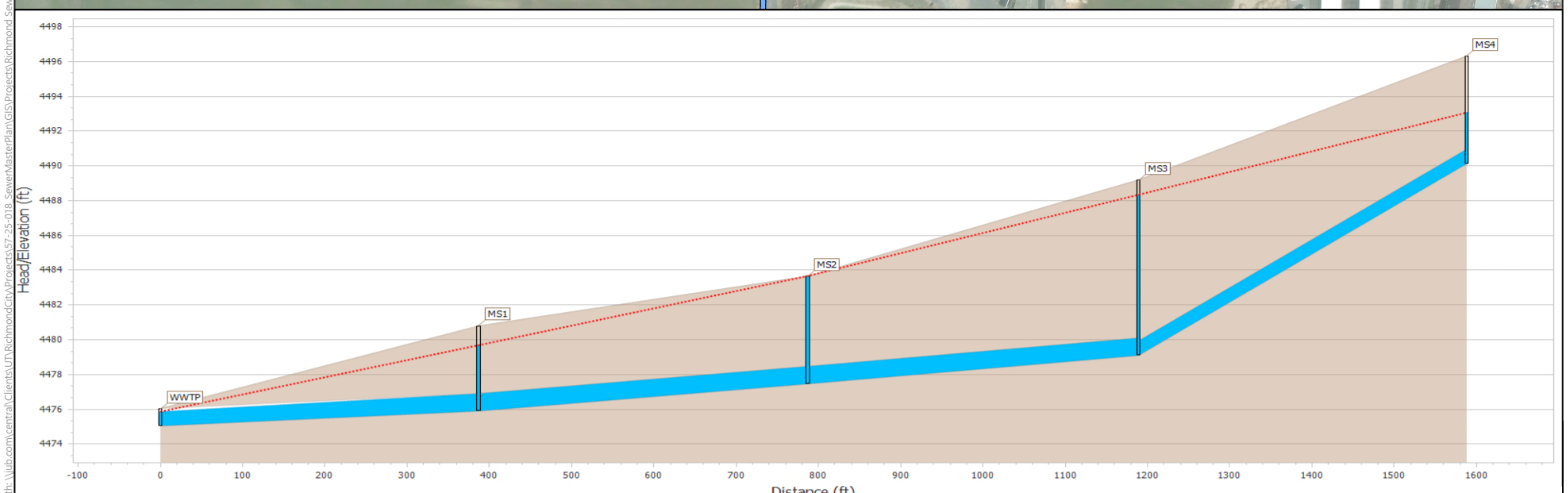
0 2,000 4,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025

Path: \\jub.com\central\Clients\UT\RichmondCity\Projects\57-25-018 SewerMasterPlan\GIS\Projects\Richmond Sewer Collection System Master Plan FIGURES-1.aprx



RICHMOND — UTAH —

Sewer Master Plan

Figure E2

C.1 Main Street Trunk Upsize Phase 1

Background

The Main Street Trunk between S 800 W and the treatment plant experiences surcharging under the Master Plan flows. The model shows a potential SSO at manhole MS2.

Solution

Replace the existing trunk line with an 18-inch pipe, between manhole MS3 and the WWTP

- Open Trench Replacement 1189 LF of 18-inch Gravity Trunk
- Opinion of Probable Cost (2025 Dollars) - $413,000

Project Timing

0 - 10 Years

Buildout Pipe Sizes	Existing Pipe Sizes
18 Inch	18 Inch
15 Inch	15 Inch
12 Inch	12 Inch
10 Inch	10 Inch
8 Inch	8 Inch
CIP Extent	6 Inch
WWTP	Abandoned Pipes
Manhole	Force Main

NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

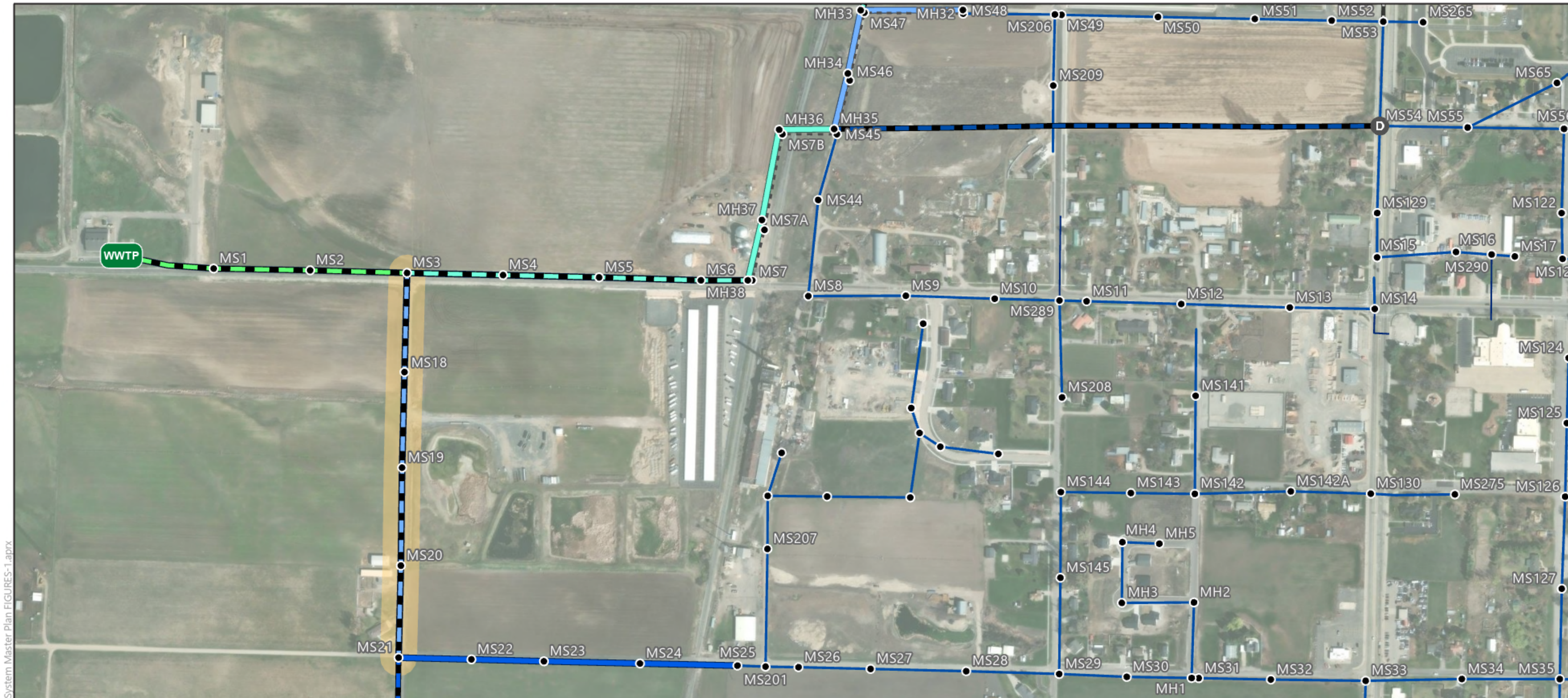
0 250 500
Feet

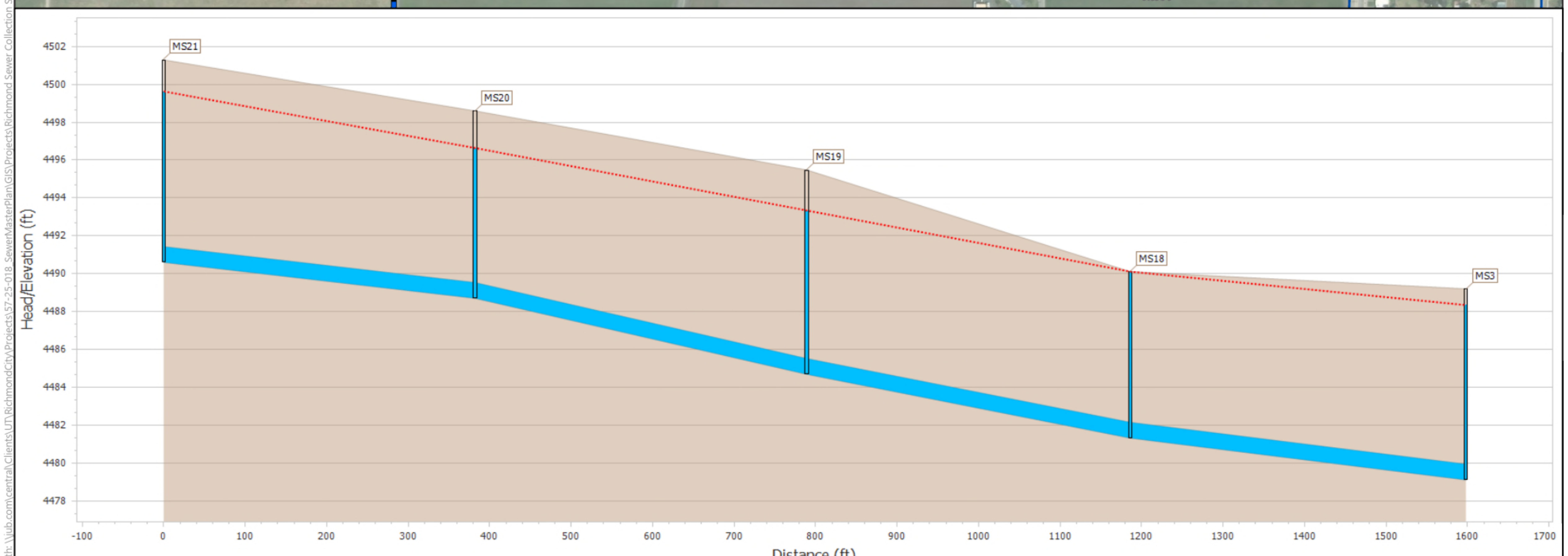
N

J-U-B ENGINEERS, INC.
THE LANGDON GROUP
GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025

Path: \\jub.com\central\Clients\UT\RichmondCity\Projects\57-25-018_SewerMasterPlan\GIS\Projects\Richmond Sewer Collection System Master Plan FIGURES-1.aprx





RICHMOND
UTAH
Sewer Master Plan

Figure E3

C.2 S 800 W Trunk

Background

The S 800 W Trunk experiences surcharging under the Master Plan flows. The model shows a potential SSO at manhole MS18.

Solution

Replace the existing trunkline with a 12-inch pipe, between manholes MS21 and MS3.

- Open Trench Replacement 1598 LF of 12-inch Gravity Trunk
- Opinion of Probable Cost (2025 Dollars) - $547,000

Project Timing

10 - 20 Years

Buildout Pipe Sizes	Existing Pipe Sizes
18 Inch	18 Inch
15 Inch	15 Inch
12 Inch	12 Inch
10 Inch	10 Inch
8 Inch	8 Inch
Diversion Point	6 Inch
WWTP	Abandoned Pipes
CIP Extent	Force Main
Manhole	

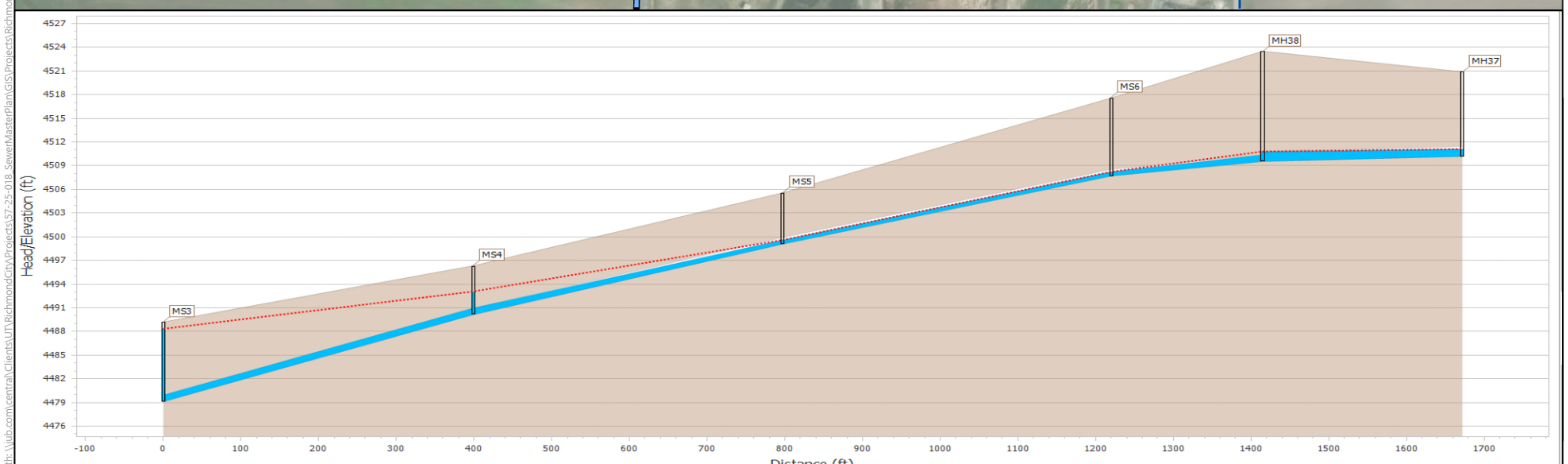
NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 500 1,000
Feet

N

J-U-B ENGINEERS, INC.
THE LANGDON GROUP
GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025



RICHMOND
— UTAH —
Sewer Master Plan

Figure E4

C.3 Main Street Trunk Upsize Phase 2

Background

The W Main St Trunk between the railroad and S 800 W shows surcharging under the Master Plan flows. The model shows a maximum surcharge of about 28 inches above the crown of the pipe at manhole MS3.

Solution

Replace the existing trunkline between the railroad and S 800 W with a 15-inch pipe.

- Open Trench Replacement 1415 LF of 15-inch Gravity Trunk
- Opinion of Probable Cost (2025) – $581,000

Project Timing

10 - 20 Years

Buildout Pipe Sizes	Existing Pipe Sizes
18 Inch	18 Inch
15 Inch	15 Inch
12 Inch	12 Inch
10 Inch	10 Inch
8 Inch	8 Inch
Force Main	6 Inch
WWTP	Abandoned Pipes
Diversion Point	Manhole
CIP Extent	Private Lift Station

NOTE: A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 300 600
Feet

N

J-U-B ENGINEERS, INC.
THE LANGDON GROUP
GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

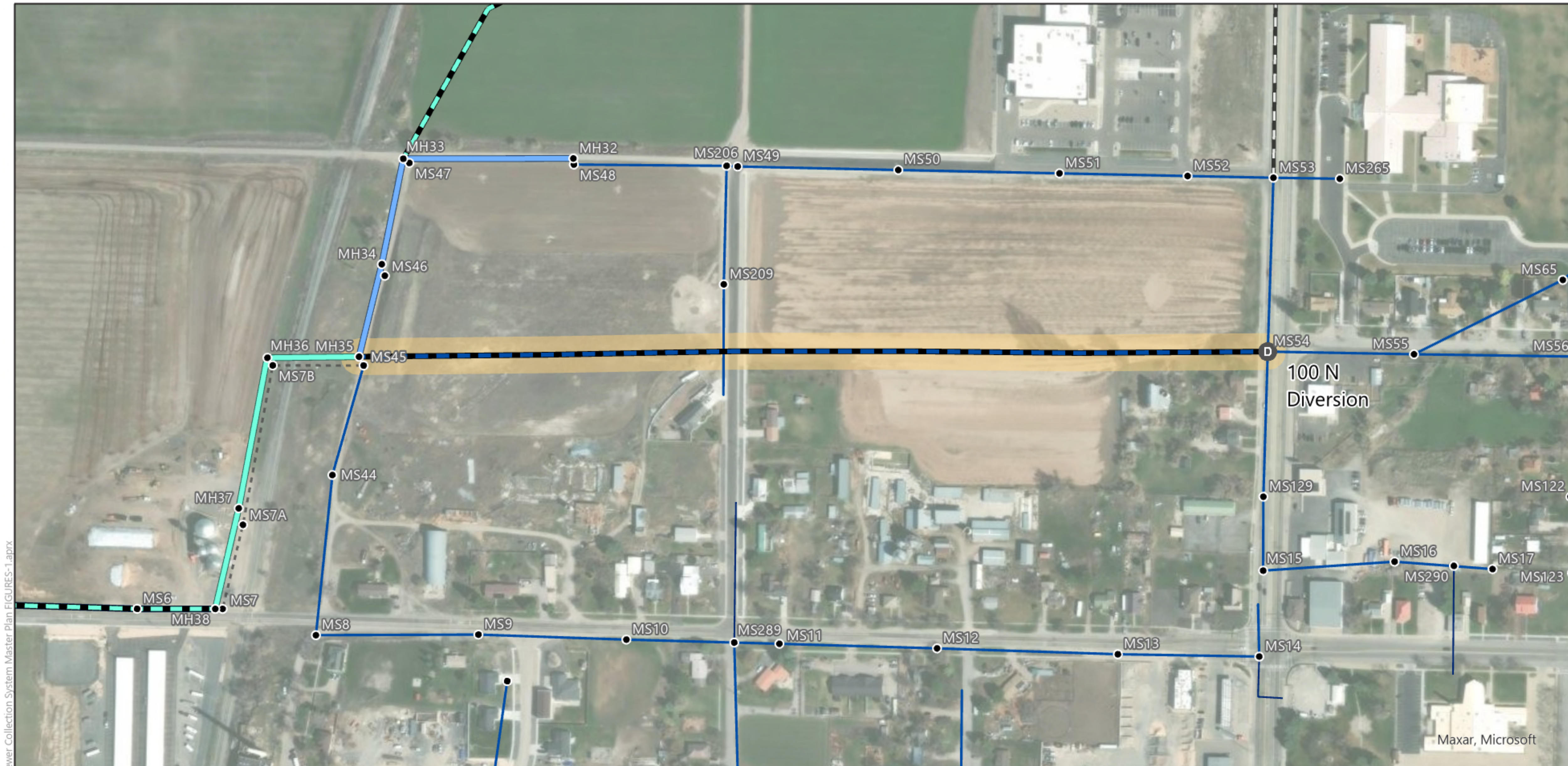
Date Printed: 8/26/2025

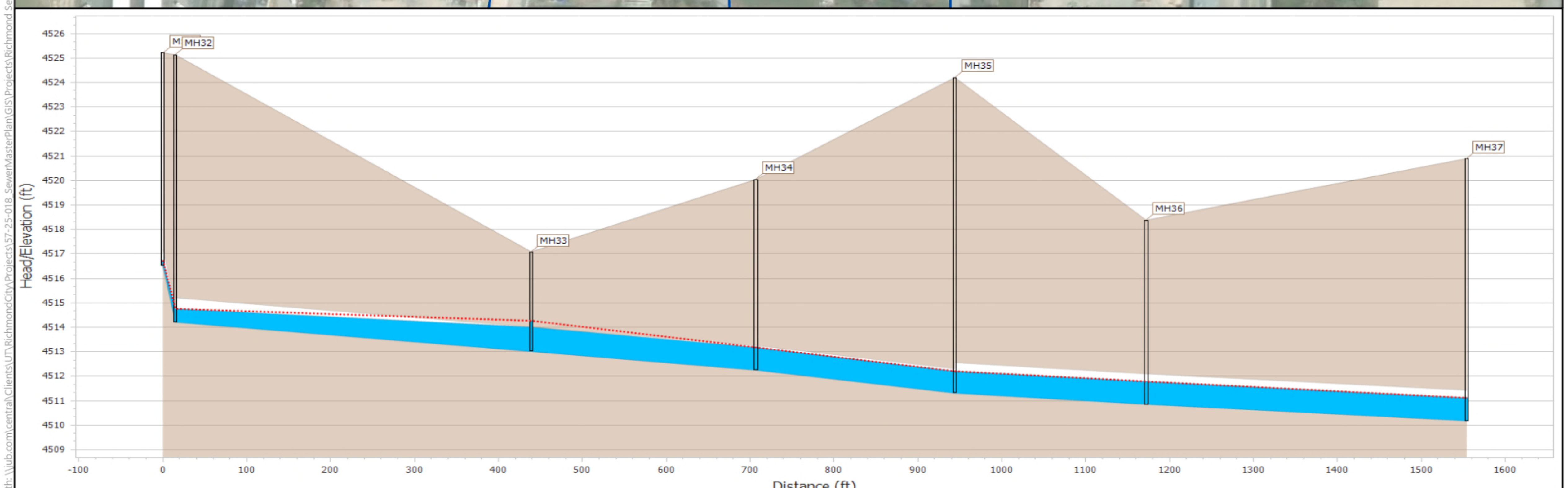
Path: \\jub.com\central\Clients\UT\RichmondCity\Projects\57-25-018 SewerMasterPlan\GIS\Projects\Richmond Sewer Collection System Master Plan FIGURES-1.aprx

RICHMOND
— UTAH —
Sewer Master Plan

Figure E5

C.4 W 100 N Relief





Background

Due to the planned 15-inch trunk line connecting to the existing 12-inch trunk at the intersection of 10600 N and 500 W a significant increase in flows enter the system at manhole MH33. The trunkline at that point becomes bottlenecked due to the extra flows under the build out conditions.

Solution

The recommended solution is to construct a new diversion structure and 8-inch gravity line from the intersection of 200 W and 100 N at manhole MS54 to the 15-inch trunkline on 500 W at MH35.

- Replace Manholes MS54 and MH35
- Install Approximately 2270 LF of 8-inch Gravity Trunk
- Opinion of Probable Cost (2025) – $632,000

Project Timing — As Needed with Growth

Buildout Pipe Sizes	Existing Pipe Sizes
18 Inch	18 Inch
15 Inch	15 Inch
12 Inch	12 Inch
10 Inch	10 Inch
8 Inch	8 Inch
Diversion Point	6 Inch
WWTP	Abandoned Pipes
CIP Extent	Force Main
	Manhole

NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 300 600
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025

RICHMOND
UTAH
Sewer Master Plan

Figure E6

K.1 North Trunk Extension

Background

For future development on the north side of Richmond a new trunk line needs to be built to connect the future lines to the existing system. The previous plan for this extension was modified to decrease the length of trunk line and to avoid parcels that were unlikely to annex into the city.

Solution

Replace MH33 and install approximately 4,050 LF of 15-inch gravity trunk and 637 LF of 8-inch gravity pipe.

- Replace Manhole MH33
- Install Approximately 7420 LF of 15-inch Gravity Trunk
- Install Approximately 637 LF of 8-inch Gravity Pipe
- Opinion of Probable Cost (2023 Dollars) - $1,508,000

Project Timing — As Needed with Growth

Buildout Pipe Sizes
- 18 Inch
- 15 Inch
- 12 Inch
- 10 Inch
- 8 Inch
- Diversion Point
- WWTP
- Private Lift Station
- CIP Extent

Existing Pipe Sizes
- 18 Inch
- 15 Inch
- 12 Inch
- 10 Inch
- 8 Inch
- 6 Inch
- Abandoned Pipes
- Force Main
- Manhole

NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

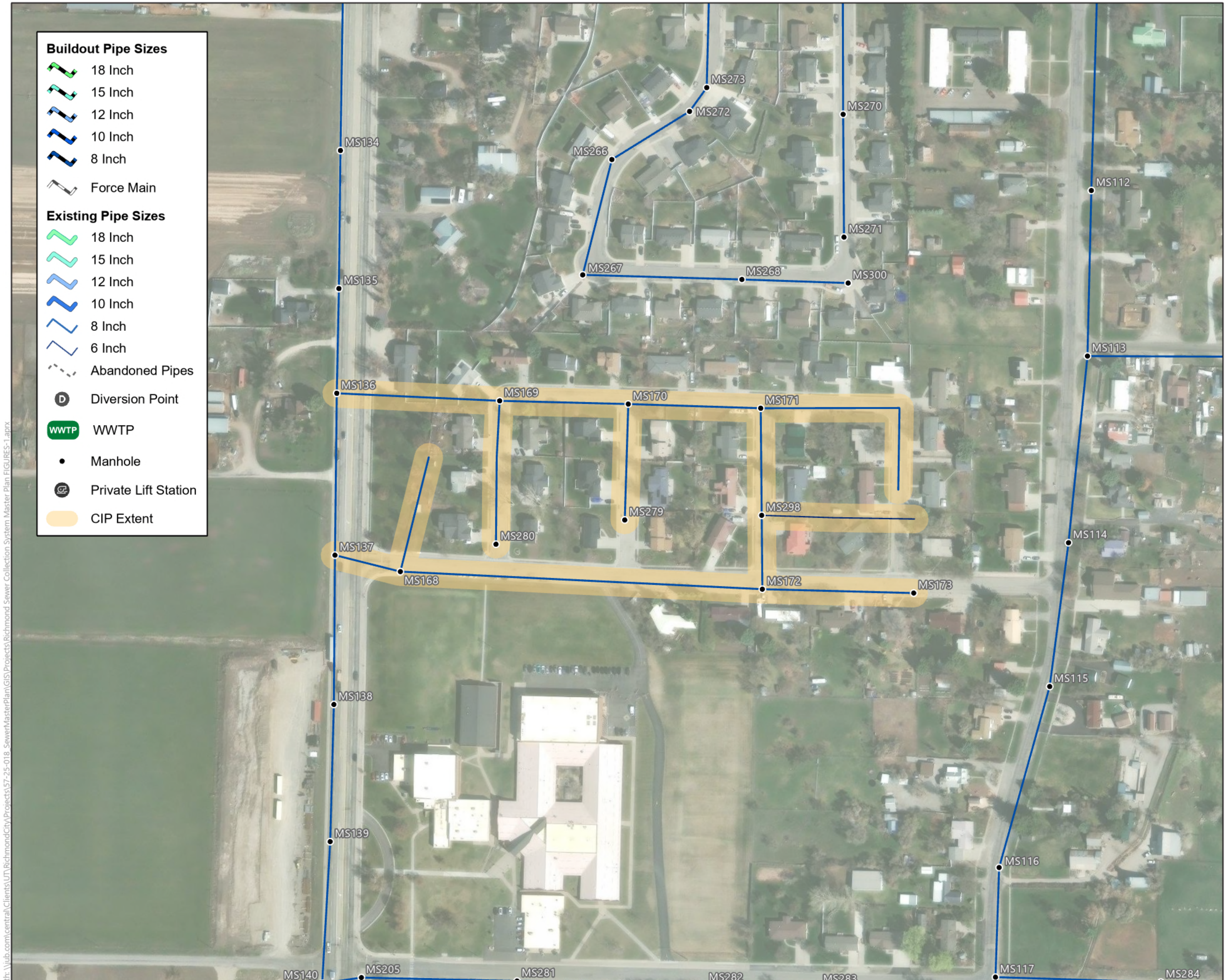
0 500 1,000
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025

Path: \\jub.com\central\Clients\UT\RichmondCity\Projects\57-25-018_SewerMasterPlan\GIS\Projects\Richmond Sewer Collection System Master Plan FIGURES-1.aprx



RICHMOND
UTAH
Sewer Master Plan

Figure E7

R.1 W 470 S Replacement

Background

The pipes along 470 S and 410 S are in poor condition and run through several residential yards making maintenance difficult, this area would benefit from being relocated. The water master plan also identified another project to replace the existing water lines on these streets. It is recommended that these two projects be combined to lower the overall construction cost and disturbance to the area.

Solution

Replace the existing pipeline with a new 8-inch pipe.

- Abandon in place 9 sanitary sewer manholes, 3,632 LF of sanitary pipe, placement of 9 new sanitary sewer manholes, and the placement of approximately 3,632 LF of new 8-inch gravity pipe.
- Abandon in place 9 manholes
- Install 9 new 48-inch manholes
- Opinion of Probable Cost (2025) – $1,344,000

Project Timing 0 - 10 Years

NOTE:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 200 400
Feet

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 8/26/2025

J-U-B ENGINEERS, INC.

400 Memorial Dr. Idaho Falls, ID 83402 208.932.4486

Opinion of Probable Project Cost

C.1 ***Main Street Upsize Ph.1***

Revision Date: Aug-2025

ESTIMATED IMPROVEMENT COST: $ 413,000

ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.0	**Mobilization** (5%)	1	LS	$ 14,060	$ 14,060
2.0	**Construction Traffic Control**	10	DAYS	$ 1,000	$ 10,000
3.0	**Gravity Sewer Pipe**				
3.1	18" PVC Gravity Sewer Pipe and Bedding	1189	LF	$ 75	$ 89,175
3.2	Remove and Dispose of 15" Sewer Pipe	1189	LF	$ 15	$ 17,835
3.3	Connect to Existing	2	EA	$ 1,500	$ 3,000
3.4	Dewatering - Minor (< 15 ft)	1189	LF	$ 14	$ 16,646
4.0	**Single Pipe Trench Excav./Backfill**				
4.1	0-10 ft. (Large Trunk)	1189	LF	$ 66	$ 78,474
4.2	10-15 ft. (Large Trunk)	0	LF	$ 98	$ -
4.3	15-20 ft. (Large Trunk)	0	LF	$ 131	$ -
5.0	**Surface Repair**				
5.1	0-10' Depth (Asphalt - ¼ Street)	802	LF	$ 44	$ 35,288
5.2	Natural Ground	387	LF	$ 13	$ 5,031
6.0	**Manholes**				
6.1	48" Manholes, 0-10 ft.	2	EA	$ 5,800	$ 11,600
8.2	Abandon Existing Manhole	2	EA	$ 1,500	$ 3,000
7.0	**Miscellaneous Other**				
7.1	Bypass Pumping	10	DAYS	$ 600	$ 6,000
7.2	Stormwater Management	1	LS	$ 5,000	$ 5,000
	ESTIMATED CONSTRUCTION COST[1]				**$ 295,000**
	Project Soft Costs [2]	15%			**$ 44,000**
	Contingency	25%			**$ 74,000**
	TOTAL PROBABLE COST IN 2025 Dollars [3]				**$ 413,000**
CLIENT PROJECT NO.:			J-U-B PROJECT NO.:		57-25-018

1 - Construction cost includes mobilization and costs related to construction. No engineering costs have been added. Costs associated with special funding requirements such as Davis-Bacon prevailing wages and American Iron and Steel (AIS) are not included. Additional costs associated with rock trenching are not included.

2 - Soft costs include: engineering, design, construction assistance, survey, geotechnical subconsultant and record drawings. No easement acquistion or legal costs are included.

3 - Costs are in 2025 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes.

J-U-B ENGINEERS, INC.

400 Memorial Dr. Idaho Falls, ID 83402 208.932.4486

Opinion of Probable Project Cost

C.2	***S 800 W Pipe Upsize***			Revision Date:	Aug-2025
				ESTIMATED IMPROVEMENT COST: $	**547,000**

ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.0	**Mobilization** (5%)	1	LS	$ 18,590	$ 18,590
2.0	**Construction Traffic Control**	16	DAYS	$ 1,000	$ 16,000
3.0	**Gravity Sewer Pipe**				
3.1	12" PVC Gravity Sewer Pipe and Bedding	1598	LF	$ 44	$ 70,312
3.2	Remove and Dispose of 15" Sewer Pipe	1598	LF	$ 19	$ 30,362
3.3	Connect to Existing	2	EA	$ 1,500	$ 3,000
3.4	Dewatering - Minor (< 15 ft)	1598	LF	$ 14	$ 22,372
4.0	**Single Pipe Trench Excav./Backfill**				
4.1	0-10 ft. (Large Trunk)	1598	LF	$ 66	$ 105,468
4.2	10-15 ft. (Large Trunk)	0	LF	$ 98	$ -
4.3	15-20 ft. (Large Trunk)	0	LF	$ 131	$ -
5.0	**Surface Repair**				
5.1	0-10' Depth (Asphalt - ¼ Street)	1598	LF	$ 44	$ 70,312
5.2	Natural Ground	0	LF	$ 13	$ -
6.0	**Manholes**				
6.1	48" Manholes, 0-10 ft.	4	EA	$ 5,800	$ 23,200
8.2	Abandon Existing Manhole	4	EA	$ 1,500	$ 6,000
7.0	**Miscellaneous Other**				
7.1	Bypass Pumping	16	DAYS	$ 600	$ 9,600
7.2	Stormwater Management	1	LS	$ 15,000	$ 15,000
	ESTIMATED CONSTRUCTION COST[1]				**$ 390,000**
	Project Soft Costs [2]	15%			**$ 59,000**
	Contingency	25%			**$ 98,000**
	TOTAL PROBABLE COST IN 2025 Dollars [3]				**$ 547,000**
CLIENT PROJECT NO.:				J-U-B PROJECT NO.:	57-25-018

1 - Construction cost includes mobilization and costs related to construction. No engineering costs have been added. Costs associated with special funding requirements such as Davis-Bacon prevailing wages and American Iron and Steel (AIS) are not included. Additional costs associated with rock trenching are not included.

2 - Soft costs include: engineering, design, construction assistance, survey, geotechnical subconsultant and record drawings. No easement acquistion or legal costs are included.

3 - Costs are in 2025 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes.

J-U-B ENGINEERS, INC.

400 Memorial Dr. Idaho Falls, ID 83402 208.932.4486

Opinion of Probable Project Cost

C.3	***Main Street Upsize Ph.2***			Revision Date:	Aug-2025
		ESTIMATED IMPROVEMENT COST:			**$ 581,000**

ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.0	**Mobilization** (5%)	1	LS	$ 19,750	$ 19,750
2.0	**Construction Traffic Control**	14	DAYS	$ 1,000	$ 14,000
3.0	**Gravity Sewer Pipe**				
3.1	15" PVC Gravity Sewer Pipe and Bedding	1415	LF	$ 55	$ 77,825
3.2	Remove and Dispose of 15" Sewer Pipe	1415	LF	$ 19	$ 26,885
3.3	Connect to Existing	2	EA	$ 1,500	$ 3,000
3.4	Dewatering - Minor (< 15 ft)	1415	LF	$ 14	$ 19,810
4.0	**Single Pipe Trench Excav./Backfill**				
4.1	0-10 ft. (Large Trunk)	1220	LF	$ 66	$ 80,520
4.2	10-15 ft. (Large Trunk)	195	LF	$ 98	$ 19,110
4.3	15-20 ft. (Large Trunk)	0	LF	$ 131	$ -
5.0	**Surface Repair**				
5.1	0-10' Depth (Asphalt - ¼ Street)	1220	LF	$ 44	$ 53,680
5.2	10-20' Depth (Asphalt - ½ Street)	195	LF	$ 71	$ 13,845
5.3	Natural Ground	0	LF	$ 13	$ -
6.0	**Manholes**				
6.1	48" Manholes, 0-10 ft.	4	EA	$ 5,800	$ 23,200
6.2	48" Manholes, 10-20 ft.	4	EA	$ 8,400	$ 33,600
6.3	Abandon Existing Manhole	4	EA	$ 1,500	$ 6,000
7.0	**Miscellaneous Other**				
7.1	Bypass Pumping	14	DAYS	$ 600	$ 8,400
7.2	Stormwater Management	1	LS	$ 15,000	$ 15,000
	ESTIMATED CONSTRUCTION COST[1]				**$ 415,000**
	Project Soft Costs [2]	15%			**$ 62,000**
	Contingency	25%			**$ 104,000**
	TOTAL PROBABLE COST IN 2025 Dollars [3]				**$ 581,000**
CLIENT PROJECT NO.:				J-U-B PROJECT NO.:	57-25-018

1 - Construction cost includes mobilization and costs related to construction. No engineering costs have been added. Costs associated with special funding requirements such as Davis-Bacon prevailing wages and American Iron and Steel (AIS) are not included. Additional costs associated with rock trenching are not included.

included.

3 - Costs are in 2025 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes.

J-U-B ENGINEERS, INC.

400 Memorial Dr. Idaho Falls, ID 83402 208.932.4486

Opinion of Probable Project Cost

C.4	***W 100 N Relief***		Revision Date:		Aug-2025
			ESTIMATED IMPROVEMENT COST:		**$ 632,000**

ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.0	**Mobilization** (5%)	1	LS	$ 21,460	$ 21,460
2.0	**Construction Traffic Control**	2	DAYS	$ 1,000	$ 2,000
3.0	**Gravity Sewer Pipe**				
3.1	8" PVC Gravity Sewer Pipe and Bedding	2263	LF	$ 33	$ 74,679
3.2	Connect to Existing	2	EA	$ 1,500	$ 3,000
3.3	Dewatering - Minor (< 15 ft)	2263	LF	$ 14	$ 31,682
4.0	**Single Pipe Trench Excav./Backfill**				
4.1	0-10 ft. (Large Trunk)	0	LF	$ 66	$ -
4.2	10-15 ft. (Large Trunk)	2263	LF	$ 98	$ 221,774
4.3	15-20 ft. (Large Trunk)	0	LF	$ 131	$ -
5.0	**Surface Repair**				
5.1	10-20' Depth (Asphalt - ½ Street)	0	LF	$ 71	$ -
5.2	Natural Ground	2263	LF	$ 13	$ 29,419
6.0	**Manholes**				
6.1	48" Manholes, 10-20 ft.	6	EA	$ 8,400	$ 50,400
7.0	**Miscellaneous Other**				
7.1	Bypass Pumping	2	DAYS	$ 600	$ 1,200
7.2	Stormwater Management	1	LS	$ 15,000	$ 15,000
	ESTIMATED CONSTRUCTION COST[1]				**$ 451,000**
	Project Soft Costs [2]	15%			**$ 68,000**
	Contingency	25%			**$ 113,000**
	TOTAL PROBABLE COST IN 2025 Dollars [3]				**$ 632,000**
CLIENT PROJECT NO.:				J-U-B PROJECT NO.:	57-25-018

1 - Construction cost includes mobilization and costs related to construction. No engineering costs have been added. Costs associated with special funding requirements such as Davis-Bacon prevailing wages and American Iron and Steel (AIS) are not included. Additional costs associated with rock trenching are not included.

2 - Soft costs include: engineering, design, construction assistance, survey, geotechnical subconsultant and record drawings. No easement acquistion or legal costs are included.

3 - Costs are in 2025 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes.

J·U·B ENGINEERS, INC.

400 Memorial Dr. Idaho Falls, ID 83402 208.932.4486

Opinion of Probable Project Cost

K.1	***North Trunk Extension***			Revision Date:		Aug-2025
				ESTIMATED IMPROVEMENT COST:	**$**	**1,508,000**
ITEM No.	**Description**	**Est. Quant.**	**Unit**	**Unit Price**		**Total Price**
1.0	**Mobilization** (5%)	1	LS	$ 51,290	$	51,290
2.0	**Construction Traffic Control**	4	DAYS	$ 1,000	$	4,000
3.0	**Gravity Sewer Pipe**					
3.1	15" PVC Gravity Sewer Pipe and Bedding	4051	LF	$ 55	$	222,805
3.2	8" PVC Gravity Sewer Pipe and Bedding	637	LF	$ 33	$	21,021
3.3	Connect to Existing	1	EA	$ 1,500	$	1,500
3.4	Dewatering - Minor (< 15 ft)	4688	LF	$ 14	$	65,632
4.0	**Single Pipe Trench Excav./Backfill**					
4.1	0-10 ft. (Large Trunk)	2097	LF	$ 66	$	138,402
4.2	10-15 ft. (Large Trunk)	1289	LF	$ 98	$	126,322
4.3	15-20 ft. (Large Trunk)	625	LF	$ 131	$	81,875
4.4	20-25 ft. (Large Trunk)	675	LF	$ 164	$	110,700
5.0	**Surface Repair**					
5.1	0-10' Depth (Asphalt - ¼ Street)	300	LF	$ 70	$	21,000
5.2	10-20' Depth (Asphalt - ½ Street)	1200	LF	$ 71	$	85,200
5.3	20-30' Depth (Asphalt - Full Street)	111	LF	$ 217	$	24,087
5.4	Natural Ground	3077	LF	$ 13	$	40,001
6.0	**Manholes**					
6.1	48" Manholes, 0-10 ft.	4	EA	$ 5,800	$	23,200
6.2	48" Manholes, 10-20 ft.	3	EA	$ 8,400	$	25,200
6.3	48" Manholes, 20-30 ft.	1	EA	$ 19,100	$	19,100
7.0	**Miscellaneous Other**					
7.1	Bypass Pumping	1	DAYS	$ 600	$	600
7.2	Stormwater Management	1	LS	$ 15,000	$	15,000
	ESTIMATED CONSTRUCTION COST[1]				**$**	**1,077,000**
	Project Soft Costs [2]	15%			**$**	**162,000**
	Contingency	25%			**$**	**269,000**
	TOTAL PROBABLE COST IN 2025 Dollars [3]				**$**	**1,508,000**
CLIENT PROJECT NO.:				J-U-B PROJECT NO.:		57-25-018

1 - Construction cost includes mobilization and costs related to construction. No engineering costs have been added. Costs associated with special funding requirements such as Davis-Bacon prevailing wages and American Iron and Steel (AIS) are not included. Additional costs associated with rock trenching are not included.

2 - Soft costs include: engineering, design, construction assistance, survey, geotechnical subconsultant and record drawings. No easement acquistion or legal costs are included.

3 - Costs are in 2025 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes.

J·U·B ENGINEERS, INC.

400 Memorial Dr. Idaho Falls, ID 83402 208.932.4486

Opinion of Probable Project Cost

R.1	***W 470 S Replacement***	Revision Date:	Aug-2025		
		ESTIMATED IMPROVEMENT COST:	**$ 1,344,000**		

ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.0	**Mobilization** (5%)	1	LS	$ 45,710	$ 45,710
2.0	**Construction Traffic Control**	20	DAYS	$ 1,000	$ 20,000
3.0	**Gravity Sewer Pipe**				
3.1	8" PVC Gravity Sewer Pipe and Bedding	3632	LF	$ 33	$ 119,856
3.2	Dewatering - Minor (< 15 ft)	3632	LF	$ 14	$ 50,848
4.0	**Single Pipe Trench Excav./Backfill**				
4.1	0-10 ft. (Large Trunk)	0	LF	$ 66	$ -
4.2	10-15 ft. (Large Trunk)	3632	LF	$ 98	$ 355,936
4.3	15-20 ft. (Large Trunk)	0	LF	$ 131	$ -
5.0	**Surface Repair**				
5.1	10-20' Depth (Asphalt - ½ Street)	3632	LF	$ 71	$ 257,872
6.0	**Miscellaneous Other**				
6.1	Bypass Pumping	2	DAYS	$ 600	$ 1,200
6.2	Abandon in Place Existing Sanitary Sewer Pipe	3632	LF	$ 15	$ 54,480
6.3	Abandon in Place Existing Sanitary Sewer Manhole	9	EA	$ 6,000	$ 54,000
	ESTIMATED CONSTRUCTION COST[1]				**$ 960,000**
	Project Soft Costs [2]	15%			**$ 144,000**
	Contingency	25%			**$ 240,000**
	TOTAL PROBABLE COST IN 2025 Dollars [3]				**$ 1,344,000**
CLIENT PROJECT NO.:		J-U-B PROJECT NO.:		57-25-018	

as Davis-Bacon prevailing wages and American Iron and Steel (AIS) are not included. Additional costs associated with rock trenching are not included.

2 - Soft costs include: engineering, design, construction assistance, survey, geotechnical subconsultant and record drawings. No easement acquistion or legal costs are

3 - Costs are in 2025 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes.

RICHMOND
UTAH
Home of Black & White Days

Richmond Water Master Plan

July 2025

Prepared By:

J·U·B ENGINEERS, INC.

1047 S 100 W #180
Logan, UT 84321

Table of Contents

List of Tables

1. Introduction

Richmond City, located in Cache County, Utah, is experiencing steady population growth and development, increasing demand on its water supply and distribution systems. The purpose of this master plan is to provide planning and funding guidance to Richmond City in water system infrastructure decisions over the next 20 years, serving as a technical roadmap for Richmond City to prioritize capital improvements, maintain regulatory compliance, and ensure long-term water supply sustainability. It is recommended that Richmond City update this Water Master Plan every five years to help ensure future projects are planned and scheduled appropriately. The culinary water system serves an area of approximately 3.5 square miles which includes 1095 connections

1.1 Scope

The scope of this master plan includes the following elements:

- Creation of a computerized hydraulic model of the existing water system
- Hydraulic model analysis of existing and future conditions
- Evaluation of system water rights, water sources, and water storage
- Preparation of a prioritized capital improvement projects list
- Preparation of a 20-year funding and implementation plan for capital improvement projects
- Evaluation of secondary irrigation system

1.2 Definitions

The following definitions are provided to clarify commonly used terms in the report:

- Average Daily Flow: The average yearly demand volume expressed in a flow rate.
- Average Yearly Demand: The total volume of water used during a calendar year.
- Cubic Feet per Second (CFS): Typical measurement for the flow of water.
- Demand: The required flow rate or volume to satisfy consumer use.
- Distribution System: The network of pipes, valves and bends used to deliver water to the users.
- Culinary Water: Water suitable for human consumption. Sometimes referred to as drinking water or potable water.
- Equivalent Residential Connection (ERC): A measure used in comparing water demand from non-residential connections to residential connections.
- Fire Flow Requirements: The rate of water delivery required to extinguish a particular fire. Usually given as a rate of flow (gallons per minute) for a specific period.

- Head loss: The amount of pressure lost in a distribution system under dynamic conditions due to the wall roughness and other physical characteristics of pipes and fittings.
- Gallons Per Minute (GPM): Typical measurement for the flow of water.
- Gallons Per Day (GPD): Typical measurement for the flow of water.
- Peak Day: The day(s) of the year in which a maximum amount of water is used in a 24-hour period.
- Peak Day Demand: The average daily flow required to meet the needs imposed on a water system during the peak day(s) of the year.
- Peak Instantaneous Demand: The flow required to meet the needs imposed on a water system during maximum flow on a peak day.
- Pounds per Square Inch (psi): typical measurement for the pressure of water.
- Pressure Reducing Valve (PRV): A valve used to reduce undesired pressure in a water distribution system.
- Pressure Zone: The area within a distribution system in which water pressure is maintained within specified limits.
- SCADA: Supervisory control and data acquisition software and hardware that allows for remote monitoring and control of system components.
- Service Area: The area for which users participate in the ownership, planning, design, construction, operation, and maintenance of a water system.

2. Background & Assumptions

Background information and assumptions were needed to complete this master plan. This section covers the service area, projected future growth, state requirements, and estimated system demands used in the analysis. The state's sizing requirements (R309-510), are separated into three different components of the culinary water system including source, storage, and distribution.

2.1 Service Area

Richmond City serves residents of Richmond, Utah, which has an estimated population of 3,268. A map of the service area of the City in Appendix A as Figure 1. It was assumed that the city would annex approximately 125 acres of land on the southeast side of the city and 20 acres around the Lees development.

2.2 Projected Growth

The projected growth in the city was estimated based on current development and known future development. Through review of in-process developments, workshops with City staff and leadership, review of available parcels, and guidance of the general plan, it was estimated that the number of ERC's will grow at a rate of 2.75% per year over the next 20 years. It is anticipated that the city will have localized areas of growth that will have some areas developing faster than others. Studying and planning for these areas was determined by using current development plans, anticipated future development phases, and future land as shown in the city's General Plan.

2.3 System Requirements

The State of Utah provides general sizing requirements (R309-510) for all culinary water systems. These requirements were used to develop the level of service of the system's source and storage capacity. The level of service of the distribution system was determined using system specific flow requirements and pressure requirements provided by the State. The flow requirements are calculated using the highest usage over the past three years with an additional safety factor. Each of the system components are discussed in the following sections.

Sources. Culinary water sources are measured by the quantity of water that can be introduced into the system to meet demand for both indoor and outdoor use. Source requirements established by the State for indoor use for the City are 800 gallons per day per ERC for peak day demand, and 146,000 gallons per year per ERC for average annual demand. In addition to the indoor use, it has been assumed that the outdoor use requirements are 998 gallons per day per ERC for peak day demand and 152,325 gallons per year per ERC for average annual demand.

Storage**.** Culinary water storage is comprised of four different components:

1. Equalization (Indoor) – Water needed to satisfy fluctuation in system demands for indoor use. The state requirements are 400 gallons per ERC for equalization storage.
2. Equalization (Outdoor) – Water needed to satisfy the fluctuation in system demands for irrigation use. The state requirements are 2848 gallons per irrigated acre.
3. Fire Flow Storage – Water needed during firefighting efforts for the largest structure protected by the system. The state's guidance is to use the local fire code for calculating fire flow storage. Typically, it is determined by the fire flow requirement for the largest structure which in this case is any building up to 10,000 square feet that does not include a sprinkler system. The fire flow requirement from the fire marshal for these structures is 3,000 GPM for 3 hours or 540,000 gallons.
4. Emergency Storage – Emergency storage is to provide water in the event of emergency situations, such as pipeline failures, major trunk main failures, equipment failures, raw-water supply contamination, or natural disasters. The Division of Drinking Water provides no sizing requirements for emergency storage but allows each system to determine the amount of emergency storage needed based on assessment of risk and of system dependability. The assumption for this master plan is that a volume equal to 25% of the peak day system demand will be set aside for emergency storage.

Distribution**.** Culinary water distribution system requirements are based on minimum pressures that must be met under specific flow conditions including fire flows. The Fire Marshal for the city was contacted for this report and indicated that 3,000 GPM with 20 psi residual pressure is the target for hydrants serving commercial zones. Residential hydrants should provide 1,500 GPM with 20 psi residual pressure. The minimum allowed for residential services is 1,000 GPM. The Fire Marshal also provided information on the necessary fire flow for structures up to 10,000 square feet without a sprinkler system.

The state requires a minimum pressure of 40 psi for the peak day demand flows and 30 psi for peak hour demand flows. Both conditions and the fire flow conditions described above must be met. Table 1 shows a summary of the state requirements for source and storage. Table 2 shows the system specific flow requirements, and the associated state provided pressure requirements.

Table 1. Summary of Source and Storage Requirements.

Category	State Requirements
Average Yearly Demand	146,000 gal/yr/ERC
Indoor Peak Day Demand	800 gal/day/ERC
Outdoor Peak Day Demand	998 gal/day/ERC
Equalization Storage	400 gal/ERC
Fire Flow Storage	3,000 GPM for 3 hours
Emergency Storage	25% of peak day demand

Table 2. Summary of Distribution Requirements.

Category	Flow Requirements	Pressure Requirements
Peak Day Demand	1,092 GPM	40 psi
Peak Hour Demand	1,638 GPM	30 psi
Residential Fire Flow	1,500 GPM	20 psi
Commercial Fire Flow	3,000 GPM	20 psi

2.4 System Demands

The culinary water system demand has two components; the peak day flow rate and an annual volume required to be delivered by the water system. System demands are compared to State requirements to determine the level of service of culinary water sources. The demands are also used in hydraulic modeling to determine the level of service of the delivery system.

Unless a secondary water system exists to provide water for outdoor use, the culinary system must provide water for both indoor and outdoor use. A small number of Richmond City residents have access to irrigation water provided through ditches that run through the city. It was assumed that approximately 30% of the connections use non-treated irrigation water for outdoor water use. Consequently, the culinary system must provide the remaining 70% of city residents with water for outdoor irrigation needs.

The future development of a secondary water system by the irrigation company would have significant current and future impacts on the demands of the culinary water system. However, the Irrigation Company has expressed no interest in developing such a system in the foreseeable future. An analysis of the feasibility for the city to develop an irrigation system is included in section 3.4.

The outdoor and indoor demands used in the model were calculated for each home using data from individual water meters from the past three years. Richmond City has meters installed at city owned springs and wells and on individual customer connections. There are several considerations when using this data for use in the system analysis.

1. Customer meters vary in accuracy from meter to meter.
2. Customer meter readings do not account for system losses.
3. Monthly meter readings during peak months can only show the average daily volume for the peak month and don't reflect the higher peak daily flows that occur during that peak month.

System demands are based on flow rates per ERC. An ERC is used to equate nonresidential users to an equivalent number of residential users. Richmond City currently has 962 residential and 45 commercial connections, resulting in a total of 1095 ERCs.

2.5 Water Loss

The City shows a high amount of culinary water loss in the data it reports to the Division of Drinking Water each year. The past three years of water loss is shown in Table 3. The water loss is the difference in the amount of water entering into the system through sources, and the water leaving the system through residential meters. The water loss in the system is assumed to be attributed to tank overflow, pipe leaks at fittings or connections, fire hydrant flushing, and malfunctioning meters.

Table 3. Historic Estimated Water Loss.

Year	Water from Sources (ac-ft)	Water Billed (ac-ft)	Estimated Water Loss
2022	550.1	473	14.0%
2023	572.4	477.2	16.6%
2024	640.9	495.8	22.6%

An analysis of the water entering and leaving the system revealed a high amount of water lost in 2024. It was discovered that a leak occurred between Cherry Creek Spring and the Main Tank for most of the year, resulting in an increase of estimated water loss. The leak has since been repaired, and it is anticipated that future water loss will return to pre-2024 levels.

3. System Analysis

The purpose of this section is to evaluate the ability of the culinary water system to meet current and future demands. The existing culinary water system consists of two springs, two wells, three tanks, and over 30 miles of pipe. The evaluation involves the sources, storage, and distribution components of the system.

3.1 Water Sources

Richmond City currently has water rights through various wells and springs in and around the City boundaries. A comprehensive water rights summary was performed by Forsgren Associates in 2023 and can be seen in Appendix C. Currently developed sources include Cherry Creek Spring, City Creek Spring, WDCI Well, and Cherry Creek Well.

Cherry Creek Spring has a water right of 3.81 CFS (1709.90 GPM) but is limited during the peak demand season to 1.5 CFS (686 GPM). The available volume on an annual basis is equal to 1156.226 ac-ft. The culinary water from Cherry Creek Spring is also slightly corrosive, and lead and copper levels tend to be elevated when water from the spring is used in the system.

City Creek Spring has a water right of 0.223 CFS (100.08 GPM) which is equal to a yearly volume of 161.44 ac-ft. However, the amount of culinary water reliably available for diversion at the spring is approximately 0.18 CFS (80 GPM).

The WDCI Well has a water right of 1.11 CFS (498.16 GPM) which is equal to a yearly volume of 477 ac-ft. The well can reliably produce a flow equal to the water right.

The Cherry Creek Well has a water right of 3 CFS (1346.38 GPM) which is equal to a yearly volume of 741.4 ac-ft. The right has two points of diversion, and only one has been developed to culinary standards. The water right only allows for a maximum diversion rate of 1.5 CFS from either well. Therefore, only 1.5 CFS (673.25 GPM) can be utilized currently, which is equal to a yearly volume of 317.4 ac-ft per year. During the well equipping it was determined that the aquifer could only yield a peak flow rate of 0.85 CFS (380 GPM), so the well was equipped with a pump that provides 380 GPM.

The springs and wells, as developed, have a combined peak day flow capacity of 2,367,360 gallons per day and a yearly volume capacity of 2,652 ac-ft. A summary of the sources ability to meet current and future demand is shown in Table 4 and Table 5.

Table 4. Source Peak Day Flow Requirements.

Year	ERCs	Available		State Required Flows		Surplus or Deficit	
		GPD	GPM	GPD	GPM	GPD	GPM
2023	1095	2,367,360	1,644	1,968,722	1,367.2	+398,638	+276.8
2033	1436	2,367,360	1,644	2,581,813	1,792.9	-214,453	-148.9
2043	1884	2,367,360	1,644	3,387,281	2,352.3	-1,019,921	-708.3

Table 5. Source Annual Volume Requirements.

Year	ERCs	Available (ac-ft)	State Required Flows (ac-ft)	Surplus or Deficit (ac-ft)
2025	1095	2,652	1,003	+1,649
2035	1436	2,652	1,315	+1,337
2045	1884	2,652	1,725	+927

Based on the required flows in the system and the projected growth, the system does not show a deficiency in source flows until the 10-year projected scenario where there is a deficit in Peak Day Flow.

Beyond existing and future capacity, other factors should be considered when determining additional source requirements. Those include drought resiliency and water quality issues. Well sources are generally less susceptible to fluctuations in flow due to drought conditions when compared to springs, thereby offering the system more resiliency to drought by delivering a higher level of consistency in flow. Also, a new source could be installed on the South end of town, creating a more balanced source distribution throughout the system and tapping into a locally separated aquifer. As discussed, the Cherry Creek Spring water is corrosive, and significant use of the water could require treatment. A new well is an option to replace some of the flows from Cherry Creek Spring and decrease the need for expensive water treatment measures.

3.1.1 40-year Supply

Utah legislation allows cities to accrue water rights in order to fulfill their needs within the coming 40 years UCA 73-1-4(2)(f)(i). Based on population projections, it is estimated that the 40-year peak day demand (year 2065) to be about 11 cfs for indoor use only.

The state of Utah also governs the time frames for the use of water under a given right. It is advisable to rotate the use of the City's rights that have been placed into a non-use status on a seven (maximum) year basis in order to protect the right. Rotations should be coordinated with the State Engineers' Office. We also advise the City to keep a calendar which would track the water right rotations as well as the dates of expiration of non-use status as well as reminders for water ruse report due dates, water right perfection dates, etc.

3.2 Water Storage

Richmond City currently has three culinary water tanks, the Main Tank which has a capacity of 500,000 gallons, the Cherry Creek Tank which has a capacity of 2,000,000 gallons, and a steel tank which has a capacity of 500,000 gallons. These three tanks provide a combined storage of 3 million gallons. A summary of current and future storage requirements is shown in Table 6.

Table 6. Storage Summary.

Storage Categories	2025 (gal)	2035 (gal)	2045 (gal)
Equalization (Indoor Use)	438,000	574,400	753,600
Equalization (Outdoor Use)	545,748	715,702	938,986
Fire Suppression	540,000	540,000	540,000
Emergency Storage	492,181	645,453	846,820
Total Required Storage	2,015,929	2,475,556	3,079,406
Total City Storage	3,000,000	3,000,000	3,000,000
Surplus or Deficit	+984,071	+524,444	-79,406

Similar to the source requirement discussion, factors beyond required capacity should be considered when determining when to construct a new culinary water storage facility. A culinary water tank not only provides storage but can set the system pressure based on the elevation of the tank. Richmond City intends to develop a new upper pressure zone on the South East portion of town. This can be accomplished by installing a pump station, or a new tank located appropriately to provide the pressures desired.

A new culinary water tank, strategically sited, would add storage to keep the city above the State Requirements in the 20-year projection, provide necessary pressures to an upper pressure zone, and would add resiliency to the system by diversifying the storage locations.

3.3 Water Distribution

The analysis of the distribution system to meet the minimum pressures under certain flow conditions was completed using a hydraulic computer model. The model is run to simulate each flow condition, including peak day, peak hour, and peak day with fire flow demands. The distribution system currently has pipe sizes ranging from 4-inch to 16-inch. The necessary improvements to meet distribution requirements were identified based on model output information. The figures attached in Appendix A illustrate the different model scenarios and results.

3.4 Secondary Water Considerations

The outdoor water use represents a large portion of the required flows for the city. Therefor a secondary water system could relieve demands on the culinary system. A preliminary design of the theoretical secondary water system was completed to evaluate the feasibility of installing such a system compared to the needed culinary water system improvements.

There is currently very little infrastructure for a secondary water system within the City. It is assumed that an entirely new system would be needed. This would include a distribution system from the Cherry Creek diversion throughout the City. The distribution system would range from a 12” main line down to 6” laterals and include PRV’s to create pressure zones similar to the zones in the culinary system. It would also include a small reservoir for equalization storage. The secondary water system is estimated to cost approximately $22,000,000. A preliminary cost estimate for the secondary water system is included in Appendix B.

The estimated cost is much higher than the proposed improvements to the culinary system which are outlined in the following section. The cost alone is enough to discourage the development of a secondary system. However, there are also concerns of inconvenience during construction because a trench would need to be dug along almost every road in the city. The city also is not limited on water rights that can be developed for culinary use. This is often a reason to begin developing a secondary system, but this is not a factor in Richmond. It is not recommended for the city to pursue a secondary irrigation system.

4. Recommended Improvements

The system analysis identified future projects that are necessary to maintain or improve the current level of service. These future projects increase the demand capacity of the system, bring pressures into reasonable ranges, and increase resiliency of the system with added infrastructure. A summary of each project is detailed below, with maps found in Appendix A. Projects that will be completed as part of developments have not been included because these will be completed by the developer. Such projects include PRV's within new connections between pressure zones.

Project 1: New well in southeast section.

The existing sources currently do not meet State Requirements for peak day demand in the 10-year scenario. This needs to be addressed before any issues arise due to the deficiency. It is recommended that a 500 GPM well with a variable frequency drive be developed in the southeast section of the city. This will resolve the deficiency issue, provide a redundant source, and coincide with future recommended projects. It is important that the new well be in the area south of 400 South and east of State Street. Currently this area is only served by one twelve-inch pipe, and the well will provide a redundant source for the area. If this pipe were to be out of service for any reason, this area would not have any way of receiving culinary water.

Project 2: Connect the system with a PRV at 600 South and east of State Street.

There is a need to increase the connectivity in the system from the southeast to the rest of the system as explained in the Project 1 description. Connecting the system at 600 South east of State Street allows for the new well proposed in Project 1 to serve a larger portion of the city with some increased redundancy. This connection would require the construction of an 8-inch PRV because this crosses between pressure zones.

Project 3: Construct a new tank on a hill east of the new well.

The construction of a 1-million-gallon tank above the south side of the city offers added storage and resiliency to the system. It also adds pressure to an area of the city that is currently very near the lower limits of the State pressure recommendations for each flow category. The new tank should be placed near an elevation of 5180 feet. This accommodates growth in the area below it, however this elevation requires one PRV to be built on the hill before connecting to the rest of the system. It also requires a ten-inch PRV to be constructed on 250 East between 9800 North and 400 South and an eight-inch PRV to be constructed on 825 South between 250 East and 100 East. The new tank and PRV's would establish new pressure zones on the south end of the city. This would allow for growth in this area. As part of construction of this tank, the flow from the well proposed in Project 1 would be directed to the tank and the tank would serve the system. The last activity included in this project is to adjust the setting of the PRV located on 500 North between Sunburst Lane and Upper Richmond Road to coincide with the settings of the new PRV's below the new tank.

The construction of a pumping station near the new well proposed in Project 1 was considered as an alternative to the tank. This option would resolve the pressure issues in this area of the system but would not increase the total storage volume for the city. The analysis shows that more storage will be needed in the future and therefore the tank is the best option to correct both the pressure issues and the storage issues.

Project 4: Create Lower Pressure Zone and Install VFD on WDCI Well.

The pressures on the west side 200 West in the system are very high in the existing scenario. The creation of a new pressure zone corrects this issue. There are five connections at the proposed pressure boundary. Because of the relatively low demands in the new zone, there is only a need for two PRV's to serve this area. Therefore, two of the connections will need to have PRV's installed and three of the connections will need to be disconnected. The PRV's are recommended to be located on 600 South between 200 West and 400 West and on 200 West between 100 North and 10600 North. The first PRV will be ten inches, and the second will be twelve inches. The disconnections would then be at Main Street and 200 West, at 100 South and 200 West, and at 200 South and 200 West.

The PRV's and disconnections result in the WDCI Well being isolated from the system. To connect the well to the system, the flow from the WDCI well would need to be routed above the new pressure boundary. This would allow it to continue to serve the system as it currently does. It is also recommended that a variable frequency drive be installed on the WDCI Well to improve its efficiency in delivering flow to the system. The estimated cost for the VFD upgrade, listed as part of Project 4, includes equipment, installation, electrical engineering, and other design engineering. It is assumed that the existing well house has sufficient space for the upgrade.

Alternative locations for the PRV's and disconnections were considered. It was also considered to move the pressure boundary further West. The arrangement of PRV's and disconnections described above offers the best solution for the systems peak pressures, overall resiliency, and demand needs.

Summary

Table 7 shows a summary of the projects, their approximate estimated cost, and proposed construction year. Project costs were based off recently constructed projects and experience with similar projects. Construction timelines were determined by immediate system needs, a projects impact to the system, and discussions with the system operator. These projects should be submitted to the state to be eligible for state funding in the future.

Table 7. Recommended Project Summary.

Project #	Project Type	Project Location	Year	Estimated Cost
1	New 500 GPM Well	South of 400 South and east of State Street	2025-2027	$4,300,000
2	New 8" PRV	600 South east of State Street	2025-2027	$350,000
3	New 1 Million Gallon Tank with PRV's	East of the south side of the city	2027-2030	$3,500,000
4	Create Lower Pressure Zone	West of 200 West	2030-2032	$1,200,000
TOTAL				**$9,350,000**

The following assumptions were made in the preparation of the project cost estimates:

- All valves, fire hydrants, services, meters, and meter boxes would be replaced as part of the projects.
- Necessary roadway restoration was assumed based on the proportion of pipe in each project currently under pavement.
- Roadway restoration of 3-inch of asphalt pavement, 6-inch of road base, and imported backfill material throughout the 6' trench width in the roadway.
- 20% contingency to account for inflation and other unexpected items.
- 10% to account for engineering and 6% to account for construction services.

Detailed cost estimates can be found in Appendix B.

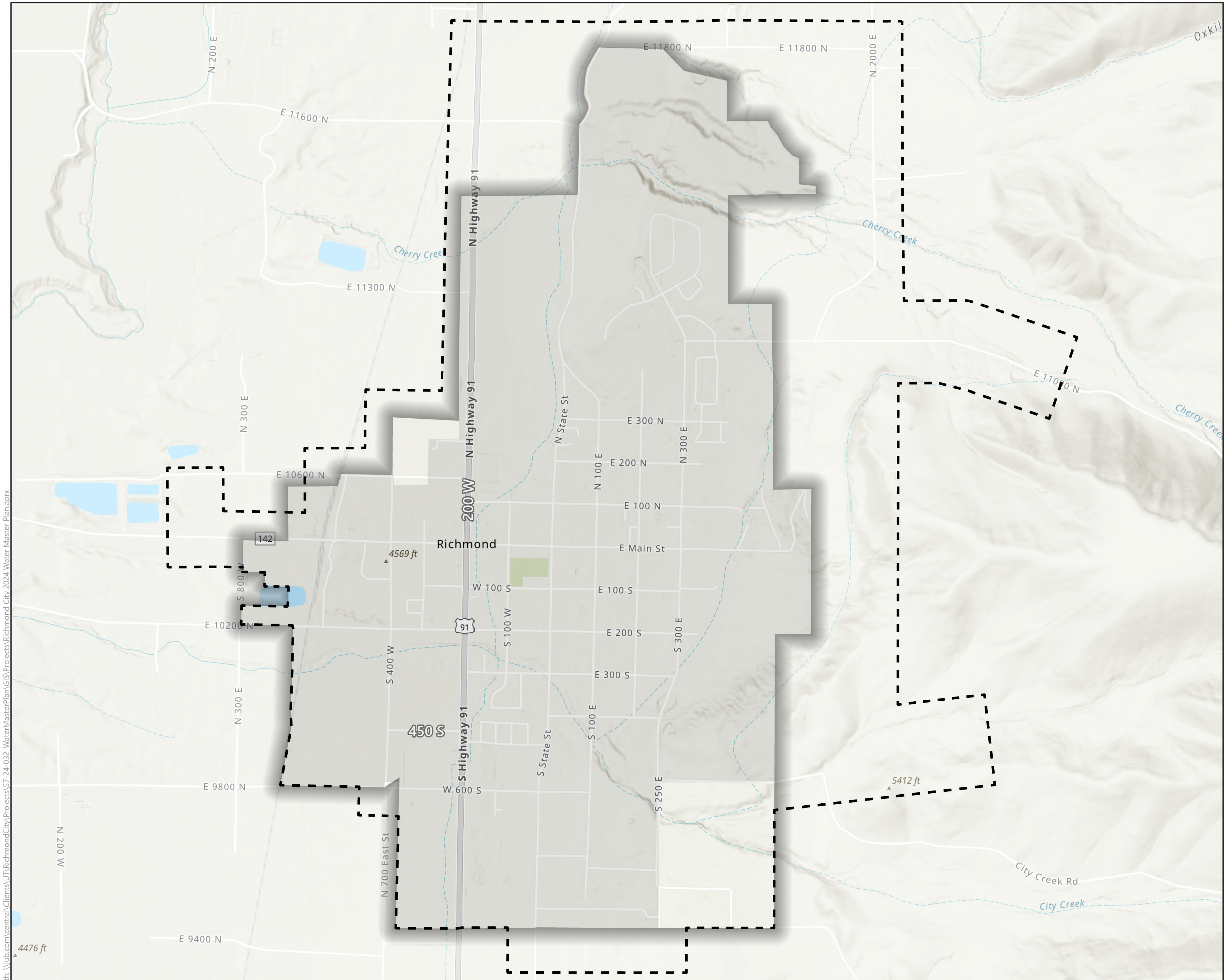
5. Implementation Plan

Richmond City is achieving most of the requirements established by the state and the Division of Drinking Water for culinary water systems. However, with projected growth the city could soon become deficient. This Master Plan addresses the necessary projects to improve system deficiencies. The implementation of this plan will require consistent infrastructure improvements over the next 10-20 years. This master plan is meant to be a living document to guide to the city going into the future. To ensure the city has the best available information to guide them we recommend that the assumptions in this master plan be reviewed and updated on a 5-year update cycle.

Richmond City can utilize a couple of funding sources to fund the recommended improvement projects. The city can use monthly assessments collected from existing users as well as impact fees from new developments. There is also potential to receive some funding from the State of Utah. To be eligible for funding from the state, any proposed projects should be submitted to their database.

Using assessments and impact fees is feasible for funding smaller projects but saving for some of the larger improvement projects may be unrealistic. Additionally, doing larger projects in smaller phases results in an overall greater expense. The Division of Drinking Water and the Division of Water Resources offer low interest loans for culinary water systems to complete larger infrastructure projects. These loans, along with potential state funding, would allow the city to complete the projects and benefit from them, while making the loan payments using the assessments and impact fees. By continuing a proactive approach to water planning, as shown by the creation of this Master Plan, future challenges can be minimized, and project costs reduced.

APPENDIX A – PROJECT MAPS AND FIGURES



RICHMOND UTAH
Water Master Plan

Figure 1

Service Area Overview

- Study Boundary
- Richmond City
- Annexation Boundary

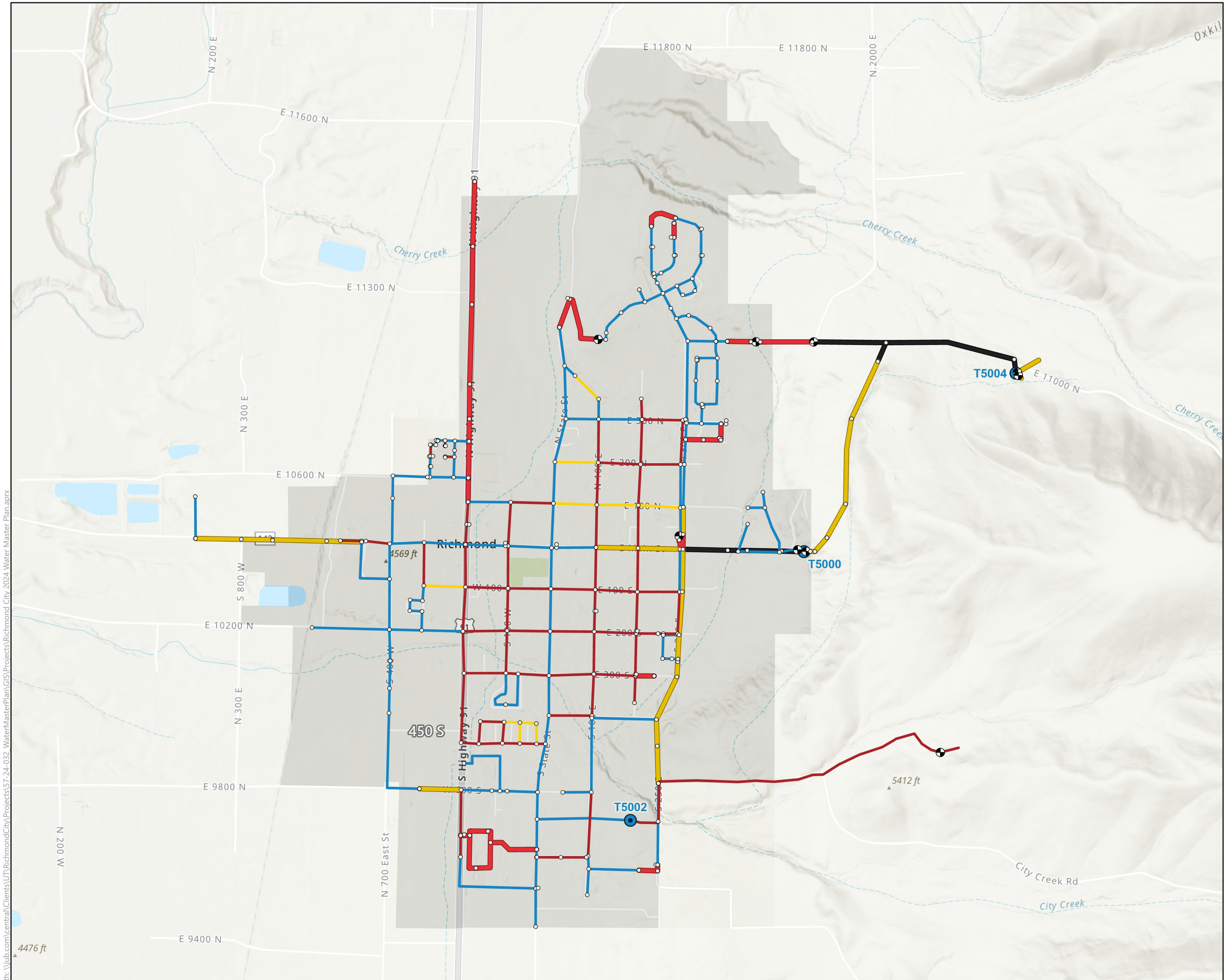
0 0.5 1
Miles

Date Printed: 7/24/2025

RICHMOND
UTAH
Water Master Plan

Figure 2

Existing System Overview



Junction

PRV

Tank

Pipe

- 4 Inch
- 6 Inch
- 8 Inch
- 10 Inch
- 12 Inch
- 14 Inch
- 16 Inch

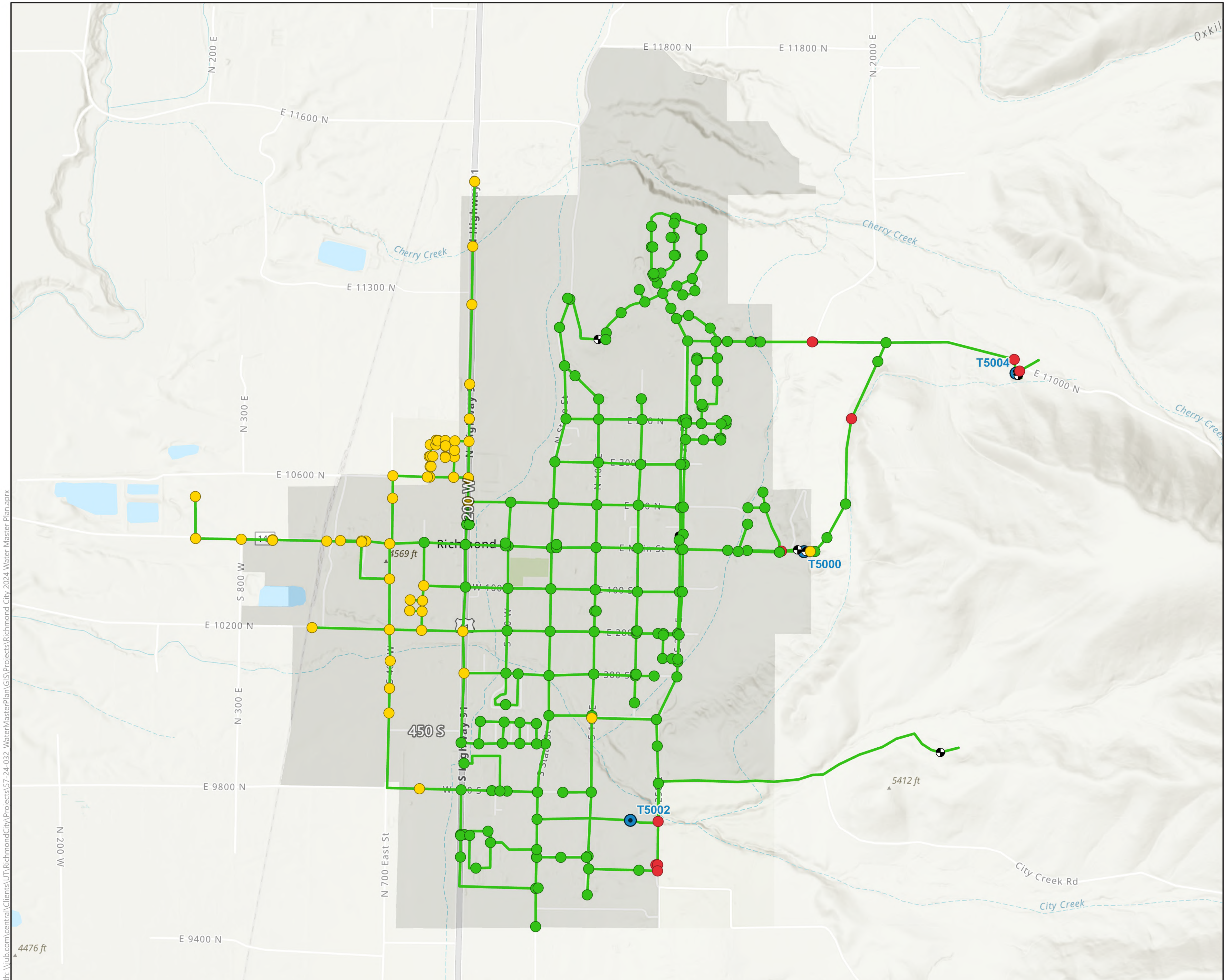
Richmond City

0 0.25 0.5
Miles

N

J-U-B ENGINEERS, INC.
THE LANGDON GROUP
GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 7/24/2025



RICHMOND
UTAH
Water Master Plan

Figure 3

Existing Peak Day

Junction
- 0-40 PSI
- 40-110 PSI
- >110 PSI
- PRV
- Tank

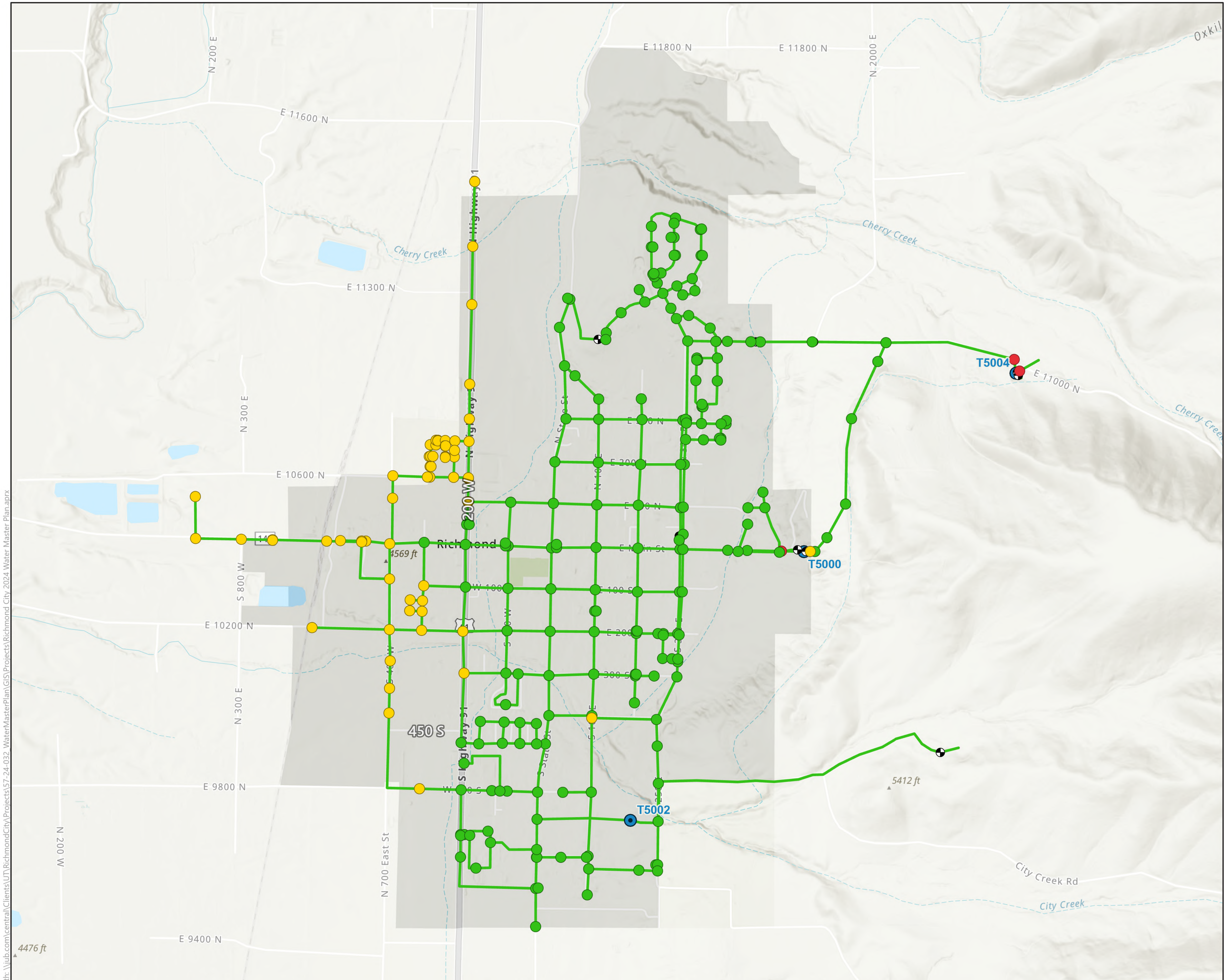
Pipe
- 0-3 FPS
- 3-5 FPS
- >5 FPS
- Richmond City

0 0.25 0.5
Miles

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 7/24/2025



RICHMOND UTAH

Water Master Plan

Figure 4

Existing Peak Instantaneous

Junction

- 0-30 PSI
- 30-110 PSI
- >110 PSI
- PRV
- Tank

Pipe

- 0-3 FPS
- 3-5 FPS
- >5 FPS
- Richmond City

0 0.25 0.5
Miles

N

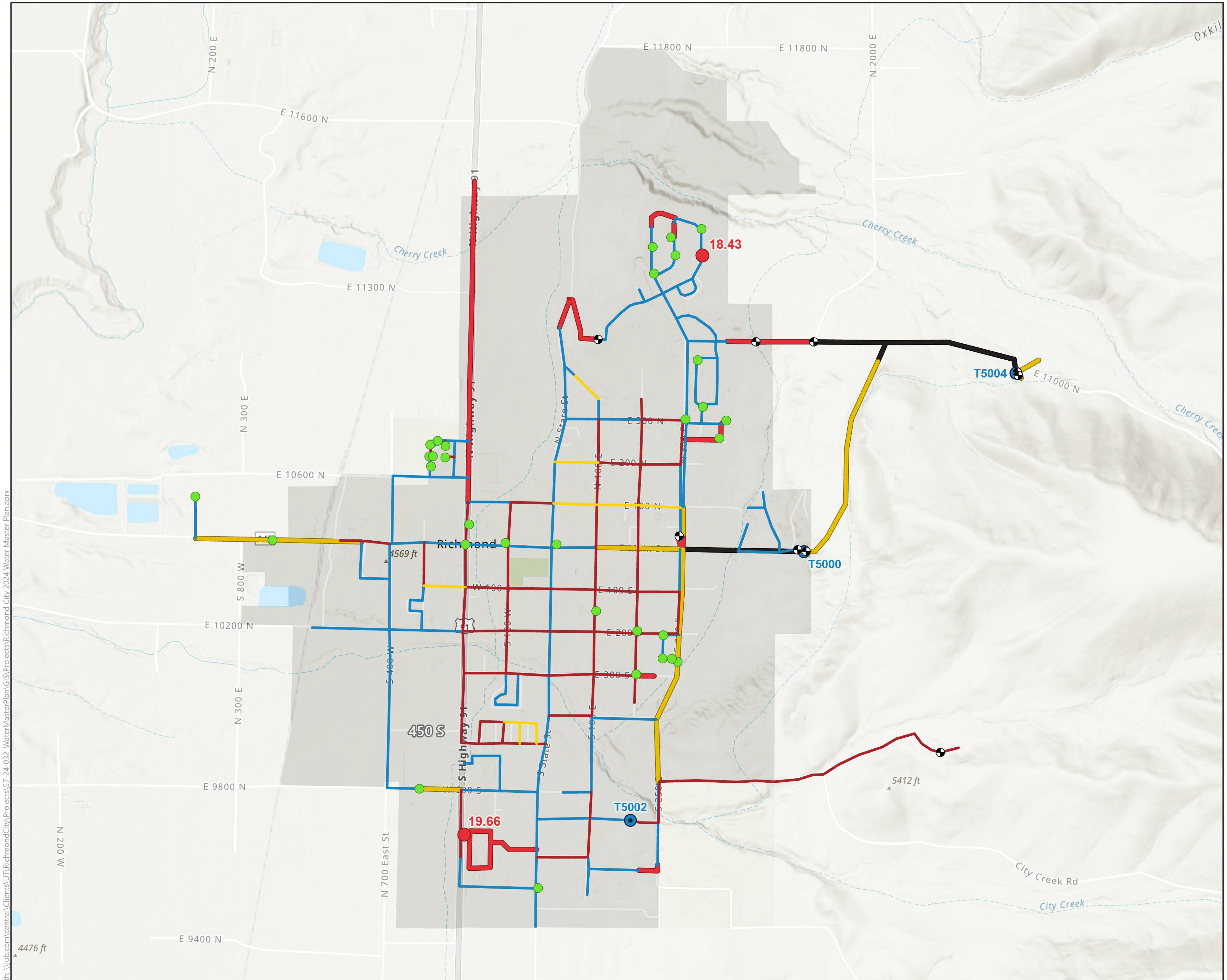
J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 7/24/2025

RICHMOND UTAH
Water Master Plan

Figure 5

Existing Fire Flow



Junction

- Fire Flow ≤ 20 psi
- Fire Flow > 20 psi
- PRV
- Tank

Pipe

- 4 Inch
- 6 Inch
- 8 Inch
- 10 Inch
- 12 Inch
- 14 Inch
- 16 Inch
- Richmond City

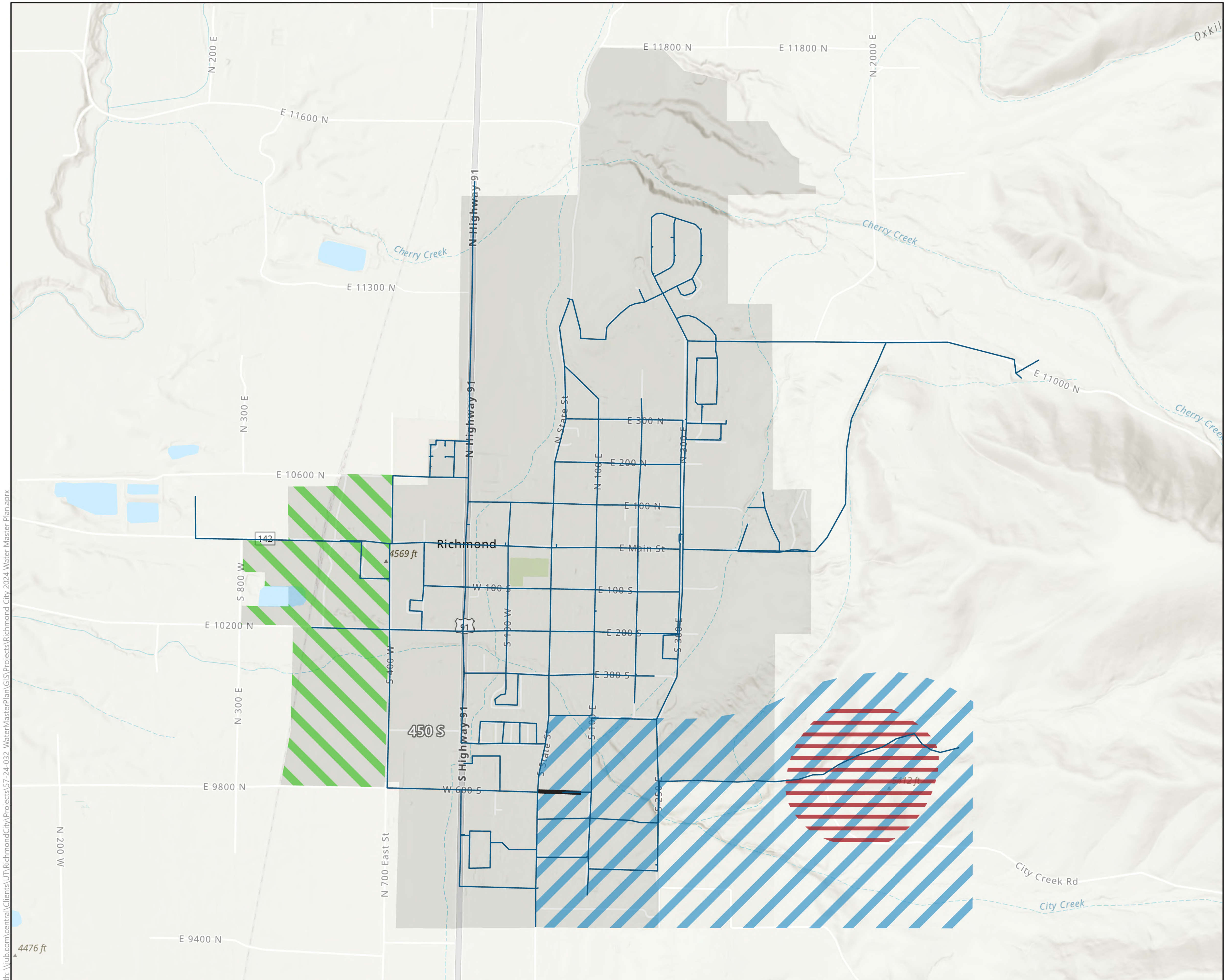
0 0.25 0.5
Miles

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 7/25/2025

Path: \\jub.com\central\Clients\UT\RichmondCity\Projects\57-24-032 WaterMasterPlan\GIS\Projects\Richmond City 2024 Water Master Plan.aprx



RICHMOND
UTAH
Water Master Plan

Figure 6

Capital Improvement Projects

Proposed Projects

1. New Well in Southeast Section
2. Connect System with a PRV at 600 South east of State Street
3. Construct a New Tank on a Hill East of the New Well
4. Create Lower Pressure Zone and Install VFD on WDCI Well

Existing Pipes

Richmond City

0 0.25 0.5
Miles

N

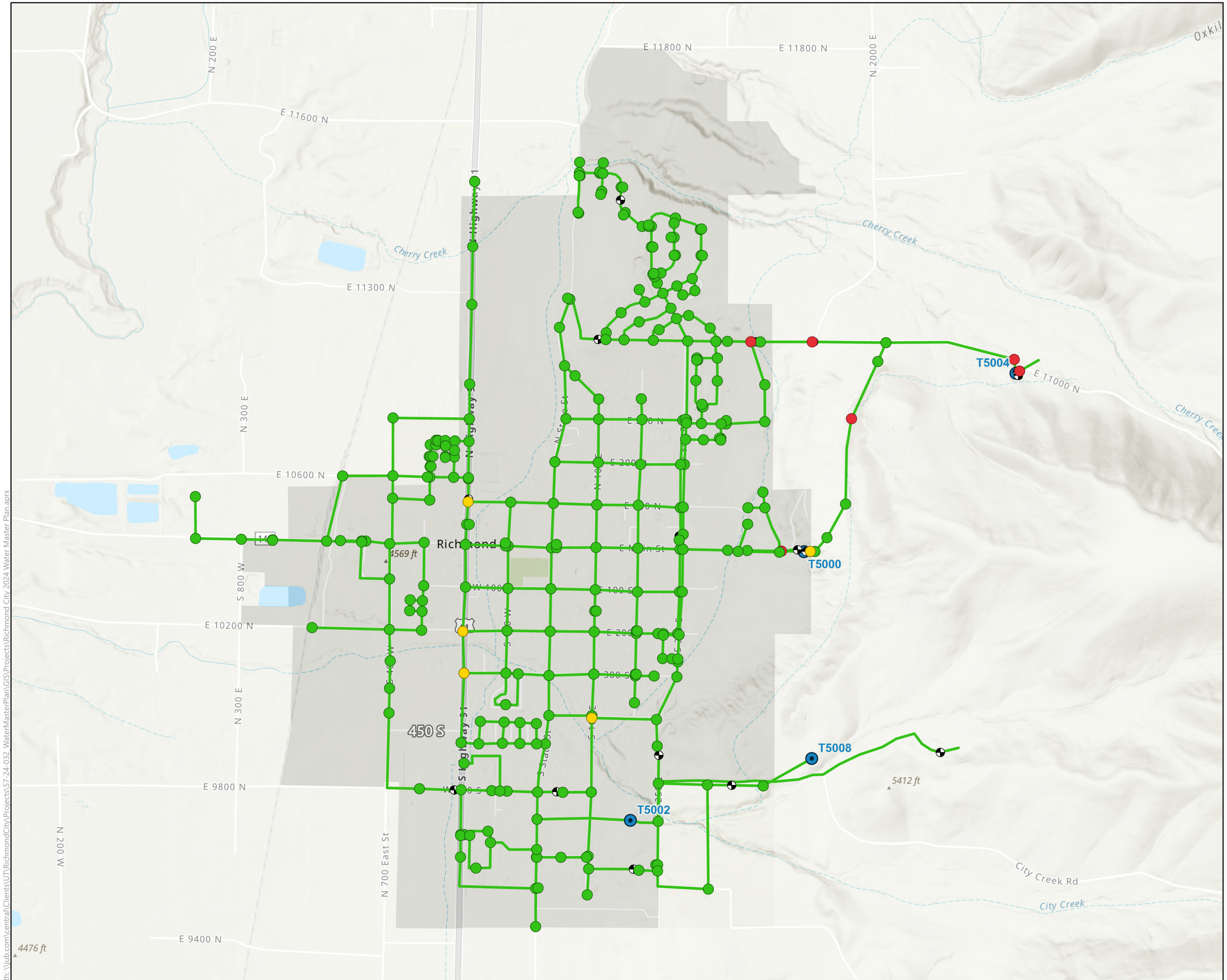
J-U-B ENGINEERS, INC.
THE LANGDON GROUP
GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 7/24/2025

RICHMOND
UTAH
Water Master Plan

Figure 7

10-Year Peak Day



Junction
- 0-40 PSI
- 40-110 PSI
- >110 PSI
- PRV
- Tank

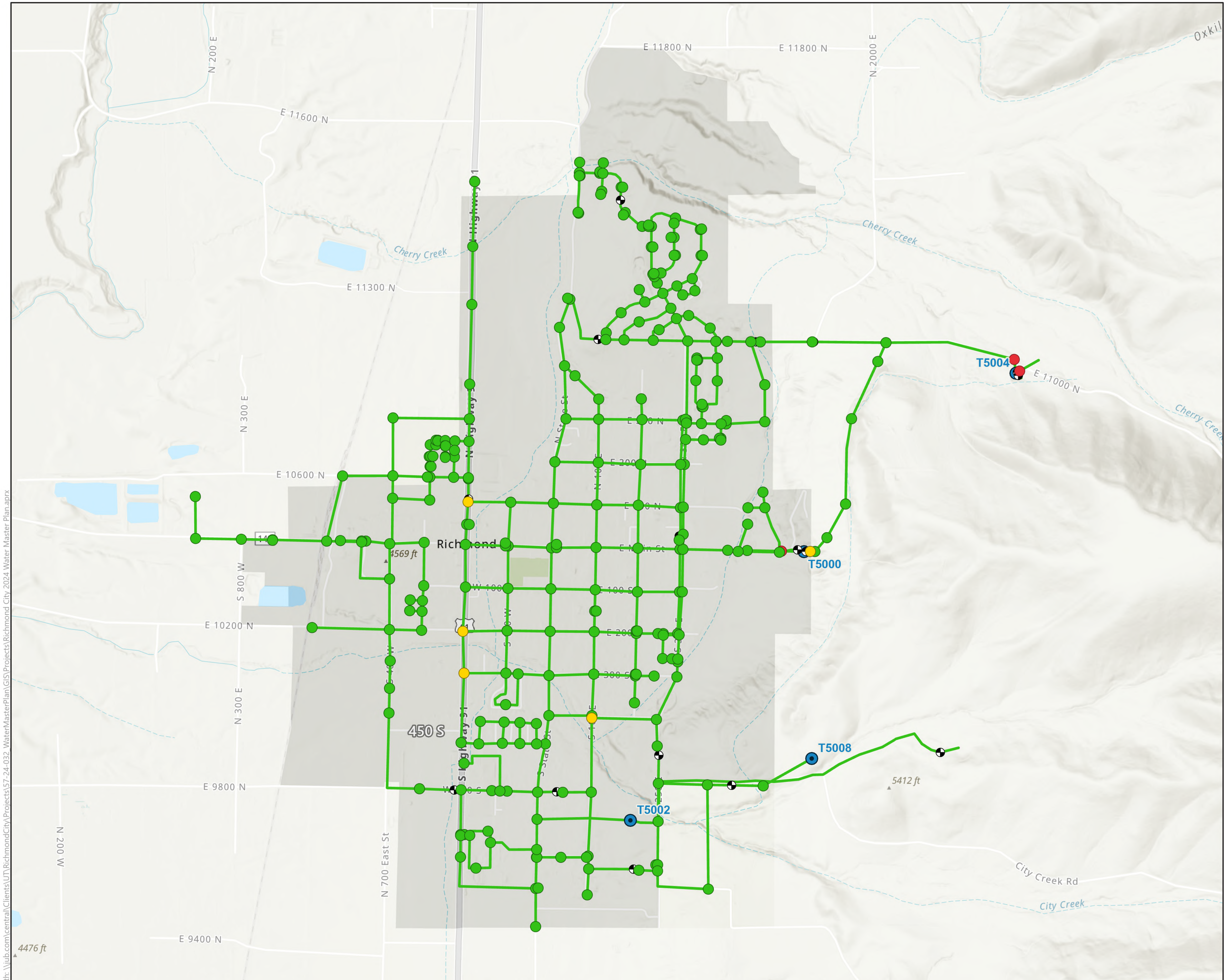
Pipe
- 0-3 FPS
- 3-5 FPS
- >5 FPS
- Richmond City

0 0.25 0.5
Miles

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 7/24/2025



RICHMOND
UTAH
Water Master Plan

Figure 8

10-Year Peak Instantaneous

Junction

- 0-30 PSI
- 30-110 PSI
- >110 PSI
- PRV
- Tank

Pipe

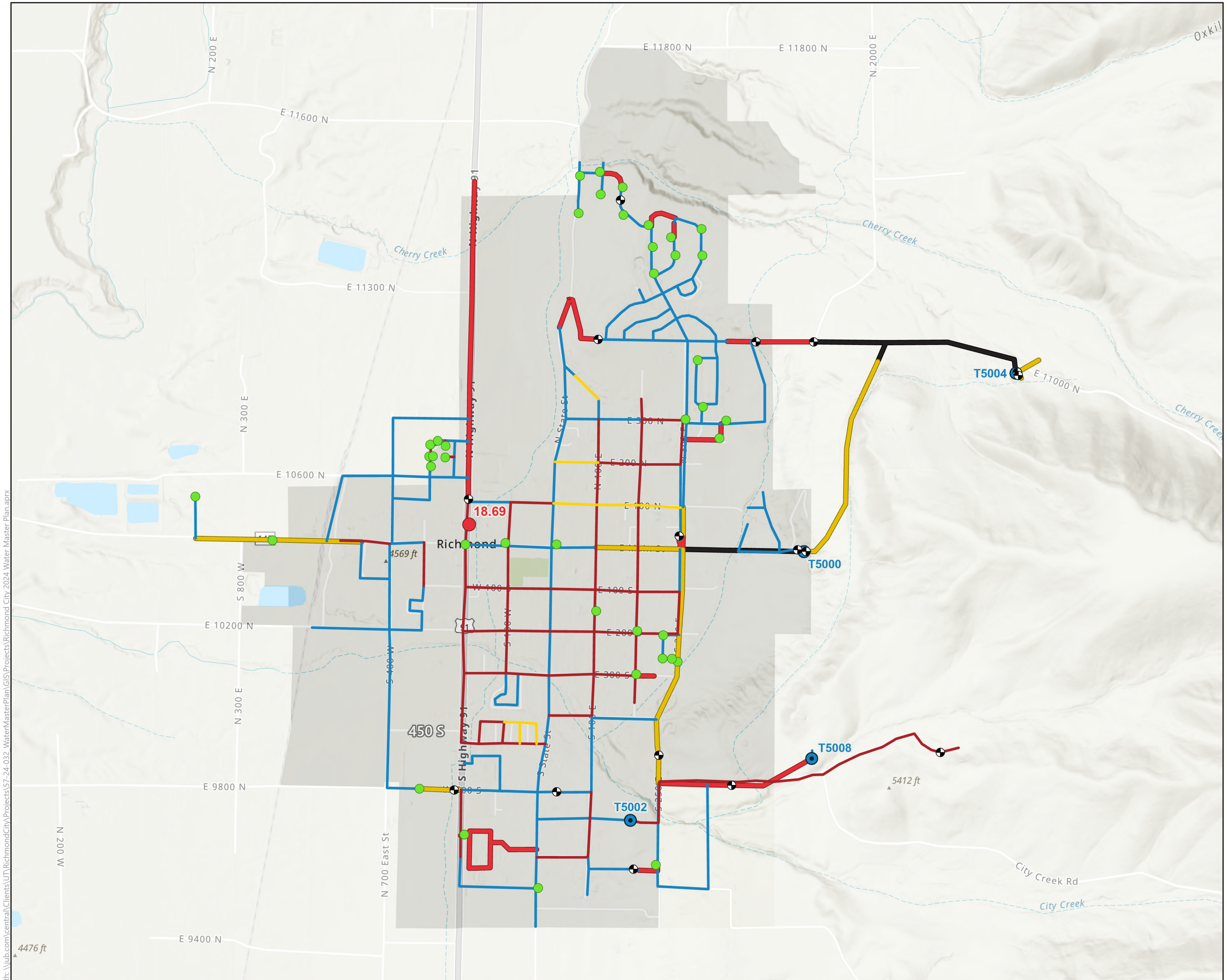
- 0-3 FPS
- 3-5 FPS
- >5 FPS
- Richmond City

0 0.25 0.5
Miles

N

J-U-B ENGINEERS, INC. | THE LANGDON GROUP | GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 7/24/2025



RICHMOND
UTAH
Water Master Plan

Figure 9

10-Year Fire Flow

Junction
- Fire Flow ≤ 20 psi
- Fire Flow > 20 psi
- PRV
- Tank

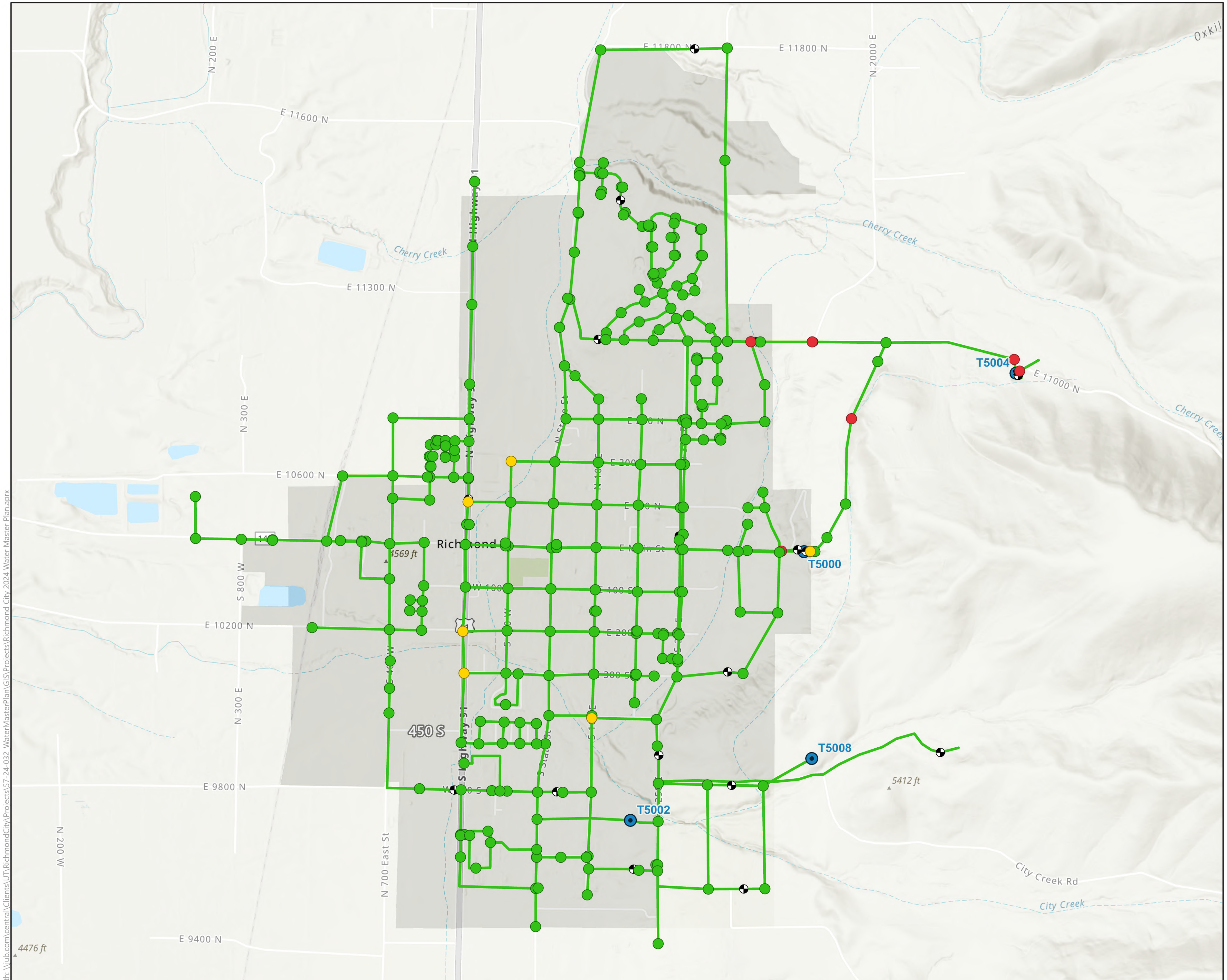
Pipe
- 4 Inch
- 6 Inch
- 8 Inch
- 10 Inch
- 12 Inch
- 14 Inch
- 16 Inch
- Richmond City

0 0.25 0.5
Miles

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 7/25/2025



RICHMOND
UTAH
Water Master Plan

Figure 10

20-Year Peak Day

Junction
- 0-40 PSI
- 40-110 PSI
- >110 PSI
- PRV
- Tank

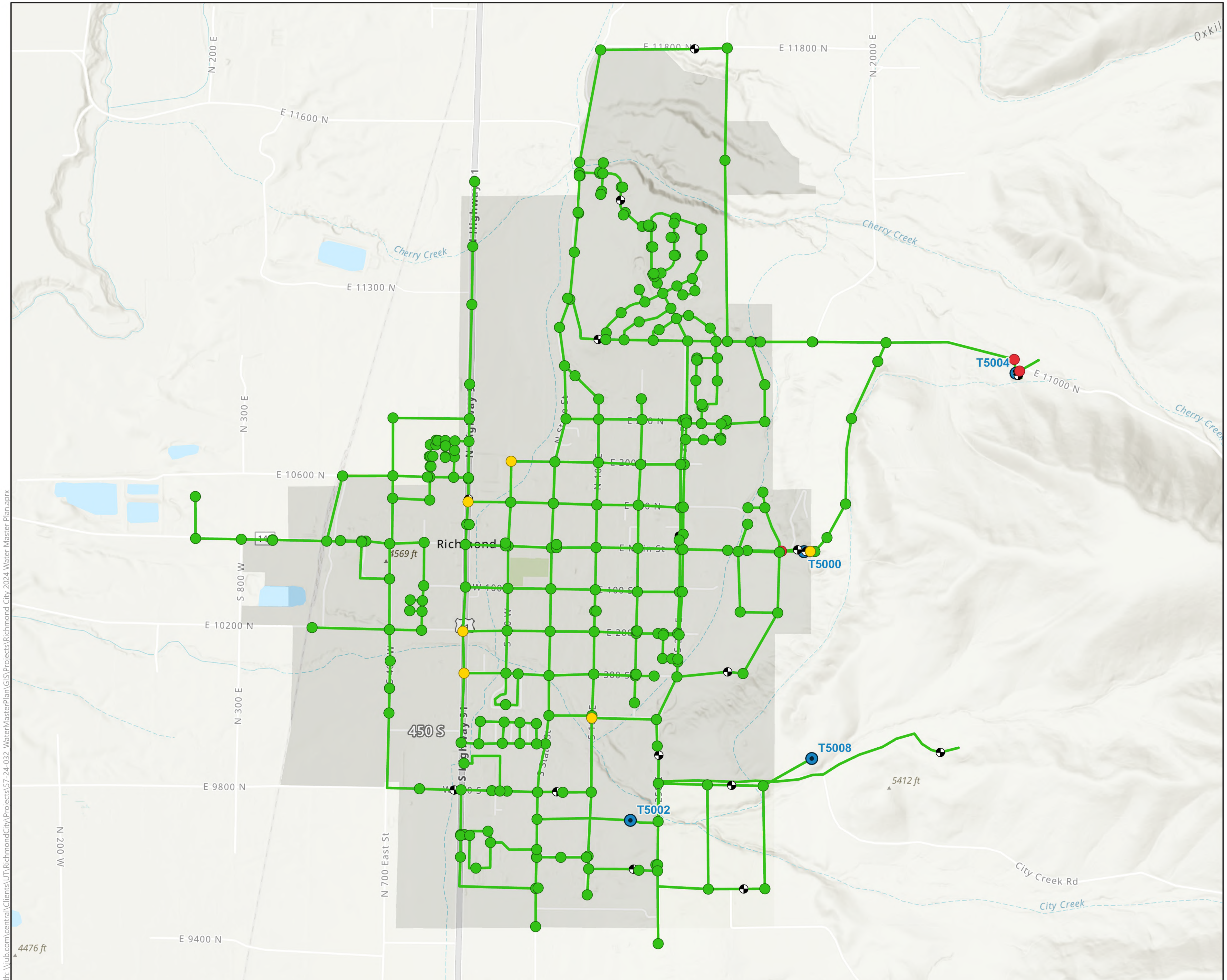
Pipe
- 0-3 FPS
- 3-5 FPS
- >5 FPS
- Richmond City

0 0.25 0.5
Miles

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 7/24/2025



RICHMOND
UTAH
Water Master Plan

Figure 11

20-Year Peak Instantaneous

Junction
- 0-30 PSI
- 30-110 PSI
- >110 PSI
- PRV
- Tank

Pipe
- 0-3 FPS
- 3-5 FPS
- >5 FPS
- Richmond City

0 0.25 0.5
Miles

N

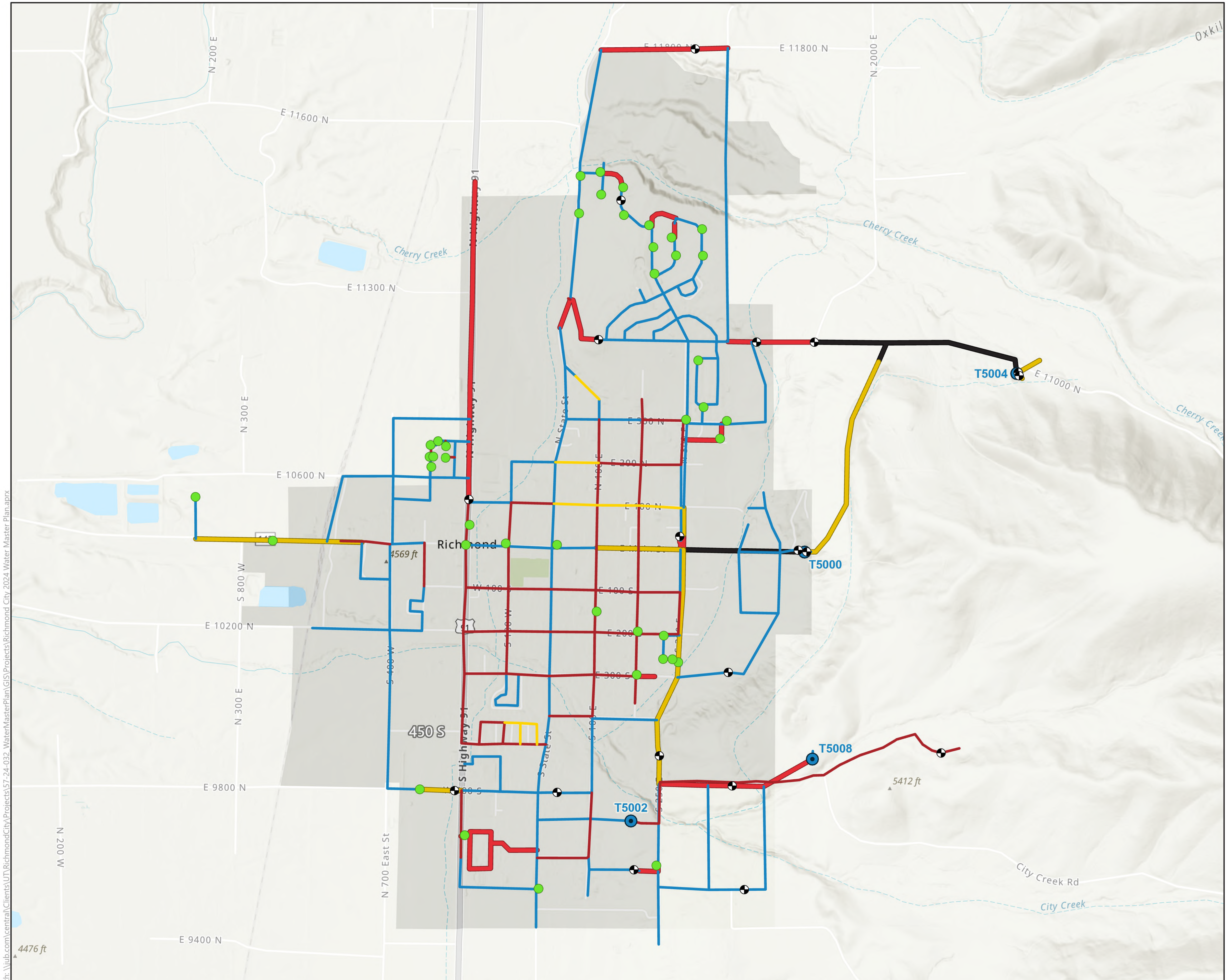
J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC.
J-U-B FAMILY OF COMPANIES

Date Printed: 7/24/2025

Path: \\jub.com\central\Clients\UT\RichmondCity\Projects\57-24-032 WaterMasterPlan\GIS\Projects\Richmond City 2024 Water Master Plan.aprx

RICHMOND UTAH
Water Master Plan

Figure 12
20-Year Fire Flow



Junction
- Fire Flow ≤ 20 psi
- Fire Flow > 20 psi
- PRV
- Tank

Pipe
- 4 Inch
- 6 Inch
- 8 Inch
- 10 Inch
- 12 Inch
- 14 Inch
- 16 Inch
- Richmond City

0 0.25 0.5
Miles

N

J-U-B ENGINEERS, INC. THE LANGDON GROUP GATEWAY MAPPING INC. J-U-B FAMILY OF COMPANIES

Date Printed: 7/25/2025

APPENDIX B – COST ESTIMATES FOR PROPOSED PROJECTS

OPINION OF PROBABLE COST

Client: Richmond City
Project: Richmond Water Masterplan
Project No.: 57-24-032
Date: May 20, 2025

New 500 gpm Well in Southeast Section

Item #	Description	Unit	Estimated Quantity	Unit Price	Total
General				**Subtotal**	**$ 165,000.00**
1	Mobilization	Lump Sum	1	$ 150,000.00	$ 150,000.00
2	Traffic Control	Lump Sum	1	$ 15,000.00	$ 15,000.00
					$ -
Demolition				**Subtotal**	**$ 5,600.00**
3	Remove Asphault	Square Yard	1,400	$ 4.00	$ 5,600.00
					$ -
Roadway				**Subtotal**	**$ 140,600.00**
4	Import Fill	Cubic Yard	2,300	$ 40.00	$ 92,000.00
5	Roadbase	Cubic Yard	300	$ 50.00	$ 15,000.00
6	HMA	Ton	280	$ 120.00	$ 33,600.00
					$ -
Utilities				**Subtotal**	**$ 2,755,000.00**
7	10" C-900 PVC Pipe	Feet	2,500	$ 60.00	$ 150,000.00
8	Well Drilling	Lump Sum	1	$ 1,500,000.00	$ 1,500,000.00
9	Well Equiping	Lump Sum	1	$ 1,000,000.00	$ 1,000,000.00
10	10" Connection to Existing	Each	1	$ 5,000.00	$ 5,000.00
11	Power Connection	Feet	1,000	$ 100.00	$ 100,000.00
					$ -
Construction Subtotal					**$ 3,066,200.00**
Construction Contingency		% Subtotal		20%	$ 613,240.00
Construction Total					**$ 3,679,440.00**
Preliminary Engineering		% Construction Total		10%	$ 367,944.00
Construction Engineering		% Construction Total		6%	$ 220,766.40
Permits		Lump Sum	1		$ -
Project Total					**$ 4,268,150.40**

OPINION OF PROBABLE COST

Client: Richmond City
Project: Richmond Water Masterplan
Project No.: 57-24-032
Date: May 20, 2025

Connect System with a PRV at 600 South east of State Street

Item #	Description	Unit	Estimated Quantity	Unit Price	Total
General				**Subtotal**	**$ 17,500.00**
1	Mobilization	Lump Sum	1	$ 15,000.00	$ 15,000.00
2	Traffic Control	Lump Sum	1	$ 2,500.00	$ 2,500.00
					$ -
Demolition				**Subtotal**	**$ 2,800.00**
3	Remove Asphault	Square Yard	700	$ 4.00	$ 2,800.00
					$ -
Roadway				**Subtotal**	**$ 60,400.00**
4	Import Fill	Cubic Yard	900	$ 40.00	$ 36,000.00
5	Roadbase	Cubic Yard	200	$ 50.00	$ 10,000.00
6	HMA	Ton	110	$ 120.00	$ 13,200.00
7	Side Walk	Square Feet	100	$ 12.00	$ 1,200.00
					$ -
Utilities				**Subtotal**	**$ 165,500.00**
8	8" C-900 PVC Pipe	Feet	500	$ 55.00	$ 27,500.00
9	8" Pressure Reducing Station	Each	1	$ 130,000.00	$ 130,000.00
10	8" Connection to Existing	Each	2	$ 4,000.00	$ 8,000.00
					$ -
Construction Subtotal					**$ 246,200.00**
Construction Contingency		% Subtotal		20%	$ 49,240.00
Construction Total					**$ 295,440.00**
Preliminary Engineering		% Construction Total		10%	$ 29,544.00
Construction Engineering		% Construction Total		6%	$ 17,726.40
Permits		Lump Sum	1		$ -
Project Total					**$ 342,710.40**

OPINION OF PROBABLE COST

Client: Richmond City
Project: Richmond Water Masterplan
Project No.: 57-24-032
Date: May 20, 2025

Construct a New Tank on a Hill East of the New Well

Item #	Description	Unit	Estimated Quantity	Unit Price	Total
General				**Subtotal**	**$ 175,000.00**
1	Mobilization	Lump Sum	1	$ 150,000.00	$ 150,000.00
2	Traffic Control	Lump Sum	1	$ 10,000.00	$ 10,000.00
3	Storm Water Pollution Prevention Plan (SWPPP)	Lump Sum	1	$ 15,000.00	$ 15,000.00
					$ -
Demolition				**Subtotal**	**$ 2,800.00**
4	Remove Asphault	Square Yard	700	$ 4.00	$ 2,800.00
					$ -
Roadway				**Subtotal**	**$ 182,200.00**
5	Import Fill	Cubic Yard	3,600	$ 40.00	$ 144,000.00
6	Roadbase	Cubic Yard	500	$ 50.00	$ 25,000.00
7	HMA	Ton	110	$ 120.00	$ 13,200.00
					$ -
Utilities				**Subtotal**	**$ 2,158,600.00**
8	8" C-900 PVC Pipe	Feet	40	$ 55.00	$ 2,200.00
9	8" Pressure Reducing Station	Each	1	$ 130,000.00	$ 130,000.00
10	10" C-900 PVC Pipe	Feet	40	$ 60.00	$ 2,400.00
11	10" Pressure Reducing Station	Each	1	$ 140,000.00	$ 140,000.00
12	12" C-900 PVC Pipe	Feet	3,000	$ 70.00	$ 210,000.00
13	12" Pressure Reducing Station	Each	1	$ 150,000.00	$ 150,000.00
14	1 MG Tank	Gal	1,000,000	$ 1.50	$ 1,500,000.00
15	12" Connection to Existing	Each	1	$ 6,000.00	$ 6,000.00
16	10" Connection to Existing	Each	2	$ 5,000.00	$ 10,000.00
17	8" Connection to Existing	Each	2	$ 4,000.00	$ 8,000.00
					$ -
Construction Subtotal					**$ 2,518,600.00**
Construction Contingency		% Subtotal		20%	$ 503,720.00
Construction Total					**$ 3,022,320.00**
Preliminary Engineering		% Construction Total		10%	$ 302,232.00
Construction Engineering		% Construction Total		6%	$ 181,339.20
Permits		Lump Sum	1		$ -
Project Total					**$ 3,505,891.20**

OPINION OF PROBABLE COST

Client: Richmond City
Project: Richmond Water Masterplan
Project No.: 57-24-032
Date: May 20, 2025

Create Lower Pressure Zone and Install VFD on WDCI Well

Item #	Description	Unit	Estimated Quantity	Unit Price	Total
General				**Subtotal**	**$ 45,000.00**
1	Mobilization	Lump Sum	1	$ 35,000.00	$ 35,000.00
2	Traffic Control	Lump Sum	1	$ 10,000.00	$ 10,000.00
					$ -
Demolition				**Subtotal**	**$ 10,400.00**
3	Remove Asphault	Square Yard	2,600	$ 4.00	$ 10,400.00
					$ -
Roadway				**Subtotal**	**$ 250,400.00**
4	Import Fill	Cubic Yard	2,900	$ 40.00	$ 116,000.00
5	Roadbase	Cubic Yard	400	$ 50.00	$ 20,000.00
6	HMA	Ton	360	$ 120.00	$ 43,200.00
7	Concrete Curb and Gutter	Feet	100	$ 40.00	$ 4,000.00
8	Side Walk	Square Feet	500	$ 12.00	$ 6,000.00
9	State Import Fill	Cubic Yard	400	$ 80.00	$ 32,000.00
10	State Roadbase	Cubic Yard	200	$ 90.00	$ 18,000.00
11	State HMA	Ton	80	$ 140.00	$ 11,200.00
					$ -
Utilities				**Subtotal**	**$ 534,800.00**
9	10" C-900 PVC Pipe	Feet	2,750	$ 60.00	$ 165,000.00
10	10" Pressure Reducing Station	Each	1	$ 140,000.00	$ 140,000.00
11	12" C-900 PVC Pipe	Feet	40	$ 70.00	$ 2,800.00
12	12" Pressure Reducing Station (UDOT RW)	Each	1	$ 160,000.00	$ 160,000.00
13	10" Connection to Existing	Each	3	$ 5,000.00	$ 15,000.00
14	12" Connection to Existing	Each	2	$ 6,000.00	$ 12,000.00
15	8" Gate Valve	Each	1	$ 5,000.00	$ 5,000.00
16	Fire Hydrant Assembly	Each	1	$ 10,000.00	$ 10,000.00
17	WDCI Well VFD	Lump Sum	1	$ 25,000.00	$ 25,000.00
					$ -
Construction Subtotal					**$ 840,600.00**
Construction Contingency		% Subtotal		20%	$ 168,120.00
Construction Total					**$ 1,008,720.00**
Preliminary Engineering		% Construction Total		10%	$ 100,872.00
Construction Engineering		% Construction Total		6%	$ 60,523.20
Permits		Lump Sum	1		$ -
Project Total					**$ 1,170,115.20**

OPINION OF PROBABLE COST

Client: Richmond City
Project: Culinary Water Masterplan
Project No.: 57-24-032
Date: May 20, 2025

Preliminary cost estimate for a citywide secondary irrigation system

Item #	Description	Unit	Estimated Quantity	Unit Price	Total
General				**Subtotal**	**$ 1,280,000.00**
1	Mobilization	Lump Sum	1	$ 800,000.00	$ 800,000.00
2	Traffic Control	Lump Sum	1	$ 400,000.00	$ 400,000.00
3	Storm Water Pollution Prevention Plan (SWPPP)	Lump Sum	1	$ 80,000.00	$ 80,000.00
					$ -
Demolition				**Subtotal**	**$ 351,600.00**
4	Remove Asphault	Square Yard	87,900	$ 4.00	$ 351,600.00
					$ -
Roadway				**Subtotal**	**$ 4,292,000.00**
5	Import Fill	Cubic Yard	23,400	$ 40.00	$ 936,000.00
6	Roadbase	Cubic Yard	14,000	$ 50.00	$ 700,000.00
7	HMA	Ton	18,700	$ 120.00	$ 2,244,000.00
8	State Import Fill	Cubic Yard	2,400	$ 80.00	$ 192,000.00
9	State Roadbase	Cubic Yard	1,200	$ 90.00	$ 108,000.00
10	State HMA	Ton	800	$ 140.00	$ 112,000.00
					$ -
Utilities				**Subtotal**	**$ 10,446,500.00**
11	6" C-900 PVC Pipe	Feet	116,700	$ 50.00	$ 5,835,000.00
12	8" C-900 PVC Pipe	Feet	5,500	$ 55.00	$ 302,500.00
13	10" C-900 PVC Pipe	Feet	2,300	$ 60.00	$ 138,000.00
14	12" C-900 PVC Pipe	Feet	7,300	$ 70.00	$ 511,000.00
15	Pressure Turnout	Each	700	$ 3,500.00	$ 2,450,000.00
16	Pressure Reducing Station	Each	7	$ 130,000.00	$ 910,000.00
17	Equalization Facility	Lump Sum	1	$ 300,000.00	$ 300,000.00
					$ -
Construction Subtotal					**$ 16,370,100.00**
Construction Contingency		% Subtotal		20%	$ 3,274,020.00
Construction Total					**$ 19,644,120.00**
Preliminary Engineering		% Construction Total		8%	$ 1,571,529.60
Construction Engineering		% Construction Total		6%	$ 1,178,647.20
Project Total					**$ 22,394,296.80**

Appendix C – Water Right Summary

Doc in File	Water Right Number	Claim/ Application Number	Owner Name (per database)	Quantity of Water (CFS)	Quantity of Water (acft)	Status	Source	POD	Interest (%)	Priority	Domestic Amount	Domestic POU	Municipal Amount	Municipal POU	Irrigation Amount	Irrigation POU	Other Amount	Other POU	Notes
Yes	25-2330	U91/a16849	Richmond City	1.11	477	CERT	UGW-Well	Underground	100	11/1/1934	-	-	477 acft	01/01-12/31	-	-	-	-	12-in. well 150-ft deep. Database lists "Other" use for industrial use for processing milk products, but was certificated in 1995 solely for municipal use. Certificate specifically limts this right to 477 acre-feet as determined in1993 Memo Decision approving a16849).
Yes	25-3014		Richmond City Corporation and Lewiston City (22.1 suppl. acres); KPR LLC (25.2 suppl. acres)	0.61	27	PD	Cub River	Surface	23.36	1868	-	-	-	-	6.75 acres	04/01-10/31	-	-	Richmond and Lewiston have a shared interest in 11.1% of the whole water right (before Hard Knucks LLC segregated its interest). So Richmond has a 5.55% interest in 11.0 cfs (0.61 cfs) and a 5.55% in 121.6 acres of irrigation (6.75 acres), which would be 27 acres.
Yes	25-3060	A10852	Richmond City Corp.	3.81	1156.226	PD	Boulder Spring, Ranger Spring, Pine Spring, Birch Creek Spring Area	Surface	100	3/11/1930	-	-	1156.226 acft*	10/31-04/01	-	-	-	-	Need to update mailing address. Database also lists irrigation, but PD is only for municipal use. Originally certificated in 1949. Volume calculated as 3.81 cfs x 153 days.
	25-3268	A27682	Richmond City Corp. (6%); C. Zan and Debra Lorena Harris (94%)	4.36		PD	Cub River	Surface	8.20%	10/8/1955	-	-	-	-	Unevaluate d	4/1-10/31	-	-	Irrigation is in supplemental group of 550.6 acres total. Member of 4 supplemental groups with several water rights and Richmond Irrigation Company water.
Yes	25-4764	U22030	Richmond City Corporation	0.223	161.44486	PD	Richmond City Springs (Rocky Ridge)	Surface	100	1907	-	-	161.4449 acft*	01/01-12/31	-	-	-	-	Database also lists irrigation, but PD is only for municipal use. Volume calculated as 0.223 cfs x 365 days.
Yes	25-4884	A39168/ a9309	Richmond City Corporation	2.00	1447.936	CERT	Underground Water Well	Underground	100	1/8/1969	-	-	1447.936 acft*	01/01-12/31	-	-	-	-	Certificated in 1984. Well is no longer being used. Richmond filed a non-use application and it was approved. Volume calculated as 2 cfs x 365 days.
Yes	25-6053	a38429	Richmond City	3.00	741.4	APP	Underground Water Wells	Underground	100	8/31/1973	-	-	741.4 acft	01/01-12/31	-	-	-	-	Originally filed for 140 acres sole supply, 400 homes, and 50 cattle. Two 12-in diameter wells ranging from 500-700 ft in depth. Water use changed from Irrigation, Stock, and Domestic to Municipal. It looked like the extension for this right will be up in 2025, so for the rights to be retained, a 40-year plan needs to be submitted before 2025. City acquired title from Gibbons and Skabelund in 2006 (any agreement or terms associated with this acquisition?). Note: nonuse application cannot be filed because this right has never been certificated/perfected.
Yes	25-7122	A47309	Richmond City and Lewiston City (50%); KPR LLC (50%)	0.03		WUC / Election	Underground Water Well	Underground	25	11/29/1976	6 EDUs	01/01-12/31	-	-	-	-	Unevaluated	01/01-12/31	3 inch well, depth of 126 ft. Other Use is for icecream production. Mr Dean had trouble figuring out how much is of the water is usable for Richmond. He recommends that Richmond look into what happens to the water. They can identify what water belongs to Richmond and then file a change order to convert the water to municipal use. WUC for domestic use for 30 people and ice cream manufacturing. Richmond and Lewiston acquired a joint 50% interest from Derwin Merrill in 1996 -- but unclear why.
Yes	25-7239		Richmond City	0.25	180.992	PD	Unnamed Spring	Surface	100	1903	-	-	180.992 acft*	01/01-12/31	-	-	-	-	Database also lists irrigation, but PD is only for municipal use. Volume calculated as 0.25 cfs x 365 days. City may not be able to use this right during portions of the irrigation season due to its late priority (relative to RIC's water rights).
Yes	25-7240		Richmond City Corp.	0.50	361.984	PD	Unnamed Spring	Surface	100	1902	-	-	361.984 acft*	01/01-12/31	0.25 acres	04/01-10/31	-	-	Need to update mailing address. Database also lists irrigation, but PD is only for municipal use. Volume calculated as 0.5 cfs x 365 days. Under 1997 amended agreement with RIC, the City is allowed to divert 125 gpm (0.28 cfs) of this right during the irrigation season before RIC, despite RIC having a senior right to the water under RIC's water rights.
Yes	25-7241		Richmond City Corp.	1.25	530.5793	PD	Cherry Creek	Surface	100	05/01/1860	-	-	530.5793 acft*	04/01-10/31	-	-	-	-	Need to update mailing address. This right was decreed by the court in 1967 based on a 1915 agreement between RIC and City. Under 1994 agreement, RIC agreed to allow City to use 125 gpm (0.28 cfs) from springs in exchange for the City letting RIC use the City's water pipeline. 1997 amended agreement provided that WR 25-7241 has a period of use from 4/1 to 10/31 (as opposed to 9/30, as contained in the PD) and that City has right to divert an additional 125 gpm (0.028 cfs) under City's WR 25-7240, despite its later priority date. City may not be able to use the remainder of this right during portions of the irrigation season due to its late priority (relative to RIC's water rights). Database says year-round. Volume based on 1.25 cfs x 214 days.
	25-7312	A48099	Richmond City Corp. (8.2%); C. Zan and Debra Lorena Harris (91.8%)	1		WUC / SER	Drains		8.20%	3/16/1977	-	-	-	-	30 acres	4/1-10/31	70 ELUs	1/1-12/31	Irrigation is in supplemental group of 231.8 acres total, but this right is limited to 30 acres. Group includes 25-3268, 25-7312, and Richmond Irrigation Company water. Water right also includes storage in several reservoirs.
Yes	25-8308	A56645	Richmond City			Withdrawn	Springs	Surface	100	7/14/1981	-	-	-	-	-	-	6.5 cfs	01/01-12/31	Withdrawn. Springs: Boulder, Ranger, Pine, Birch. Returned water: 6.5 cfs. Was intended to be used for nonconsumptive hydropower use. Other use if an unnamed Hydro-Electric Power Plant rated at 400 KW.

Yes	25-8325	A56907	Richmond City			Rejected	Cherry Creek and Tributory Springs	Surface	100	9/3/1981	-	-	0	01/01-12/31	-	-	350 cfs	01/01-12/31	Rejected. Returned water: 330.0 cfs. Other use is Power, unnamed Hydro-electric power plant rated at 27 MW
Yes	25-8781	A62089	Richmond City Corporation			Withdrawn	Springs	Surface	100	9/30/1986	-	-	-	-	-	-	3.5 cfs	01/01-12/31	Withdrawn. Springs: Boulder, Ranger, Pine, Birch. Other use is Power. A hydro-Electric power plant that returned 3.5 cfs
Yes	25-9110	A65174	Richmond City Corporation			Rejected	Springs	Surface	100	2/13/1991	-	-	0	01/01-12/31	-	-	-	-	Rejected. Springs: Boulder, Ranger, Pine, Birch
Yes	25-10914	a35063	Richmond City		8.6	APP	Chambers Spring and 3 Underground Wells	Underground	100	05/01/1861	-	-	8.6	01/01/-12/31	-	-	-	-	Changes: a35063, changed POD and Nature of Use. The diversion of water is limited to 8.6 acft annually and the depletion of water is limited to 4.3 acft. Under active litigation. It would be best to check with the city attorney.
Yes	25-11040	a34951a	Richmond City			Retired	Chambers Spring and 2 Underground Wells	Underground	100	39764	-	-	-	-	-	-	-	-	Changes: a34951a, affected POD and POU, filed 11/12/2008 for 0.3 acft for 0.075 acres. Source changed from Chamber Spring to two 8-in. wells. Same issue as 10914, but looks like this right is protected until 2024. This irrigated acreage is "retired" to allow for approval of WR 25-11042.
Yes	25-11042	A78910	Richmond City		19.999	APP	Underground water well	Underground	100	8/10/2020	-	-	19.999 acft	01/01-12/31	-	-	-	-	Existing well, 12-in. diameter, 150 ft depth. WR 25-11040 and WR 25-11109 were "retired" to allow this application to be approved.
Yes	25-11109	a35063c	Richmond City			Retired	Chambers Spring and 3 Underground Wells	Underground	100	5/1/1861	-	-	-	-	-	-	-	-	Changes: a35063c, changes affected POD and Nature of Use for 7.7 acft for irrigation of 1.925 acres. Bought from Morley Cox. This irrigated acreage is "retired" to allow for approval of WR 25-11042.
Yes	25-11158	a35063d	Richmond City			Retired	Chambers Spring and 3 Underground Wells	Underground	100	5/1/1861	-	-	-	-	-	-	-	-	Changes: a35063d, changed POD and Nature of Use for 8 acft for irrigation of 2 acres. Bought from Morley Cox. This irrigated acreage is "retired" to allow for approval of WR 25-11160.
Yes	25-11160	A79565	Richmond City		19.999	APP	Underground well	Underground	100	12/13/2012	-	-	19.999 acft	01/01-12/31	-	-	-	-	Information from UWR. WR 25-11158 was "retired" to allow for approval of this water right.
Yes	25-11192	a35063e	Richmond City			Retired	Chambers Spring and 3 Underground Wells	Underground	100	5/1/1861	-	-	-	-	-	-	-	-	Changes: a35063e, changed POD and Nature of Use for 8 acft for irrigation of 2 acres. Bought from Morley Cos. This irrigated acreage was "retired" to allow for approval of WR 25-11194.
Yes	25-11194	A79979	Richmond City		19.999	APP	Underground well	Underground	100	10/31/2013	-	-	19.999 acft	01/01-12/31	-	-	-	-	Information from UWR. WR 25-11192 was "retired" to allow for approval of this water right.
Yes	25-11776	a35063ba	Richmond City		5	APP	Chambers Spring and 3 Underground Wells	Underground	100	05/01/1861	-	-	5 acft	01/01/-12/31	-	-	-	-	Changes: a35063ba, Changes made to POD and Nature of Use, The diversion of water is limited to 5 acft annually and the depletion of water is limited to 2.5 acft.

* = calculated

TOTAL	**18.14**	**5158.1592**	

Status:	
Approved	APP
Certificated	CERT
Proposed Determination	PD
Water User's Claim	WUC

Richmond City
Emergency Operations Plan

DRAFT

Table of Contents

PREFACE

The Richmond City Emergency Operations Plan establishes a flexible framework for the community's activities to prepare for, respond to, and recovery from all types of emergencies and disasters. This manual is to assist City officials and staff during times of emergencies and disasters. Each section contains activities that will need to be organized and/or accomplished. The activation of this plan and the number of responders needed to assist in the EOC and in the field will depend on the type and size of the emergency or disaster. This plan is modular and can be activated fully or in part, depending on the situation.

PROMULGATION

This plan is promulgated as the Richmond City Emergency Operations Plan. The plan is designed to comply with all applicable Federal regulations, local ordinances and resolutions and provides policies and procedures to be followed to prepare for, mitigate, respond and recover from emergencies, disasters, and terrorism events.

This plan has been constructed with the best information available and is written from a planning perspective. It is recognized that as an emergency unfolds and new information becomes available, decisions and actions may be different than the plans envisioned at the time the plan was developed.

Richmond City gives full support to the plan and urges all officials, employees, and others involved in the total emergency management effort, individually and collectively, to do their share in making the City of Richmond a disaster resistant and resilient community.

This plan supersedes all previous plans.

Promulgated this xx day of (Month, Year)

____

Mayor, Richmond City, Utah

Approval and Implementation

Transmitted herewith is the integrated Emergency Operations Plan for Richmond City. It provides a framework for all city departments to plan and perform their respective emergency functions before, during and after a disaster or other emergency. It is further intended that this document be used as a reference and training aid for all departments and emergency response personnel to ensure efficient and effective response and management of disasters and other emergencies.

Authority for emergency interim succession to elected and statutory offices is granted to local governments under Utah Code Title 53 – 2a – 807.

> *1. By July 1 of each year, each political subdivision shall: (a) for each officer and the emergency manager described in Part 14, Local Emergency Management Act, designate three emergency interim successors and specify their order of succession; (b) identify the political subdivision's alerting authority and any individuals authorized to send emergency alerts; (c) provide a list of those designated successors and individuals to the division; and(d) have an emergency alert plan in place and provide a copy of the plan to the division .*

Authority for response to, and recovery from, disasters or local emergencies is granted to local governments under Utah Code Title 53 - 2a – 205.

> *(1)*
> *(a) In order to protect life and property when a state of emergency or local emergency has been declared, subject to limitation by the Legislature as described in Subsection 53-2a-206(5), and subject to Section 53-2a-216, the chief executive officer of each political subdivision of the state is authorized to:*
> *(i) carry out, in the chief executive officer's jurisdiction, the measures as may be ordered by the governor under this part; and*
> *(ii) take any additional measures the chief executive officer may consider necessary, subject to the limitations and provisions of this part.*
> *(b) The chief executive officer may not take an action that is inconsistent with any order, rule, regulation, or action of the governor.*
> *(c) A chief executive officer of a municipality may not exercise powers under this chapter to respond to an epidemic or a pandemic.*
> *(2) Subject to Section 53-2a-216, when a state of emergency or local emergency is declared, the authority of the chief executive officer includes:*
> *(a) utilizing all available resources of the political subdivision as reasonably necessary to manage a state of emergency or local emergency;*

(b) employing measures and giving direction to local officers and agencies which are reasonable and necessary for the purpose of securing compliance with the provisions of this part and with orders, rules, and regulations made under this part;
(c) if necessary for the preservation of life, issuing an order for the evacuation of all or part of the population from any stricken or threatened area within the political subdivision;
(d) recommending routes, modes of transportation, and destinations in relation to an evacuation;
(e) suspending or limiting the sale, dispensing, or transportation of alcoholic beverages, explosives, and combustibles in relation to an evacuation, except that the chief executive officer may not restrict the lawful bearing of arms;
(f) controlling ingress and egress to and from a disaster area, controlling the movement of persons within a disaster area, and ordering the occupancy or evacuation of premises in a disaster area;
(g) clearing or removing debris or wreckage that may threaten public health, public safety, or private property from publicly or privately owned land or waters, except that where there is no immediate threat to public health or safety, the chief executive officer shall not exercise this authority in relation to privately owned land or waters unless:
(i) the owner authorizes the employees of designated local agencies to enter upon the private land or waters to perform any tasks necessary for the removal or clearance; and
(ii) the owner provides an unconditional authorization for removal of the debris or wreckage and agrees to indemnify the local and state government against any claim arising from the removal; and
(h) invoking the provisions of any mutual aid agreement entered into by the political subdivision.
(3)
(a) If the chief executive is unavailable to issue an order for evacuation under Subsection (2)(c), the chief law enforcement officer having jurisdiction for the area may issue an urgent order for evacuation, for a period not to exceed 36 hours, if the order is necessary for the preservation of life.
(b) The chief executive officer may ratify, modify, or revoke the chief law enforcement officer's order.
(4) Notice of an order or the ratification, modification, or revocation of an order issued under this section shall be:
(a) given to the persons within the jurisdiction by the most effective and reasonable means available; and
(b) filed in accordance with Subsection 53-2a-209(1).

Authority for Disaster Declarations is granted under Utah Code Title 53 – 2a – 208.

53-2a-208. Local emergency -- Declarations -- Termination of a local emergency.

(1)

(a) Except as provided in Subsection (1)(b), a chief executive officer of a municipality or county may declare by proclamation a state of emergency if the chief executive officer finds:

(i) a disaster has occurred or the occurrence or threat of a disaster is imminent in an area of the municipality or county; and

(ii) the municipality or county requires additional assistance to supplement the response and recovery efforts of the municipality or county.

(b) A chief executive officer of a municipality may not declare by proclamation a state of emergency in response to an epidemic or a pandemic.

(2) A declaration of a local emergency:

(a) constitutes an official recognition that a disaster situation exists within the affected municipality or county;

(b) provides a legal basis for requesting and obtaining mutual aid or disaster assistance from other political subdivisions or from the state or federal government;

(c) activates the response and recovery aspects of any and all applicable local disaster emergency plans; and

(d) authorizes the furnishing of aid and assistance in relation to the proclamation.

(3) A local emergency proclamation issued under this section shall state:

(a) the nature of the local emergency;

(b) the area or areas that are affected or threatened; and

(c) the conditions which caused the emergency.

(4) The emergency declaration process within the state shall be as follows:

(a) a city or town, shall declare to the county;

(b) a county shall declare to the state;

(c) the state shall declare to the federal government; and

(d) a tribe, as defined in Section 23A-1-202, shall declare as determined under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. Sec. 5121 et seq.

(5) Nothing in this part affects:

(a) the governor's authority to declare a state of emergency under Section 53-2a-206; or

(b) the duties, requests, reimbursements, or other actions taken by a political subdivision participating in the state-wide mutual aid system pursuant to Title 53, Chapter 2a, Part 3, Statewide Mutual Aid Act.

(6)

(a) Except as provided in Subsection (6)(b), a state of emergency described in Subsection (1) expires the earlier of:

(i) the day on which the chief executive officer finds that:

(A) the threat or danger has passed;

(B) the disaster reduced to the extent that emergency conditions no longer exist; or

(C) the municipality or county no longer requires state government assistance to supplement the response and recovery efforts of the municipality or county;

(ii) 30 days after the day on which the chief executive officer declares the state of emergency; or

(iii) the day on which the legislative body of the municipality or county terminates the state of emergency by majority vote.

(b)(i)

(A) The legislative body of a municipality may at any time terminate by majority vote a state of emergency declared by the chief executive officer of the municipality.

(B) The legislative body of a county may at any time terminate by majority vote a state of emergency declared by the chief executive officer of the county.

(ii) The legislative body of a municipality or county may by majority vote extend a state of emergency for a time period stated in the motion.

(iii) If the legislative body of a municipality or county extends a state of emergency in accordance with this subsection, the state of emergency expires on the date designated by the legislative body in the motion.

(iv) An action by a legislative body of a municipality or county to terminate a state of emergency as described in this Subsection (6)(b) is not subject to veto by the relevant chief executive officer.

(c) Except as provided in Subsection (7), after a state of emergency expires in accordance with this Subsection (6), the chief executive officer may not declare a new state of emergency in response to the same disaster or occurrence as the expired state of emergency.

(7)

(a) After a state of emergency expires in accordance with Subsection (6), the chief executive officer may declare a new state of emergency in response to the same disaster or occurrence as the expired state of emergency, if the chief executive officer finds that exigent circumstances exist.

(b) A state of emergency declared in accordance with Subsection (7)(a) expires in accordance with Subsections (6)(a) and (b).

(c) After a state of emergency declared in accordance with Subsection (7)(a) expires, the chief executive officer may not declare a new state of emergency in response to the same disaster or occurrence as the expired state of emergency, regardless of whether exigent circumstances exist.

Amended by Chapter 438, 2024 General Session

Under Utah Code Ann. § 53-2a-1402, the city must designate an emergency manager. The manager creates a plan (or adopts the plan for the county) and coordinates with other emergency managers. This is the language of the statute:

(1) Each political subdivision of the state of Utah shall designate an emergency manager. (2) A political subdivision may designate an officer of the political subdivision to serve as the emergency manager. (3) An emergency manager shall: (a) create a plan to coordinate emergency preparedness, response, mitigation, coordination, and other recovery activities; and(b) coordinate with other emergency managers and officials to ensure efficient, appropriate, and coordinated emergency preparedness, response, mitigation, and recovery. (4) Each political subdivision shall provide for emergency interim succession of the emergency manager as described in Part 8, Emergency Interim Succession Act.

This plan may be used to prepare for or to respond whenever there is a disaster or emergency that could significantly threaten human health, property or the environment. The functions of emergency management are under the immediate operational direction and control of the Designated City Council Member **or his/her designee**, who becomes the City's Emergency Manager and coordinates interdepartmental emergency operations and maintains the ultimate responsibility for resolution of conflicts regarding the application of limited resources to a variety of concurrent emergency situations. Upon declaration of a disaster or other emergency, the Emergency Manager or his/her designee is authorized to commit the resources necessary to carry out the provisions contained in this plan.

Note that according to the Utah Code Ann. § 53-2a-1402 (above) the Emergency Manager MAY be an officer of the political subdivision (such as a city council person) but it is not specifically required.

National Incident Management System (NIMS)
In accordance with the Homeland Security Presidential Directive (HSPD) 5, all departments and organizations having responsibilities delineated in this Emergency Operations Plan will use the National Incident Management System (NIMS). This system will allow proper coordination between local, state and federal organizations.

Responsibility for coordination of emergency activities with regional, state, and private partners resides with the Emergency Manager or his/her designee and will be accomplished through established liaison roles within the incident or unified command structure as outlined in the National Incident Management System.

The Incident Command System (ICS), as a part of NIMS, will enable effective and efficient incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating with a common organizational structure. All EOC functions and on-scene management of incidents will be conducted using the Incident Command System. The City Council and Department heads will comprise the EOC team and will provide overall direction and support to the EOC and responders in the field.

The plan is in accordance with existing local, state, and federal statutes. It has been approved by the Richmond City Council and will be revised and updated as required.

Effective Date: (Month, Date, Year)

Mayor	Emergency Manager

Record of Changes

The Richmond City Emergency Operations Plan is a dynamic document that will be strengthened and enhanced over time as it is tested and activated for actual events or exercises. In concert with the plan maintenance section and planning efforts with other agencies, this plan may be revised and refined on a regular basis.

Each revision to the plan will be numbered and documented. As new versions are created, they will be distributed to designated plan holders and will supersede all previous versions.

INSTRUCTIONS TO PLAN HOLDER

Use this form to document any changes to the Richmond City Emergency Operations Plan. Update the plan by removing outdated pages and replacing them with updated information.

RECORD OF CHANGES

REVISION NUMBER	SECTION OF PLAN CHANGED	PAGES	REVISION DATE	INITIAL

SITUATIONS AND ASSUMPTIONS

SITUATION:

Richmond City is located in north Cache County, Utah covering 3.5 square miles with a population of about 2500 residents. Richmond is approximately six miles from the Idaho state line.

The major terrain features defining the Richmond city area are the foothills of the northern end of the Wasach Range to the east, and the Cache Valley Floor to the north, west and south. The closest river is the Bear River, to the east.

The adjacent cities are Lewiston to the northwest, Cove (unincorporated) to the north, and Smithfield to the south. The largest nearby city is Logan, 12 miles south, which is the county seat. The Cache County Emergency Operations Center is located in the Cache County Sheriff's Complex in Logan.

US Highway 91 runs north and south through the city connecting Logan with the Idaho state line.

Emergency Response is provided to the City of Richmond by Cache County Fire (Fire and EMS), and Cache County (Sheriff). Richmond City also has a small volunteer fire department which provides backup to the County fire response.

Local hospitals are Cache Valley Hospital, North Logan (11 miles), Logan Regional Hospital (Intermountain Health Care), Logan, 12.7 miles, and Franklin County Medical Center, Preston, Idaho (13.7 miles)

There are two public schools located in Richmond: White Pine elementary on the north end of town on Highway 91, and North Cache middle school on the south end of town on Highway 91.

VULNERABILITY:

Richmond at moderate risk for earthquakes. On August 30, 1962 Richmond experienced a 5.7 earthquake which caused extensive damage to homes, schools and religious facilities.

Utah is well known for its rapid and often severe changes in weather. Severe weather includes; extreme cold, winter storms, large scale wind events, thunderstorms, lightning, hail, tornadoes, flooding, avalanches and heat waves. While some types of these events can be predicted, others will occur with little or no warning.

Hazardous Materials are transported daily via US Highway 91, and via the Union Pacific Railroad track to the west of the city.

Richmond is at moderate risk of localized flooding, primarily due to snowmelt and/or blocked irrigation canals.

There are two major industrial facilities in Richmond, Lower's Food to the south and Pepperidge Farms to the north. The primary hazard posed by these facilities is the potential for hazardous chemical release, particularly ammonia refrigerant from Lower's.

Drought due to abnormally dry weather could have a serious effect on the local farmlands, livestock and crops

INTRODUCTION

This manual is to assist City officials and staff during times of emergencies and disasters. Each section contains major activities that will need to be organized and/or accomplished. The activation of this plan and the numbers of responders needed to assist in the EOC and in the field will depend on the type and size of the emergency or disaster. This plan is modular and can be activated fully or in part, depending on the situation.

Each position identified in this manual should have guidelines and procedures in place to actually carry out the duties he or she is assigned. Everyone should be familiar with their role before, during and after a disaster. Other assignments may be given to staff that are not outlined in this manual.

Checklists are in the back of the manual for emergency support functions which are outlined in this plan.

NIMS (National Incident Management System)

Richmond City will utilize principles outlined in the National Incident Management (NIMS) and Incident Command System (ICS) to manage emergency situations.

Richmond City responds to emergencies in accordance with principles of the Incident Command System (ICS) and Unified Command System (UCS) as identified in the National Incident Management System. The City EOC is also organized within NIMS guidelines. The City Council and Department heads will comprise the City Disaster team and will provide overall direction and support to the EOC and responders in the field.

City Council Members and city officials should complete basic training regarding the NIMS. This training includes the following FEMA courses: “IS-700-NIMS An Introduction”, “IS-100 An Introduction to ICS”, FEMA G 0402, NIMS Overview for Senior Officials (Executives, Elected and Appointed)

Additionally Council Members are encouraged to complete the following FEMA courses: “IS-200 Basic ICS for Single Resources and Initial Action Incident” and “IS-800, A NRP An Introduction”. Council Members are also invited to participate in any of the exercises conducted by the Emergency Manager. These exercises may include tabletop, functional, or full scale exercises and/or drills to test all or part of the City’s Emergency Operations

ADMINISTRATION and LOGISTICS

During a disaster response, it is clear that some administrative policies and procedures should be suspended, relaxed or made optional under threat of disaster. Such actions should, however, be carefully considered, and the consequences should be projected. Details of purchasing and contracting must be maintained. City employees, volunteers and mutual aid resources must have complete documentation of all hours and costs associated with the disaster response.

INITIAL RESPONSE

In the event of an unusual event or emergency situation, the initial responder should notify the city government as follows:

First contact: City Administrator.

Alternate first contact: Mayor

Second alternate: City Public works director.

The City Administrator will notify the Mayor (or in the Mayor's absence, city council members in order of seniority).

The Mayor and City Administrator will decide the next steps in terms of notification and initial operations.

EMERGENCY OPERATIONS CENTER

The function of Richmond City's Emergency Operation Center (EOC) is to be the center for communication, information and coordination during a state of emergency. The primary EOC is located at the Richmond City Hall. The back-up EOC is located at the Black and White Days building. The EOC serves 5 main objectives: **1) Situation Assessment, 2) Direction and Control, 3) Coordination, 4) Priority Establishment, and 5) Resource Management.**

ACTIVATION OF EOC

The EOC can be activated by the Mayor, or, if the Mayor is unavailable, by the following City officials: 1) Council Chair Person, 2) Council member over Public Safety, (City Emergency Coordinator), and 3) City Administrator.

CONTINUITY OF GOVERNMENT

The line of succession for Richmond City's continuity of government, in case the chief elected official is not available, is as follows as outlined in City Ordinance:

A. Mayor
B. Mayor pro tem
C. Council Member over Emergency Management
D. Any other available Council Member

CONCEPT OF OPERATIONS

GENERAL:

The operation of the plan shall be coordinated among all departments and agencies and not dependent upon any one individual.

The City of Richmond Emergency Operations Center (EOC) staff will collect, record and evaluate information in order to determine measures to be taken before, during and after disasters/emergencies.

The information will be evaluated and used to identify the need for critical resources to support response activities and minimize the effects of the emergency.

Problem areas and deployment of resources will be monitored and recorded.

Public information will be coordinated with the Joint Information Center (JIC) as necessary.

OPERATIONS:

Operation of the plan commences when the City Mayor/Council or a designated representative, determines that the severity or length of the situation warrants plan implementation to reduce the threat to life and/or property

Alert and order the mobilization of the City emergency management organization.

Activate the City Emergency Operations Center. Size and composition of the staff is to be determined by the magnitude of the disaster.

Alert the general population of the disaster or impending disaster.

Arrange for the evacuation of threatened areas if necessary.

Alert the Cache County Emergency Management for assistance and coordination of other resource agencies.

Richmond City will utilize a simple Emergency Level Response System to help clarify the impact of the emergency on the City, and to alert City officials as to the need for EOC activation.
The emergency response levels outlined below are declared by the on-scene commanders in concert with the Mayor or Mayor's designee (see Continuity of Government). When an incident reaches a magnitude that the City's resources are being tasked, then, the on-scene commanders will notify the Mayor to discuss:

A. Impact of the Event on the City and its resources.
B. Situation Status (what has happened, what is happening, what may happen.)
C. Resource Status (resources on-scene, resources en-route, resources needed.)
D. Need for declaration of Emergency Level.

Emergency response is always guided by the following priorities: 1) Life Safety, 2) Incident Stabilization, and 3) Protection of Property.
The following checklists for the respective Emergency Level would then be followed by the Mayor and on-scene Commander based on the aforementioned priorities.

LEVEL 2 EMERGENCY:

A. Definition of a Level 2 Emergency - Any unexpected occurrence that can be met with the City's normally available resources. This would include resources from contracted outside agencies (i.e. Cache County on-duty deputies, Cache County Fire etc.). A Level 2 Emergency might require the use of all City resources, but yet would not overwhelm the City's response capabilities.

B. Responsibility- The department that would normally respond to the situation and establish command is responsible for the decision making to properly resolve the incident.

C. Actions- The responsible department shall set up an on-site command post as appropriate. No City wide action is required.

D. Notifications- Mayor, Fire, Cache County Sheriff's Office, other department heads as determined by the Mayor including County Emergency Management is needed.

E. Press Relations- Press relations will be handled by the City Administrator, Mayor or designated Public Information Officer.

F. EOC – Not activated.

NOTE: If a large scale evacuation (10 + homes) is required, the level is automatically changed from a Level 2 to Level 1 response and the City EOC must be activated.

LEVEL 1 EMERGENCY:

A) Definition of a Level 1 Emergency- Any unexpected occurrence that overwhelms the City's response capabilities and resources. A Level 1 Emergency requires additional resources beyond a normal response pattern. Such emergencies require a cooperative effort and a commitment of personnel, equipment or resources that would upset the normal working routine of either or all responding departments or agencies.

B) Responsibility- The primary decision making responsibility rests with the Emergency Operations Center. The nature of this emergency will require a cooperative effort with all City departments and outside agencies and/or jurisdictions that are responding to the City.
C) Notification-Mayor, all Department Heads, the City Council and Cache County Emergency Management will be notified.
D) Actions- The Mayor or designee (see Activation of EOC) will activate the EOC. Members of the EOC, under the direction of the Mayor will organize, and coordinate the City's response. Those departments responsible for on-scene management, will establish an on-site command post and notify all responding agencies (and the EOC) of the location. The on-site command post will coordinate directly with the EOC.
E) Press Relations- Press relations will be handled by the Mayor, city administrator or designated Public Information Officer (PIO).

F) EOC- Activated.

NOTE:

The County EOC may also be activated to support the City EOC. If it is not activated, the County Emergency Manager may report to the City EOC for coordination and support.
The County Joint Information Center may also be activated (without the County EOC being activated) to support the City's information needs.

RESPONSE CHECKLIST

The following checklist should be followed by all City staff who are assigned to respond to the City EOC in the event of a large scale emergency or disaster.
Upon notification of an emergency/disaster:

- Get background information from the person(s) who notified you of the emergency.

  a. Location
  b. Incident size and type
  c. Type of damage
  d. Response up to now

- Make arrangements for family/household needs. If a member of your household is injured or your house is severely damaged, take care of those matters first. Come into work if you can. Please note that the Religious organizations and volunteer response team members in Richmond City will be checking the status of the families/households during the emergency and relaying information between the EOC and responders.

- Take personal supplies for 72 hour needs, i.e. toothbrush, deodorant, personal medication, a change of clothes if possible.

- Report to the Council Chambers, unless asked to report elsewhere. (Alternate EOC is the Black and White Days building).

- If a member of your household is able, bring them into work with you to assist in clerical, messenger, and other duties which would assist assigned emergency responders.

- Employee welfare and the welfare of the employee's families is of utmost concern to the City. All individuals are encouraged to be prepared for a disaster and to prepare their families as well.

WHEN THE EOC IS ACTIVATED

Log all events, actions, decisions, communications, reasons for decisions, etc. Save all logs for records and references.

Ensure that all Team members in the EOC are doing the same.

Begin Damage Assessments. Start with Rapid Assessments to obtain a quick picture of what has happened in the community. Then deploy resources. Rapid Assessment will give you the initial damage information that you need for declaring a state of emergency.

Damage Assessments will need to be organized and conducted so that more detailed information for recovery efforts can be obtained. This is usually done by joint state and federal teams, along with local representatives from Richmond City.

Assign people to fill any vacancies in EOC or to special duties.

Hold regular briefing meetings with volunteer response teams for updates on response activities and actions on the established priorities.

Ensure that departments are keeping records of the event and their activities.

Additional clerical help is paramount to keep accurate status of events.

Assist the Public Information Officer (Mayor) to prepare press releases, instructions, information, etc and set a time schedule for subsequent releases.

If needed, assist the Mayor in preparing a Disaster Declaration.

Guarantee purchasing needs are being met so each department can get the resources it needs to appropriately respond to the emergency.

See that utilities are being restored to damaged areas and temporary shelters.

Assist in managing coordination and internal activities within the EOC

MAYOR (city administrator?) :

- Report to the EOC. If it is not activated, then report to the on-scene Command Post.
- Maintain authority before, during, and after an emergency declaration.
- Issue Proclamation of Local Emergency in Richmond City, Utah.
- Issue and approve public proclamations as necessary during the declared emergency.
- Answer questions from the general public about the declared emergency. Activate County JIC/JIS (Joint Information Center/Joint Information System) if necessary.
- Contact County Emergency Manager to coordinate activities of EOC and/or command post.
- Coordinate press releases with various Public Information Officers (PIOs).
- Establish media locations for news conferences, interviews, etc.
- Develop and distribute media releases to the public through the news media.
- Appoint assistants and specialists during the emergency as necessary.
- Activate Mutual Aid Agreements as necessary.
- Document all actions, costs and decisions. Obtain scribe if necessary to assist with documentation.
- Review public assistance needs as well as individual assistance needs in the City.
- Conduct periodic briefings in the EOC for staff.
- Maintain situational awareness for all departments and coordinate actions of the City with all involved.
- Rescind Proclamation of Local Emergency when appropriate.

CITY COUNCIL MEMBERS:

- Report to the EOC when activated.
- Begin a log of activities, decisions, communications, and significant events. Make sure that everyone is doing the same.

- Get an assistant to help you with documenting decisions, faxing reports, ect.

- Assist in alerting appropriate City departments, council members, City staff, and outside agencies as needed. (Specific City Council member duties listed later in plan)

- **Direction and Control –** As a member of the City Disaster team (Council and Department Directors), assist in determining the priorities and objectives for the situation and ensure that the EOC members are communicating and coordinating with each other and obtaining needed resources.

- Each individual Department Director and Council member (EOC Council Disaster Team) is responsible for the allocation of available resources in their respective control. The majority of requests are made by the on-scene Incident Commander and members of the EOC Disaster Team.

- Assist with Mutual Aid Agreements between neighboring jurisdictions to increase efficiency of emergency response efforts. Such agreements also assure that costs are proper and compensation is made as required. This requires coordination is made as required. This requires coordination with City Administrator.

- Oversee the coordination and implementation of response activities for your assigned emergency functions (duties) and provide updates and briefing information to the Mayor and other members of the Council Disaster team on a regular basis.

- Recommend actions regarding curfews, forced evacuations, authority and need of immediate demolition of unsafe structures on private property or other matters.

- Have the administrative assistant assist with errands and clerical duties, such as: maintain the log of events, decisions, communications, significant events which can be referred to during a debriefing.

- Assist in preparation of emergency related ordinances, Disaster Declaration and process with other government agencies.

- Assist purchasing with contract preparation and administration.

- Assist the Mayor in developing appropriate wording to warn the general and at risk populations.

CITY RECORDER:

- Upon notification, report to your own office unless asked to report elsewhere. Get at least two assistants to help you with your emergency responsibilities.

- Begin a log of the information you receive, decisions you make and hours you work.

- Assist with obtaining home telephone numbers of those involved with response efforts. Each responder's home will be called to give and receive information on the emergency and expected duration.

- Assist the Emergency Coordinator in accounting for each responder's hours logged involved in the emergency. Note who is exempt and who is not. It is possible that FEMA will pay 75 percent of overtime workforce expenses directly related to the disaster.

- Remind all parties involved that each person, included non-exempt staff, needs to have an accurate account of their hours spent responding to the emergency.

- Collect from each department and/or group after shift or day records on the following.

- Personnel- who, where, when, activity and time worked.

- Begin accumulating, or have an assistant retrieve the shift time logs from the EOC and the on-scene responders.

- Assist volunteer teams in continuous operations and shift changes for relief personnel for an emergency that lasts 12 hours or longer.

FIRE DEPARTMENT:

Begin a log of events, decisions, communications, and significant events. Save all logs.

Make sure that all agencies involved in responding are taking measures to maintain their own safety.

As soon as is reasonable, tour the disaster site and take photos for records.

Tour the established shelters and assist Shelter Manager with correcting any hazards and preventing any injuries inside of the shelter.

After your tour, advise the volunteer team leaders of issues dealing directly with Risk Management and responder safety.

If applicable, assist the Incident Commander and City Attorney in investigation and documentation for potential liability issues.

If necessary, recommend that the Policy Group request a Critical Incident Street Debriefing team for the emergency responders on scene and in the EOC coordinate this with Incident Command and the Director of Public Safety.

A representative from Fire Service/ EMS will report to the EOC to assist in response coordination should the EOC be activated.

Ensure that departments are keeping records of the event and their activities. This information can be used as documentation for potential liability issues.

Communicate with the Public Safety to ensure that all safety measures are being taken in consideration of populations with special needs.

Communicate with the Shelter Coordinator to ensure safety at all established temporary shelters. If possible, have a trained medical responder treat small wounds at the shelter rather than transporting them to a hospital.

EMERGENCY MANAGEMENT COORDINATOR

(City COUNCIL MEMBER):

Notify the Cache County Emergency Manager.

Make sure EOC telephone numbers are available to the P.I.O. and all City staff.

Establish communication links with Cache Country County.

Get an assistant to update the status board in the EOC, be a runner and take notes.

Through volunteer coordinator, notify or alert voluntary agencies with the following information:

- Type of disaster; Time of disaster; Actions already taken; Areas/number of persons involved; Estimate of damage/loss of life; Type/amount of assistance needed.

Update information on conditions of disaster with the following information.

- Status of public services; Status of water and sewer systems; Release of hazardous materials; Rumor control; Status of weather.

Be sure accurate logs and records of activities are being kept by all Departments with the following information.

- Service activities; Estimates of damage; Manpower and equipment utilized; Mutual aid or extra-jurisdictional assistance requested or provided; Financial expenditures; Federal and State reports.

Maintain contact with the National Weather Service.

Work with the local volunteers in filling out and faxing/emailing the Preliminary building Damage Assessment Surveys to the County and State.

Work with the P.I.O. and the County in activating the Emergency Alert System.

Recommend a professional Critical Incident Street Debriefing Team.

If necessary, communicate with the plant manager or plant emergency coordinator for local industrial facilities.

PUBLIC INFORMATION OFFICER (PIO)

Warning Phase of an Emergency

- Coordinate with departments on what information needs to be released before an action takes place, i.e. evacuation, in-place sheltering, anticipated weather information, etc.

- Prepare printed material (if applicable) for media and quick distribution to public and monitor media reports.

- **After the Emergency has begun -** Get an assistant to assist you with clerical duties.

- Log activities, decisions, communications, major events, ect.

- Establish a media center, and handle inquiries from the media. Schedule regular press conferences. Let them know where and when information will be released. **The media center must be separate from the EOC.**

- Coordinate visitor control at the EOC

- Coordinate all rumor control activities. You may need assistants to help you.

- Determine the value of the information received.

- Release the names of injured residents or employees **only after the next of kin have been notified.**

- Keep records of what you did and why.

Emergency Alert System

- If the desired action is to activate the emergency alert system, contact the Cache County Sheriff's Office. Give them the brief information to be broadcast. **This information should answer who, what, where, when, why and how.**

- Call back the Cache County Sheriff's Office to update or cancel the E.A.S.

- **People Need Information About:**
    - Damage to community.
    - What services are/ are not available.
    - What the City is doing to restore lost services.
    - Estimates of how long services will be out.

- What the public should do and plan for.
- **Where medical, shelter, and food services may be obtained.**

COMMUNICATIONS COORDINATOR

- Designate a runner to take and receive written messages and those messages, which cannot be transmitted by radio or telephone.

- See that redundant communication links are established between the EOC and field personnel.

- Is there sufficient communication equipment with emergency power supplies available?

- Inform all parties involved in the response of the channels assigned to the different departments and how to contact other departments and groups.

- Coordinate with ARES (Amateur Radio Emergency Services) to augment City needs. For example, setting up communications between shelters, field personnel and the EOC and establish communications with other government agencies including Cache County.

HEALTH and MEDICAL VICTIM ACCOUNTABILITY

- Coordinate with medical facilities so we can tell people where to go for medical help.

- Inform the Public Information Officer of the availability of medical resources.

- Establish a temporary morgue if needed.

- Is the emergency being surveyed for health and sanitation hazards?

- Is decontamination an issue? How will it be handled?

- Have helicopter landing zones with adequate ground support been established.

- Is water being tested for contamination? (Public Works)

- Should arrangements be made for bulk water supply?

- Are there adequate facilities for proper containment and disposal of medical wastes?

- Contact the Cache County Sheriff's Office to alert them of the possibility of needing additional medical resources including mental health workers.

- Work with the Communications Coordinator as needed at hospitals, shelters or on scene.
- Monitor health and sanitation conditions and needs in designated shelters.
- Coordinate the established of emergency hospitals if required.
- Work with Community Services Coordinator to make communication links with every established shelter.
- Contact Shelter Coordinator and start collecting copies of shelter registration forms.
- Work with the PIO to determine when and under what conditions the release of victim information will be given to the public.
- Coordinate victim information with local hospitals.
- The EOC will be the victim inquiry center to exchange information as to the names of people and in which shelters they are in.

TRANSPORTATION COORDINATOR

- The goals of the Transportation Coordinators are to: 1) Obtain information regarding the status of major roads: 2) Coordinate the transportation of groups of people from point A to point B without congesting routes used by emergency vehicles and equipment.
- Obtain a current, full size street map.
- You will need at least one assistant to help you with calling people and recording information.
- Assist in the allocation of City vehicles and equipment.
- Work with all on scene teams and groups to keep information of open routes and inform the EOC of roads needing to be cleared.
- When releasing information, remind the PIO to tell the general public to stay off the roads unless completely necessary and frequently update the PIO of roads closed.
- Coordinate transportation needs of displaced people to shelter sites.
- Assist with the transportation of food and supplies to shelter areas.
- Provide appropriate transportation for the return of displaced people to their residences.

- Provide and coordinate public transportation to emergency feeding sites, food distribution points, and clothing pick-up areas.

- Begin a log of activities, decisions, events, communications, etc.

- Designate an assistant to help with clerical duties such as message running, taking notes, or other errands.

- Keep records of what you did and why. Make sure that all coordinators under your control are doing the same.

- Obtain information on status of department resources.
    - Personnel
    - Equipment, Building, Offices
    - Fleet Resources
    - Heavy Equipment
    - Communications
    - Materials
- Obtain information from field personnel regarding impacts of the disaster on the community.
- Street conditions, including bridges.
- Water distribution systems, including tanks, sewer lift stations, water treatment plant, wells springs and dams.
- Water availability to the public.
- Available/unavailable utilities from other agencies (private/public)
- Infrastructure.
- All Public Works damage assessment information must be submitted to the Policy Group which is the paramount requirement in declaring a disaster. A formal declaration cannot be made without the Preliminary Damage assessment Report being submitted to the Policy Group and the County EOC.
- Coordinate and recommend response priorities during Policy Group briefings. Standard priorities are 1) Route Clearance 2) Utility restoration of critical buildings.

All other response functions and protocol performed by Public Works will follow previously established departmental plans.

If Applicable

- Assist with evacuation plans and traffic control resources such as barricades and emergency signs.

- Lead the discussion as to where debris should be taken. Is the location temporary or permanent?

- Make sure that all of the shelters have sufficient basic utilities.

- Make sure someone is keeping records on vehicle, manpower, and equipment use.

- Check with mutual aid cities and BoxElder County to see if they have any Public Works resources available.

Flooding

- Identify flood areas and coordinate with Law Enforcement and Public Information for warnings, evacuations, and traffic control.

- Identify routes for storm water runoff to deter flooding damage.

DAMAGE ASSESSMENT COORDINATOR (Public Works)

- Assess the structural safety of the City Building EOC, and Public Works maintenance buildings, water and waste treatment plants.

- Report casualties and deaths to the EOC for forwarding to County authorities.
- Immediately gather information and fill out the Preliminary Damage Assessment report. Give one copy to the Policy Group, transmit a copy to Cache County County and the State Emergency Management Divisions and keep a copy.

- Attend Policy Group briefings and report damage assessment information.

- Assemble the Damage Assessment Team consisting of one Building Inspector and one Public Works Inspector. The team is to update the Damage Assessment Coordinator after a completed inspection of each targeted area and / or building.

- See that damage assessments are done on potential shelters and mass care facilities. Coordinate with Cache School District. The Damage Assessment Team will post each building inspected as Safe to Enter or Unsafe to Enter. The notice should include the time and date of inspection.

- Collect information from other sources such as volunteers, other government agencies, religious groups, and engineers from engineering firms on information they may have about damage.

- Complete the Initial Damage Assessment Report and send a copy to the Cache County EOC and the State EOC and keep a copy for your records.

- Keep records of what was completed and the reasons of such.

- Coordinate with Volunteer Coordinator to see if volunteers are a possibility and available.

VOLUNTEER COORDINATOR

- Report to the EOC, unless otherwise instructed.
- Begin a log of decisions, communications and significant events.
- Have four logs with you at all times. 1) Requests from public about status of a neighborhood; 2) The status of a neighborhood 3) Requests from parents about the status of their child at a particular school; 4) The status of students at a particular school.
- Get at least two assistants to assist you in documenting information given and received, making phone calls and assignments.
- Make your telephone numbers readily available to the Policy Group, EOC, public.
- Activate your community call down list.
    - Call each community leader to share information about the emergency.
    - Make sure that all of the information you receive is confirmed and that you get the name of the person giving the information.
    - Necessary information: Preliminary extent of damage to each individual community, neighborhood needs and availability of resources, i.e people equipment.

END OF MAIN PLAN

ANNEXES

Annex A: Emergency Contact List

Name	Title/Position	Cell Phone	Home Phone	Work Phone	Email
Richmond City Office					
Paul Erickson	Mayor	(435) 757-4579		(435) 258-2092	perickson@cachevalleybank.com
Lyle Bair	City Council	(435) 770-1938		(435) 258-2092	lyle.bair1@gmail.com
Kelly Crafts	City Council	(435) 760-5079		(435) 258-2092	kelly@richmondutah.org
Amber Ervin	City Council	(435) 890-0337		(435) 258-2092	aervin@richmondutah.org
Tucker Thatcher	City Council	(435) 881-2708		(435) 258-2092	tuckerthatcher@gmail.com
Terrie Wierenga	City Council	(435) 770-9061		(435) 258-2092	twierenga@richmondutah.org
City Staff					
Jeremy Kimpton	Public Works Director	?		(435) 258-2092	jkimpton@richmondutah.org
HollyJo Karren	City Administrator City Treasurer	?		(435) 258-2092	hkarren@richmondutah.org
Justin Lewis	City Recorder	?		(435) 258-2092	jlewis@richmondutah.org
Public Works					
Austin Hinckley	Water Department	?		(435) 258-2092	ahinckley@richmondutah.org
Shane Lewis	Sewer Department	?		(435) 258-2092	slewis@richmondutah.org
Court					
Melissa Titensor	Justice Court Clerk			(435) 258-2092	richmondcitycourt@richmondutah.org
First Responders					
Jay Downs	Fire Chief			(435) 563-6825	jdowns@smithfieldcity.org
Jeremy Hunt	Ass't. Fire Chief			(435) 563-6825	jhunt@smithfieldcity.org
Irrigation District					
Crossing Guards					
Cache County Sheriff's Office					
Cache Dispatch				435-716-9400	
Sheriff's Office				435-755-1000	
Non-Emergency				435-753-7555	
Animal Control		435-994-6293		435-716-9400	

Emergency Mgt.		435-994-9595		435-755-1059	wlusk@cachesheriff.org
Medical Examiner				435-716-9400	
Smithfield Fire Department					
Fire Department				(435) 563-6226	
Richmond City Planning & Zoning					
Name	**Title/Position**	**Cell Phone**	**Home**	**Work Phone**	**Email**
LDS Stake Center				435 258 2861	
LDS Church 1st E.				435 258 2873	
LDS Church Relief Society					
White Pine School				435 258 2344	
North Cache School				435 258 2452	
Valley Veterinary				435 258 2484	
N.Cache Veterinary				435 258 2190	
Lower's Food				435 258 2449	
Pepperidge Farms				435 258 3618	
Casper's Ice Cream				435 258 2477	
PMG Vegetation Control				435 760 2222	
US Post Office				435 358 2132	
State Liquor Store				435 258-2047	
Itty Bitty Equipment				435 258 1175	
Bair Automotive				435 258 5535	
Randy's Service				435 258 2735	
Ag Needs Trucking				435 214 0304	
Cemetery District				435 258-2092	
Red Cross				801-605-6372	
FAA				866-835-5322	
Union Pacific RR				1 888 877-7267	
VOAD / Bill Tolbert	Region 1 Coord	720 937-3232			bill.tolbert@gmail.com
Craig Humphreys	Logan Em. Mgr.				craig.humphreys@loganutah.org

Annex B: Emergency Call Taker Information Checklist

This form is to be used by staff or Emergency Operations Center support personal to document requests for emergency assistance that are received at the City Offices, or Emergency Operations Center if activated.

Location:		Date:	

Description		Remarks
1	Nature and scope of the emergency:	
2	Number of injuries:	
3	Type of assistance required:	
4	Name and contact information of the individual reporting the emergency:	
5	Notify Emergency Dispatch (911) or other emergency responders as required:	
6	Determine area to be warned or alerted:	
7	Determine appropriate steps to warn residents, schools, hospitals, nursing homes, major industries, institutions, public assembly areas, businesses, and visitors:	
8	Determine the need to evacuate or shelter in place:(See evacuation and in-place shelter checklists under this Section)	
9	Determine the extent of property damage:	
10	Notify the City Administrator and appropriate staff as required.	
11	Other:	
12	Other:	

Annex C: EOC Activation Considerations Checklist

After the determination has been made to activate the EOC, the following should be considered:

- EOC Set up:
- Staff Call Down
- Functional assignments
- EOC Action Plan
- Notify County Dispatch, County EOC
- Information gathering, information sharing
- Verify wireless and hard wire phone capabilities, City radios, set communication priorities and assigns equipment and personnel as required.
- Notify Red Cross, local Volunteer Organizations Active in Disaster (VOAD), Health Department, Dominion Energy, Churches, Rocky Mountain Power, Century Link as needed.
- Notify City insurance carrier as required.
- Staffing levels (shifts, breaks)
- Feeding
- Sleeping
- Recovery Plan

Staging Area
Resource Management
Proclamation of Disaster
Damage assessments (windshield, inspectors, engineers)
Barricades
Water (bottled, trucked, pipeline)
Sewer (port-a-potty, infrastructure)
Electric (generators, grid)
Food-Feeding (field, community, shelters, EOC)
Care and Shelter:

- Location, American Red Cross
- Capacity (ADA compliance)
- Animal Shelter/Control
- Evacuation (notification, transportation)

Community Health – Medical
Communications: (news releases, radio, Cloud speaker, email, etc.)

- Joint Information Center
- Public Health information releases
- Emergency Dispatch coordination (911)
- Social Media

Security
Triage – Hospital – Medical Supplies
Debris management (separate, box, removal)
Donations management
Cash donations (finance department, ARC)
Schools (Shelter-in-place)
Evacuation shelters

Assistance Center (short/long term)
Staffing for shift changes (field, EOC)
Demobilization/Redeployment
Recovery
Mitigation

Annex D: Secondary Action Checklists

PUBLIC WARNING CHECKLIST

The public should be instructed on the following protective measures:

If evacuations are necessary (see Evacuation Checklist in Section F below)
To stay clear of the disaster area
To stay out of damaged buildings until they are inspected for safety
On water contamination or conservation. (Do not use, do not drink, boil order, or conservation directives on laundry, car washing, irrigating, etc. after water pressure has been partially restored or if water supplies are low to prevent overdrawing the system)
Safety and movement of livestock
Disposition or burial of dead pets or livestock
Location of first-aid and emergency medical stations
Location of distribution centers for emergency food, water, and clothing
Danger of floating propane tanks
Public immunization recommendations
Regarding curfew instructions, if necessary
Where to deposit any personal effects of victims found in the disaster area
Movement and safe storage of important records and documents
Importance of documenting and photographing property damage
Household and community hazardous material dangers
Whether or not to attempt to pick up children from school, (schools have emergency evacuation procedures in place)
Procedures for in-place sheltering
How and where to go to volunteer
If curfews are necessary

PUBLIC INFORMATION CHECKLIST

Determine if the City Administrator will serve as the PIO or if a designee will assist with that role.
Notify news media that the City Administrator or designee is the PIO.
Establish procedures for release of public information, including use of social media, such as city website, Facebook, Twitter, email lists etc. Establish a hashtag.
Establish a Joint Information Center (JIC) if necessary.
Instruct emergency responders to refer news media to the official spokesperson.
Establish a disaster inquiry center. (If the disaster gets wide attention, set up a special area for use of VIPs and national news media. They will need desks, telephones, electricity, food, and water. News releases will need to be prepared by 4:00 a.m. for use on the east coast by the national news media.)

DISASTER MANAGEMENT CHECKLIST

Have experts been requested for disaster scene management?

Are Incident Command/Unified Command situation reports being forwarded to the EOC?

Are damage assessment reports being sent to the EOC in a timely manner (copies should also be forwarded to the County EOC).

Are response and recovery activities being documented?

On-site and EOC operations (events log, situation reports, damage assessment reports, photographs, videos, etc.)

Emergency responder information (name, agency or organization represented, operational assignment, hours worked, equipment costs and usage, materials purchased, etc.).

Volunteer information (name, agency or organization represented, volunteer assignment, hours worked, equipment costs and usage, materials purchased, etc.).

Contracted Services (work performed, hours worked, materials provided, equipment costs and usage, etc.).

Have safeguards been established to protect vital records?

Are measures being taken to protect the disaster scene, preserve evidence, and document the incident?

Are communications established between disaster site and Emergency Operation Center?

Is traffic control set up in and around disaster area?

Have emergency power and lights been established for nighttime operations?

Is law enforcement security established to prevent looting and to control spectators?

Has fire control been established at the disaster site?

Are tests being conducted for possible chemical or radiological contamination as a result of the disaster?

Have religious leaders been notified and advised as to where they are needed?

Will distribution centers be needed for emergency food, water, and clothing?

Are arrangements set up to handle donations of food, clothing, money, etc.?

Are food, water, warm clothing, first-aid, temporary shelter, and sanitary facilities available to rescue workers?

Should air traffic control be set up in the disaster area for authorized aircraft and helicopters? (If so, call the FAA (866-835-5322).

Have building safety inspection procedures been established?

Have the standard symbols adopted by the Urban Search and Rescue Teams when searching a disaster area been used and attached to each building searched to avoid duplication of effort?

Have procedures been enacted to ensure the safety and security of prisoners?

Have post-disaster assistance centers (federal, State and local agencies) been established?

Are preparations for post-disaster recovery being made?

Has the Critical Incident Stress Management Team been requested for disaster scene workers?

MASS FATALITY OPERATIONS CHECKLIST

Has a family assistance center been established and staffed? Coordinate with Red Cross, public health, County, State and/or churches.

Have adequate administrative and support personnel, copy machines, and telephones been provided to the family assistance center?

Have recovery and transport teams been issued personal protective clothing?

Has the County Medical Examiner (at the Sheriff's Office) been notified?

Is there a need for a temporary morgue?

Are refrigerated storage units available for temporary storage of remains?

Are adequate numbers of body bags and plastic containers available? (Request additional quantities through the State DEM.

Does the State Medical Examiner require additional assistance?

Are religious leaders available to provide assistance to relatives?

Have local morticians or funeral directors been notified to assist with survivors and body identification?

MISSING PERSONS CHECKLIST

1. Has a procedure been set up to report and/or locate missing persons and someone assigned to handle these cases, such as trained volunteers or the American Red Cross?
2. Are accurate lists of missing persons being publicized via local news media (radio, TV and newspapers, internet, email and social media)?

EVACUATION CHECKLIST

Notify EOC of evacuation needs.

Determine evacuation area by readily identifiable boundaries.

Determine who is authorized to initiate general evacuation and secure authority.

Choose safe evacuation routes.

Choose and implement policy for those refusing to evacuate.

Activate alert warning methods (sirens, patrol cars, etc.).

Issue specific instructions to population (County Code Red, EAS, Richmond Cloud Speaker, door-to-door, patrol cars, etc.).

Establish reception centers and public shelters (Red Cross).

Conduct evacuation. Consider the following:

Permanent Residents

Special needs populations (senior citizens, disabled, children)

Transient Population (tourists, hotels, motels, campers etc.)

Senior citizens center

Schools (public, private, preschools)

Large facilities (factories, sports events, conventions, businesses etc.)

If needed, provide emergency medical care.

Provide traffic control points in and around evacuation area.

Plan for the care of pets and livestock.

Provide law enforcement security in the evacuated area.

Monitor and inspect areas for safe reentry.

Issue "all-clear" order.

Manage the orderly return of evacuees.

EMERGENCY MEDICAL CHECKLIST

Have treatment sites been established?

Have triage, treatment, and transport teams been established?

If needed, has a temporary morgue been set up?

Are proper records being maintained on the victims?

Do medical aid stations at the scene have ambulances available?

Have first-aid stations been established upwind and uphill from the danger area?

Has everyone who may have had contact with hazardous materials been segregated and decontaminated?

Is adequate personal protective equipment available and is it being used?

Have helicopter landing zones with adequate ground support (lights, wind direction, aviation fuel, ground personnel, etc.) been established?

Are medical and health teams organized and functioning?

Are priorities established for health and medical services?

Have medical services been provided to the special needs population?

Is water being tested for contamination and potability?

Should available bulk water tankers be filled for possible use?

Is disaster area being surveyed for health hazards and sanitation?

Is immunization required?

Are immunization supplies and equipment available?

Has a warning been issued to all persons at the disaster scene not to eat, drink, or smoke in contaminated areas?

LAW ENFORCEMENT CHECKLIST

Are assigned law enforcement personnel on scene?

Has law enforcement security been established for residents, stores, buildings, and facilities in the disaster area to prevent looting?

Has a curfew been imposed?

Has a proclamation to desist and disperse been issued?

Has martial law been imposed?

Have adjacent jurisdictions been alerted?

SEARCH AND RESCUE CHECKLIST

Are search and rescue operations underway for stranded or trapped people?

Do search and rescue teams require logistical support (food, water, communication, special equipment, transportation, personnel, lighting, etc.)?

Has the search and rescue leader been adequately briefed regarding estimated numbers of people (including age, sex, etc.); type of structure (concrete, steel, wood); name and location of incident commander; special hazardous conditions (fire, hazmat, structural, etc.); and weather forecast?

Are transportation, shelter, meals, and medical services available for rescued people?

COMMUNICATIONS CHECKLIST

Is sufficient communication equipment available? (Activate ARES if necessary through county EOC)

Are amateur radio operators on the scene?

Do amateur radio personnel have adequate facilities for operation and shelter?

Is amateur radio communication between the command post and the shelter required?

Does the command post have trained dispatch operators on duty?

Is access to communication room restricted to authorized personnel?

Has backup communication been developed (radio, cell phones, runners, telephone lines)?

SHELTER-IN-PLACE PROTECTION CHECKLIST/INFORMATION

Determine shelter-in-place areas and establish readily identifiable boundaries.

Activate warning methods and provide instructions to the public as required.

Have shelter-in-place protection instructions been provided to the public? Shelter-in-place protection measures include the following:

Stay inside house or building or go inside immediately.

Close windows and doors.

Turn off air conditioners and heating system.

Close fireplace dampers.

Gather radio, flashlights, food, water, essential medication, duct tape, emergency supplies, etc.

Go to inside leeward area or basement of building and seal cracks and openings to provide extra protection (especially if in-place sheltering may last for two hours or more).

Do not use the basement if toxic gases are heavier than air.

Take whatever measures are necessary to ensure respiratory protection (may be wet towels).

Provide instructions for special populations.

Once conditions have stabilized, monitor and inspect areas for a safe exit.

Issue all-clear.

Instruct residents to go outdoors and air-out house or building.

TEMPORARY SHELTER CHECKLIST

Is the Red Cross ready to receive evacuees?

If not, where are temporary shelters located?

Is sheltering available for transient population?

Has the public been informed of shelter locations and access routes?

Is traffic control set up in the vicinity of the shelter?

Are routes to shelters safe?

Are reception centers located near the shelters?

Are evacuees being registered in shelters?

Are sufficient food, water, first-aid, cots, and other supplies available in the shelters?

Are sufficient latrines, bedding, telephones, and recreation located at the shelters?

Are mass feeding arrangements set up?

Are law enforcement security and fire control present in the shelters?

Have mental health volunteers been requested?

Are medical services available?

Have individuals been asked about special health needs such as medication, diet, etc.?

Are arrangements in place for the periodic inspection of shelters by health personnel?

Have instructions been issued on what to do with livestock and pets?

Have arrangements been made for shelter notification when evacuation is completed?

Has liaison between the command post and shelter been set up to provide updated reports?

Have policies been established to release persons in shelter or to return them to their homes?

Have the needs of those with disabilities, accessibility and functional needs been addressed?

PUBLIC UTILITIES CHECKLIST

Are utilities damaged?

Should utilities (electricity, gas or water) be shut off?

Are there sewage problems? If so, has it contaminated the public water supply?

What is the potential for disruption of electricity, gas, water or sewer?

If a utility is damaged, when will it be repaired or is an alternate source available?

Are wells operational?

Annex E: SUPPLEMENTAL INSTRUCTIONS FOR CITY DEPARTMENTS

City Buildings

In the event of a large-scale emergency or disaster, City buildings may be used for various purposes. The Public Works Director or building inspector will assess buildings for damage that may render them unsuitable for use.

The Public Works Director or building inspector will supervise any temporary repairs to damaged City buildings.

In the event of a long-term power outage during winter months, all buildings, except those required for emergency services, will be winterized by draining the water lines and pouring an anti-freeze agent in the drains. Anti-freeze is stored at the shop for this purpose.

During a short-term power outage (one lasting only a few hours at most), the City will utilize portable generators to power the office area within City Hall and shop, and to provide electricity for the communication equipment.

The City may utilize approved propane heaters and fuel to heat specific rooms under emergency conditions.

Water Department

During an emergency or disaster situation, Water Department employees will:

Assess the type and severity of damage to the system;

Take actions to protect public health;

Take actions to reduce or minimize additional system damage;

Make repairs based on priorities; and

Return the system to normal operations as quickly as possible.

The City recognizes that a severe earthquake may damage the distribution network. Water Department personnel will attempt to isolate sections of the network that are still intact and set up points of distribution where the public has access to emergency drinking water.

If there is an extended power outage during the winter months, personnel will winterize the pump houses, pour antifreeze down drain lines, and prevent freezing utilizing portable propane heaters.

Sewer Department

During an emergency or disaster situation, Sewer Department employees will:

Assess the type and severity of damage to the system;

Take actions to protect public health;

Take actions to reduce or minimize additional system damage;

Make repairs based on priorities; and

Return the system to normal operations as quickly as possible.

In the event power is disrupted, ensure the auxiliary power system is functioning properly at the primary lift station.

Ensure on-site fuel reserves are adequate at the primary lift station to maintain long-term electrical generation capabilities.

As required, contract with fuel distributors to ensure a continuous supply of fuel for emergency generators.

In the event of an extended power outage, sewer department staff will determine the need for reduction of culinary water consumption to limit inflow to the lift station and make recommendations of such restrictions to the City Administrator.

Electrical Generation

During a power outage, portable or installed generators may be used to supply power to City Hall, City Shop, wells, chlorinator, and sewer lift stations/

The EOC will coordinate with Rocky Mountain Power in the placement and startup of emergency generators if they are deployed at strategic locations throughout community.

Irrigation canals

Private agricultural land and buildings, landscaping, outbuildings, vacation homes, fences, and developed or undeveloped land fall outside the scope of the City's services, and City staff and resources will not be involved in working on these properties except as incidental to satisfying a compelling public interest as outlined above.

Priorities

Life safety is paramount. No employees shall be placed in danger to preserve or protect property, public or private. Water rescue or life safety activities shall only be done under the guidance of properly trained individuals (i.e. swift-water rescue certified) and in accordance with applicable OSHA guidelines.

Public infrastructure, including roads, bridges, utilities, and other infrastructure owned by and benefitting the public.

Quasi-public infrastructure (canals, headgates, ditches, and levees that directly or indirectly impact public infrastructure)

Private homes (primary dwellings) and businesses

Private agricultural land and buildings, landscaping, outbuildings, vacation homes, fences, and developed or undeveloped land fall outside the scope of the City's services, and City staff and resources will not be involved in working on these properties except as incidental to satisfying a compelling public interest as outlined above.

Annex F: Situation & Damage Assessment Report Form

<table>
<tr><td>1. Name of Jurisdiction:</td><td>2. Type of incident (e.g. flood, wildfire, earthquake):</td></tr>
<tr><td></td><td></td></tr>
<tr><td>3. Date and time of incident:</td><td>4. Location (city/town, Lat/Long):</td></tr>
<tr><td></td><td></td></tr>
<tr><td colspan="2">5. Impact on Individuals, number of homes/businesses affected:</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">6. Impact on your community. Include narrative below on the following topics:
Infrastructure (e.g. roads, water & sewer, utilities, public facilities, and buildings)
Debris
Health concerns
Agriculture
Any other not mentioned here, or any requested by the State EOC</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">7. Local resources mobilized, and volunteer hours tracked. Burn rates of commodities at staging areas.</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">8. If reporting jurisdiction is a city or town, what local or county assistance is being provided?</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">9. Has a "Local Disaster Emergency" been officially declared? If so, by whom? If Declared, provide a copy of the Declaration, or link to the Declaration if available online.</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">10. Any other information you would like to provide:</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>11. Name and contact info of person completing this report:</td><td>12. Date of this report:</td></tr>
<tr><td></td><td></td></tr>
</table>

Annex G: Initial Preliminary Damage Assessment (PDA) Report Form

UTDEM EOC Phone Number (801) 538-3400   Fax Number (801) 538-3772

Jurisdiction:	
Date/Time IDA Report Prepared:	
Prepared By:	
Call back number:	
Fax Number:	
Email Address:	

Part I: Private Property CUMULATIVE DAMAGES

Type Property	**# Destroyed**	**# Major Damage**	**# Minor Damage**	**# Affected**	**Dollar Loss**	**% Flood Insured**	**% Property Insured**	**% Owned**	**% Secondary**
Single Dwelling Houses (including condo units)									
Multi-Family Residences (count each unit)									
Manufactured Residences (Mobile)									
Business/Industry									
Non-Profit Organization Buildings									
Agricultural Facilities									

Part II: Public Property (Includes eligible non-profit Facilities) CUMULATIVE DAMAGES

Type of Property	**Estimated Dollar Loss**	**% Insured**
Category A (Debris Removal)		
Category B (Emergency Protective Measures)		
Category C (Roads and Bridges)		
Category D (Water Control Facilities)		
Category E (Public Buildings and Equipment		
Category F (Public Utilities)		
Category G (Parks and Recreation Facilities)		
TOTAL	$0.00	

Additional Comments:

PRELIMINARY DAMAGE ASSESSMENT SITE ESTIMATE FORM INSTRUCTIONS

DATE:

COUNTY:

PUBLIC ENTITY: Richmond City Corporation

NAME OF LOCAL CONTACT: Person able to provide additional information.

PHONE NO.: Cell phone, if possible

SITE NO.: Start at 1 and number sequentially. Do not change Site numbers. Add new site numbers at the end.

CATEGORY:

Category A: Debris Removal: Force Account Labor overtime and cost of equipment and material. Cost of straight time is not eligible unless additional, unscheduled personnel were used. All contractual debris removal costs are eligible.

Category B: Protective Measures: Force Account Labor including Police, Fire, Public Works overtime and cost of equipment and materials. Cost of straight time is not eligible unless additional, unscheduled personnel were used. All contractual protective measure costs are eligible.

Category C: Roads and Bridges: Repair of roads, bridges and associated features such as shoulders, ditches, culverts, lighting and signs

Category D: Water Control Facilities: Repair of irrigation systems, drainage channels, pumping facilities, levees, dams and flood control channels

Category E: Public Buildings: Repair or replacement of buildings, including their contents and systems; heavy equipment and vehicles

Category F: Public Utilities: Repair of water delivery and treatment systems, sewage collection facilities

Category G: Recreational or Other: Repair and restoration of parks, playgrounds, pools, and man-made beaches. This category is also used for any facility that cannot be characterized adequately by categories A-F, such as cemeteries.

LOCATION: Name of building/address or name of road/bridge. Include GPS coordinates if possible.
DESCRIPTION OF DAMAGE: Describe facility that was damaged, types of damage and the approximate extent of damage. Use estimated measurements. Specify types of materials and amounts of materials. For roads, specify road materials, shoulder erosion, culvert washouts, debris (including slides), sizes of structures and pipes. For bridges, specify piers, parapets, surface, abutments, superstructure, and approaches. For water control facilities describe specific damage to major components.
IMPACT: Describe any threats to health and safety, essential services, social and economic sectors caused by damage or loss.
% COMPLETE: Percentage of work completed on the site on the day of the inspection/survey.
COST ESTIMATE: Best estimate on costs to repair or replace the facility for a fair and reasonable price. For emergency work, the total estimated cost for force account labor overtime, equipment and materials. Also include all contractor costs.
NOTES: 1) Cost estimates for categories C through G should reflect the cost of restoring a facility to its <u>pre-disaster design</u>, with no improvements or mitigation measures included, even if improvements and/or mitigation measures are planned when rebuilding. 2) Any costs covered by insurance should <u>NOT</u> be included in the estimates.

Annex H Mutual Aid Agreements

TBD

Annex I School emergency and reunification plans

TBD

Annex J Business/industrial emergency plans

TBD

Annex K EOC Staffing and volunteers

1) **City employees and elected officials**
2) **Volunteers**
3) **Communications**

Annex L: Communications Plans

1. **ICS 205**
2. **Cache County Emergency Communications Plan**
3. **Richmond City Communications Plan**

1. ICS 205

Incident Radio Communications Plan

Purpose. The Incident Radio Communications Plan (ICS 205) provides information on all radio frequency or trunked radio system talkgroup assignments for each operational period. The plan is a summary of information obtained about available radio frequencies or talkgroups and the assignments of those resources by the Communications Unit Leader for use by incident responders. Information from the Incident Radio Communications Plan on frequency or talkgroup assignments is normally placed on the Assignment List (ICS 204).

Preparation. The ICS 205 is prepared by the Communications Unit Leader and given to the Planning Section Chief for inclusion in the Incident Action Plan.

Distribution. The ICS 205 is duplicated and attached to the Incident Objectives (ICS 202) and given to all recipients as part of the Incident Action Plan (IAP). All completed original forms must be given to the Documentation Unit. Information from the ICS 205 is placed on Assignment Lists.

Notes:

The ICS 205 is used to provide, in one location, information on all radio frequency assignments down to the Division/Group level for each operational period.
The ICS 205 serves as part of the IAP.

Link to ICS 205

(Print out and insert ICS-205)

2. CACHE COUNTY AMATEUR RADIO COMMUNICATIONS PLAN

Link to: <u>Cache County Emergency Communication Plan</u>

A. INTRODUCTION

The Cache County Amateur Radio Emergency Service® (ARES®) is composed of FCC licensed amateur radio operators who have voluntarily registered their capabilities and equipment for public communications service.
Under Federal regulations, the contents of messages handled by amateur radio are not divulged to unauthorized persons and such public service communications are furnished without compensation of any kind.
The Cache County ARES® functions in this EMERGENCY PLAN under the direction of the Cache County Emergency Coordinator (EC), who is appointed by the Utah Section Emergency Coordinator of the American Radio Relay League (ARRL) with the support of Amateur Radio operators that are part of ARES® and or RACES.
The EC may appoint Assistant Emergency Coordinators (AEC) sufficient to function efficiently.

B. PURPOSE

The purpose of this plan is to provide a written guide containing the minimum information that would be needed in an emergency. Each emergency is different and flexibility is a necessity to provide an adequate response.
The primary responsibility of the Cache County ARES® is to furnish emergency communications in the event of a natural or a man-made disaster when regular communications fail or become inadequate.
All drills, training and instruction shall be carried out to ensure readiness to respond quickly in providing effective amateur emergency communications.
The following jurisdictions/agencies shall be served, as requested, in an emergency:

1. Incorporated Jurisdictions in Cache County.
2. The Unincorporated Area or Populations under the authority of the Cache County Executive and the Cache County Office of Emergency Management.
3. The American Red Cross
4. Police and Fire Departments
5. Hospitals and Nursing Homes
6. The District Emergency Coordinator, when surrounding counties request assistance.
7. The Utah Department of Public Safety
8. The Federal Emergency Management Agency
9. Cache County Sheriff’s Office

C. PLAN ACTIVATION

If a representative of an agency that ARES Serves (See Section 2.4) requests ARES Activation. Or any member of the Cache County ARES® who becomes aware that a communications emergency may exist, should contact the EC/AEC If they are not available then the ARES Member should take this action. Then monitor the Cache County Emergency Net repeater for activity. (Emergency repeater frequencies and tones are documented in Appendix 1)

A series of three tones (hi-lo-hi) heard on the 146.720- repeater indicates that a net or an emergency situation is in progress. Should you hear these tones, please stay on frequency and check in with net control. If you hear no traffic within a couple of minutes, call for the net control operator on this frequency 146.72- repeater or the 147.200+ repeater. (See Appendix 1) If an ARES Member finds it necessary to turn on the Emergency tones for an Event like Weather, Fire, Flood, or Earthquake. They are welcome to but must make sure that they or another ARES Member manages the net and follows the procedures set out in this Plan. To activate the Emergency Tones on any of the Mt Logan Repeater system mainly 146.72-,147.26+ or 145.310-, Key your Microphone and type in DTMF 516 to turn it on. To Turn off the Emergency Tones type in 522.

If local telephone service is available, the EC and/or Assistant ECs shall be notified by telephone or by any other means available.

In any emergency in which amateur radio is requested to serve, amateur radio operators may be alerted by any City/County Emergency Management Coordinator, Red Cross, or State official notifying the EC. In the event the EC is unavailable, an Assistant EC shall be notified. The Assistant will attempt to notify the EC periodically.

When this plan is activated, EVERY Amateur Radio operator is encouraged to monitor the information network frequency and offer assistance AS ASKED by the NCS. The most important skill is the ability to LISTEN, LISTEN, LISTEN. As tactical nets are established on frequencies assigned by the emergency frequency coordinator, the NCS can direct volunteers to these frequencies. The purpose of the information net (InfoNet) is to collect and disseminate VERIFIED information to those listening. This could include weather data, road conditions, shelter locations, summaries of media reports, status of commercial power, staging areas, locations of supplies, requests for volunteers with specific expertise, etc. This is NOT a tactical or staging net. The NCS will not conduct roll calls but will keep lists of stations who have checked in. Stations will check out with NCS. Generally stations will “check in” with “call sign and location”. Stations may check in with VERIFIED (not hearsay) information. The NCS may ask for lists of undamaged roads into a particular area to assist agencies moving and staging emergency vehicles. Emergency traffic of any kind is, obviously, encouraged.

When a group (such as CERT, Red Cross, shelter, church, staging area manager, search/rescue, etc.) has a specific assignment and geographic area, the emergency frequency coordinator will determine a simplex or repeater frequency for use. The group MUST have enough operators to justify a frequency assignment AND must have an NCS. The InfoNet will keep track of such assignments (location, purpose, frequency and NCS). The InfoNet can regularly update listeners as to what activities are occurring and what frequencies various tactical nets are using. When the tactical assignment is complete, the frequency is released for assignment by the emergency frequency coordinator.

D. MOBILIZATION

The EC will notify ARES® members by Radio, Cell phone, pagers and Email Systems as from information entered into the ARES member database.

If telephone service is available, the Telephone Tree will be activated. If telephone service is not available, notification will be by radio and/or runner, as necessary.

The EC, or operator designated by him, will transmit on each VHF 2-Meter repeater, in turn, advising all stations of the ARES® activation and requesting that all operators switch to the ARES® frequency for further instruction.

Upon the awareness or notification that a communications emergency exists, members of the Cache County ARES® will check-in on the Cache County Emergency Net and maintain radio silence. (Emergency repeater frequencies and tones are documented in Appendix 1)

Mobile and Portable units will be activated.

The EC will assume NET CONTROL or delegate another operator to act as Net Control Station (NCS) on the Cache County Emergency Net repeater or other frequency to be determined by the EC. (See Appendix: 1.) Control will be established at whichever Emergency Operation Center (EOC) is activated by the Emergency Management Coordinator of the jurisdiction involved with the emergency. Only VHF equipment will be used at the EOC unless otherwise directed by the EC. HF stations will be established as needed at a location away from the disaster site at the residence of an ARES® operator. HF stations will maintain a link with the EOC via the Cache County Emergency Net repeater and use appropriate HF frequencies (see Appendix 1).

Operators with pre-assigned operating positions/locations shall contact the EC/AEC to determine if they should proceed to their operating locations immediately or standby on the primary net frequency for further instructions.

TACTICAL CALL	PRIMARY	BACKUP #1	BACKUP #2	
Command #1	147.200+ (PL103.5) 220 Link to Mt Logan, 221 un-link to Mt Logan	146.640 s	146.640- (PL 103.5)	
Command #2	146.720- (PL103.5)	146.720 s	146.800- (PL 88.5)	
EOC Intercom	147.520 s			
Tac #1	146.460 s			
Tac #2	146.560 s			
Tac #3	146.540 s			
State Wide Net/Intertie	449.650 - (PL100.0)	147.180 + (PL 100.0)		
Portable Repeater	147.860/144.710 (PL77.0)	449.250 – (PL103.3)		
Packet/Winlink Gateways	145.030 N7UWX-10	144.950 KD7IIW-10	145.090 N7UWX-11	
APRS/Winlink	144.390 s			
State Wide HF	7.272 Mhz LSB			
State RACES HF	3.920 Mhz LSB			
D-Star 1-A (AC7O) Digital Data only	1299.750 s			
D-Star 1-B (AC7O)	447.975-			
D-Star 1-C (AC7O)	145.150-			
D-Star 2-B (NU7TS)	449.575 -			

Other Resources			
TACTICAL CALL	**PRIMARY**	**BACKUP #1**	**BACKUP #2**
ERC Logan Bishop's Storehouse	146.420 s		
Smithfield	145.550 s		
Smithfield	439.225 s	147.460 s	
Logan PAR 1	146.580 s		
Logan PAR 2	146.540 s		
Hyde Park	146.500 s		
Sedgwick (Idaho)	146.800- (PL 88.5)	146.800 s	
Promontory	147.260+ (PL 103.5)	147.260 s	
Red Spur	145.310- (103.5)	145.310 s	
Mt. Logan (440)	449.625- (PL 103.5)	449.625 s	
Pisgah (440)	449.800- (PL 103.5	449.800 s	
North Logan – N7RRZ	147.240+ (PL 79.7)	147.240 s	
North Logan – N7RRZ	449.325+ (PL 156.7)	449.325 s	
Ogden Store House	145.590		

*Some repeaters need permission/MOU (memorandum of understanding)

Regional Nets			
TACTICAL CALL	**PRIMARY**	**BACKUP**	**TIME**
BRIDGERLAND ARC	146.720-	146.720 s	TUE 21:00
LOGAN BISHOP'S STOREHOUSE ERC	146.420 s		1&3 SU 20:30
SPARC (Sedgwick)	146.800-		SUN 20:00
RACES VHF Net (IRLP)	449.650-	147.180+	3rd Thur Even Mo. 20:00
RACES HF Net	3.920		3rd Sat Odd Mo. 08:00
Beehive Utah Net (NTS)	7.272		Daily 12:30
UBET (Brigham City area)	145.430- (PL 123.0)	145.290- (PL123.0)	Wed 20:00
Box Elder Co. Emergency training net	145.430- (PL 123.0)	145.290- (PL123.0)	Sun. 19:30
DCARC (Davis County)	147.42 s	449.925-	Thur. 19:00
Weber Co ARES	448.600 - (PL123.0)		Tue 08:00 pm
BEARS (Bear Lake)	147.120+		Sat. 18:30
UARC	146.620-		Sun. 20:00

Entitee	Primary	Backup # 1	Backup # 2
Cache County			
EOC Inter Com	147.520		
Tac #1	146.460		
Tac #2	146.560		
Tac #3	146.540		
Logan Bishops Storehouse			
ERC	146.420		
Hyde Park			
City ECC	146.500	438.775	
Hyrum			
City ECC	145.670	438.825	
Lewiston			
City ECC	438.850		
Logan			
PAR #1	147.580		
PAR #2	147.540		
Mt Logan Stake	447.800		
WIC	146.460		
USU			
USU ECC	439.100		

Mendon			
City ECC	146.480		
Millville			
City ECC	145.790		
Nibley			
City ECC	147.560	439.300	
North Logan			
City ECC	145.770	145.670	145.570
Paradise			
City ECC	145.610		
Providence			
City ECC	146.440	439.450	
Richmond			
City ECC	145.730		
River Heights			
City ECC	145.690		
Smithfield			
City ECC	145.550	439.225	147.460
Wellsville			
City ECC	145.590		

Cache County Radio Resource

Repeater Name: IRLP Repeater (IRLP node 3381)
Frequency: 147.200 **Offset:** + positive **PL Tone:** 103.5
Location: Little Mt.
Coverage: Cache Valley
Primary Use: Command #1,
Secondary Use: Command #2 Net
Notes:

Swappable with Mt. Logan for command net depending on situation.
IRLP (node 3381)

RACES IRLP Reflector 9257
Link to Mt. Logan (221 Un-link 220 Link)
East bench coverage for Mt. Logan if linked

Repeater Name: Mt. Logan Repeater

Frequency: 146.720 **Offset: -** negative **PL Tone:** 103.5
Location: Mt. Logan
Coverage: Cache County, Cache Valley, Logan Canyon, 100 mile radius.
Primary Use: Command net #2
Secondary Use: Command net#1
Notes:

- Swappable with Valley Floor Repeater for command net depending on situation.
- Links –
  Permanent links - 147.260+, 145.310-, 449.625-
  Temporary links – 146.800-, 145.410-, 147.200+
- Autopatch - *###-#### (no letup)
- 911 - 911
- Emergency power

Repeater Name: EOC Intercom

Frequency: 147.520 **Offset:** simplex **PL Tone:** none

Location:

Coverage:

Primary Use: Cache EOC to City EOC/ECC to EOC/ECC

Secondary Use: Talk in to EOC/ECC to EOC/ECC

Notes:

Repeater Name: TAC #1, #2, #3

Frequency: 146.460, 146.560, 146.520 **Offset:** simplex **PL Tone:** none
Location:
Coverage:
Primary Use: Assigned as necessary
Secondary Use:
Notes:

Repeater Name: Valley Floor Repeater

Frequency: 146.640 **Offset: -** negative **PL Tone:** 103.5
Location: Cache County Sheriff's office
Coverage: Cache County, Valley floor
Primary Use:
Secondary Use: Back-up #2
Notes:

Emergency power

Repeater Name: Portable Repeater
Frequency: 147.860/144.710 **Offset: -** negative **PL Tone:** 77.0
Location: As Assigned
Coverage: Location dependant 25 mile coverage
Primary Use: as needed
Secondary Use:
Notes:

G. Linkable to Mt. Logan, Sedgwick, 449.800-, 446.000 s

Repeater Name: Sedgwick Repeater
Frequency: 146.800 **Offset: -** negative **PL Tone:** 88.5
Location: Sedgwick Peak
Coverage: Cache Valley, SE Idaho, SW Wyoming
Primary Use:
Secondary Use: Command #2 Backup
Notes:

E. Linkable to Mt. Logan (Link to Mt Logan 172)
F. 449.375- permanent link on same site

Repeater Name: BARC Promontory
Frequency: 147.260 **Offset:** + positive **PL Tone:** 103.5
Location: South end of Promontory Mt. range
Coverage: South to Utah County, North to Box Elder County, West Desert
Primary Use:
Secondary Use: Command #2 Net
Notes:

C. Emergency power
D. Autopatch same as Mt. Logan

Repeater Name: Red Spur
Frequency: 145.310 **Offset: -** negative **PL Tone:** 103.5
Location: Red Spur
Coverage: Bear Lake County, Rich County, Logan Canyon, Black Smith Fork Canyon, SW Wyoming
Primary Use:
Secondary Use: Command #2 Net
Notes:

E. Solar Power
F. Autopatch same as Mt Logan

Repeater Name: Pisgah
Frequency: 449.800 **Offset: -** negative **PL Tone:** 103.5
Location: Mt. Pisgah
Coverage: Cache County, Black Smith Fork Canyon
Primary Use:
Secondary Use:
Notes:

Repeater Name: Intermountain Intertie
Frequency: 449.650 **Offset: -** negative **PL Tone:** 100.0
Location: Mt. Pisgah

Coverage: Cache County, Black Smith Fork Canyon
Primary Use: StateWide RACES Net
Secondary Use: State Wide Connectivity
Notes:

G.

Repeater Name: D-Star 1-A (AC7O)

Frequency: 1299.750 **Offset:** Simplex **PL Tone:** none
Location: Valley Floor
Coverage: Cache County
Primary Use: D-Star 1.2 gig Digital Data
Secondary Use:
Notes:

H. D-Star

Repeater Name: D-Star 1-B (AC7O)

Frequency: 447.975 **Offset: -**negative **PL Tone:** none
Location: Valley Floor
Coverage: Cache County
Primary Use: D-Star Voice
Secondary Use: Data
Notes:

I. D-Star

Repeater Name: D-Star 1-C (AC7O)

Frequency: 145.150 **Offset: -**negative **PL Tone:** none
Location: Valley Floor
Coverage: Cache County
Primary Use: D-Star Voice
Secondary Use: Data
Notes:

J. D-Star

Repeater Name: D-Star 2-B (NU7TS)

Frequency: 449.575 **Offset: -**negative **PL Tone:** none
Location: Wellsville
Coverage: Cache County
Primary Use: D-Star Voice
Secondary Use: Data
Notes:

K. D-Star

Repeater Name: Mt. Logan 440

Frequency: 449.625 **Offset: -** negative **PL Tone:** 103.5
Location: Mt. Logan
Coverage: Cache County, Cache Valley, Logan Canyon, 100 mile radius.
Primary Use:
Secondary Use: Command #2 Net
Notes:

- Links –
  Permanent links - 147.260+, 145.310-, 449.625-
  Temporary links – 146.800-, 145.410-, 147.200+
- Autopatch - *###-#### (no letup)
- 911 - 911
- Emergency power

Repeater Name: N7RRZ
Frequency: 147.240 **Offset:** +positive **PL Tone:** 79.7
Location: North Logan
Coverage: Cache County, Cache Valley,
Primary Use:
Secondary Use:
Notes:
- Links –
  Permanent links – 449.325- (156.7) same site
- Autopatch - *007###-#### (no letup)
- 911 - 911

Repeater Name: Winlink N7UWX-10
Frequency: 145.030 **Offset:** none **PL Tone:** none
Location: Cache County Sheriff Office
Coverage: Cache County, Cache Valley,
Primary Use: Winlink
Secondary Use: Packet
Notes:

A. Mt Logan node Call **"LGU2/N7UWX-2"**
B. Riverside node Call **"LGU"**

Repeater Name: Winlink KD7IIW-10
Frequency: 144.950 **Offset:** none **PL Tone:** none
Location: Cache County Smithfield Fire Department
Coverage: Cache County, Cache Valley,
Primary Use: Winlink
Secondary Use: Packet
Notes:

Repeater Name: Winlink N7UWX-11
Frequency: 145.090 **Offset:** none **PL Tone:** none
Location: Cache County PORTABLE
Coverage: Cache County, Cache Valley,
Primary Use: Winlink
Secondary Use: Packet
Notes:

3. Richmond City communications plan

Richmond will use the Cache County Emergency Communications Plan (above) with the following additions for local communications:

The Richmond Stake Emergency Communications Net amateur radio operators will use 147.58 Simplex for local Stake-based communications in Richmond, Lewiston and Cove. The City EOC will monitor this frequency as possible and maintain communions with the Stake as appropriate. Stake ERC radio operators will pass traffic to the City EOC. Stake radio operators may also be in contact with the Bishop's Storehouse radio operators as possible and if conditions warrant. Stake operators should not contact the County EOC directly. Richmond Stake Net Control should contact the Richmond City EOC on 145.730 MHz.

Richmond City Amateur Radio operators will communicate locally between themselves and with the City EOC on 145.730 MHz per the county communications plan. City operators should not contact the County EOC directly.

City EOC operators will communicate with the County EOC on the assigned Command and Tactical frequencies described in the County Emergency Communications Plan.

The City has a set of mobile and hand held VHF-FM radios operating on 153.815 and 154.085 MHz, call sign **WNRM789**. The EOC will maintain contact with city employees with these radios. A base station with these frequencies will need to be installed in the EOC.

GMRS and FRS will be used by non-Ham residents and Ward and Stake communications specialists to communicate with the EOC on preassigned channels and repeater(s) **TBD**. The City EOC has a GMRS base station and will monitor these channels.

Cache County uses a proprietary 700/800 MHz trunked radio system for law enforcement and public safety communications. If the County makes these radios available to Richmond City they will also be used to communicate with County law enforcement and public safety assets.

Annex M: Bear River Association of Governments Pre Disaster Mitigation Plan

The entire Bear River Association of Governments Pre Disaster Mitigation Plan (less annexes) is hereby incorporated into the Richmond City Emergency Operations Plan.

The entire plan in PDF form is here:

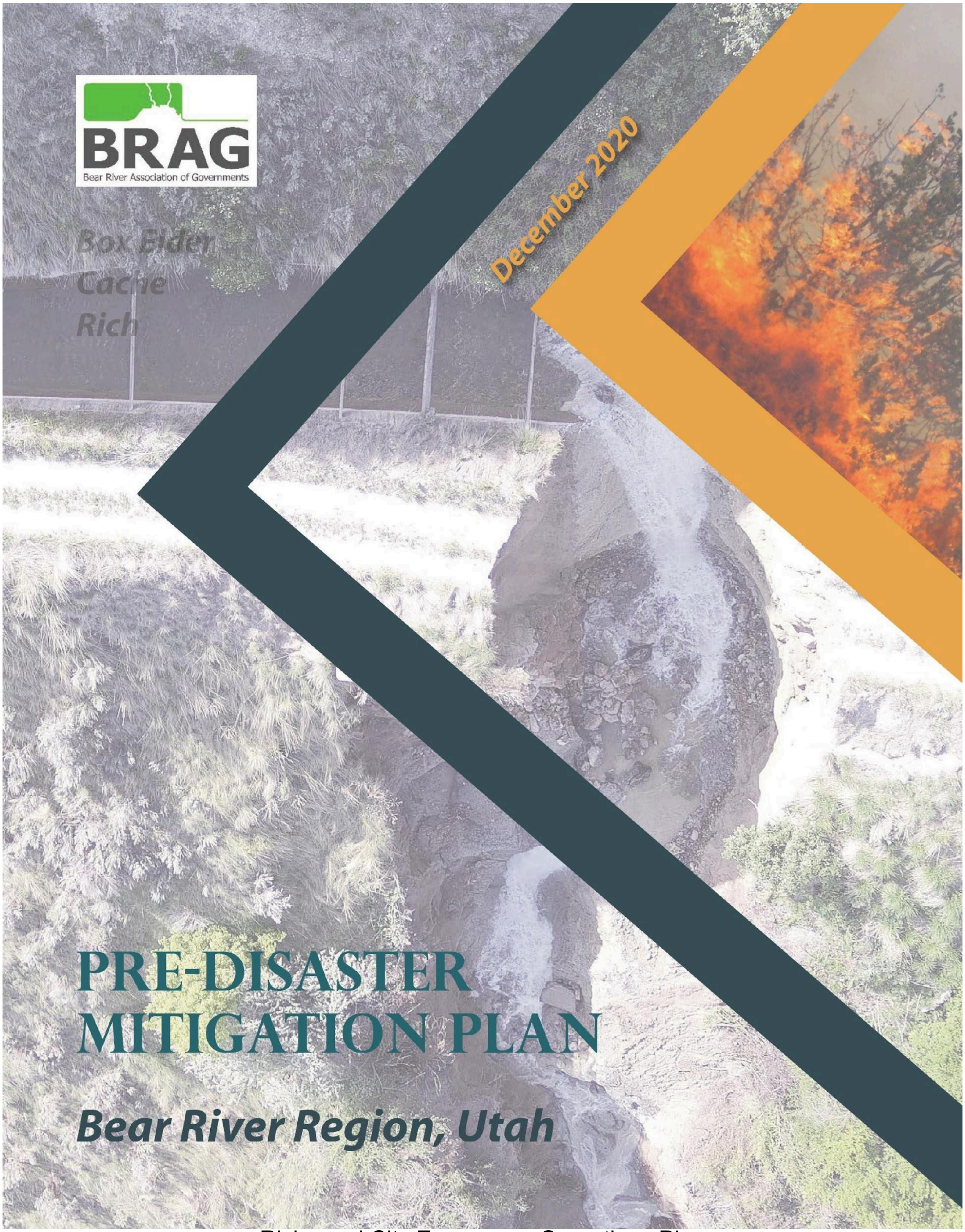
https://drive.google.com/file/d/1nj1ABPnw0rZnnbJwZpui8MaoIC1Xqxh5/view?usp=sharing

The web page for the plan is located here:

https://brag.maps.arcgis.com/apps/MapSeries/index.html?appid=fc507e02862e42cbbf627437c1658549

A printed copy of the plan (less annexes) follows. The separate section detailing Richmond City hazards and mitigation is at the end.

Bear River Association of Governments Pre-Disaster Mitigation Plan



Richmond City Emergency Operations Plan
DRAFT

Executive Summary

Welcome to the 2020 Bear River Region Pre-Disaster Mitigation Plan!

This plan serves as the FEMA-approved natural hazard mitigation plan for Box Elder, Cache, and Rich counties, and the 39 incorporated municipalities in extreme northern Utah. The site provides information on local and regional natural hazards, risk assessments for each community, community mitigation strategies, historical hazards information, and other natural hazards planning and mitigation resources.

It is hoped that through learning more about natural hazards and implementing the strategies included in this plan, potential losses to life, property, infrastructure, and other critical resources can be greatly reduced.

How to use this plan

The sections in this plan include information on local community risks, natural hazards data and information, resources for adopting the plan, implementing mitigation strategies, and many other resources.

Visit brag.utah.gov for a link to the online version of this plan.

What is hazard mitigation?

According to the Federal Emergency Management Agency (FEMA), hazard mitigation is defined as, "...any sustainable action that reduces or eliminates long-term risk to people and property from future disasters. Mitigation planning breaks the cycle of disaster damage, reconstruction, and repeated damage."

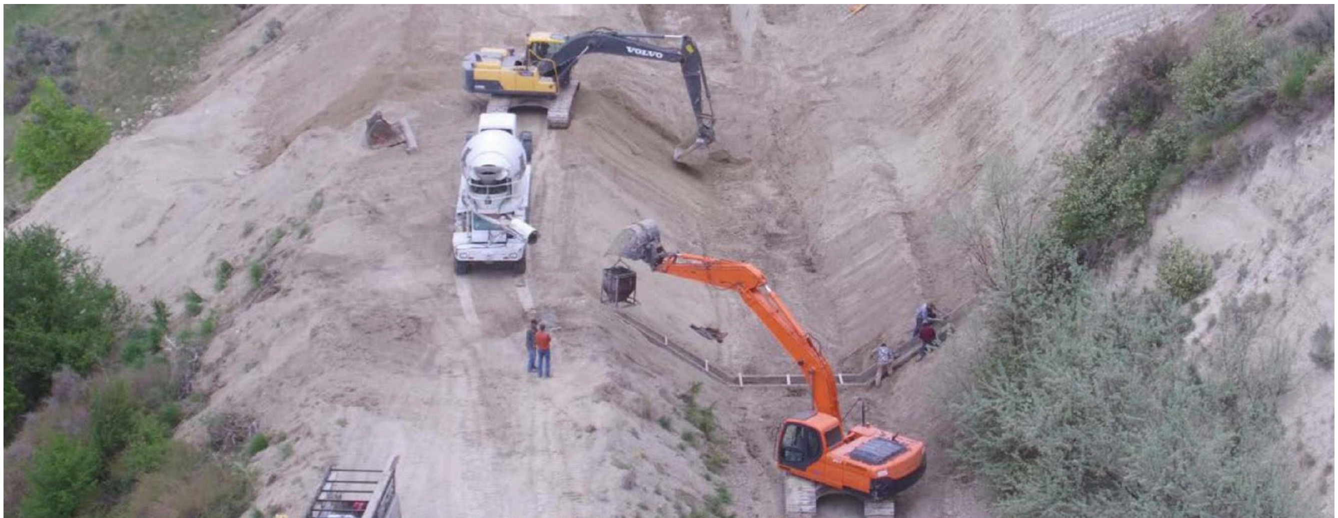
In addition to reducing potential losses, hazard mitigation measures also:

- Reduce vulnerability of communities to disasters.
- Promote individual and community safety and their ability to adapt to changing conditions and recover.
- Promote community vitality after a disaster.
- Lessen response and recovery resource requirements.
- Result in safer communities that are more self-reliant.

Does hazard mitigation work?

Yes, hazard mitigation works! By making smart investments now in implementing hazard mitigation strategies, local governments can help save lives, reduce losses to property and infrastructure, and preserve community assets that, otherwise, could be lost. According to FEMA, for every $1 spent on hazard mitigation projects funded by FEMA, local governments can save $6 by implementing mitigation strategies in their communities. Additionally, if communities adopt ordinances that help guide smart development in natural hazard areas, they can save around $11 for every $1 spent

Table of Contents


Canal Breach repairs in Box Elder County in 2020 (Photo courtesy of Box Elder County Emergency Management)

Plan Purpose and Use

Project scope

This plan identifies the region's natural hazards, helps communities understand their vulnerabilities to those hazards, and documents potential solutions that can significantly reduce threats to life, property, infrastructure, natural systems, and other community assets.

This is not an emergency response or management plan. Certainly, the plan can be used to identify weaknesses and refocus emergency response planning, which is an important mitigation strategy. However, the focus of this plan is to support better decision making directed toward minimizing impacts from natural hazard events.

Participating jurisdictions in the Bear River Region

RICH COUNTY	CACHE COUNTY
Garden City	Amalga
Laketown	Clarkston
Randolph	Cornish Town
Woodruff*	Hyde Park City
BOX ELDER COUNTY	Hyrum City
Bear River City	Lewiston City
Brigham City	Logan City
Corinne City	Mendon City
Deweyville	Millville City
Elwood	Newton
Fielding*	Nibley
Garland City	North Logan City
Honeyville City	Paradise
Howell	Providence City
Mantua	Richmond City
Perry City	River Heights City
Plymouth	Smithfield City
Portage	Trenton
Snowville	Wellsville City
Tremonton City	
Willard City	

**If jurisdictions did not participate in the planning process, including all types of communication or meeting attendance, they are not currently considered a participating jurisdiction.*

Planning Objectives

- Protection of life before, during, and after the occurrence of a natural hazard event
- Protection of emergency response facilities and capabilities
- Improved communications and warning systems
- Protection of homes, businesses, educational facilities, cultural-historical amenities, natural systems, and other community assets
- Identification and mapping of critical facilities, homes, businesses, educational facilities, cultural-historical amenities, natural systems, and other community assets
- Government collaboration across jurisdictional boundaries before, during, and after natural hazard events

How the plan can be used

Help local and appointed officials plan, design, and implement programs and projects that help reduce community vulnerability to, and potential losses from, natural hazards.
Help facilitate inter-jurisdictional coordination and collaboration related to hazard mitigation planning and implementation.
Provide guidance for local emergency management and planning offices and staff.
Help local jurisdictions comply with the Disaster Mitigation Act of 2000, through adoption of this plan. This helps communities qualify and apply for certain federal pre- and post-disaster funds.

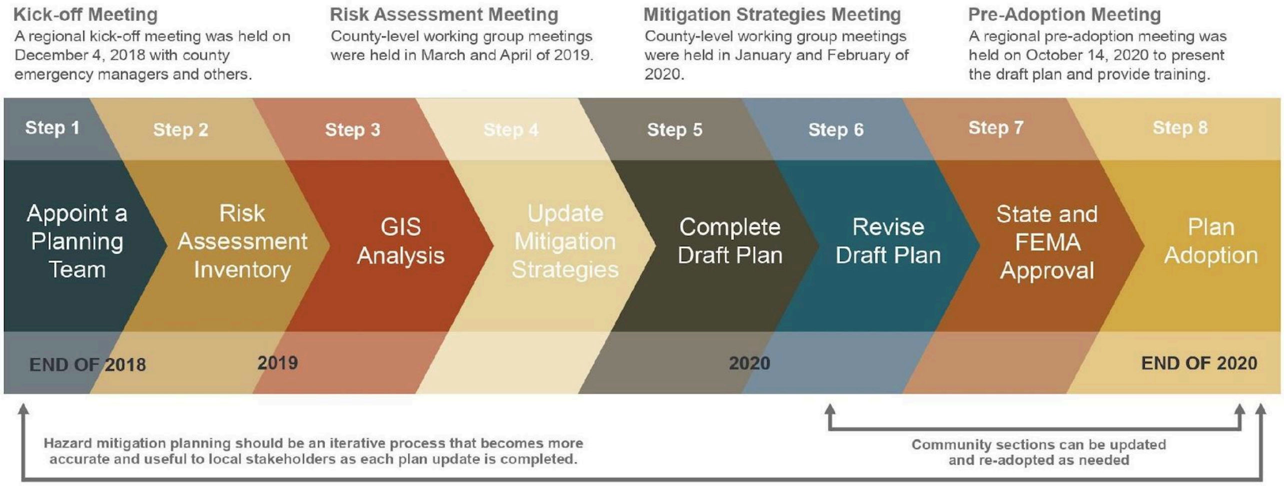
Increasing local capacity

One of the many benefits of having this regional natural hazard mitigation plan is the potential it creates for local governments and other entities to expand their local planning and implementation capacity. Communities can reference this plan in their local land use zoning and ordinances, and can show developers, builders, lenders, elected officials, and members of the general public where hazards exist and what is at stake if hazard events occur. Likewise, council members, planning and zoning commissions, and others can strategize on how they can plan better for hazards in their city, town, or county to mitigate potential impacts.

Additionally, most communities in the Bear River Region are experiencing fairly steady population growth - some are growing quite rapidly. As these communities grow, their ability to increase their local capacity for improved land use and natural hazards planning and implementation will also likely occur as function of that growth.

Likewise, as a local Association of Governments, BRAG provides general planning technical assistance to cities, towns, and counties in the Bear River Region, helping them increase their capacity to plan for and mitigate hazard risks in their respective communities.

Photo: Historic Willard landslide and flooding event in 1923 courtesy of Utah State University Special Collections.



Project timeline and various steps in the planning process for the 2020 Bear River Region Pre-Disaster Mitigation Plan.

The Planning Process

County Working Group Meetings:

RISK ASSESSMENT:

Review of mapped critical facilities and infrastructure; Wildfire hazards presentation (Utah FFSL); Geologic hazards presentation (Utah Geological Survey); and review of online hazards map.

MITIGATION STRATEGIES:

FEMA-approved mitigation strategies and floodplain model ordinances (FEMA); Geologic hazards model ordinance (Utah Geological Survey); Community potential loss analyses; and a mitigation strategies exercise.

PRE-ADOPTION:

Presentation of the draft PDM Plan and findings; Plan adoption and implications for local governments;

Overview and project timeline

While the pre-disaster mitigation plan update process has been standardized to a certain degree by FEMA, through working with local stakeholders included in county working groups, BRAG has adjusted the process to fit the needs of Bear River Region communities.

The sections below provide more information on critical components of the planning process.

Forming county working groups and meetings

Early on in the planning process, BRAG staff consulted with county emergency managers in Box Elder, Cache, and Rich Counties to help determine project details, and come up with a list of initial agencies, organizations, and other groups to include in county-wide working groups. These organizations were invited to attend the first regional kick-off meeting in 2018. During this meeting, BRAG staff, county emergency managers, Utah Division of Emergency Management staff, and others created a list of additional stakeholders that needed to be brought to the table to participate in the planning process.

County working groups were then formed, and three meetings were held for each respective county to discuss natural hazards and community risk assessments, create local mitigation strategies, and to present the draft plan and discuss plan promulgation (See **APPENDIX B** for meeting agendas and attendance lists).

In addition to the county working group meetings, many other meetings were held with state staff and local communities. Mayors, council members, city/town staff, and others were very generous with their time, especially as they worked with BRAG to create realistic mitigation strategies that fit their needs. Below is a list of other organizations BRAG staff met with as part of this plan update, whether in person, e-mail, or over phone or video calls:

- Utah Division of Emergency Management
- BRAG Governing Board (x2)
- Local GIS Analysis Professionals
- Utah Geological Survey
- Utah Forestry, Fire, and State Lands
- ESRI Denver Office
- Northwest Band of Shoshone Native American Tribe
- Box Elder Mayor's Association Meeting (Mayors in attendance representing: Willard, Brigham City, Mantua, Snowville, Perry, Honeyville, Deweyville, Tremonton, Portage; and Box Elder County representatives)

Local city, town, and county meetings:

Amalga
Bear River City
Brigham City
Box Elder County
Cache County
Clarkston
Corinne
Cornish
Deweyville
Elwood
Garden City
Garland
Honeyville
Howell
Hyde Park
Hyrum
Laketown
Lewiston
Logan
Mantua
Mendon
Millville
Newton
Nibley
North Logan
Paradise
Perry
Plymouth
Portage
Providence
Randolph
Rich County
Richmond
River Heights
Smithfield
Snowville
Tremonton
Trenton
Wellsville
Willard


Photo (right): Rich County Risk Assessment Meeting held on April 10, 2019 in Garden City, Utah (BRAG).

Public outreach

Public outreach for the plan update was achieved via letters, e-mails, the presence of a hazard mitigation page on the BRAG website at brag.utah.gov, and public service announcements in local newspapers (See **APPENDIX B** for detailed agendas and lists of attendees for each meeting, and APPENDIX C for all other public outreach documentation). Through the use of all of these approaches, the following stakeholders were invited to participate in the planning process:

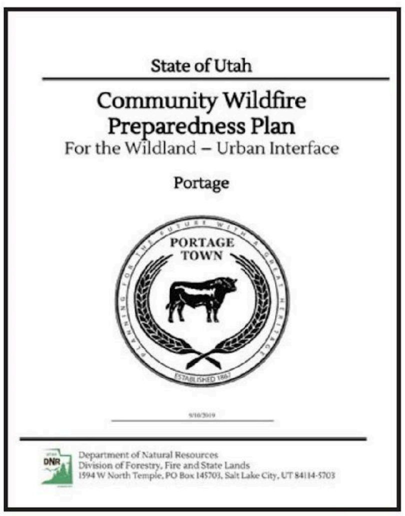
- All cities, towns, and counties in the Bear River Region including: Elected and appointed officials, emergency managers, city managers, clerks, public works staff, civil engineers, planners, and other related staff
- Local citizens
- Surrounding states, regions, and counties
- Federal and state agencies, including land management agencies and emergency management staff
- School districts and local universities/colleges MPO, UDOT, and other transportation planners
- Northwest Band of Shoshone Nation

On April 15, 2019, BRAG staff met with members of the Northwest Band of Shoshone Nation at the tribal office in Brigham City. Though there is no reservation land in the region, the tribe is an integral part of the community. As such, the tribe as a sovereign nation is included in this plan, though no technical analysis was provided. The tribe was included in written correspondence and made aware of the planning process so they could provide input if desired.

Incorporating other plans and studies

Other plans and studies referenced and incorporated into this plan update process include a variety of federal, state, regional, and local plans. Some plans were from other regions in the U.S. and Canada, while others were from more local communities in Utah. FEMA provides a variety of useful hazard mitigation planning resources available at fema.gov, and the State of Utah's Hazard Mitigation Plan, available at hazards.utah.gov, has been an extremely valuable resource during the creation of this plan. Plans and studies incorporated into this plan update process include the following:

- Utah Public Health Joint Risk Assessment, 2014 Recently completed
- Community Wildfire Protection Plans (CWPP) for Box Elder County, Deweyville, Honeyville, Plymouth, Portage, and Willard (2019)
- Garden City Community Wildfire Protection Plan
- Utah Geological Survey, Guidelines for Evaluating Surface-Fault Rupture Hazards in Utah, 2003


State of Utah

Community Wildfire Preparedness Plan

For the Wildland – Urban Interface

Portage

PORTAGE TOWN

Department of Natural Resources
Division of Forestry, Fire and State Lands
1594 W North Temple, PO Box 145703, Salt Lake City, UT 84114-5703

The Community Wildfire Preparedness plan for Portage Town, completed in 2019, is a great document to reference in this pre-disaster mitigation plan. In some areas, these types of plans are being merged in order to better coordinate mitigation efforts across multiple agencies and jurisdictions.

- Other Utah Geological Survey guides and booklets
- Utah Natural Hazards Handbook, 2008
- UGS Geologic Hazard Model Ordinance, 2020
- Utah DEM Flood Damage Prevention Ordinances
- Floodplain Management in Utah; Quick Guide, 2003
- Box Elder County. Hansel Valley floodplain resident letters, maps, and photos, 2014
- Local Community Risk Assessment Surveys, 2018

Other plans and websites referenced for the design of this plan:

- Six-County Regional Pre-Disaster Mitigation Plan (Utah), 2020
- New River Valley Hazard Mitigation Plan (Virginia), 2017
- City of Los Angeles 2018 Local Hazard Mitigation Plan
- City of Boulder Multi-Hazard Mitigation Plan, 2018
- South Central Region Multi-Jurisdiction Hazard Mitigation Plan, 2018
- San Diego County Multi-Jurisdiction Hazard Mitigation Plan, 2017
- Utah CDO Online Tools and Resources - ESRI StoryMaps Montana Forest Action Plan (Online)
- Seattle Hazard Explorer (Online)
- Are You Ready Tampa Bay? (Online)
- Denver ESRI Office and ESRI Denver ArcGIS HUB Site*

*Thanks to the ESRI Denver Regional Office staff who provided valuable input on potential ESRI tools and apps for use in creating this plan. A big thanks also to the Utah Community Development Office (CDO) staff for sharing examples of excellent plans and guides they have created recently by utilizing similar ESRI products.

Incorporating this plan into other community plans and studies

There are several ways that communities can incorporate this plan into their own local plans and studies. Some communities in the past have adopted this plan as an appendix or reference to their General Plan. Others have used the maps and hazards data in particular as a means of disclosing potential risks for future development, allowing developers and builders to do additional site assessments or studies before building. Ideally, the data layers in this plan could be used as a supplement for sensitive lands planning and to justify additional ordinances for future development which can reduce potential losses and liability for local governments. See the Implementation Resources tab at the top of this website for links to model geologic and floodplain ordinances.

Other plans, studies, and projects that can incorporate the information from this plan include:

- Capitol improvements list and plans
- Future infrastructure studies and projects
- Regional and community level sensitive lands studies and plans
- General plan updates
- Community Wildfire Preparedness Plans

- Community Emergency Response Plans
- County Resource Management Plans
- Hazard mitigation related grant applications
- Many others...

Flooding in Box Elder County in 2017. Frozen conditions and heavy rainfall contributed to many homes and properties being flooded in the eastern part of the county.

Identifying natural hazards

Hazards were identified and evaluated for inclusion in this plan based on historical review of past events, synthesis of existing reports and data, hazard mapping analysis, and input from local stakeholders (see graphic to the right). Consideration for inclusion was based on the likelihood of a hazard's occurrence, location of potential hazard risk areas, and the potential impact of the event in terms of its effect on human life, property, infrastructure, and other assets/amenities. It should be noted that not all hazards were analyzed with GIS software, due to the fact that GIS data does not exist for all hazards. However, all hazards on this list were discussed and qualitative analysis was performed on a certain level for each hazard based on the best available data.

For information on hazard locations and extents, click on the "Hazard Maps and Risks" tab at the top to view an interactive map of natural hazards in the Bear River Region (includes only data from the left column).

Also, for more information on natural hazards, including specific hazard definitions, click HERE to visit the 2019 Utah Hazard Mitigation Plan website. Scroll down until you see photos of various hazards and click on each one to learn more.

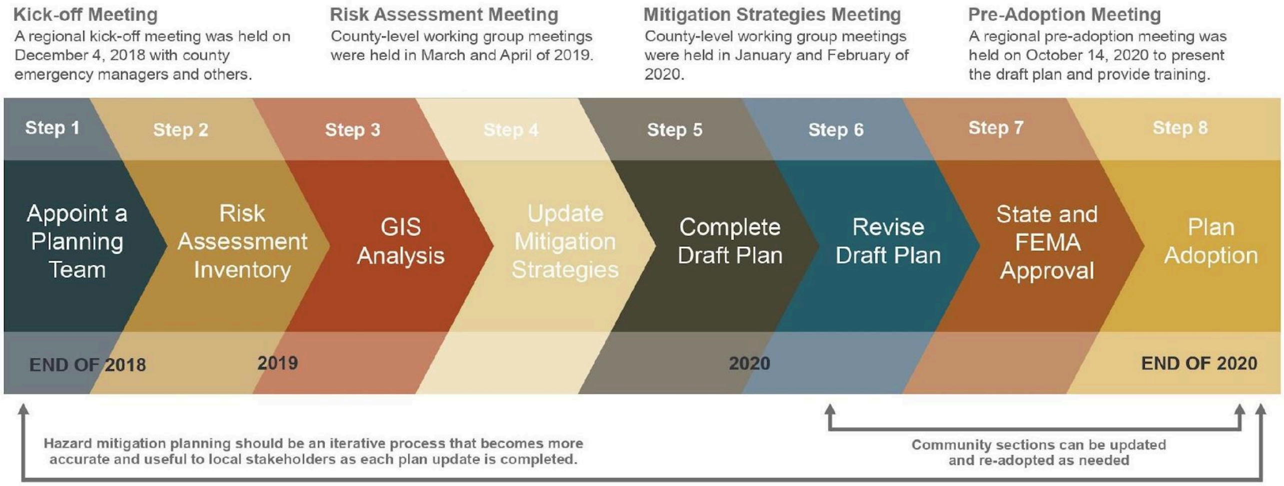
*Note: Due to the outbreak of COVID-19 in 2020, pandemics are listed as a natural hazard in the Bear River Region. However, due to the fact that the COVID-19 outbreak occurred late in the planning process, no analysis was included and no mitigation strategies were created. Local emergency managers anticipate the need for mitigation strategies for pandemics in the future. If local governments would like to include strategies for pandemics in this plan updated, the plan can be amended at a later date and re-adopted by the affected jurisdiction.

HAZARDS - GIS DATA	HAZARDS - NO GIS DATA
Avalanche Terrain	Air Quality
Dam Failure	Alluvial Fans
Flood (FEMA 100-Year)	Climate Change
Flood (Soils/Purdue)	Drought
Flood (Valley Bottom)	Insect Infestation/Plant Disease
Geologic Faults (Quaternary)	Radon
Landslide	Severe Weather
Liquefaction	Tornado
Steep Slopes	Seiche
Problem Soils (Struct. w/ Basements)	Volcanic
Problem Soils (Struct. w/o Basements)	Seasonal Population Growth
Wildfire (Utah FFSL)	*Pandemics
Wildfire (US Forest Service)	

Natural hazards identified in the Bear River Region. Though some natural hazards data exists in GIS format, and were utilized for analysis in community risk assessments, risks were also identified and strategies created for other hazards based on local conditions and needs.

Identifying structures, critical facilities, infrastructure, and other assets

The table to the right shows the types of structures (ex: homes, businesses), critical facilities (ex: fire station, town hall, post office),



Project timeline and various steps in the planning process for the 2020 Bear River Region Pre-Disaster Mitigation Plan.

The Planning Process

County Working Group Meetings:

RISK ASSESSMENT:

Review of mapped critical facilities and infrastructure; Wildfire hazards presentation (Utah FFSL); Geologic hazards presentation (Utah Geological Survey); and review of online hazards map.

MITIGATION STRATEGIES:

FEMA-approved mitigation strategies and floodplain model ordinances (FEMA); Geologic hazards model ordinance (Utah Geological Survey); Community potential loss analyses; and a mitigation strategies exercise.

PRE-ADOPTION:

Presentation of the draft PDM Plan and findings; Plan adoption and implications for local governments;

Overview and project timeline

While the pre-disaster mitigation plan update process has been standardized to a certain degree by FEMA, through working with local stakeholders included in county working groups, BRAG has adjusted the process to fit the needs of Bear River Region communities.

The sections below provide more information on critical components of the planning process.

Forming county working groups and meetings

Early on in the planning process, BRAG staff consulted with county emergency managers in Box Elder, Cache, and Rich Counties to help determine project details, and come up with a list of initial agencies, organizations, and other groups to include in county-wide working groups. These organizations were invited to attend the first regional kick-off meeting in 2018. During this meeting, BRAG staff, county emergency managers, Utah Division of Emergency Management staff, and others created a list of additional stakeholders that needed to be brought to the table to participate in the planning process.

County working groups were then formed, and three meetings were held for each respective county to discuss natural hazards and community risk assessments, create local mitigation strategies, and to present the draft plan and discuss plan promulgation (See **APPENDIX B** for meeting agendas and attendance lists).

In addition to the county working group meetings, many other meetings were held with state staff and local communities. Mayors, council members, city/town staff, and others were very generous with their time, especially as they worked with BRAG to create realistic mitigation strategies that fit their needs. Below is a list of other organizations BRAG staff met with as part of this plan update, whether in person, e-mail, or over phone or video calls:

- Utah Division of Emergency Management
- BRAG Governing Board (x2)
- Local GIS Analysis Professionals
- Utah Geological Survey
- Utah Forestry, Fire, and State Lands
- ESRI Denver Office
- Northwest Band of Shoshone Native American Tribe
- Box Elder Mayor's Association Meeting (Mayors in attendance representing: Willard, Brigham City, Mantua, Snowville, Perry, Honeyville, Deweyville, Tremonton, Portage; and Box Elder County representatives)

Local city, town, and county meetings:

Amalga
Bear River City
Brigham City
Box Elder County
Cache County
Clarkston
Corinne
Cornish
Deweyville
Elwood
Garden City
Garland
Honeyville
Howell
Hyde Park
Hyrum
Laketown
Lewiston
Logan
Mantua
Mendon
Millville
Newton
Nibley
North Logan
Paradise
Perry
Plymouth
Portage
Providence
Randolph
Rich County
Richmond
River Heights
Smithfield
Snowville
Tremonton
Trenton
Wellsville
Willard

Photo (right): Rich County Risk Assessment Meeting held on April 10, 2019 in Garden City, Utah (BRAG).

Public outreach

Public outreach for the plan update was achieved via letters, e-mails, the presence of a hazard mitigation page on the BRAG website at brag.utah.gov, and public service announcements in local newspapers (See **APPENDIX B** for detailed agendas and lists of attendees for each meeting, and APPENDIX C for all other public outreach documentation). Through the use of all of these approaches, the following stakeholders were invited to participate in the planning process:

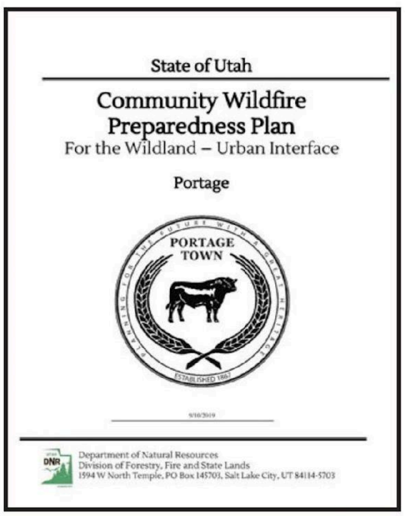
- All cities, towns, and counties in the Bear River Region including: Elected and appointed officials, emergency managers, city managers, clerks, public works staff, civil engineers, planners, and other related staff
- Local citizens
- Surrounding states, regions, and counties
- Federal and state agencies, including land management agencies and emergency management staff
- School districts and local universities/colleges MPO, UDOT, and other transportation planners
- Northwest Band of Shoshone Nation

On April 15, 2019, BRAG staff met with members of the Northwest Band of Shoshone Nation at the tribal office in Brigham City. Though there is no reservation land in the region, the tribe is an integral part of the community. As such, the tribe as a sovereign nation is included in this plan, though no technical analysis was provided. The tribe was included in written correspondence and made aware of the planning process so they could provide input if desired.

Incorporating other plans and studies

Other plans and studies referenced and incorporated into this plan update process include a variety of federal, state, regional, and local plans. Some plans were from other regions in the U.S. and Canada, while others were from more local communities in Utah. FEMA provides a variety of useful hazard mitigation planning resources available at fema.gov, and the State of Utah's Hazard Mitigation Plan, available at hazards.utah.gov, has been an extremely valuable resource during the creation of this plan. Plans and studies incorporated into this plan update process include the following:

- Utah Public Health Joint Risk Assessment, 2014 Recently completed
- Community Wildfire Protection Plans (CWPP) for Box Elder County, Deweyville, Honeyville, Plymouth, Portage, and Willard (2019)
- Garden City Community Wildfire Protection Plan
- Utah Geological Survey, Guidelines for Evaluating Surface-Fault Rupture Hazards in Utah, 2003


State of Utah

Community Wildfire Preparedness Plan

For the Wildland – Urban Interface

Portage

PORTAGE TOWN

ESTABLISHED 1867

9/10/2019

Department of Natural Resources
Division of Forestry, Fire and State Lands
1594 W North Temple, PO Box 145703, Salt Lake City, UT 84114-5703

The Community Wildfire Preparedness plan for Portage Town, completed in 2019, is a great document to reference in this pre-disaster mitigation plan. In some areas, these types of plans are being merged in order to better coordinate mitigation efforts across multiple agencies and jurisdictions.

- Other Utah Geological Survey guides and booklets
- Utah Natural Hazards Handbook, 2008
- UGS Geologic Hazard Model Ordinance, 2020
- Utah DEM Flood Damage Prevention Ordinances
- Floodplain Management in Utah; Quick Guide, 2003
- Box Elder County. Hansel Valley floodplain resident letters, maps, and photos, 2014
- Local Community Risk Assessment Surveys, 2018

Other plans and websites referenced for the design of this plan:

- Six-County Regional Pre-Disaster Mitigation Plan (Utah), 2020
- New River Valley Hazard Mitigation Plan (Virginia), 2017
- City of Los Angeles 2018 Local Hazard Mitigation Plan
- City of Boulder Multi-Hazard Mitigation Plan, 2018
- South Central Region Multi-Jurisdiction Hazard Mitigation Plan, 2018
- San Diego County Multi-Jurisdiction Hazard Mitigation Plan, 2017
- Utah CDO Online Tools and Resources - ESRI StoryMaps Montana Forest Action Plan (Online)
- Seattle Hazard Explorer (Online)
- Are You Ready Tampa Bay? (Online)
- Denver ESRI Office and ESRI Denver ArcGIS HUB Site*

*Thanks to the ESRI Denver Regional Office staff who provided valuable input on potential ESRI tools and apps for use in creating this plan. A big thanks also to the Utah Community Development Office (CDO) staff for sharing examples of excellent plans and guides they have created recently by utilizing similar ESRI products.

Incorporating this plan into other community plans and studies

There are several ways that communities can incorporate this plan into their own local plans and studies. Some communities in the past have adopted this plan as an appendix or reference to their General Plan. Others have used the maps and hazards data in particular as a means of disclosing potential risks for future development, allowing developers and builders to do additional site assessments or studies before building. Ideally, the data layers in this plan could be used as a supplement for sensitive lands planning and to justify additional ordinances for future development which can reduce potential losses and liability for local governments. See the Implementation Resources tab at the top of this website for links to model geologic and floodplain ordinances.

Other plans, studies, and projects that can incorporate the information from this plan include:

- Capitol improvements list and plans
- Future infrastructure studies and projects
- Regional and community level sensitive lands studies and plans
- General plan updates
- Community Wildfire Preparedness Plans

- Community Emergency Response Plans
- County Resource Management Plans
- Hazard mitigation related grant applications
- Many others...

Flooding in Box Elder County in 2017. Frozen conditions and heavy rainfall contributed to many homes and properties being flooded in the eastern part of the county.

Identifying natural hazards

Hazards were identified and evaluated for inclusion in this plan based on historical review of past events, synthesis of existing reports and data, hazard mapping analysis, and input from local stakeholders (see graphic to the right). Consideration for inclusion was based on the likelihood of a hazard's occurrence, location of potential hazard risk areas, and the potential impact of the event in terms of its effect on human life, property, infrastructure, and other assets/amenities. It should be noted that not all hazards were analyzed with GIS software, due to the fact that GIS data does not exist for all hazards. However, all hazards on this list were discussed and qualitative analysis was performed on a certain level for each hazard based on the best available data.

For information on hazard locations and extents, click on the "Hazard Maps and Risks" tab at the top to view an interactive map of natural hazards in the Bear River Region (includes only data from the left column).

Also, for more information on natural hazards, including specific hazard definitions, click HERE to visit the 2019 Utah Hazard Mitigation Plan website. Scroll down until you see photos of various hazards and click on each one to learn more.

HAZARDS - GIS DATA	HAZARDS - NO GIS DATA
Avalanche Terrain	Air Quality
Dam Failure	Alluvial Fans
Flood (FEMA 100-Year)	Climate Change
Flood (Soils/Purdue)	Drought
Flood (Valley Bottom)	Insect Infestation/Plant Disease
Geologic Faults (Quaternary)	Radon
Landslide	Severe Weather
Liquefaction	Tornado
Steep Slopes	Seiche
Problem Soils (Struct. w/ Basements)	Volcanic
Problem Soils (Struct. w/o Basements)	Seasonal Population Growth
Wildfire (Utah FFSL)	*Pandemics
Wildfire (US Forest Service)	

Natural hazards identified in the Bear River Region. Though some natural hazards data exists in GIS format, and were utilized for analysis in community risk assessments, risks were also identified and strategies created for other hazards based on local conditions and needs.

*Note: Due to the outbreak of COVID-19 in 2020, pandemics are listed as a natural hazard in the Bear River Region. However, due to the fact that the COVID-19 outbreak occurred late in the planning process, no analysis was included and no mitigation strategies were created. Local emergency managers anticipate the need for mitigation strategies for pandemics in the future. If local governments would like to include strategies for pandemics in this plan updated, the plan can be amended at a later date and re-adopted by the affected jurisdiction.

Identifying structures, critical facilities, infrastructure, and other assets

The table to the right shows the types of structures (ex: homes, businesses), critical facilities (ex: fire station, town hall, post office),

STRUCTURES, CRITICAL FACILITIES, INFRASTRUCTURE, AND OTHER ASSETS			
HOMES	Home	NATURAL INFRASTRUCTURE	Lake/Pond
COMMUNITY RESOURCES	Cemetery		Reservoir
	Commercial Business		Playa
	Library		Riparian Area
	Place of Worship		Spring/Seep
	University/College		Stream/River
	School		Wetland
GOVERNMENT FACILITIES	Correctional Facility	OTHER INFRASTRUCTURE	Communication Towers
	Military Facility		Microwave Service Towers
	Post Office		Gas Station
	Town Hall		Sewer Pipeline
RECREATION AMENITIES	Campground/Recreation Facility		Wastewater Facility
	Golf Course		Contaminated Land
	Public Areas		Hazmat Material Storage
	Historic Site		Mines
	Museum		Broadband Anchors
	State Park		Solid Waste Facility
	Park	TRANSPORTATION INFRASTRUCTURE	Airport/Heliport
	Trail		Bridge/Culvert/Underpass
EMERGENCY SERVICES	Emergency Medical Service		Railroad
	Emergency Operations Center/PSAP		Emergency Outlet Roads
	Fire Station		Road
	Hospital/Health Care Facility	WATER INFRASTRUCTURE	Canal
	National System Shelter Facility		Culinary Water Pipeline
	Law Enforcement Station		Culinary Water Source
ENERGY INFRASTRUCTURE	Substation/Regulator		Water Tank
	Natural Gas Pipeline		Dam
	Crude Oil Pipeline		Groundwater Recharge
	Oil and Gas Well		Groundwater Protection and Transient NC Zones
	Petroleum Pipeline		
	Hydrogen Sulfide Pipeline		Well
	Power Generation Facility	AGRICULTURAL RESOURCES	Farmland
	Transmission Line		Grazing Allotments

A comprehensive list of structures, critical facilities, infrastructure, and other assets analyzed in the 2020 Bear River Region Pre-Disaster Mitigation Plan.

infrastructure (ex: roads, water lines, wells), and other assets/ amenities (ex: natural areas, groundwater protection zones, agricultural lands) included in local community risk assessments.

To identify the types and locations of these datasets, BRAG staff relied heavily on county working group members to define what types of data were needed, and to verify the location of the most critical facilities and community assets. BRAG staff also collected large quantities of GIS data from local, state and federal agencies, data clearinghouses (Including Utah AGRC), and many other sources. Other datasets were digitized as needed if not available.

Community Asset Data:

- **Point data** (64,061 residential/ commercial & 9,078 critical facility points - 73,139 total)
- **Line data** (19,207 miles)
- **Polygon data** (4,804,951 acres)

Note: Not all assets were located in all jurisdictions. For example, some communities wanted water and sewer main lines included in their analysis, while others did not. All datasets were not available for all jurisdictions. As such, potential losses, in many cases, could be higher for certain hazards in certain communities, than are documented in this plan.

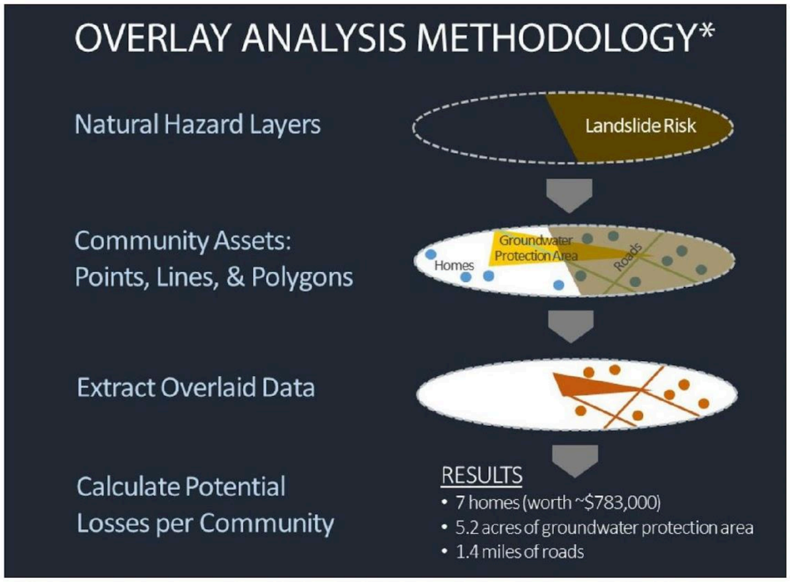
Risk assessment methodology

BRAG staff utilized Geographic Information Systems (GIS) software for analyzing potential losses to local communities from various natural hazards in the Bear River Region. This was only done for those hazards that had available GIS data. A relatively simple and time-tested methodology of overlay analysis was utilized for these community assessments (see graphic below for a simplified version). In an overlay analysis, various datasets are overlaid on one another, and data is extracted from where those datasets share a common geographic location. Data can be extracted by these locations and quantified or categorized, resulting in a better understanding of that geographic area based on those particular datasets.
See APPENDIX D for a more detailed description of the GIS-based risk assessment methodology for this plan update.

Other hazards without available GIS data were also analyzed to determine risk. This analysis was much more qualitative in nature, and considered overall exposure, probability, and severity for each hazard and for each county, respectively. For information on how non-GIS hazard risks were determined, see county risk matrices and summaries in the Hazard Risks and Profiles section.

The basic steps involved in the GIS-based risk assessment analyses for this plan update:

1. **Data preparation (existing and/ or created)**
2. **Consolidate data by type and re-format (to create uniformity across multiple datasets and types)**
3. **Extract community point, line, and polygon asset data by natural hazard layer per each municipality or county**
4. **Calculate potential loss values by asset type for each community**



Basic risk assessment overlay analysis methodology for the 2020 Bear River Region Pre-Disaster Mitigation Plan. For a more detailed methodology and details on GIS datasets utilized for this plan, see Appendix D and Appendix E, respectively.

Note: Local county working group members felt that sensitive critical facility, infrastructure, and other related data should not be shared with the public for safety and security reasons. To address their concerns, all analysis was performed in-house by BRAG GIS and vetted during county working group meetings. If interested in viewing or obtaining GIS data from this plan update, contact each respective emergency manager for Box Elder, Cache, or Rich Counties.

Creating and prioritizing mitigation strategies

After completing community-level risk assessments for all 42 jurisdictions in the Bear River Region, potential losses were then calculated by asset type. Mitigation strategies meetings were held with county working groups, where presentations were given on how to create effective mitigation strategies for various hazards. BRAG staff then created individual mitigation strategies packets for each jurisdiction and e-mailed a fillable digital file to community leaders and staff to fill out. Each packet had mitigation strategies sections to address each hazard in their respective community.

BRAG staff provided assistance to officials and staff as needed in person, by e-mail, and over the phone or video calls. When completed, packets were then sent back to BRAG and integrated into this plan.

After reviewing a list of mitigation strategies from 2015, some communities decided to keep the same strategies from that plan, since local conditions have not changed substantially since that time, and/or strategies were not yet implemented for various reasons.

Click on the "Community Sections" tab at the top to see mitigation strategies for each community.

A guiding factor in prioritizing mitigation strategies was the principle that mitigation should provide the greatest amount of good to the greatest number of people, after considering resources, staffing, and other constraints. Recurrence intervals, past events, and damage estimates compiled during the risk assessment in this plan were also considered. Overall, each community individually considered their own capabilities and resources as they prioritized each strategy.

As part of the process for creating implementation strategies for this plan update, each community also reviewed their strategies list from the 2016 plan, and recorded which strategies were implemented over the past 5 years, if any. After reviewing their strategies from 2016, some communities determined to keep and/or modify those strategies in an effort to try to implement those in the upcoming 5 years. However, some communities have taken great strides in reducing losses through strategy implementation. Some examples of these implemented strategies include:

Creation of Community Wildfire Protection Plans (CWPP)
Improved fire regulations
Purchase of back-up generators
Flood reduction measures such as culverts and retention basins
Improved floodplain and other hazards GIS data
Improved training for local emergency response and fire crews and better equipment
Updates of local ordinances to help reduce risks to future development
Click HERE to see a community-specific, regional list of all mitigation strategies implemented from the 2016 plan.

NFIP participation and compliance

COMMUNITIES PARTICIPATING IN NFIP - 2020

Jurisdiction	County
BEAR RIVER, CITY OF	BOX ELDER COUNTY
BOX ELDER COUNTY	BOX ELDER COUNTY
BRIGHAM CITY, CITY OF	BOX ELDER COUNTY
CORINNE, CITY OF	BOX ELDER COUNTY
GARLAND, CITY OF	BOX ELDER COUNTY
HONEYVILLE, CITY OF	BOX ELDER COUNTY
MANTUA, TOWN OF	BOX ELDER COUNTY
PERRY CITY, CITY OF	BOX ELDER COUNTY
TREMONTON, CITY OF	BOX ELDER COUNTY
WILLARD,CITY OF	BOX ELDER COUNTY
CACHE COUNTY	CACHE COUNTY
CLARKSTON, TOWN OF	CACHE COUNTY
HYDE PARK, TOWN OF	CACHE COUNTY
HYRUM, CITY OF	CACHE COUNTY
LEWISTON, CITY OF	CACHE COUNTY
LOGAN, CITY OF	CACHE COUNTY
MENDON, CITY OF	CACHE COUNTY
MILLVILLE, TOWN OF	CACHE COUNTY
NEWTON, TOWN OF	CACHE COUNTY
NIBLEY, TOWN OF	CACHE COUNTY
NORTH LOGAN, CITY OF	CACHE COUNTY
PARADISE, TOWN OF	CACHE COUNTY
PROVIDENCE, CITY OF	CACHE COUNTY
RICHMOND, CITY OF	CACHE COUNTY
RIVER HEIGHTS, CITY OF	CACHE COUNTY
SMITHFIELD, CITY OF	CACHE COUNTY
WELLSVILLE, CITY OF	CACHE COUNTY
LAKETOWN, TOWN OF	RICH COUNTY
RICH COUNTY	RICH COUNTY
WOODRUFF, TOWN OF	RICH COUNTY

The National Flood Insurance Program (NFIP) was created to reduce losses from flood events and to provide more affordable flood insurance options. Local governments can join NFIP for free, even if they do not have FEMA 100-year floodplain mapping. This allows local residents to purchase flood insurance if they are concerned about flood risks for their home.

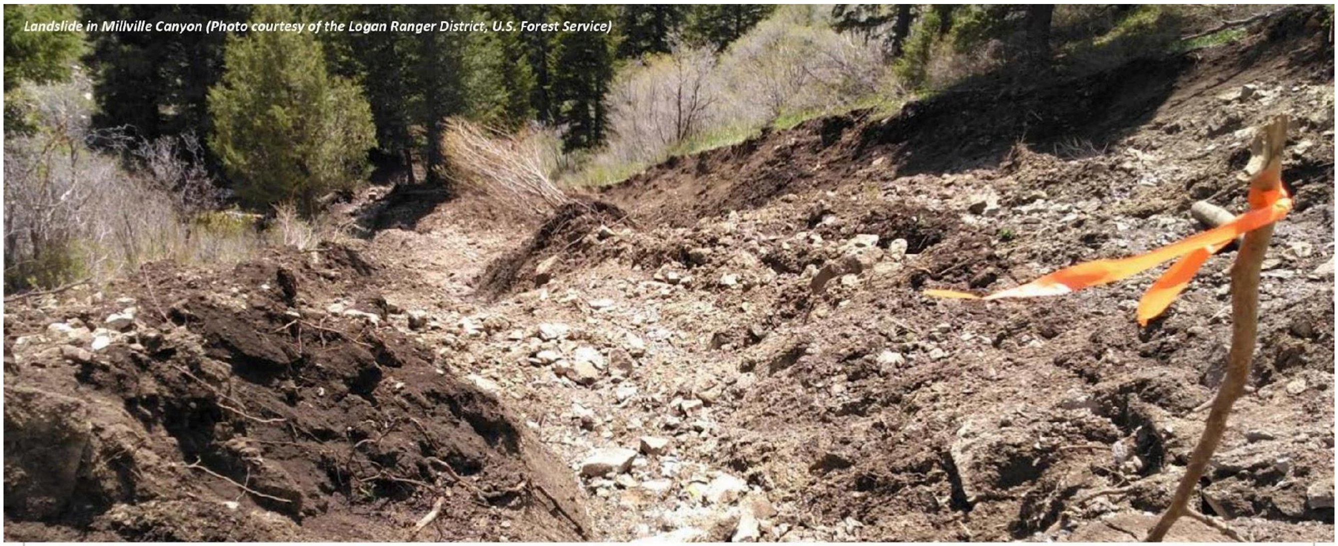
During the planning process, Floodplain Administrators (FPA's) were invited to local working group meetings via local elected and appointed officials and community staff, many of which are currently serving in that capacity in addition to other duties. Communities in the Bear River Region participating in the NFIP are consistently working towards NFIP compliance, and education and training is ongoing as coordinated and provided by the State Floodplain Manager. Additionally, BRAG staff will continue to work with local governments to provide additional training and resources, to help them reduce losses and comply with NFIP.

NFIP repetitive loss structures

Occasionally, the same home or business suffers damages from a flood year after year. Structures that are located in the FEMA 100-year floodplain, have insurance under NFIP, and suffer damages from flooding year after year, are considered, "repetitive loss" properties.

As of September 14, 2020, Box Elder County has zero repetitive loss properties; Cache County has 10; and Rich County has zero.

COMMUNITIES NOT PARTICIPATING IN NFIP - 2020	
Jurisdiction	**County**
AMALGA, TOWN OF	CACHE COUNTY
CORNISH, TOWN OF	CACHE COUNTY
DEWEYVILLE, CITY OF	BOX ELDER COUNTY
ELWOOD, CITY OF	BOX ELDER COUNTY
FIELDING, TOWN OF	BOX ELDER COUNTY
HOWELL, CITY OF	BOX ELDER COUNTY
PLYMOUTH, TOWN OF	BOX ELDER COUNTY
PORTAGE, CITY OF	BOX ELDER COUNTY
SNOWVILLE, TOWN OF	BOX ELDER COUNTY
TRENTON, TOWN OF	CACHE COUNTY



Writing the Plan and Plan Adoption

Though professional planning staff at Bear River Association of Governments (BRAG) oversaw this plan update process and created the online plan and plan document, they did so with extensive input from:

- County emergency managers
- City and town emergency managers
- Elected and appointed officials
- Local planners
- City managers/administrators
- Public works
- Local engineers
- Town and city clerks
- State and federal agencies and land management representatives
- Natural hazards experts
- The general public

...and many others

Throughout the entire planning process, BRAG staff worked to incorporate new ideas, values, and priorities into the plan. Input from local working group members, the public, elected officials, and others were highly valued, and greatly informed the planning process. This includes comments from stakeholders on working group make-up and membership, risk assessment data and methodologies, mitigation strategy ideas and training, and even the final format of this plan.

This plan was also created on the coat tails of past BRAG planners and planning interns who, over the years, have helped to improve the plan, including updated layout and design, GIS analysis methodologies, and community outreach tools and techniques. BRAG's fifteen-member Governing Board also provided oversight and support throughout the entire planning process.

BRAG staff who have worked on various elements of this plan include:

- Zac Covington, *Sr. Regional Planner and Project Manager*
- Scott McComb, *Regional Planner*
- Lara Gale, *Regional Planning Intern*

Plan adoption and FEMA approval

Following the completion of this online plan and FEMA approval, a hard copy was available at the BRAG office for those interested in looking at the plan in that format.

After a 30-day public comment period on the online plan, comments from local communities, the public, county working group members, as well as the Utah Division of Emergency Services were integrated into the draft. The plan was then sent to FEMA Region VIII for review.

After revisions to the draft plan were completed, letters were sent to each local jurisdiction in the Bear River Region explaining the benefits of adopting a FEMA-approved plan. Blank promulgation forms were then sent to the chief elected official for each jurisdiction, and communities were encouraged to adopt the plan and send the completed promulgation forms to BRAG for inclusion in the plan. Hard copies of the plan were also made available to all participating jurisdictions by request.

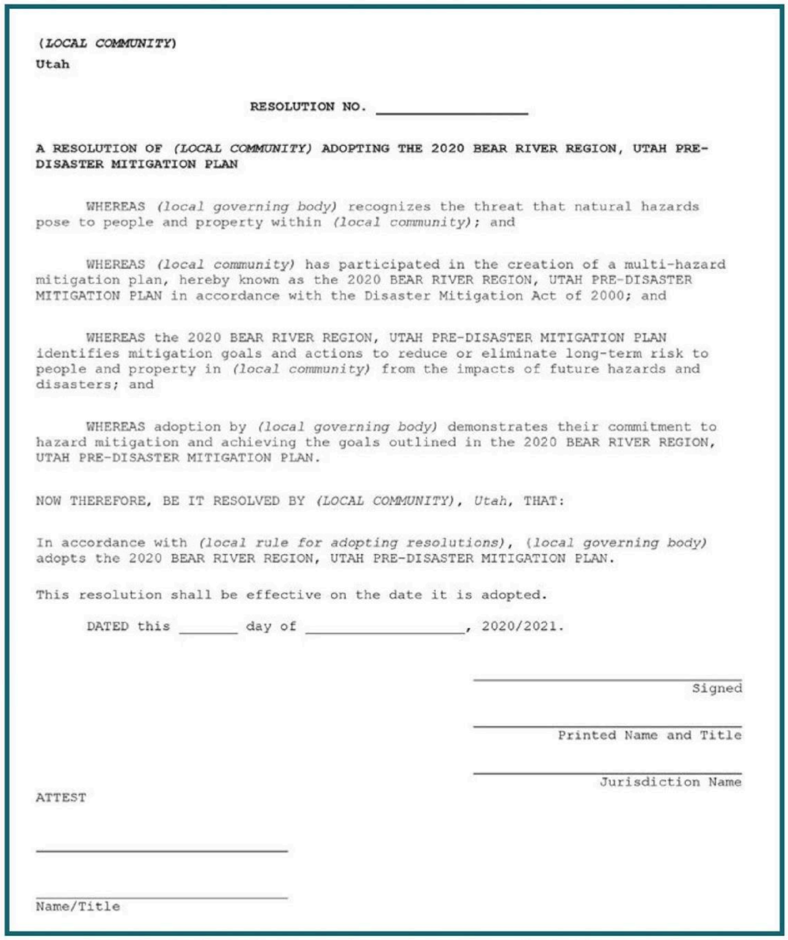
Updating the plan

The plan will be monitored, evaluated, and updated by BRAG staff annually, or on an as-needed basis, depending on the current need. These updates could include adding new or revising current mitigation strategies, integrating more recent plans and/or studies, utilizing better GIS data, or other necessary updates. As need dictates, local jurisdictions, the BRAG Governing Board, or other participating organizations can request updates to the plan as necessary.

Likewise, local communities are encouraged to have ongoing and regular discussions with the public regarding local hazards and potential mitigation strategies to reduce losses in their county, city, or town. This input can be integrated into the plan directly through plan amendments and adoption of the updated plan as needs dictate.

If the plan is amended, each affected participating jurisdiction will be required to hold a public meeting to re-adopt the amended plan by resolution.

Contingent on funding, this plan will also be updated on a regular basis every 5 years according to FEMA requirements for approved plans.



(*LOCAL COMMUNITY*)
Utah

RESOLUTION NO. ________________

A RESOLUTION OF (*LOCAL COMMUNITY*) ADOPTING THE 2020 BEAR RIVER REGION, UTAH PRE-DISASTER MITIGATION PLAN

WHEREAS (*local governing body*) recognizes the threat that natural hazards pose to people and property within (*local community*); and

WHEREAS (*local community*) has participated in the creation of a multi-hazard mitigation plan, hereby known as the 2020 BEAR RIVER REGION, UTAH PRE-DISASTER MITIGATION PLAN in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the 2020 BEAR RIVER REGION, UTAH PRE-DISASTER MITIGATION PLAN identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in (*local community*) from the impacts of future hazards and disasters; and

WHEREAS adoption by (*local governing body*) demonstrates their commitment to hazard mitigation and achieving the goals outlined in the 2020 BEAR RIVER REGION, UTAH PRE-DISASTER MITIGATION PLAN.

NOW THEREFORE, BE IT RESOLVED BY (*LOCAL COMMUNITY*), *Utah*, THAT:

In accordance with (*local rule for adopting resolutions*), (*local governing body*) adopts the 2020 BEAR RIVER REGION, UTAH PRE-DISASTER MITIGATION PLAN.

This resolution shall be effective on the date it is adopted.

DATED this _______ day of ________________, 2020/2021.

____
Signed

____
Printed Name and Title

____
Jurisdiction Name

ATTEST

____

____
Name/Title

Basic resolution template for adopting the 2020 Bear River Region Pre-Disaster Mitigation Plan, adapted from a basic FEMA template.

Hazard Risks and Profiles

HAZARDS - GIS DATA	HAZARDS - NO GIS DATA
Avalanche Terrain	Air Quality
Dam Failure	Alluvial Fans
Flood (FEMA 100-Year)	Climate Change
Flood (Soils/Purdue)	Drought
Flood (Valley Bottom)	Insect Infestation/Plant Disease
Geologic Faults (Quaternary)	Radon
Landslide	Severe Weather
Liquefaction	Tornado
Steep Slopes	Seiche
Problem Soils (Struct. w/ Basements)	Volcanic
Problem Soils (Struct. w/o Basements)	Seasonal Population Growth
Wildfire (Utah FFSL)	*Pandemics
Wildfire (US Forest Service)	

Natural hazards in the Bear River Region

The table above shows natural hazards identified in the Bear River Region. Some of these hazards were mapped using currently available GIS data (left column), while others did not have GIS data (right column). For more information on potential risks from hazards without GIS data, read the county hazard risk profiles later in this section.

Natural hazards and historical hazard events and maps

To access interactive webmaps showing natural hazards in the Bear River Region, as well as historical hazard events, visit the web-version of this plan at: **https://brag.maps.arcgis.com/apps/MapSeries/index.html?appid=fc507e02862e42cbbf627437c1658549**.

Likewise, an extensive database of historical hazard events was compiled as part of this planning process. This database includes information on:

- Avalanches from 2010 to 2020
- Hail storms from 1955 to 2018
- High wind paths from 1950 to 2018
- Tornado paths from 1950 to 2018
- Earthquake epicenters from 1850 to 2016
- Wildfires from 1992 to 2015 (two datasets)
- Long-term drought averaged from 1895 to 2012
- Ag. production
- Drought
- Population growth
- Grasshoppers/crickets
- Tornados
- Air Quality
- Floods
- Landslides
- Radon

See **Appendix F** for more details.

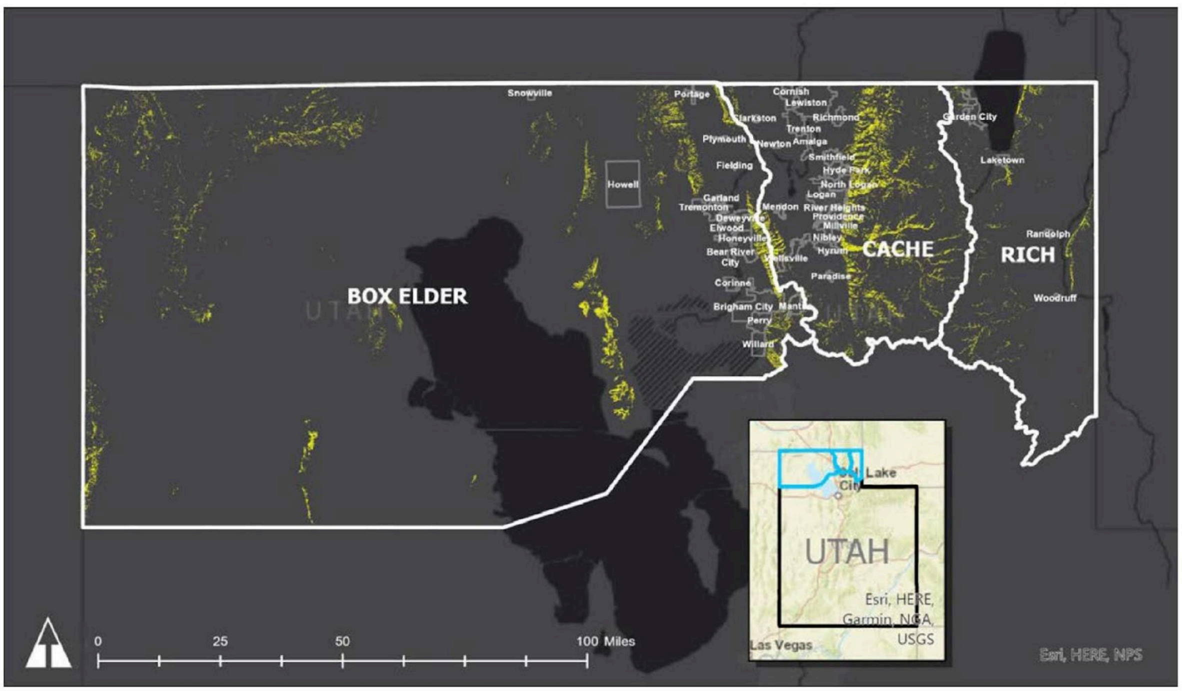
For the purpose of this planning document, the following pages show hazards mapped on a regional scale, including a paragraph or two with summaries about each hazard (those with GIS data). For individual community risk assessments which provide community-level mapping and risk information, visit the online plan at the above web address.

AVALANCHE

Hazard Description: An avalanche is a mass of snow, ice, and debris that slides rapidly down steep mountain slopes at speeds up to 80 mph when triggered by ground shaking, sound, or movement. Dry or slab avalanches are the most common and the deadliest in Utah. They are triggered when heavy snow is rapidly added to weaker layers. Wet avalanches occur during spring thaw events.

Avalanches pose a significant hazard in Utah's mountains between the months of January and April, seasons of heavy snow accumulation and unstable snowpack conditions. Weather, terrain, topography, and snow conditions also impact avalanche activity.

Map Description: This map display areas of avalanche terrain based on areas with slope between 35° to 40°, low profile and bare ground vegetation, and elevation above 5,500 feet.

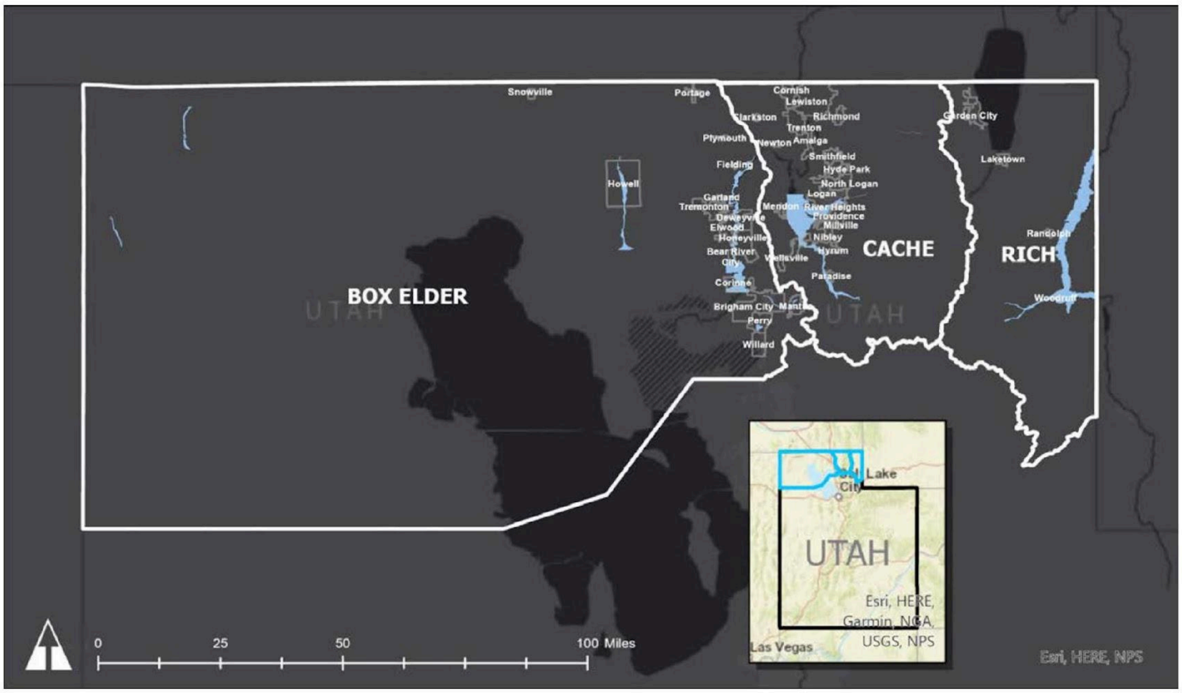


Richmond City Emergency Operations Plan
DRAFT

DAM FAILURE

Hazard Description: A dam failure or dam burst is the sudden, rapid, and uncontrolled release of impounded water or the likelihood of such an uncontrolled release. Dams can fail for one or more of the following reasons: (1)overtopping caused by floods that exceed the capacity of the dam; (2) deliberate acts of sabotage; (3) structural failure of materials used in dam construction; (3) movement and/or failure of the foundation supporting the dam; (4) settlement and cracking of concrete or embankment dam; (5) piping and internal erosion of soil in embankments; and (6) inadequate maintenance and upkeep. See also Flood.

Map Description: This map displays areas of inundation for all high hazard dams under the Utah Division of Water Rights as well as the location of dams. For more information visit: *https://www.waterrights.utah.gov/gisinfo/wrcover.asp*

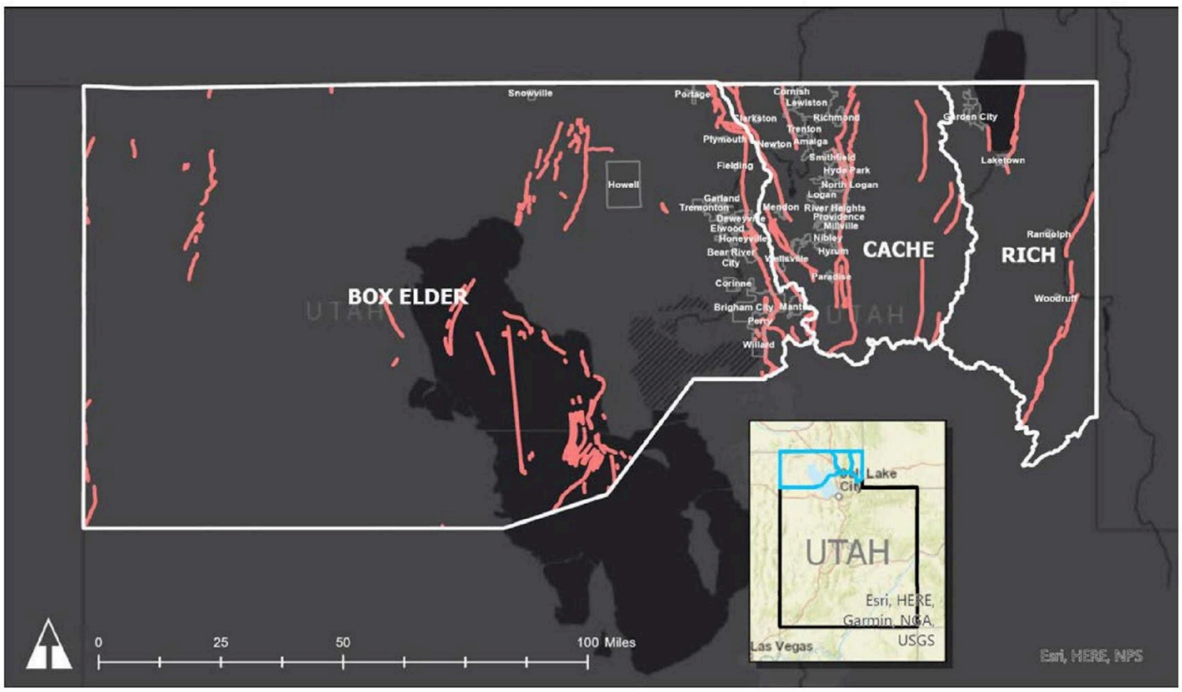


EARTHQUAKE/FAULTS

Hazard Description: Any sudden shaking of the ground caused by seismic waves through the Earth's rocks constitutes an earthquake. Seismic waves are produced when some form of energy stored in Earth's crust is suddenly released, usually when masses of rock straining against one another suddenly fracture and "slip." Earthquakes occur most often along geologic faults, narrow zones where rock masses move in relation to one another. The major fault lines of the world are located at the fringes of the huge tectonic plates that make up Earth's crust.

Certain saturated soft soil can take on the characteristics of a fluid when shaken by an earthquake, resulting in a state called liquefaction. Amplified shaking also results in areas of "soft soils" which includes fill, loose sand, waterfront, and lake bed clays.

Map Description: This map displays the earthquake damage zone (1,500 foot buffer on either side of the quaternary fault) as recommended by the Utah Geological Survey. For more information visit: *https://geology.utah.gov/apps/qfaults/index.html*

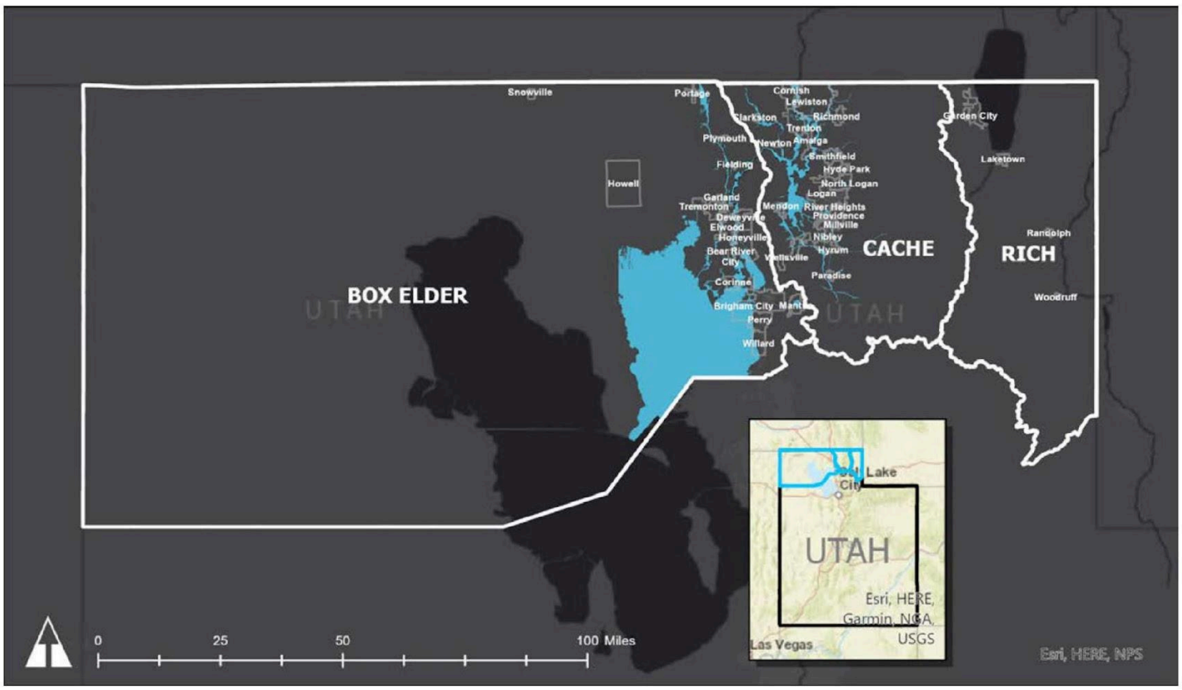


FLOOD - FEMA

Hazard Description: A flood is an overflow of water from rivers, groundwater, or rainfall that submerges areas that are usually dry. The most common cause of flooding is due to rain or snowmelt that accumulates faster than soils can absorb it or rivers can carry it away. Flooding can also result from the failure of a water control structure, such as a levee or dam (see also Dam Failure).

A 1% Annual Chance Flood, or 100-year flood, is a flood that has a 1 percent chance or greater of occurring in any given year. Experiencing a 100-year flood does not decrease the chance of a second 100-year flood occurring that same year or any year that follows. A 100- year flood today, independent of future sea level rise and other climate change effects, has a 26 percent chance of occurring over the life of a 30-year mortgage. Similarly, a 100-year flood today has a 45 percent chance of occurring over the 60-year life of a power substation.

Map Description: This map displays the FEMA identified 100 year floodplain. For more information visit: https://msc.fema.gov/portal/home

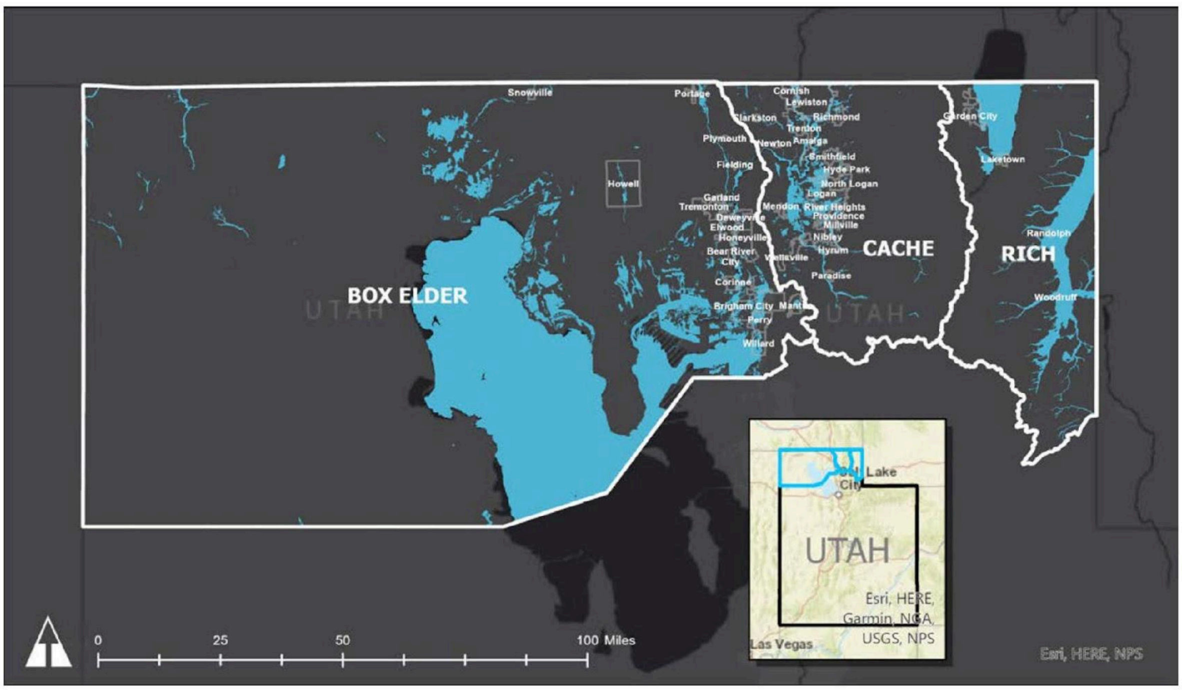


FLOOD - SOIL

Hazard Description: A flood is an overflow of water from rivers, groundwater, or rainfall that submerges areas that are usually dry. The most common cause of flooding is due to rain or snowmelt that accumulates faster than soils can absorb it or rivers can carry it away. Flooding can also result from the failure of a water control structure, such as a levee or dam (see also Dam Failure).

A 1% Annual Chance Flood, or 100-year flood, is a flood that has a 1 percent chance or greater of occurring in any given year. Experiencing a 100-year flood does not decrease the chance of a second 100-year flood occurring that same year or any year that follows. A 100- year flood today, independent of future sea level rise and other climate change effects, has a 26 percent chance of occurring over the life of a 30-year mortgage. Similarly, a 100-year flood today has a 45 percent chance of occurring over the 60-year life of a power substation.

Map Description: This map displays the 100 year floodplain based on NRCS soil survey data (https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/survey/) and was identified based on research by Sangway and Merwade (*https://onlinelibrary.wiley.com/doi/abs/10.1111/1752-1688.12306*).

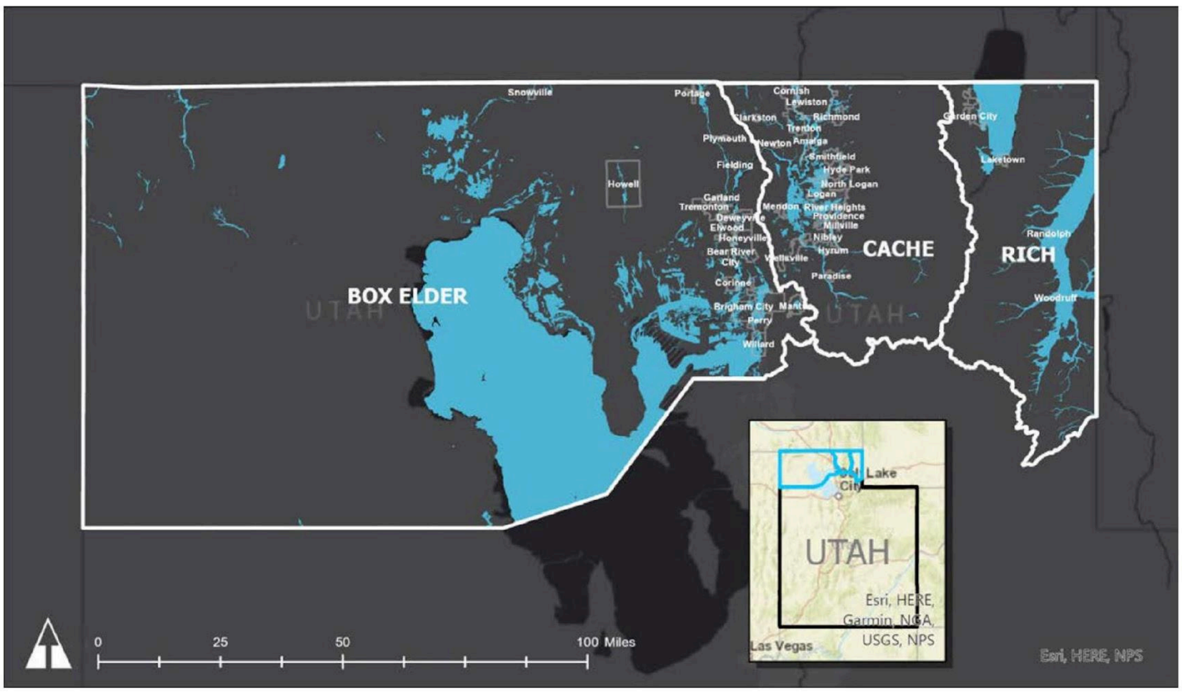


FLOOD - VALLEY BOTTOM

Hazard Description: A flood is an overflow of water from rivers, groundwater, or rainfall that submerges areas that are usually dry. The most common cause of flooding is due to rain or snowmelt that accumulates faster than soils can absorb it or rivers can carry it away. Flooding can also result from the failure of a water control structure, such as a levee or dam (see also Dam Failure).

A 1% Annual Chance Flood, or 100-year flood, is a flood that has a 1 percent chance or greater of occurring in any given year. Experiencing a 100-year flood does not decrease the chance of a second 100-year flood occurring that same year or any year that follows. A 100- year flood today, independent of future sea level rise and other climate change effects, has a 26 percent chance of occurring over the life of a 30-year mortgage. Similarly, a 100-year flood today has a 45 percent chance of occurring over the 60-year life of a power substation.

Map Description: The valley bottom map displays the potential flood plains based on stream networks and elevation data (*https://databasin.org/datasets/95a24aeef6a24996bf8082090fdbd831*).

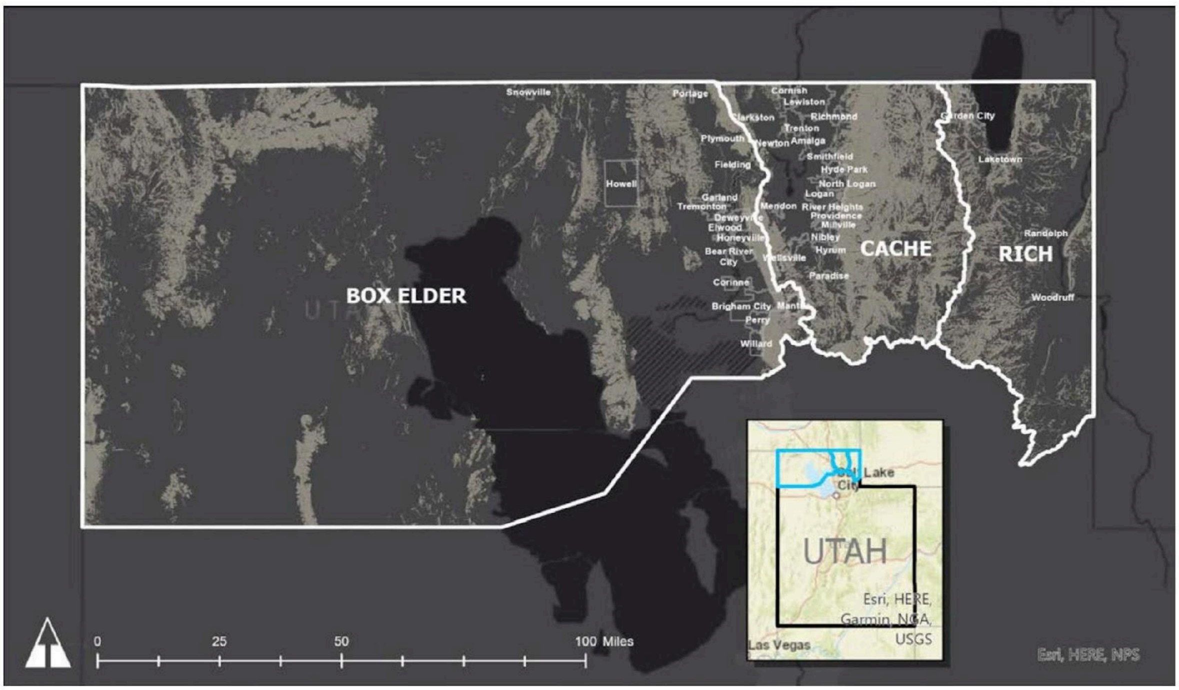


LANDSLIDE

Hazard Description: A landslide is the movement of a mass of rock, debris, or earth down a slope by force of gravity. They flow rapidly, striking at avalanche speeds that can travel several miles, growing in size as they pick up trees, boulders, cars and other materials.

Landslides occur when the slope or soil stability changes from stable to unstable, which may be caused by earthquakes, storms, volcanic eruptions, erosion, fire, or additional human-induced activities. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high. However, landslides can occur with very little slope, sometimes classified as earth slumping or earth flow.

Hazard Description: This map displays moderate to high landslide susceptibility based on research completed by Utah Geological Survey geologists. For more information visit: *https://ugspub.nr.utah.gov/publications/maps/m-228/m-228.pdf*

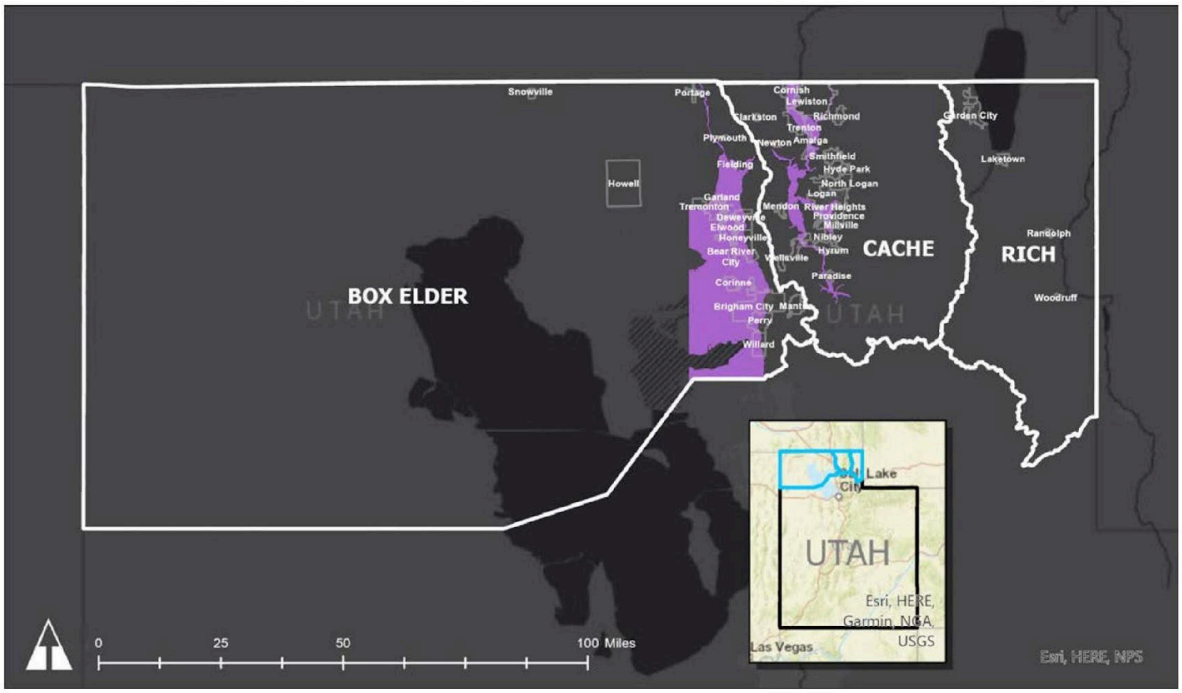


LIQUEFACTION

Hazard Description: Liquefaction occurs when soils that are saturated with water temporarily lose their ability to hold their structure, acting more like a viscous liquid than a solid. It mostly occurs during an earthquake and can damage anything on or in the ground, including buildings and other structures, roads, sewer and water lines, and other infrastructure.

Two conditions must be present in order for liquefaction to occur: 1) The soil must be susceptible to liquefaction, which are most often shallow (0-30 feet), and loose/sandy soils; and, 2) There must be ground shaking (such as during an earthquake) that is strong enough to loosen the soil structure.

Hazard Description: This map displays moderate to high liquefaction potential based on research completed by Utah Geological Survey geologists. For more information visit: *https://geology.utah.gov/hazards/earthquakes/liquefaction/*

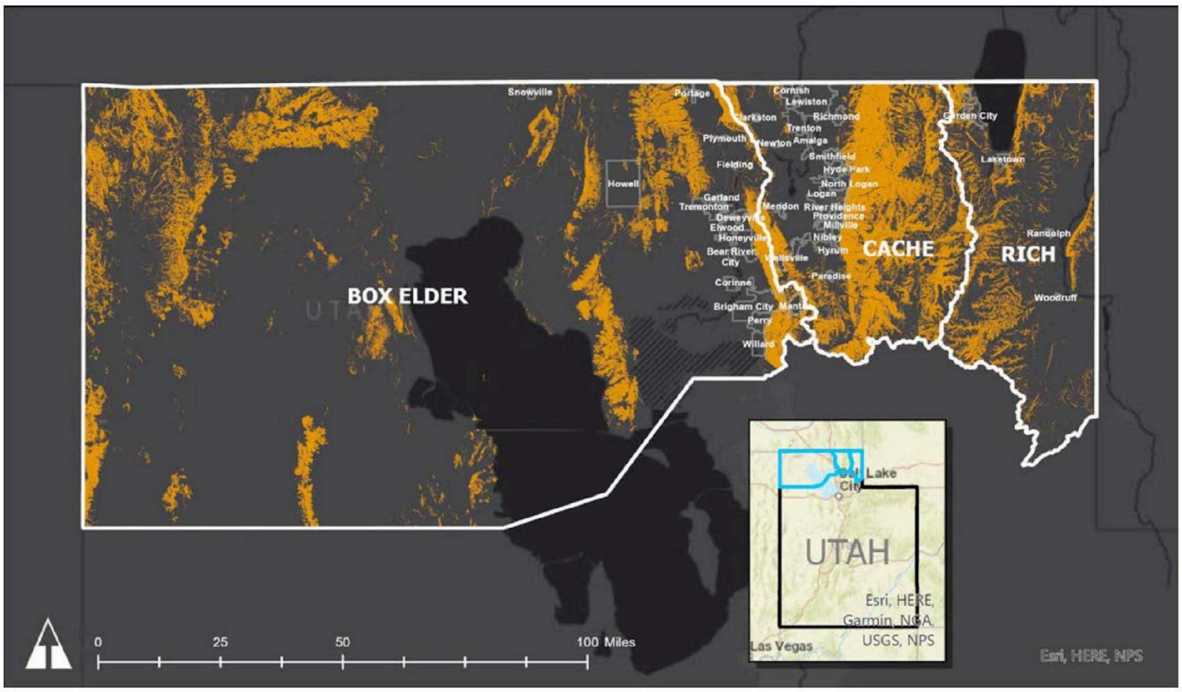


STEEP SLOPE

Hazard Description: A landslide is the movement of a mass of rock, debris, or earth down a slope by force of gravity. They flow rapidly, striking at avalanche speeds that can travel several miles, growing in size as they pick up trees, boulders, cars and other materials.

Landslides occur when the slope or soil stability changes from stable to unstable, which may be caused by earthquakes, storms, volcanic eruptions, erosion, fire, or additional human-induced activities. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high. However, landslides can occur with very little slope, sometimes classified as earth slumping or earth flow.

Hazard Description: This map displays areas of steep slopes (30 percent slope or greater) and was developed using the U.S. Geologic Survey National Elevation Dataset. For more information visit: *https://www.usgs.gov/core-science-systems/national-geospatial-program/national-map*



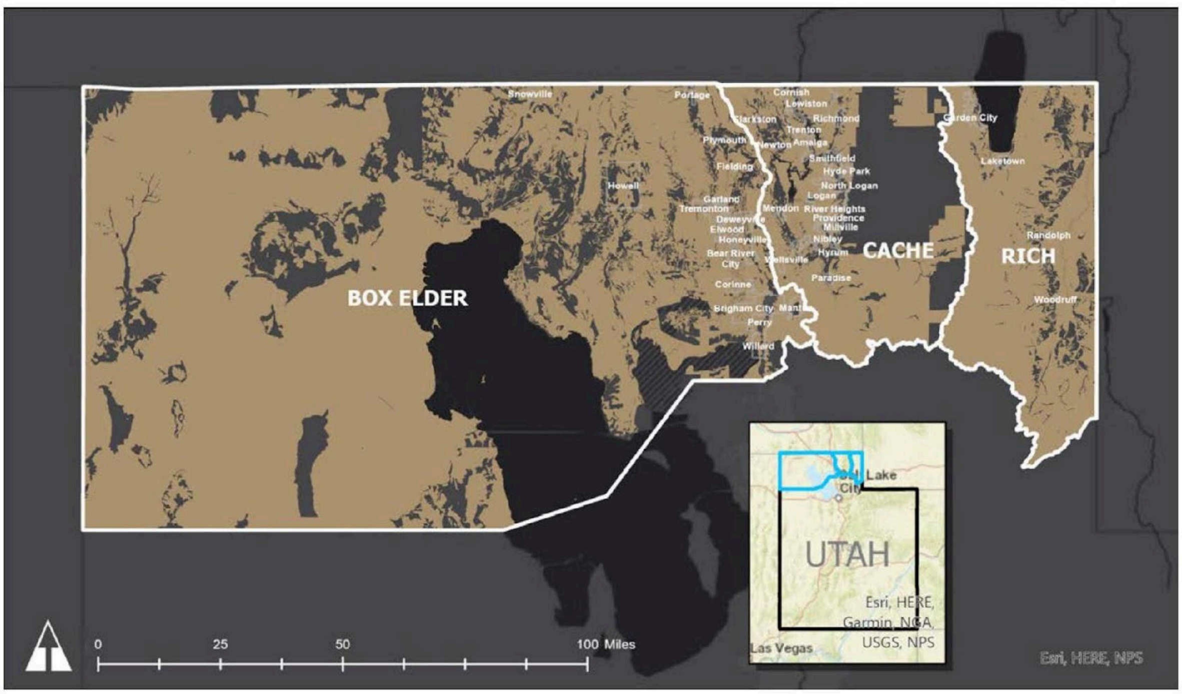
PROBLEM SOILS (WITH BASEMENTS)

Hazard Description: Problem soils are a group of hazards related to the specific properties of soils, and can include:

- Collapsible soil: Soils that have considerable strength when in a day, natural state, but significantly settle due to hydrocompaction (reduction of air space within the soil) when wetted;
- Expansive soil: Soil with high clay content that swells when wet and shrinks when dried; and
- Subsidence : Sinking of the ground caused by groundwater depletion and/or underground mine subsidence or collapse

Problem soils can cause extensive damage to structures and foundations, and may also damage pavements after construction. They have caused an undetermined, but very significant amount of infrastructure damage and resulting economic impact.

Map Description: This map displays soils not suitable for dwellings with basements based on soil parameters (see reference section USDA SSURGO 1. Soils Not Suitable for Dwellings with Basements for more information).



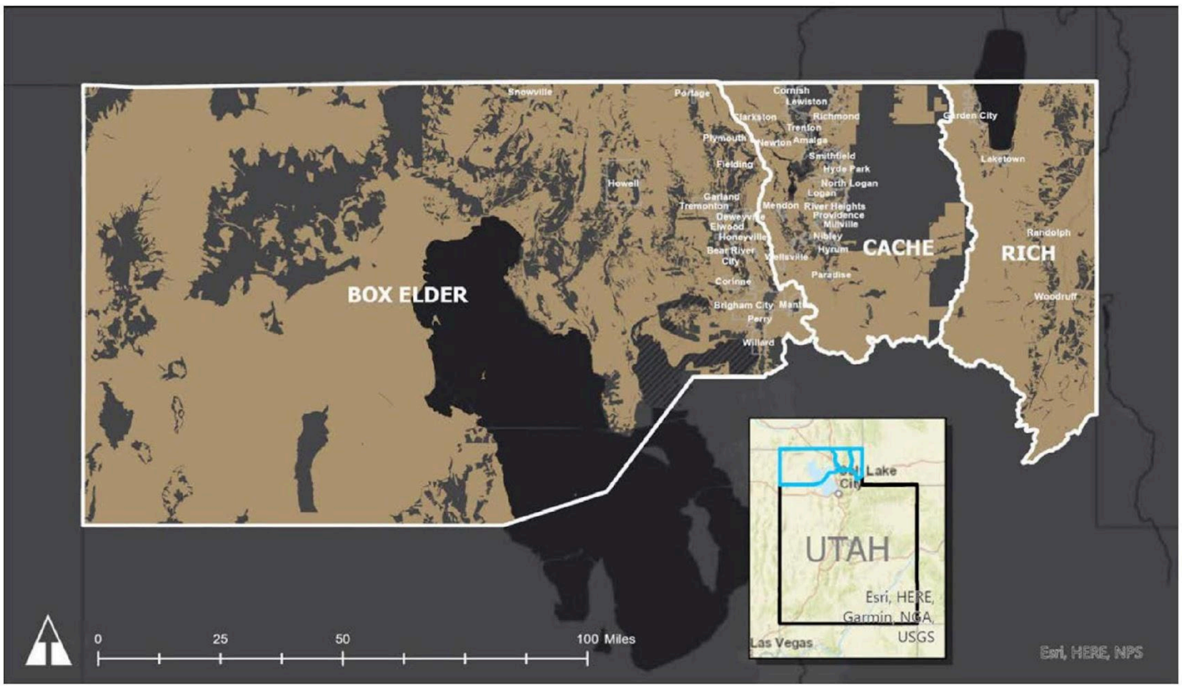
PROBLEM SOILS (WITHOUT BASEMENTS)

Hazard Description: Problem soils are a group of hazards related to the specific properties of soils, and can include:

- Collapsible soil: Soils that have considerable strength when in a day, natural state, but significantly settle due to hydrocompaction (reduction of air space within the soil) when wetted;
- Expansive soil: Soil with high clay content that swells when wet and shrinks when dried; and
- Subsidence : Sinking of the ground caused by groundwater depletion and/or underground mine subsidence or collapse

Problem soils can cause extensive damage to structures and foundations, and may also damage pavements after construction. They have caused an undetermined, but very significant amount of infrastructure damage and resulting economic impact.

Map Description: This map displays soils not suitable for dwellings without basements based on soil parameters (see reference section USDA SSURGO 2. Soils Not Suitable for Dwellings without Basements for more information).

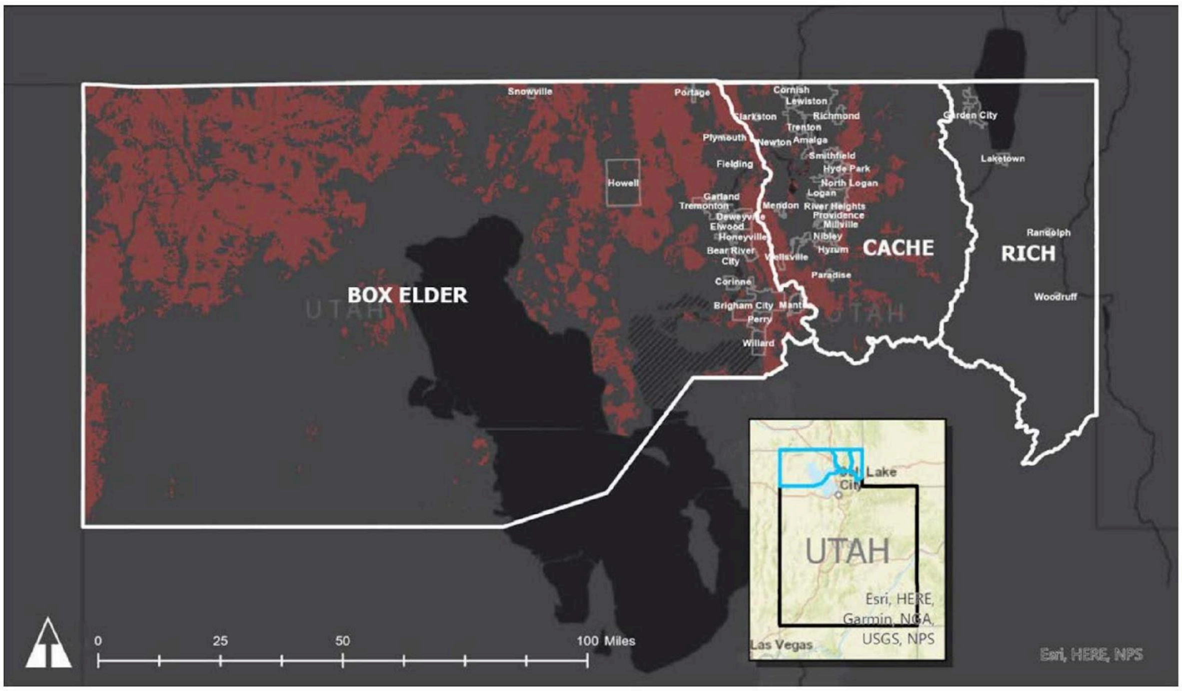


WILDFIRE - UTAH FFSL

Hazard Description: A wildfire is any outdoor fire that is not controlled, supervised, or arranged. Wildfire probability depends on fuel, weather and topography. Wildfires can occur in the wildland or the wildland urban interface. A wildland is an area where development is almost nonexistent, except for roads, railroads, or power lines. Wildland urban interface is an area where structures and other human development meet or intermingle with wildland or vegetation fuels.

Fuels are anything that will burn and include vegetation and structures. The weather, such as high temperatures, low humidity and high winds increase the likelihood that a wildfire will spread. Topography affects speed at which a wildfire will spread. A fire will move more quickly uphill which causes hot gases to rise in front of it. These gases in turn, pre-heat and dry vegetation ahead of the wildfire causing it to catch fire more rapidly.

Hazard Description: This map displays areas of moderate to high wildfire threat developed by the Utah Division of Forestry, Fire and State Lands and historical wildfire occurrences from 1980-2016. For more information visit: *https://wildfirerisk.utah.gov/*

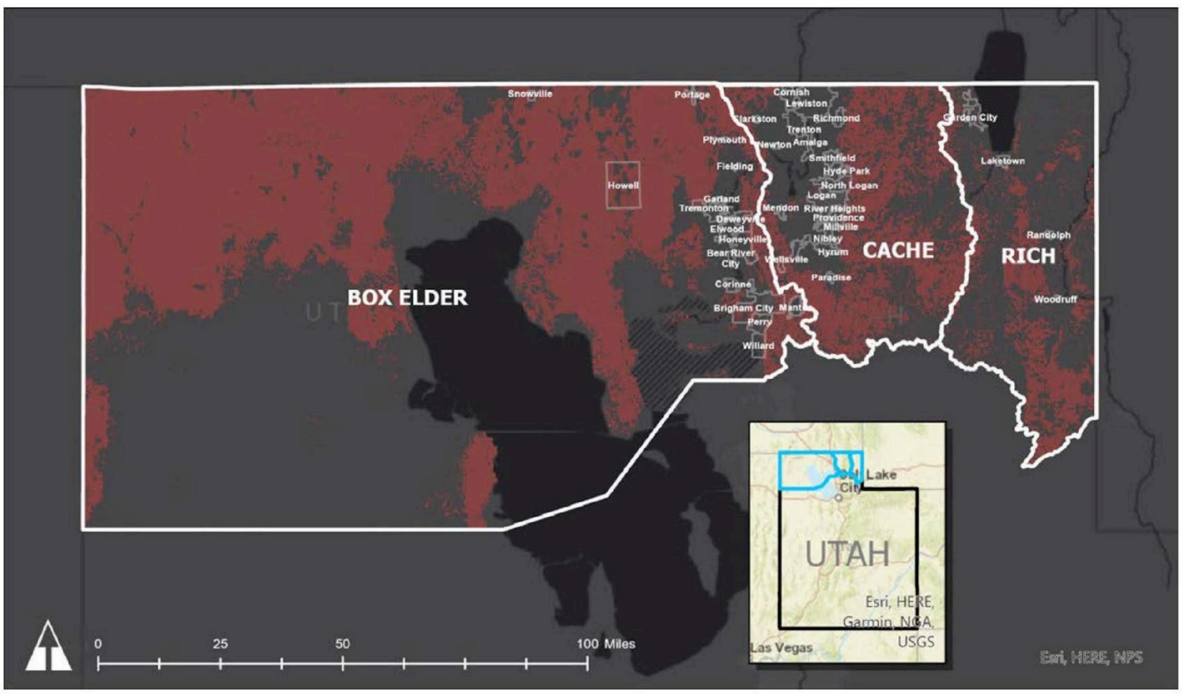


WILDFIRE - U.S. FOREST SERVICE

Hazard Description: A wildfire is any outdoor fire that is not controlled, supervised, or arranged. Wildfire probability depends on fuel, weather and topography. Wildfires can occur in the wildland or the wildland urban interface. A wildland is an area where development is almost nonexistent, except for roads, railroads, or power lines. Wildland urban interface is an area where structures and other human development meet or intermingle with wildland or vegetation fuels.

Fuels are anything that will burn and include vegetation and structures. The weather, such as high temperatures, low humidity and high winds increase the likelihood that a wildfire will spread. Topography affects speed at which a wildfire will spread. A fire will move more quickly uphill which causes hot gases to rise in front of it. These gases in turn, pre-heat and dry vegetation ahead of the wildfire causing it to catch fire more rapidly.

Hazard Description: This map displays areas of moderate to high wildfire hazard potential developed by the U.S. Forest Service and historical wildfire occurrences from 1980-2016. For more information visit: *https://www.firelab.org/project/wildfire-hazard-potential*



Hazard	Exposure	Probability	Severity	Overall Risk
AIR QUALITY	Low	Moderate	Moderate	Moderate
ALUVIAL FANS	Moderate	Low	Low	Low
AVALANCHE	Low	High	Moderate	Moderate
CLIMATE CHANGE	Moderate	High	Moderate	Moderate
DAM FAILURE	Low	Low	Moderate	Moderate
DROUGHT	Moderate	Moderate	Moderate	Moderate
FAULTS	Low	Moderate	Moderate	Moderate
FLOOD	Moderate	High	Moderate	Moderate
INSECT INFEST.	Moderate	Moderate	Moderate	Moderate
LANDSLIDE	Moderate	Moderate	Moderate	Moderate
LIQUEFACTION	Moderate	Moderate	Moderate	Moderate
PROBLEM SOILS	High	Low	Low	Moderate
RADON	Low	High	Low	Moderate
SEASONAL POP.	Moderate	High	Moderate	Moderate
SEICHE	Low	Low	Low	Low
SEVERE WEATHER	High	High	High	High
STEEP SLOPES	Low	Low	Low	Low
TORNADO	Low	Low	Moderate	Moderate
VOLCANIC	Very Low	Very Low	High	Low
WILDFIRE	Moderate	High	Moderate	High

A comprehensive table showing risk profiles for each natural hazard in the Bear River Region, collectively, identified during the planning process.

Regional natural hazard profiles and risk matrices

The table above shows risk profiles for every natural hazard identified throughout the planning process. Each profile is based on averages from all three counties considering the following three components of risk:

- **EXPOSURE to the hazard**
- **PROBABILITY of a future hazard event**
- **SEVERITY of a potential of a hazard event**

These components were averaged together to create an overall regional risk classification of either low, moderate, or high. While most hazards in the region, collectively, were categorized as a moderate risk, the hazard profiles and risk matrices for each individual county indicate much more diversity when considering geography, geology and soils, topography, vegetation types, localized climate, population characteristics, housing density, and many other factors.

The next three sections illustrate the diversity of various hazard risks for each respective county for each natural hazard identified in this plan.

For definitions of each natural hazard in the Bear River Region, visit the Utah Hazard Mitigation website at **hazards.utah.gov**. Scroll down until you see the hazard you would like to learn more about, and click on the photo.

Countywide risk matrices: Exposure, probability, and severity

Risks to each natural hazard for each county in the Bear River Region were analyzed during the planning process. Risk was determined by considering the three elements of exposure, probability, and severity.

Exposure, or the geographic overlap of natural hazard areas on community assets, was determined for the following 5 categories:

- People, businesses, and property
- Critical facilities and infrastructure
- Working lands
- Natural systems
- Recreation amenities

On the next several pages are tables showing risk matrices for each county, including exposure, probability, severity, and combined matrices. Notice the hazard names at the top of the exposure table in green text - these are hazards with GIS data available. The figures for those hazards were strictly based on potential loss numbers, and whether or not 30% or more of amenities were potentially impacted by the hazard. The hazards listed in blue text, where GIS data did not exist, were estimated by BRAG staff based on historical exposure and professional opinion, and were vetted through county emergency management staff.

Probability scores were based on qualitative assessments of historical events and the likelihood of more events occurring within the next 5 years.

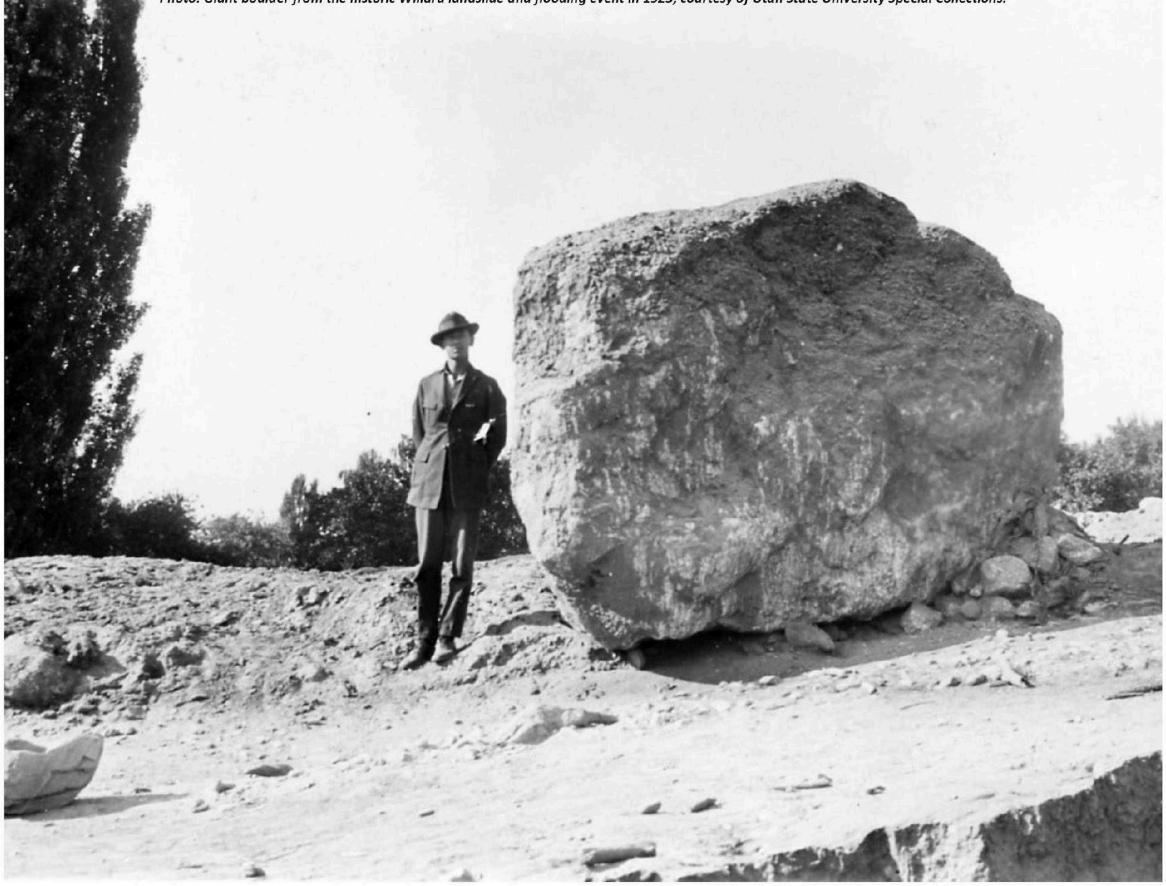
Severity scores were based on the scale and level of damage of past events, or the severity of future events according to local natural hazards experts. Severity was also determined for the same 5 categories as they were for exposure.

Combined risk

After averages were determined for each risk factor, scores for exposure, probability, and severity were added together to illustrate combined risk scores. These combined risk scores provide local governments with a sense of where their highest risks are for each respective natural hazard. Combined risk data is not intended to be all inclusive or perfectly representative, but may help local communities prioritize mitigation projects strategies to protect lives, property, infrastructure, and other amenities as practical, efficient, and cost effective as possible.

The next three pages contain risk matrices and summary tables for each respective county in the Bear River Region:

Photo: Giant boulder from the historic Willard landslide and flooding event in 1923, courtesy of Utah State University Special Collections.



BOX ELDER COUNTY EXPOSURE SCORES PER HAZARD

CATEGORY	Wildfire (Combined)	Flood (Combined)	Dam Failure	Faults	Landslide	Liquefaction	Steep Slopes	Problem Soils (No Bsmt)	Problem Soils (Bsmt)	Avalanche Terrain	Air Quality	Aluvial Fans	Climate Change	Drought	Insect Infestation/ Plant Disease	Radon	Severe Weather	Tornado	Seiche	Volcanic	Seasonal Population Growth
People, Businesses, and Property	1	1	1	1	1	3	0	3	3	0	2	2	2	2	1	3	3	1	1	0	1
Critical Facilities and Infrastructure	3	1	0	1	1	1	1	3	3	0	1	2	1	1	0	0	2	1	2	0	2
Working Lands	2	1	1	1	1	3	1	3	3	0	0	1	2	3	3	0	3	1	1	0	0
Natural Systems	2	1	1	2	2	3	1	3	3	0	1	2	2	2	2	0	2	0	2	0	0
Recreation Amenities	3	2	1	1	1	1	1	3	3	0	0	1	1	2	2	0	1	0	2	0	2
TOTAL	11	6	4	6	6	11	4	15	15	0	4	8	8	10	8	3	11	3	8	0	5
AVERAGE	2.2	1.2	0.8	1.2	1.2	2.2	0.8	3.0	3.0	0.0	0.8	1.6	1.6	2.0	1.6	0.6	2.2	0.6	1.6	0.0	1.0

Exposure Scoring Methodology for Hazards with GIS data (green hazard headings): 1) Losses for each community were collectively added together per county for each hazard. 2) Comprehensive county losses per hazard were then calculated by type as a percent of the total. 3) Types of amenities and facilities were grouped into: People, businesses, and property; Critical Facilities and Infrastructure; Working Lands; Natural Systems; and Recreation Amenities. 4) Percent losses for each category were then averaged for each natural hazard. For example, percentages for recreation amenities potentially affected by landslides were all averaged to give one loss value. 5) These averaged percentages were then translated into numerical scores: **0(Very Low) = less than 1%; 1(Low) = 1%-15%; 2 (Moderate) = 15%-30%; and 3 (High) = 30%+**

Other Notes: Low, Moderate, and High Values were based on other recent hazard mitigation plans and studies, where greater than 30% of losses was generally considered significant. Wildfire and Flood hazards included multiple datasets. As such, percentages were averaged for each dataset, then averaged again for each hazard collectively.

Non-GIS hazard (blue hazard headings) exposure scores were estimated based on the potential for 30% or more of the category amenities to be exposed to each hazard at any given time.

BOX ELDER COUNTY PROBABILITY SCORES PER HAZARD

CATEGORY	Wildfire	Flood	Dam Failure	Faults (Earthquake)	Landslide	Liquefaction	Steep Slopes	Problem Soils (No Bsmt)	Problem Soils (Bsmt)	Avalanche	Air Quality	Aluvial Fans	Climate Change	Drought	Insect Infestation/ Plant Disease	Radon	Severe Weather	Tornado	Seiche	Volcanic	Seasonal Population Growth
Probability Score	3	3	1	3	2	3	1	1	1	2	2	1	3	2	2	3	3	1	1	0	2

*Probability scores based on qualitative assessments of historical events and the likelihood of more events occuring within the next 5 years. **Scores range from 0 to 3; 0 = Unlikely, 1 = Somewhat Likely, 2 = Likely, and 3 = Very Likely.** Note: For hazard types listed above that do not occur as an event, per se, a probability score of 1 was used to represent a constant, but low, probability of occurance. For example, problem soils, steep slopes, and aluvial fans are prevelent in the Bear River Region. However, each of these are present as existing conditions only, and do not occur as specific events, while other related hazards, such as landslides, do.

BOX ELDER COUNTY SEVERITY SCORES PER HAZARD

CATEGORY	Wildfire	Flood	Dam Failure	Faults	Landslide	Liquefaction	Steep Slopes	Problem Soils (No Bsmt)	Problem Soils (Bsmt)	Avalanche	Air Quality	Aluvial Fans	Climate Change	Drought	Insect Infestation/ Plant Disease	Radon	Severe Weather	Tornado	Seiche**	Volcanic	Seasonal Population Growth
People, Businesses, and Property	2	2	3	2	3	3	1	1	1	2	2	1	1	1	1	3	3	3	2	3	1
Critical Facilities and Infrastructure	2	2	2	3	2	3	2	1	1	1	1	1	1	1	0	0	2	2	2	3	2
Working Lands	3	2	1	0	1	2	0	0	0	1	0	0	2	3	3	0	3	2	1	3	0
Natural Systems	2	1	2	0	2	1	1	0	0	2	1	1	3	3	3	0	2	2	1	3	2
Recreation Amenities	1	1	2	1	1	1	1	0	0	1	1	1	2	2	2	0	1	1	2	3	2
TOTAL	10	8	10	6	9	10	5	2	2	7	5	4	9	10	9	3	11	10	8	15	7
AVERAGE	2.0	1.6	2.0	1.2	1.8	2.0	1.0	0.4	0.4	1.4	1.0	0.8	1.8	2.0	1.8	0.6	2.2	2.0	1.6	3.0	1.4

*Scores were determined based on the severity of past events, or the severity of potential future events. Severity is defined as causing a great amount of damage in relation to each respective category. **Scores for each respective category range from 0 to 3; 0 = Not Severe, 1 = Somewhat Severe, 2 = Severe, and 3 = Very Severe.** Average scores were calculated for each hazard to determine overall relative severity. **It is very unlikely that a seiche event will occur in Cache County, so a severity rating is irrelevent.

BOX ELDER COUNTY COMBINED RISK SCORES PER HAZARD

CATEGORY	Wildfire	Flood	Dam Failure	Faults	Landslide	Liquefaction	Steep Slopes	Problem Soils (No Bsmt)	Problem Soils (Bsmt)	Avalanche	Air Quality	Aluvial Fans	Climate Change	Drought	Insect Infestation/ Plant Disease	Radon	Severe Weather	Tornado	Seiche	Volcanic	Seasonal Population Growth
Exposure (Average)	2.2	1.2	0.8	1.2	1.2	2.2	0.8	3.0	3.0	0.0	0.8	1.6	1.6	2.0	1.6	0.6	2.2	0.6	1.6	0.0	1.0
Probability	3.0	3.0	1.0	3.0	2.0	3.0	1.0	1.0	1.0	2.0	2.0	1.0	3.0	2.0	2.0	3.0	3.0	1.0	1.0	0.0	2.0
Severity (Average)	2.0	1.6	2.0	1.2	1.8	2.0	1.0	0.4	0.4	1.4	1.0	0.8	1.8	2.0	1.8	0.6	2.2	2.0	1.6	3.0	1.4
TOTAL	7.2	5.8	3.8	5.4	5.0	7.2	2.8	4.4	4.4	3.4	3.8	3.4	6.4	6.0	5.4	4.2	7.4	3.6	4.2	3.0	4.4

Scores were based on a scale ranging from 1 to 9; 9 representing the highest risk.

CACHE COUNTY EXPOSURE SCORES PER HAZARD

CATEGORY	Wildfire (Combined)	Flood (Combined)	Dam Failure	Faults	Landslide	Liquefaction	Steep Slopes	Problem Soils (No Bsmt)	Problem Soils (Bsmt)	Avalanche Terrain	Air Quality	Aluvial Fans	Climate Change	Drought	Insect Infestation/ Plant Disease	Radon	Severe Weather	Tornado	Seiche	Volcanic	Seasonal Population Growth
People, Businesses, and Property	1	1	1	1	1	1	0	3	3	0	3	2	2	2	1	3	3	1	0	0	1
Critical Facilities and Infrastructure	2	1	1	1	3	1	2	3	3	1	1	1	1	1	0	0	2	1	0	0	1
Working Lands	1	1	1	1	1	1	1	3	3	0	0	1	2	3	3	0	3	1	0	0	0
Natural Systems	2	2	2	1	2	1	1	2	3	1	1	2	2	2	2	0	2	0	0	0	2
Recreation Amenities	2	3	1	1	2	2	1	3	3	1	0	1	1	2	2	0	1	0	0	0	2
TOTAL	8	8	6	5	9	6	5	14	15	3	5	7	8	10	8	3	11	3	0	0	6
AVERAGE	1.6	1.6	1.2	1.0	1.8	1.2	1.0	2.8	3.0	0.6	1.0	1.4	1.6	2.0	1.6	0.6	2.2	0.6	0.0	0.0	1.2

Exposure Scoring Methodology for Hazards with GIS data (green hazard headings): 1) Losses for each community were collectively added together per county for each hazard. 2) Comprehensive county losses per hazard were then calculated by type as a percent of the total. 3) Types of amenities and facilities were grouped into: People, businesses, and property; Critical Facilities and Infrastructure; Working Lands; Natural Systems; and Recreation Amenities. 4) Percent losses for each category were then averaged for each natural hazard. For example, percentages for recreation amenities potentially affected by landslides were all averaged to give one loss value. 5) These averaged percentages were then translated into numerical scores: **0(Very Low) = less than 1%; 1(Low) = 1%-15%; 2 (Moderate) = 15%-30%; and 3 (High) = 30%+**

Other Notes: Low, Moderate, and High Values were based on other recent hazard mitigation plans and studies, where greater than 30% of losses was generally considered significant. Wildfire and Flood hazards included multiple datasets. As such, percentages were averaged for each dataset, then averaged again for each hazard collectively.

Non-GIS hazard (blue hazard headings) exposure scores were estimated based on the potential for 30% or more of the category amenities to be exposed to each hazard at any given time.

CACHE COUNTY PROBABILITY SCORES PER HAZARD

CATEGORY	Wildfire	Flood	Dam Failure	Faults (Earthquake)	Landslide	Liquefaction	Steep Slopes	Problem Soils (No Bsmt)	Problem Soils (Bsmt)	Avalanche	Air Quality	Aluvial Fans	Climate Change	Drought	Insect Infestation/ Plant Disease	Radon	Severe Weather	Tornado	Seiche	Volcanic	Seasonal Population Growth
Probability Score	3	3	1	2	2	2	1	1	1	3	3	1	3	2	2	3	3	1	0	0	2

*Probability scores based on qualitative assessments of historical events and the likelihood of more events occuring within the next 5 years. **Scores range from 0 to 3; 0 = Unlikely, 1 = Somewhat Likely, 2 = Likely, and 3 = Very Likely.** Note: For hazard types listed above that do not occur as an event, per se, a probability score of 1 was used to represent a constant, but low, probability of occurance. For example, problem soils, steep slopes, and aluvial fans are prevelent in the Bear River Region. However, each of these are present as existing conditions only, and do not occur as specific events, while other related hazards, such as landslides, do.

CACHE COUNTY SEVERITY SCORES PER HAZARD

CATEGORY	Wildfire	Flood	Dam Failure	Faults	Landslide	Liquefaction	Steep Slopes	Problem Soils (No Bsmt)	Problem Soils (Bsmt)	Avalanche	Air Quality	Aluvial Fans	Climate Change	Drought	Insect Infestation/ Plant Disease	Radon	Severe Weather	Tornado	Seiche**	Volcanic	Seasonal Population Growth
People, Businesses, and Property	2	2	3	2	3	3	1	1	1	2	3	1	1	1	1	3	3	3	0	3	1
Critical Facilities and Infrastructure	2	2	2	3	2	3	2	1	1	2	2	1	1	1	0	0	2	2	0	3	2
Working Lands	2	1	1	0	1	2	0	0	0	1	0	0	2	3	3	0	3	2	0	3	0
Natural Systems	2	1	2	0	2	1	1	0	0	2	1	1	3	3	3	0	2	2	0	3	2
Recreation Amenities	2	1	2	1	1	2	1	0	0	1	1	1	2	2	2	0	1	1	0	3	2
TOTAL	10	7	10	6	9	11	5	2	2	8	7	4	9	10	9	3	11	10	0	15	7
AVERAGE	2.0	1.4	2.0	1.2	1.8	2.2	1.0	0.4	0.4	1.6	1.4	0.8	1.8	2.0	1.8	0.6	2.2	2.0	0.0	3.0	1.4

*Scores were determined based on the severity of past events, or the severity of potential future events. Severity is defined as causing a great amount of damage in relation to each respective category. **Scores for each respective category range from 0 to 3; 0 = Not Severe, 1 = Somewhat Severe, 2 = Severe, and 3 = Very Severe.** Average scores were calculated for each hazard to determine overall relative severity. **It is very unlikely that a seiche event will occur in Cache County, so a severity rating is irrelevent.

CACHE COUNTY COMBINED RISK SCORES PER HAZARD

CATEGORY	Wildfire	Flood	Dam Failure	Faults	Landslide	Liquefaction	Steep Slopes	Problem Soils (No Bsmt)	Problem Soils (Bsmt)	Avalanche	Air Quality	Aluvial Fans	Climate Change	Drought	Insect Infestation/ Plant Disease	Radon	Severe Weather	Tornado	Seiche	Volcanic	Seasonal Population Growth
Exposure (Average)	1.6	1.6	1.2	1.0	1.8	1.2	1.0	2.8	3.0	0.6	1.0	1.4	1.6	2.0	1.6	0.6	2.2	0.6	0.0	0.0	1.2
Probability	3.0	3.0	1.0	2.0	2.0	2.0	1.0	1.0	1.0	3.0	3.0	1.0	3.0	2.0	2.0	3.0	3.0	1.0	0.0	0.0	2.0
Severity (Average)	2.0	1.4	2.0	1.2	1.8	2.2	1.0	0.4	0.4	1.6	1.4	0.8	1.8	2.0	1.8	0.6	2.2	2.0	0.0	3.0	1.4
TOTAL	6.6	6.0	4.2	4.2	5.6	5.4	3.0	4.2	4.4	5.2	5.4	3.2	6.4	6.0	5.4	4.2	7.4	3.6	0.0	3.0	4.6

Scores were based on a scale ranging from 1 to 9; 9 representing the highest risk.

RICH COUNTY EXPOSURE SCORES PER HAZARD

CATEGORY	Wildfire (Combined)	Flood (Combined)	Dam Failure	Faults	Landslide	Steep Slopes	Problem Soils (No Bsmt)	Problem Soils (Bsmt)	Avalanche Terrain	Air Quality	Aluvial Fans	Climate Change	Drought	Insect Infestation/ Plant Disease	Radon	Severe Weather	Tornado	Seiche	Volcanic	Seasonal Population Growth
People, Businesses, and Property	1	2	1	1	1	0	3	3	0	1	1	1	2	1	3	3	1	1	0	3
Critical Facilities and Infrastructure	2	3	1	1	1	1	3	3	0	0	1	0	0	0	0	2	1	1	0	3
Working Lands	2	2	1	1	2	1	3	3	0	0	0	2	3	3	0	3	1	0	0	0
Natural Systems	2	3	1	1	1	1	3	3	0	0	1	2	2	2	0	2	0	0	0	2
Recreation Amenities	2	2	1	1	2	1	3	3	0	0	1	1	2	2	0	1	0	2	0	2
TOTAL	9	12	5	5	7	4	15	15	0	1	4	6	9	8	3	11	3	4	0	10
AVERAGE	1.8	2.4	1.0	1.0	1.4	0.8	3.0	3.0	0.0	0.2	0.8	1.2	1.8	1.6	0.6	2.2	0.6	0.8	0.0	2.0

Exposure Scoring Methodology for Hazards with GIS data (green hazard headings): 1) Losses for each community were collectively added together per county for each hazard. 2) Comprehensive county losses per hazard were then calculated by type as a percent of the total. 3) Types of amenities and facilities were grouped into: People, businesses, and property; Critical Facilities and Infrastructure; Working Lands; Natural Systems; and Recreation Amenities. 4) Percent losses for each category were then averaged for each natural hazard. For example, percentages for recreation amenities potentially affected by landslides were all averaged to give one loss value. 5) These averaged percentages were then translated into numerical scores: **0(Very Low) = less than 1%; 1(Low) = 1%-15%; 2 (Moderate) = 15%-30%; and 3 (High) = 30%+**

Other Notes: Low, Moderate, and High Values were based on other recent hazard mitigation plans and studies, where greater than 30% of losses was generally considered significant. Wildfire and Flood hazards included multiple datasets. As such, percentages were averaged for each dateset, then averaged again for each hazard collectively.

Non-GIS hazard (blue hazard headings) exposure scores were estimated based on the potential for 30% or more of the category amenities to be exposed to each hazard at any given time.

RICH COUNTY PROBABILITY SCORES PER HAZARD

CATEGORY	Wildfire	Flood	Dam Failure	Faults (Earthquake)	Landslide	Steep Slopes	Problem Soils (No Bsmt)	Problem Soils (Bsmt)	Avalanche	Air Quality	Aluvial Fans	Climate Change	Drought	Insect Infestation/ Plant Disease	Radon	Severe Weather	Tornado	Seiche	Volcanic	Seasonal Population Growth
Probability Score	3	3	1	1	2	1	1	1	2	1	1	3	2	2	3	3	1	1	0	3

*Probability scores based on qualitative assessments of historical events and the likelihood of more events occuring within the next 5 years. **Scores range from 0 to 3; 0 = Unlikely, 1 = Somewhat Likely, 2 = Likely, and 3 = Very Likely.** Note: For hazard types listed above that do not occur as an event, per se, a probability score of 1 was used to represent a constant, but low, probability of occurance. For example, problem soils, steep slopes, and aluvial fans are prevelent in the Bear River Region. However, each of these are present as existing conditions only, and do not occur as specific events, while other related hazards, such as landslides, do.

RICH COUNTY SEVERITY SCORES PER HAZARD

CATEGORY	Wildfire	Flood	Dam Failure	Faults	Landslide	Steep Slopes	Problem Soils (No Bsmt)	Problem Soils (Bsmt)	Avalanche	Air Quality	Aluvial Fans	Climate Change	Drought	Insect Infestation/ Plant Disease	Radon	Severe Weather	Tornado	Seiche	Volcanic	Seasonal Population Growth
People, Businesses, and Property	2	2	3	2	2	1	1	1	2	2	1	1	1	1	3	3	3	2	3	1
Critical Facilities and Infrastructure	2	2	2	3	3	2	1	1	2	1	1	1	1	0	0	2	2	1	3	3
Working Lands	3	1	1	0	1	0	0	0	1	0	0	2	3	3	0	3	2	0	3	0
Natural Systems	2	1	2	0	1	1	0	0	2	1	1	2	3	3	0	2	2	1	3	2
Recreation Amenities	2	1	1	0	1	1	0	0	1	1	1	2	2	2	0	1	1	2	3	2
TOTAL	11	7	9	5	8	5	2	2	8	5	4	8	10	9	3	11	10	6	15	8
AVERAGE	2.2	1.4	1.8	1.0	1.6	1.0	0.4	0.4	1.6	1.0	0.8	1.6	2.0	1.8	0.6	2.2	2.0	1.2	3.0	1.6

*Scores were determined based on the severity of past events, or the severity of potential future events. Severity is defined as causing a great amount of damage in relation to each respective category. **Scores for each respective category range from 0 to 3; 0 = Not Severe, 1 = Somewhat Severe, 2 = Severe, and 3 = Very Severe.** Average scores were calculated for each hazard to determine overall relative severity.

RICH COUNTY COMBINED RISK SCORES PER HAZARD

CATEGORY	Wildfire	Flood	Dam Failure	Faults	Landslide	Steep Slopes	Problem Soils (No Bsmt)	Problem Soils (Bsmt)	Avalanche	Air Quality	Aluvial Fans	Climate Change	Drought	Insect Infestation/ Plant Disease	Radon	Severe Weather	Tornado	Seiche	Volcanic	Seasonal Population Growth
Exposure (Average)	1.8	2.4	1.0	1.0	1.4	0.8	3.0	3.0	0.0	0.2	0.8	1.2	1.8	1.6	0.6	2.2	0.6	0.8	0.0	2.0
Probability	3.0	3.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	1.0	1.0	3.0	2.0	2.0	3.0	3.0	1.0	1.0	0.0	3.0
Severity (Average)	2.2	1.4	1.8	1.0	1.6	1.0	0.4	0.4	1.6	1.0	0.8	1.6	2.0	1.8	0.6	2.0	2.0	1.2	2.8	1.6
TOTAL	7.0	6.8	3.8	3.0	5.0	2.8	4.4	4.4	3.6	2.2	2.6	5.8	5.8	5.4	4.2	7.2	3.6	3.0	2.8	6.6

Scores were based on a scale ranging from 1 to 9; 9 representing the highest risk.

Photo: New development on the benches of Cache Valley.

Implications for future growth

While the type and location of future development in the county and within each jurisdiction can be difficult to accurately project, both temporally and spatially, it is important to consider implications various natural hazards may have on future populations and community assets.

Most of the time, developers prefer to build on land that provides the best return on investment. Land that is already near existing infrastructure, is inexpensive to purchase, and requires minimal improvements for construction is the most likely to be developed first. However, when these less expensive properties are built out, development patterns often shift to those that provide better views, larger lots, more amenities, and better access to the outdoors. Often, these lots are located on steeper hillsides and benches, canyons and drainage areas, or other places that were not developed early on for a variety of other reasons.

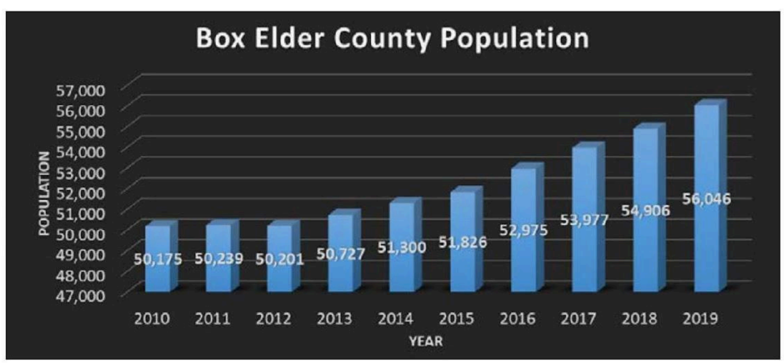
Consequently, some communities in the Bear River Region do not currently have significant risks to residential areas from natural hazards, especially the smaller more rural cities and towns. However, as those cities and towns eventually expand, especially those that are already located close to larger cities, some of these communities could see risks to residential areas and other community assets increase dramatically in the next 10 or 20 years.

Below are summaries for each county regarding potential future development patterns, and potential risks to those areas from various natural hazards.

Box Elder County

Between 2010 and 2019, Box Elder County's population increased from 50,175 residents to 56,046. This is equates to between roughly 1% and 2% growth per year.

Overall, most of the recent growth in Box Elder County has occurred in Perry, Willard, Brigham City, and Tremonton.



Population data citation: Annual Estimates of the Resident Population for Counties in Utah: April 1, 2010 to July 1, 2019 (CO-EST2019-ANNRES-49)

In Perry and Willard, most of the new growth is expected to occur along eastern benches and open areas on the periphery of existing developments. Much of this growth could be located along the Brigham City segment of the Wasatch Fault, as well as wildland-urban interface areas near the base of the mountains. Likewise, canyon drainages exist in similar areas in higher elevations above the towns. If development is allowed in these drainages, or in alluvial fans downhill from these areas, there is also a potential risk for debris flows following a heavy rain event. Wildfires in the summer, followed by significant rain or snowmelt events in the fall or following spring could exacerbate these impacts. Low elevation properties west of town could also be impacted as development occurs, via high water table and potential liquefaction risk areas.

Brigham City is seeing steady growth north and west of town. Some of these areas are in lower elevations where potential flood risk, high water table, and potential liquefaction risk exists. Risks in Willard and Perry also exists on steeper hillsides east of town, where wildfires could occur, or drainage areas could flood and cause severe damage if structures are located in those areas.

Tremonton has experienced steady and significant growth in the past few years. Most of the new development has occurred on the fringes of town, near existing residential areas. Some homes have been constructed east of the Malad River drainage. The greatest risks to future development in Tremonton collectively is likely in flood and landslide hazard areas near the Malad and Bear River drainages, so those areas should be avoided in order to reduce potential losses.

Development for the remainder of Box Elder County communities will likely occur in safe, lower elevation areas first. However, as communities grow, that development will likely move to areas with a high water table that are prone to flooding; steeper benches and hillsides, canyon drainages, and along river corridors. Recent development has occurred along the Bear River, specifically, where, although the FEMA 100-year floodplain was legally modified, significant risk still exists for flooding and landslides along steep river banks. Again, development along these large river drainages and corridors will pose significant risks to residents and community assets.

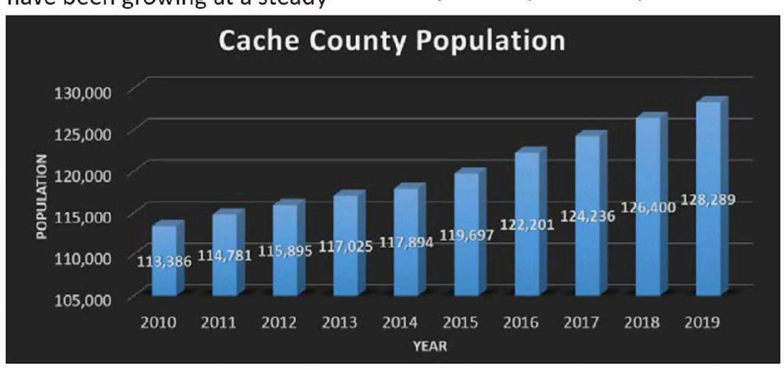
Cache County

Between 2010 and 2019, Cache County's population increased from 113,386 residents to 128,289. This is equates to between roughly 1% and 2.5% growth per year.

Most of the southern and eastern sides of Cache Valley have been growing at a steady rate. The communities on the south end of the valley, namely Wellsville, Mendon, Hyrum, and Paradise, are all experiencing growth in what used to be lower-elevation agricultural fields. The most significant risk for these developments are drainage areas from nearby canyons, geologic faults on the benches, and high water table and liquefaction areas in lower elevations. Steep slopes along rivers (Bear, Little Bear, Blacksmith Fork) and reservoir edges (Hyrum Reservoir in particular), are also places where development pressures may increase over time, and should be planned carefully to avoid potential losses.

Development is also occurring in Logan, Nibley, Millville, and Providence in low-elevation areas with potential high water tables and flood risk. In most cases, this is not an issue unless homes and other structures have basements, in which cases substantial damage could occur, especially during high rain or snow melt events.

In general, all of the east bench communities in Cache Valley are experiencing increasing development pressures along the benches and higher-elevation slopes. This, of course, is where



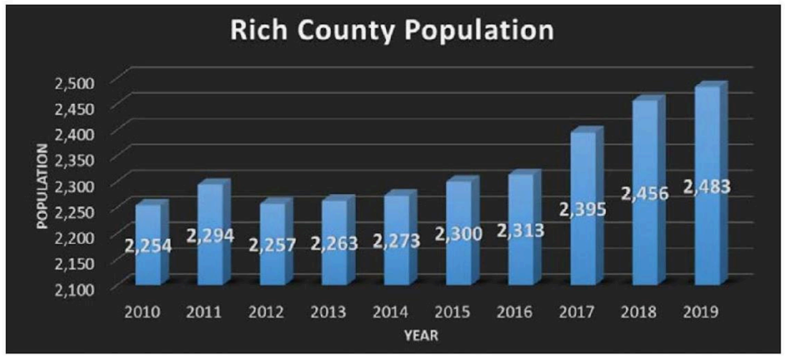
Population data citation: Annual Estimates of the Resident Population for Counties in Utah: April 1, 2010 to July 1, 2019 (CO-EST2019-ANNRES-49) high risk exists from landslides, geologic faults, and wildfire. Likewise, if development occurs in drainage areas near the canyons, there is an increased risk for flooding and debris flows, the latter being triggered by high rain events after a wildfire has occurred, stripping the landscape of structural vegetation.

As these, and other, communities build out, there will also likely be pressure build along river corridors, including the Logan, Blacksmith, Little Bear, Bear, and Cub Rivers. Steep banks along the river banks and in the greater river basin areas can be hot spots for landslides, which have occurred on a fairly regular basis in Cache Valley.

Small communities in particular should be very careful with how they build out in the future. Historic grid pattern developments as they were laid out by pioneers in the late 19th Century, largely avoided some of the more severe hazard areas. As communities grow, it is essential that they use the best data available to inform local land use ordinances, in order to avoid potential losses to their community.

Rich County

Between 2010 and 2019, Rich County's population increased from 2,254 residents to roughly 2,483. This is equates to between roughly 1% and 2.5% growth per year. However, Rich County population figures are sometimes misleading. During the summer months, populations swell from 2,400 year-round residents, to between 30,000 to 60,000 on any given weekend, due to high visitation at Bear Lake (includes both Idaho and Utah visitation numbers).



Population data citation: Annual Estimates of the Resident Population for Counties in Utah: April 1, 2010 to July 1, 2019 (CO-EST2019-ANNRES-49)

Probably the greatest challenge in Rich County related to development in natural hazard areas, are the homes being constructed both on the beach front, and on steeper hillsides near U.S. Forest Service boundaries. Flooding is an obvious issue along the lake shore, especially during extreme weather events and in years with higher rainfall or extraordinary snow melt events in general. Likewise, if an earthquake occurs along either the west or east faults, especially the east fault located under the lake bed, a seiche (a small tsunami) is a likely risk.

Garden City, Laketown, and the unincorporated county near the lake have the highest development pressures in the county. Any properties with either access to, or views of, the lake are, generally, considered highly desirable. West of Garden City, along most of the hillsides parallel to the lake shore, homes are being constructed at an alarming rate. Many of these homes are at risk from either wildfires or landslides. North of Laketown and on the east side of Garden City near the lake shore, properties are selling quickly and for disproportionately higher values than other local nearby properties. These homes may also be at risk from flooding, liquefaction during an earthquake, or a seiche.

While Randolph and Woodruff are not growing at the same rate as the lakeside communities, there is some growth occurring. Both communities have higher than normal risks for flooding. Much of this is likely due to their proximity to the Bear River drainage, where high water tables or certain soils may be conducive to wet conditions.

Community Sections

Specific community risk assessments are available to view and download via the interactive online plan located at: **https://brag.maps.arcgis.com/apps/MapSeries/index.html?appid=fc507e02862e42cbbf627437c1658549.**

These individual community risk assessments provide a much more detailed assessment of current risks from each natural hazard in the region (at least those with GIS data). Technical analyses were conducted to provide comprehensive lists of potential losses for each city, town, and county, and potential loss tables were created. Likewise, mitigation strategies were vetted through local working groups and local elected and appointed officials and staff, and are also available for viewing online or for download.

This plan can be combined with these community-specific documents to create a complete plan for cities, towns, and counties which they can then adopt in local public meetings, or reference as a printed hard-copy of the plan. Communities can also adopt the online plan in its entirety.

***FOR DETAILED RISK ASSESSMENTS, POTENTIAL LOSS TABLES, AND MITIGATION STRATEGY LISTS, VIEW OR DOWNLOAD COMMUNITY-SPECIFIC SECTIONS ON THE PLAN WEBSITE AT: https://brag.maps.arcgis.com/apps/MapSeries/index.html?appid=fc507e02862e42cbbf627437c1658549 -**

Photo: Waterford, NY landslide in May of 2020 (https://www.timesunion.com/news/article/Waterford-landslide-still-moving-15254487.php).

Implementation Resources

While learning about natural hazards and potential risks to local communities is the first step to reducing losses from natural hazard events, implementing mitigation strategies is the key to actually saving lives, property, critical facilities, and other community assets. Below are several key resources to help you get started with implementing mitigation strategies in your community.

Local land use ordinances

According to the *2019 Mitigation* special hazard-specific study.

These local ordinances can reduce liability for local governments dramatically, and can help protect the health, welfare, and safety of local residents.

See the graphic on the next page for a list of Benefit/Cost Ratios (BCRs) for various types of mitigation strategies.

The State of Utah has several effective model ordinances that can serve as great starting points for local governments:

Contact Steve Bowman with UGS at 801-537-3304 or stevebowman@utah.gov. Contact Kathy Holder with Utah DEM at 801-538-3332 or kcholder@utah.gov.

Grants/loans

- FEMA BRIC Grants (Formerly "Pre-Disaster Mitigation") 75% funded (25% local match). Apply through the State Division of Emergency Management. All projects must be included in this pre-disaster mitigation plan in order to apply. Visit the BRIC website for more information.

BCRs for Mitigation Strategies Studied

(from Highest to Lowest)

- Adopting Model Codes Saves $11 per $1 Spent
- Federal Mitigation Grants Save $6 per $1 Spent
- Private-Sector Building Retrofit Saves $4 per $1 Spent
- Exceeding Codes Saves $4 per $1 Spent
- Mitigating Infrastructure Saves $4 per $1 Spent

Source: National Institute of Building Sciences, 2019 Mitigation Saves Report

Planning grants: 50% funded (50% cash match). Infrastructure or large capital project grants (match

includes resources, guides, best practices, case studies, and other helpful information. To access

Richmond City community risk assesment

Community Risk Assessment

2020 Pre-Disaster Mitigation Plan Update - Bear River Region

RICHMOND CITY

SUMMARY

Analysis of natural hazards in the community of Richmond City revealed that the greatest potential risks come from ***problem soils, steep slopes, landslide, faults, flood, and wildfire***. These hazards have varied potential to impact life, property, infrastructure, and other amenities within jurisdictional boundaries. Currently, *flood, landslide, and problem soils* have the greatest potential to impact the community based on potential loss values (see potential loss table on the following page). Other natural hazard types not mentioned here were found to have no potential impacts to Richmond, or there was no GIS data available to analyze the hazard. See the following potential loss table, hazard maps and accompanying text for more detailed descriptions of potential risks associated with each natural hazard. For hazards that have multiple datasets, only one collective risk assessment narrative has been provided.

RICHMOND CITY - POTENTIAL LOSSES PER NATURAL HAZARD

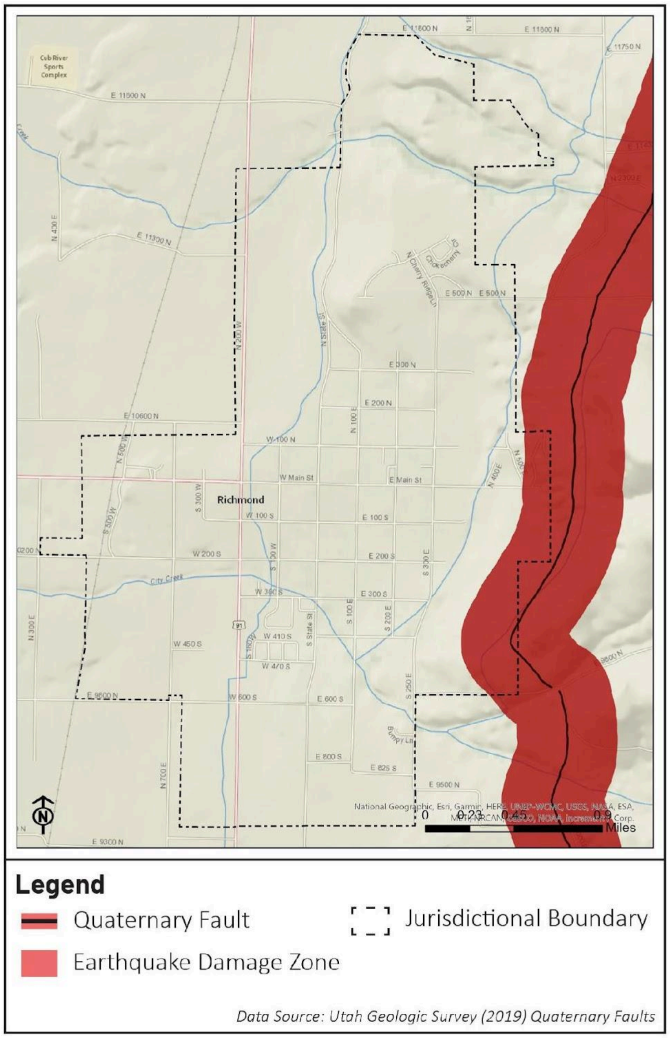
CATEGORY	TYPE	UNITS	NATURAL HAZARD									
			WILDFIRE (FFSL)	WILDFIRE (USFS)	FLOOD (FEMA)	FLOOD (VALLEY BOTTOM)	FLOOD (SOILS)	FAULTS	LANDSLIDE	STEEP SLOPES	PROBLEM SOILS (NO BSMT)	PROBLEM SOILS (BSMT)
AGRICULTURAL RESOURCES	Farmland	Acres	18.2	3.1	81.8	0.04	51.4	14.1	32.6	2.3	1,489.4	566.7
	Grazing Allotments	Acres										
HOMES	Home	Number/ Value	9 @ $3.2M		40 @ $22.9M		16 @ $5.2M	5 @ $1.6M	24 @ $7.8M	3 @ $1.2M	859 @ $243.7M	178 @ $51.6M
COMMUNITY RESOURCES	Cemetery	Number									1	
	Commercial Business	Number/ Value									25 @ $7.1M	4 @ $1.8M
	Library	Number									1	
	Place of Worship	Number									2	
	University/College	Number										
	School	Number									3	1
GOVERNMENT FACILITIES	Correctional Facility	Number										
	Military Facility	Number										
	Post Office	Number									1	
	Town Hall	Number									1	
RECREATION AMENITIES	Campground/Recreation Facility	Number										
	Golf Course	Number										
	Public Areas	Number									1	
	Historic Site	Number									17	1
	Museum	Number										
	State Park	Number										
	Park	Number									1	
	Trail	Miles	0.1								1.2	0.1
EMERGENCY SERVICES	Emergency Medical Service	Number									1	
	Emergency Operations Center/PSAP	Number										
	Fire Station	Number									1	
	Hospital/Health Care Facility	Number										
	National System Shelter Facility	Number										
	Law Enforcement Station	Number										
ENERGY INFRASTRUCTURE	Substation/Regulator	Number									1	1
	Natural Gas Pipeline	Miles			0.2		0.2				2.2	1.1
	Crude Oil Pipeline	Miles										
	Oil and Gas Well	Number										
	Petroleum Pipeline	Miles										
	Hydrogen Sulfide Pipeline	Miles										
	Power Generation Facility	Number										
	Transmission Line	Miles						0.3	0.3	0.1	0.5	0.5
NATURAL INFRASTRUCTURE	Lake/Pond	Acres										
	Reservoir	Acres										
	Playa	Acres										
	Riparian Area	Acres	5.0	2.4	21.1		13.0		7.2	6.9	37.7	37.4
	Spring/Seep	Number									1	1
	Stream/River	Miles	0.02	0.1	2.5		0.4		0.1		2.0	1.4
	Wetland	Acres	0.2		6.5		3.3		0.3	0.1	9.1	7.9
OTHER INFRASTRUCTURE	Communication Towers	Number							1		6	2
	Microwave Service Towers	Number							1		4	2
	Gas Station	Number									1	
	Sewer Pipeline	Miles/Value	0.1		0.7		0.2		0.5	0.04	17.1	4.9
	Wastewater Facility	Number										
	Contaminated Land	Acres										
	Hazmat Material Storage	Number										
	Mines	Number	1						1		1	1
	Broadband Anchors	Number									10	1
	Solid Waste Facility	Number										
TRANSPORTATION INFRASTRUCTURE	Airport/Heliport	Number										
	Bridge/Culvert/Underpass	Number/ Value			1						1	1
	Railroad	Miles/Value			0.1						0.4	0.8
	Emergency Outlet Roads	Miles			0.2		0.2				1.8	0.9
	Road	Miles/Value	0.2		1.0		1.0	0.5	0.8	0.2	23.6	7.5
ATER INFRASTRUCTURE	Canal	Miles										
	Culinary Water Pipeline	Miles/Value	0.2		1.0		0.9	0.4	0.7	0.1	25.2	7.2
	Culinary Water Source	Number									2	1
	Water Tank	Number						1	1	1	2	2
	Dam	Number										
	Groundwater Recharge	Acres	71.0	7.9	64.2		134.3	93.1	173.3	25.6	1,398.8	649.6
	Groundwater Protection and	Acres	5.8		65.4		44.3		7.0	0.1	426.5	221.1

Earthquake/Faults

Hazard Description: Any sudden shaking of the ground caused by seismic waves through the Earth's rocks constitutes an earthquake. Seismic waves are produced when some form of energy stored in Earth's crust is suddenly released, usually when masses of rock straining against one another suddenly fracture and "slip." Earthquakes occur most often along geologic faults, narrow zones where rock masses move in relation to one another. The major fault lines of the world are located at the fringes of the huge tectonic plates that make up Earth's crust.

Certain saturated soft soil can take on the characteristics of a fluid when shaken by an earthquake, resulting in a state called liquefaction. Amplified shaking also results in areas of "soft soils" which includes fill, loose sand, waterfront, and lake bed clays.

Map Description: This map displays the earthquake damage zone (1,500 foot buffer on either side of the quaternary fault) as recommended by the Utah Geological Survey. For more information visit: *https://geology.utah.gov/apps/qfaults/index.html*



RISK:

Faults exist east of town along the steeper benches and hillsides. Potential losses consist of 5 homes, 0.3 miles of transmission lines, 0.5 miles of roads, 0.4 miles of culinary water lines, 1 water tank, and other natural and agricultural lands.

Flood - FEMA

Hazard Description: A flood is an overflow of water from rivers, groundwater, or rainfall that submerges areas that are usually dry. The most common cause of flooding is due to rain or snowmelt that accumulates faster than soils can absorb it or rivers can carry it away. Flooding can also result from the failure of a water control structure, such as a levee or dam (see also Dam Failure).

A 1% Annual Chance Flood, or 100-year flood, is a flood that has a 1 percent chance or greater of occurring in any given year. Experiencing a 100-year flood does not decrease the chance of a second 100-year flood occurring that same year or any year that follows. A 100- year flood today, independent of future sea level rise and other climate change effects, has a 26 percent chance of occurring over the life of a 30-year mortgage. Similarly, a 100-year flood today has a 45 percent chance of occurring over the 60-year life of a power substation.

Map Description: This map displays the FEMA identified 100 year floodplain. For more information visit: *https://msc.fema.gov/portal/home*

RISK:

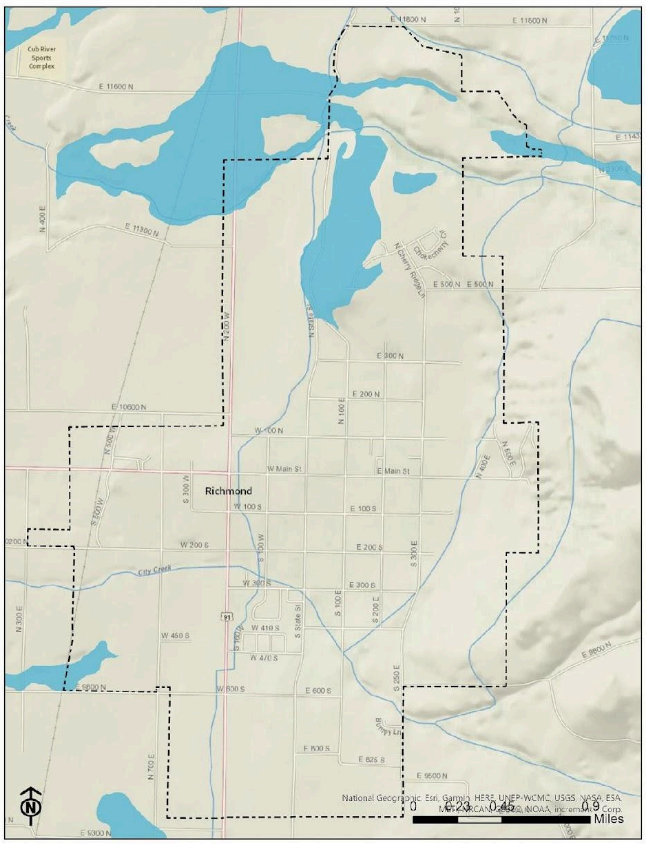
Flooding is probably the most substantial risk to hazards in this analysis for Richmond City, and consist mostly of floodways along city and cherry creeks, as well as saturated soils northwest of town. Around 40 homes are at risk, along with 1 bridge/culvert, 1 mile of roads, and many acres of natural and agricultural lands.

Flood - Soil

Hazard Description: A flood is an overflow of water from rivers, groundwater, or rainfall that submerges areas that are usually dry. The most common cause of flooding is due to rain or snowmelt that accumulates faster than soils can absorb it or rivers can carry it away. Flooding can also result from the failure of a water control structure, such as a levee or dam (see also Dam Failure).

A 1% Annual Chance Flood, or 100-year flood, is a flood that has a 1 percent chance or greater of occurring in any given year. Experiencing a 100-year flood does not decrease the chance of a second 100-year flood occurring that same year or any year that follows. A 100- year flood today, independent of future sea level rise and other climate change effects, has a 26 percent chance of occurring over the life of a 30-year mortgage. Similarly, a 100-year flood today has a 45 percent chance of occurring over the 60-year life of a power substation.

Map Description: This map displays the 100 year floodplain based on NRCS soil survey data (https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/survey/) and was identified based on research by Sangway and Merwade (*https://onlinelibrary.wiley.com/doi/abs/10.1111/1752-1688.12306*).



Legend

Floodplain

Jurisdictional Boundary

Data Source: FEMA

Flood - Valley Bottom

Hazard Description: A flood is an overflow of water from rivers, groundwater, or rainfall that submerges areas that are usually dry. The most common cause of flooding is due to rain or snowmelt that accumulates faster than soils can absorb it or rivers can carry it away. Flooding can also result from the failure of a water control structure, such as a levee or dam (see also Dam Failure).

A 1% Annual Chance Flood, or 100-year flood, is a flood that has a 1 percent chance or greater of occurring in any given year. Experiencing a 100-year flood does not decrease the chance of a second 100-year flood occurring that same year or any year that follows. A 100- year flood today, independent of future sea level rise and other climate change effects, has a 26 percent chance of occurring over the life of a 30-year mortgage. Similarly, a 100-year flood today has a 45 percent chance of occurring over the 60-year life of a power substation.

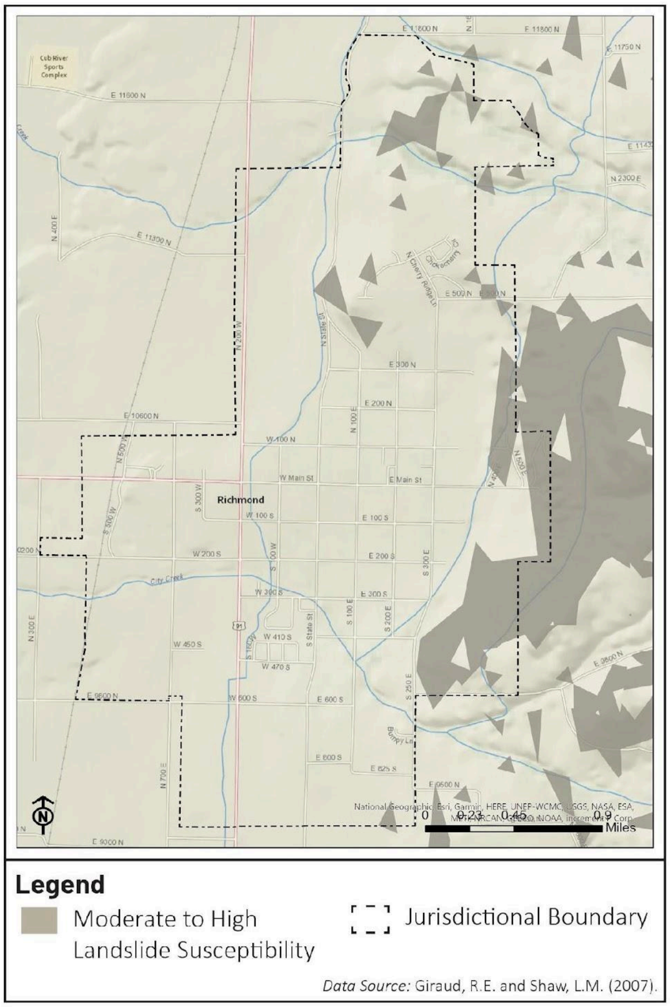
Map Description: The valley bottom map displays the potential flood plaing based on stream networks and elevation data (*https://databasin.org/datasets/95a24aeef6a24996bf8082090fdbd831*).

Landslide

Hazard Description: A landslide is the movement of a mass of rock, debris, or earth down a slope by force of gravity. They flow rapidly, striking at avalanche speeds that can travel several miles, growing in size as they pick up trees, boulders, cars and other materials.

Landslides occur when the slope or soil stability changes from stable to unstable, which may be caused by earthquakes, storms, volcanic eruptions, erosion, fire, or additional human-induced activities. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high. However, landslides can occur with very little slope, sometimes classified as earth slumping or earth flow.

Hazard Description: This map displays moderate to high landslide susceptibility based on research completed by Utah Geological Survey geologists. For more information visit: *https://ugspub.nr.utah.gov/publications/maps/m-228/m-228.pdf*



RISK:

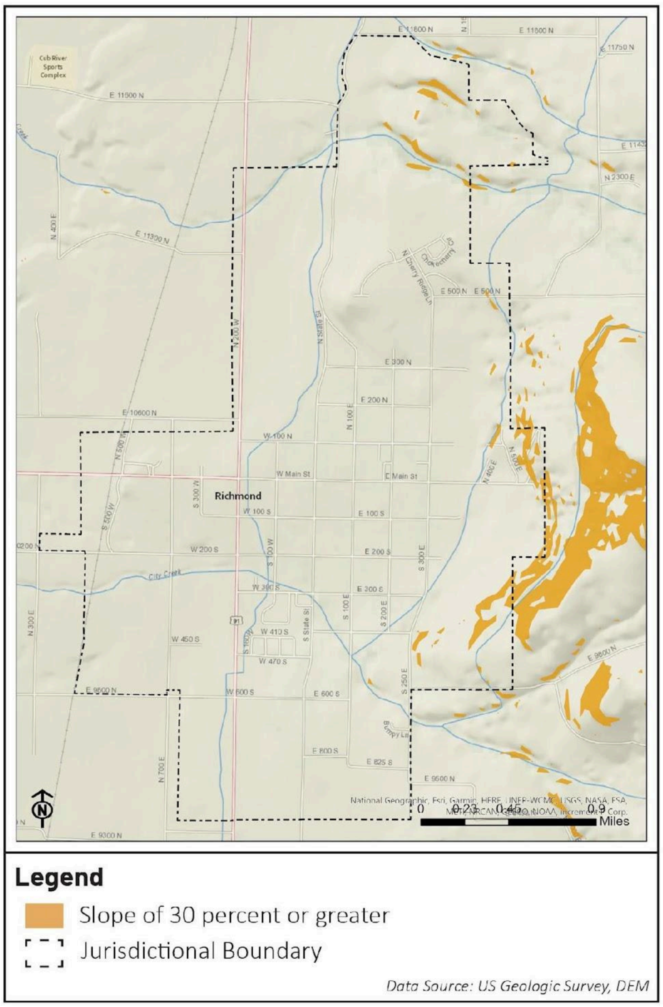
Landslide areas create a substantial risk for Richmond City and its residents. Around 24 homes are at risk, along with 0.3 miles of transmission lines, 1 communication tower, 0.5 miles of sewer main lines, 0.8 miles of roads, 0.7 miles of culinary water pipelines, 1 water tank, and some natural and agricultural lands.

Steep Slope

Hazard Description: A landslide is the movement of a mass of rock, debris, or earth down a slope by force of gravity. They flow rapidly, striking at avalanche speeds that can travel several miles, growing in size as they pick up trees, boulders, cars and other materials.

Landslides occur when the slope or soil stability changes from stable to unstable, which may be caused by earthquakes, storms, volcanic eruptions, erosion, fire, or additional human-induced activities. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high. However, landslides can occur with very little slope, sometimes classified as earth slumping or earth flow.

Hazard Description: This map displays areas of steep slopes (30 percent slope or greater) and was developed using the U.S. Geologic Survey National Elevation Dataset. For more information visit: *https://www.usgs.gov/core-science-systems/national-geospatial-program/national-map*



RISK:

Steep slopes exist along the east hillsides above town. Potential losses include 3 homes, 0.1 miles of transmission lines, 0.2 miles of roads, 0.1 miles of culinary water main lines, and 1 water tank.

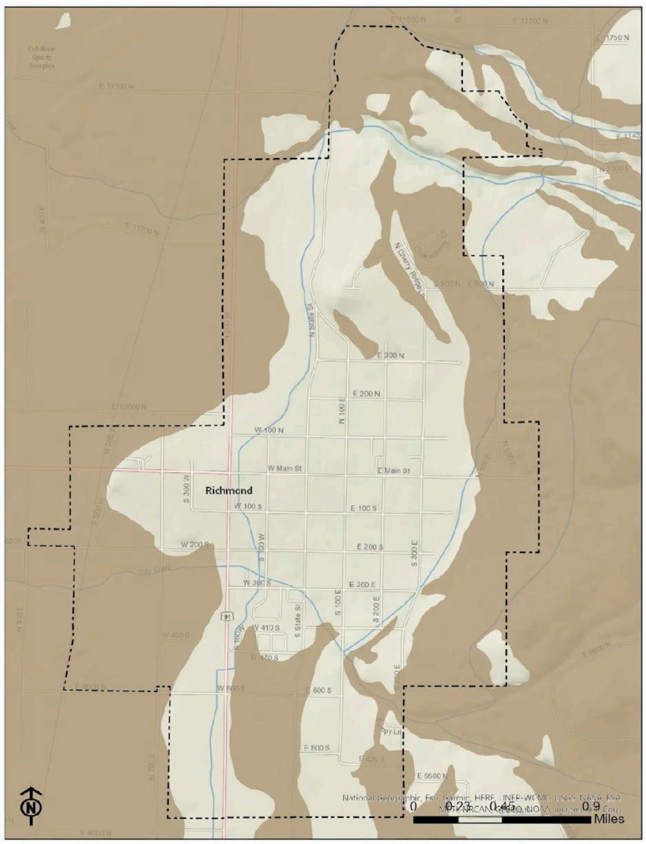
Problem Soils (with basements)

Hazard Description: Problem soils are a group of hazards related to the specific properties of soils, and can include:

- Collapsible soil: Soils that have considerable strength when in a day, natural state, but significantly settle due to hydrocompaction (reduction of air space within the soil) when wetted;
- Expansive soil: Soil with high clay content that swells when wet and shrinks when dried; and
- Subsidence : Sinking of the ground caused by groundwater depletion and/or underground mine subsidence or collapse

Problem soils can cause extensive damage to structures and foundations, and may also damage pavements after construction. They have caused an undetermined, but very significant amount of infrastructure damage and resulting economic impact.

Map Description: This map displays soils not suitable for dwellings with basements based on soil parameters (see reference section USDA SSURGO 1. Soils Not Suitable for Dwellings with Basements for more information).



Legend

Soils Not Suitable for Dwellings with Basements

Jurisdictional Boundary

Data Source: SSURGO Database, National Resources Conservation Service (NRCS)

RISK:

Most of Richmond City is covered by soils that could prove problematic to buildings and some infrastructure. However, very little damage has been seen to structures and infrastructure built on problematic soils in the Bear River Region in recent years, especially those that are in compliance with national and international building codes. The vast majority of the local governments in the State of Utah are utilizing one of these codes, which mitigates most impacts from these soils. It should be noted, however, that if structures or infrastructure are built on problematic soils that are also on steep slopes, previous landslides, saturated soils, or on other questionable areas, extensive damage may result.

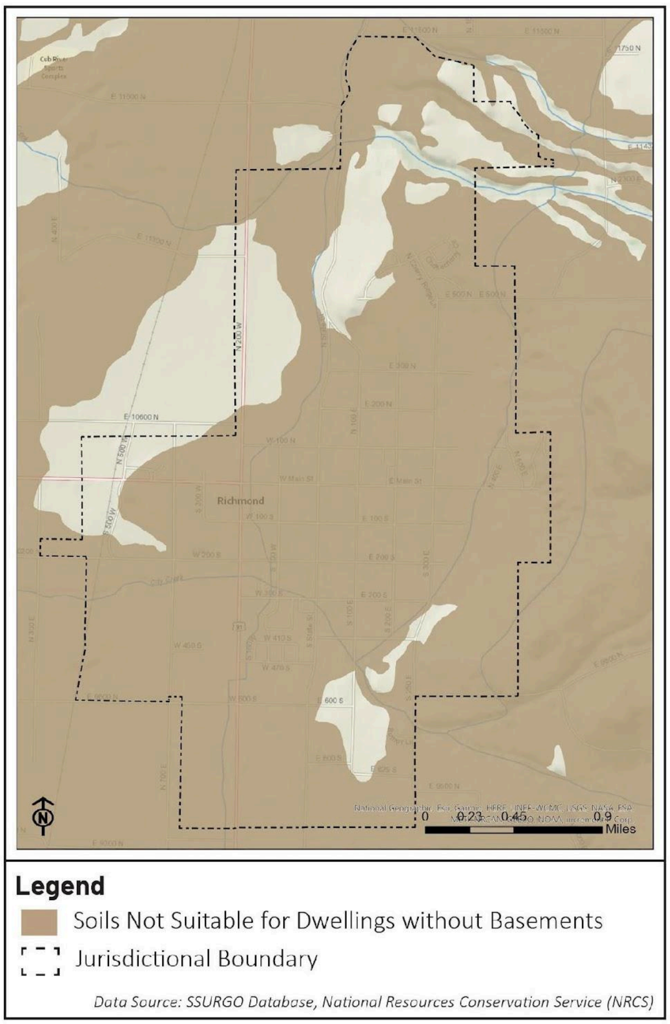
Problem Soils (without basements)

Hazard Description: Problem soils are a group of hazards related to the specific properties of soils, and can include:

- Collapsible soil: Soils that have considerable strength when in a day, natural state, but significantly settle due to hydrocompaction (reduction of air space within the soil) when wetted;
- Expansive soil: Soil with high clay content that swells when wet and shrinks when dried; and
- Subsidence : Sinking of the ground caused by groundwater depletion and/or underground mine subsidence or collapse

Problem soils can cause extensive damage to structures and foundations, and may also damage pavements after construction. They have caused an undetermined, but very significant amount of infrastructure damage and resulting economic impact.

Map Description: This map displays soils not suitable for dwellings without basements based on soil parameters (see reference section USDA SSURGO 2. Soils Not Suitable for Dwellings without Basements for more information).

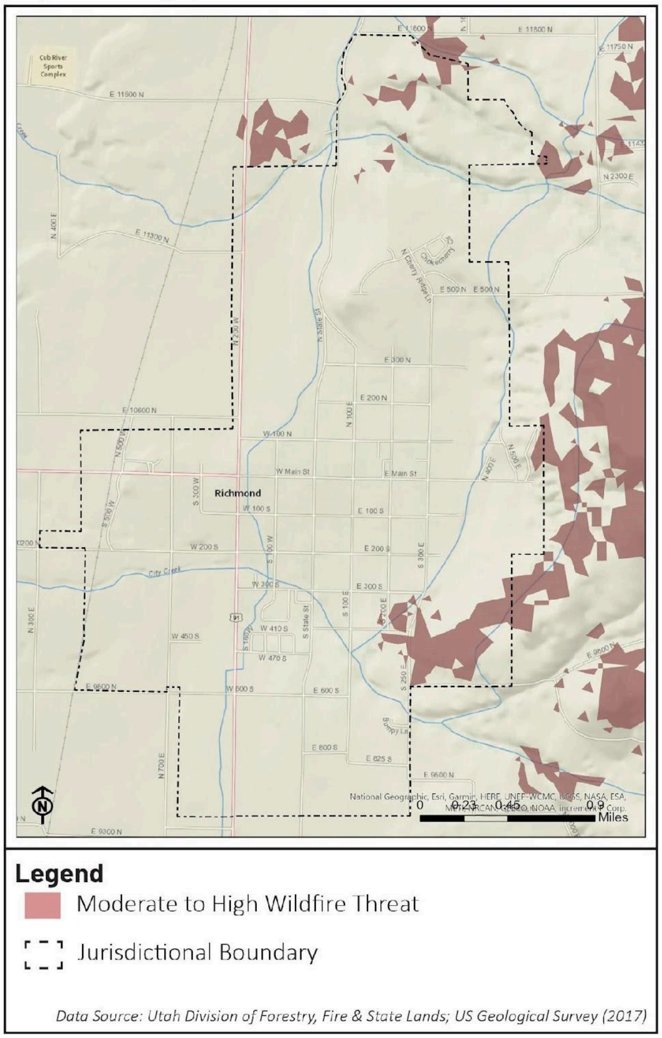


Wildfire - Utah FFSL

Hazard Description: A wildfire is any outdoor fire that is not controlled, supervised, or arranged. Wildfire probability depends on fuel, weather and topography. Wildfires can occur in the wildland or the wildland urban interface. A wildland is an area where development is almost nonexistent, except for roads, railroads, or power lines. Wildland urban interface is an area where structures and other human development meet or intermingle with wildland or vegetation fuels.

Fuels are anything that will burn and include vegetation and structures. The weather, such as high temperatures, low humidity and high winds increase the likelihood that a wildfire will spread. Topography affects speed at which a wildfire will spread. A fire will move more quickly uphill which causes hot gases to rise in front of it. These gases in turn, pre-heat and dry vegetation ahead of the wildfire causing it to catch fire more rapidly.

Hazard Description: This map displays areas of moderate to high wildfire threat developed by the Utah Division of Forestry, Fire and State Lands and historical wildfire occurrences from 1980-2016. For more information visit: *https://wildfirerisk.utah.gov/*



RISK:

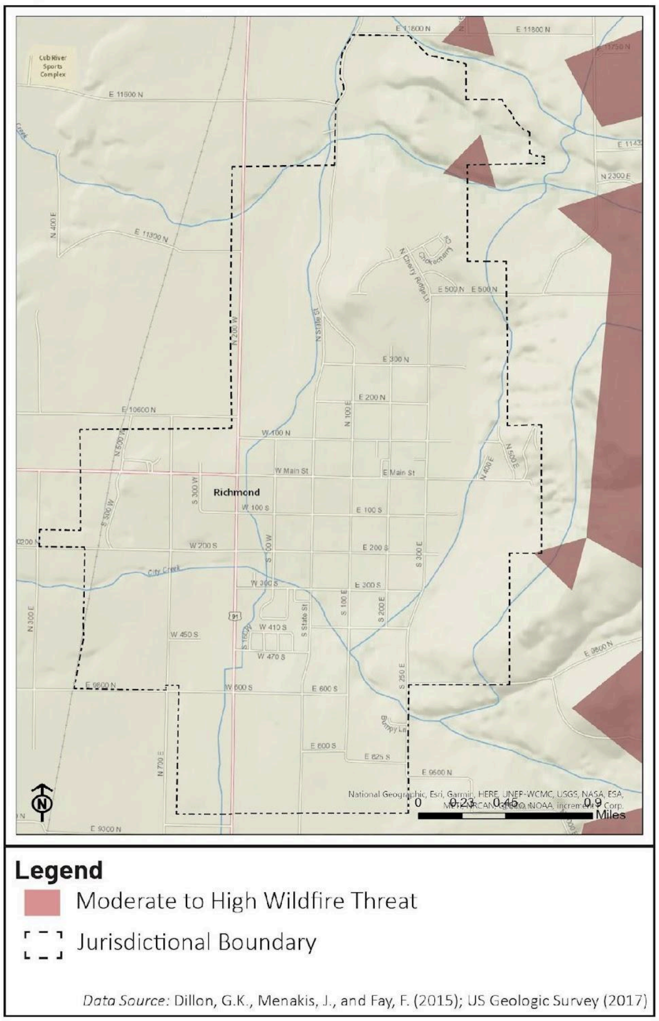
The steep, vegetated hills east of Richmond create the most substantial wildfire risk. 9 homes, 0.2 miles of roads, 71 acres of source water protection areas, and 18.2 acres of local farmland could be impacted.

Wildfire – US Forest Service

Hazard Description: A wildfire is any outdoor fire that is not controlled, supervised, or arranged. Wildfire probability depends on fuel, weather and topography. Wildfires can occur in the wildland or the wildland urban interface. A wildland is an area where development is almost nonexistent, except for roads, railroads, or power lines. Wildland urban interface is an area where structures and other human development meet or intermingle with wildland or vegetation fuels.

Fuels are anything that will burn and include vegetation and structures. The weather, such as high temperatures, low humidity and high winds increase the likelihood that a wildfire will spread. Topography affects speed at which a wildfire will spread. A fire will move more quickly uphill which causes hot gases to rise in front of it. These gases in turn, pre-heat and dry vegetation ahead of the wildfire causing it to catch fire more rapidly.

Hazard Description: This map displays areas of moderate to high wildfire hazard potential developed by the U.S. Forest Service and historical wildfire occurrences from 1980-2016. For more information visit: *https://www.firelab.org/project/wildfire-hazard-potential*



RICHMOND STAKE EMERGENCY PLAN

EMERGENCY
PREPAREDNESS
TIPS

Richmond City Office: 258-2092 Lewiston
City Office: 258-2141

EMERGENCY NUMBERS

Fire, Police and Medical Emergencies: 9-1-1
Poison Control Center: 1-800-456-7707

Doctor's Phone Number______________

Ward FRS Channel______________

COMMUNICATION ASSESSMENT FOR ALL EMERGENCIES

Every home should have a door hanger stored with their emergency preparedness materials. These hangers are red on one side that says "NEED HELP", and green on the other side that says "OUT SAFELY". In the event of an emergency, immediately hang the door hanger on the doorknob of your front entrance. If help is needed, put the red side out. If you have evacuated or don't need any help, put the green side out. This will greatly speed up response times by both civil and church responders. If you do evacuate, please fill out the contact information on the green side of the hanger, if possible.

NOTE: If you do not have a hanger, contact your ward emergency preparedness specialist.

COMMUNICATIONS METHODS

Telephones are the best form of communication, as long as phone lines and cell towers are operating. If they fail, Licensed Amateur Radio oper- ators are prepared to transmit and receive emergency communications. Station operators could be available at their homes, schools, or emergency operation centers, such as the firehouse. Some operators also have mobile capabilities

Texting will sometimes work if cell towers are overloaded with calls.

Email, Face Time, Skype, and ZOOM can also work, as long as there is an internet or data connection that is functional.

FAMILY EMERGENCY PROCEDURE

In case of an emergency and the family is separated, the family should have a plan that will reunite the various family members. Location sites should be selected adjacent to the family home, at a neighbors, in the neighborhood, and in the community to allow for various levels of emergencies. List these locations for your family emergency plan below:

Home Area: _________ Neighbor: _____ Neighborhood: _______ Community: __

MEDICAL AND FIRST AID SUPPLIES

A well-supplied First Aid Kit must be tailored to the individual needs of your family. Existing health problems in the family, for example, heart disorders, diabetes, serious allergies, asthma, or ulcer, may make it necessary to include specific medicines in your First Aid Kit. It is also necessary to consider the ages of family mernbers:

Elderly members of the family may have special needs.

Infants or small children within the family may need items such as baby oil, etc.

Should a member of the family be pregnant, you must provide your First Aid Kit with supplies for emergency childbirth and the after-care of the mother and infant.

In addition to special items dictated by your specific family needs and ages, the following is a basic list of medical and first aid supplies recommended for all. You are urged to discuss this basic list, as well as your special needs, with your physician so that he or she may advise you of specific medications to purchase, provide you with any needed prescriptions, inform you regarding how to use the medicines, how to store them and storage life of each medication so that they may be stored and rotated without significant deterioration, and counsel you regarding quantities you will need.

AT LEAST ONE ADULT MEMBER OF EVERY FAMILY SHOULD BECOME FAMILIAR WITH THE FOUR MAIN FIRST AID FUNCTIONS:

AIRWAY - BREATHING - CIRCULATION – SHOCK

ALL ARE LIFE THREATENING AND SHOULD BE ACTED ON QUICKLY IN AN EMERGENCY

LIST OF BASIC SUPPLIES

Antiseptic Solution - Iodine compounds such as Chlorhexidine. (Ask your druggist for these.)

NOTE: Do not use mercurochrome or merthiolate.

Neosporin
Antiseptic Soap
Normal Saline Solution - One teaspoon table salt to 1 pint water
Water Purification - for each gallon of water, use 4 purification tablets, or 12 drops of Tincture of Iodine, or 8 drops of liquid chlorine bleach. If water is cloudy, double these amounts.
Rubbing Alcohol - 70% Aspirin
Tablets
Acetaminophen Tablets (Tylenol)
Nausea Medication - such as Emetrol Petroleum Jelly
Diarrhea medication
Thermometer
Tweezers Scissors
Safety Pins - assorted sizes
Measuring Spoon
Matches - in waterproof case
Paper Drinking Cups - for administering liquids
Heavy String
Small Splints - Popsicle sticks, tongue depressors, etc.
Band-Aids - assorted sizes
Cotton - sterile, absorbent Gauze
Rolls - 2 in, 3 in, and 4 in Dressings
- 4 x 4 in., sterile Tape Roll - 2 in.
wide
(Micropore tape, paper tape, or adhesive tape) 3
Triangular bandages (slings) - 40 in.
Sanitary Napkins can be used for dressings or for splint padding
Insect Repellent
Caladryl
Syrup of Ipecac
Individual Medical Needs

CARE AND MAINTENANCE OF SUPPLIES

Medicines in your emergency supplies should be carefully labeled with the name of the medicine, directions for use, and necessary warnings (i.e., POISON, "External Use Only;' etc.). These labels should be clearly visible. All stored medicines should be placed out of reach of children, packed so as to prevent breakage, and stored in a cool, dry place. Best storage temperature should be below 70°, but above freezing. Rotation of medical and emergency supplies is strongly urged to prevent waste due to deterioration and to eliminate the danger of using out-dated

EARTHQUAKES

Before An Earthquake

1. Have water and food supply.
2. Organize a 72-hour portable emergency kit.
3. Bolt down or provide strong support for water heaters and other appliances.
4. Consider earthquake insurance.

During An Earthquake

1. STAY CALM
2. If you are indoors, stay inside and find protection in a doorway, or crouch under a desk or table, away from windows or glass dividers; avoid masonry wall (brick) and chimneys (fireplaces).
3. Outside: Stand away from buildings, trees, telephone and electric lines.
4. On the Road: Drive away from underpasses/overpasses; stop in a safe area; stay in the vehicle.
5. In an office building: Stay next to a pillar or support column or under a heavy table or desk.

After An Earthquake

1. Check for injuries. Provide first aid.
2. Check for safety - gas, water, sewage breaks; check for downed electric lines; turn off interrupted utilities as necessary; check for building damage and potential safety problems during aftershocks, such as cracks around chimney and foundation; check for fires.
3. Clean up dangerous spills.
4. Wear shoes.
5. Tune radio to an emergency station and listen for instructions from public safety agencies.
6. Use the telephone only for emergencies.
7. As soon as possible, notify your family that you are okay.
8. Do not use matches or open flames in the home until you are sure there are no gas leaks.
9. Don't turn light switches off and on. Sparks created by the switch contacts can ignite gas fumes.
10. In public buildings, follow evacuation procedure immediately and return only after the building has been declared safe by the appropriate authorities.
11. Report damages or needs to your Neighborhood Coordinator

Things You Need To Know

1. How, where and when to turn off electricity, gas and water.
2. First aid.
3. Plan for reuniting your family.
4. Plan and practice a family drill at least once a year.

POWER OUTAGE

Before the power outage:

1. Learn location of fuse box or circuit breaker.
2. Store candles, flashlights and extra batteries in a handy place.
3. Have food and water supplies on hand, since the outage may last awhile.
4. Know the location of all camping equipment (stove, lantern, sleeping bags). You may need them. Make sure the equipment is operational and that you know how to use them. REMEMBER THAT CAMPING EQUIPMENT REQUIRING GASOLINE, ROPANE, WHITEGAS, COLEMAN FUEL OR CHARCOAL BRIQUETS SHOULD NOT BE USED INSIDE THE HOUSE -ONLY OUTSIDE.
5. Keep adequate supply of fuel on hand. Propane, white gas, gasoline and Coleman fuel must not be stored or used in the house or garage, as they are too volatile. Only kerosene may be used in the house and stored in direct sunlight and is limited in quantity to one 55-gallon drum on a person's property.
6. Keep your refrigerator well defrosted. Built-up ice works against your freezer.

During the Power Outage

1. Unplug all your appliances. The surge of power that comes when power is restored could ruin your appliances.
2. Turn off all but one light switch.
3. A major problem during an outage is food thawing in the refrigerator or freezer. Open door only to take food out, and do so as quickly as possible. If you have access to dry ice, place it in a cardboard box and then on top of food.
4. When using camping equipment during an outage, remember to do so outside. Use only a fireplace, a properly installed wood store, or a new style kerosene heater used in a safe area with the room vented. i.e., fresh outside air coming into the room.
5. Report any downed lines.
6. Do not allow children to carry lanterns, candles or fuel.

After the outage:

1. When power is restored, plug in appliances one by one, waiting a few minutes inbetween each one. This may prevent an overload on the system.
2. Be patient. Energy may first be restored to police and fire departments and hospitals.
3. Examine your frozen food. If it still contains ice crystal, it may be refrozen. If meat is off color or has an odd odor, throw it away.

EMERGENCY CONTROL OF NATURAL GAS

1. Check house piping and appliances for damage.
2. Check for fires or fire hazards.
3. Do not use matches, lighters or other open flames.
4. Do not operate electrical switches, appliances or battery-operated devices if natural gas leaks are suspected. This could create sparks that could ignite gas from broken lines.
5. If gas line breakage is suspected, shut off the gas at the meter. This should be done, however, only if there is a strong smell of natural gas or if you hear gas escaping.
6. Wear heavy shoes in all areas near broken glass or debris. Keep your head and face protected from falling debris.
7. Turn on a battery-operated radio (if no gas leaks are found) or car radio to receive disaster instructions. Do not use your telephone except in extreme emergency situations.

EMERGENCY PROCEDURES FOR HOME ELECTRICAL CIRCUITS

1. Familiarize yourself and family with the location of the electrical breaker panel.
2. Turn off breakers for areas of concern.
3. Main breaker rnay be shut off if in doubt.
4. In cases of basement flooding:
    a) A shock hazard may exist even in an inch of water if an extension cord connection is on the floor.
    b) Think before stepping in any water.
    c) If the electrical panel is upstairs, shut off all circuits.
    d) If the electrical panel is in the basement, determine whether it can be reached on dry ground. If not refer to the next step.
5. Check your house electrical meter. If it is on your home there may be a main disconnect switch (breaker) next to it. If the meter is on an underground service, it may be in front of your home; but there should be a main breaker where the line enters the home. Shut it off!

CHEMICAL EMERGENCY

How To Do **In-Place Sheltering** during a Chemical Emergency (From Cache County Local Emergency Planning Committee)

In-place sheltering simply means staying inside you home, business or other facility, or seeking shelter in the nearest available building. In-Place Sheltering keeps you inside a more protected area during an accidental release of toxic chemicals, or emergencies involving hazardous materials where air quality may be threatened.

When Should You In-Place Shelter?

Local authorities are responsible for issuing orders for In-Place Sheltering during chemical

or hazardous material emergencies. You may receive notice from Police, Fire and Emergency Management Officials, directly or through radio or television broadcasts. An emergency **vehicle going through your area with a Hi-Lo Siren sounding continuously means an** emergency situation may exist in your area. You should immediately tune to your local Emergency Alert System (EAS) for more information. The primary EAS station for Cache Valley is KVNU 610 AM. **Emergency information, including steps to be taken, will be broadcast continuously until the emergency is over.**

1. If possible, bring pets inside.
2. Close and lock all doors and windows to the outside.
3. Turn off all heating and air conditioning systems, and switch inlets or vents to the "closed" position.
4. Close all fireplace dampers.
5. Seal gaps around window-type air conditioners, fireplace dampers, doors, and windows with tape, plastic sheeting, wax paper, aluminum wrap, or other material.
6. Seal all bathroom exhaust fans or grills, range vents, dryer vents, and all other openings, as much as possible.
7. Close drapes and shades covering windows.
8. Stay away from windows and doors. Remain inside until you are informed by Police, Fire and Emergency Management Officials directly, or through radio broadcasts, that it is safe to leave.

If time does not permit you to seal the entire home, close exterior doors and windows and as

many internal doors as possible, then move to a room that can be easily sealed and seal that room.

In-Place Sheltering in your Workplace

In addition to the directions listed for your home, you should take the following steps:

1. Ensure that **all** ventilation systems are set to 100 percent re-circulation so that no outside air is drawn into the building.
2. If 100 percent re-circulation is not possible, ventilating systems should be turned off.
3. Minimize use of elevators as they tend to "pump" air **in** and out of a building while moving up and down.

Again, remain inside until you receive notice from Police, Fire and Emergency Management Officials directly, or through radio broadcasts, that it is safe to leave.

When In-Place Sheltering has been ordered because of an accidental release of toxic

chemicals, remember to DO the following:

1. Stay inside your place of business, home or in another enclosed building.
2. Stay tuned to the Emergency Alert System (EAS) on your radio or television for more information.
3.

Do NOT call 911 unless it is a life threatening emergency.

Do NOT go outside unless specifically instructed to evacuate.

Most chemical emergencies last for only a few hours. A 72-Hour Emergency PreparednessKit,

or at least the following items would be valuable for your home as well as your work place.

1. Flashlight
2. Battery-powered radio
3. Drinking water
4. Non-perishable, ready-to-eat foods for family and pets
5. Can opener
6. Hygiene products
7. Fire extinguisher
8. First aid kit
9. Adjustable wrench

10. Change of clothing
11. Sleeping bags
12. Money

FIRE

Preparation:

1. Make sure home is free of combustible materials.
2. Don't run wires under carpets or rugs.
3. Know avenues of escape. HAVE A FAMILY PLAN and have frequent fire drills.
4. HAVE A PLACE TO MEET - so no one tries to go back into a burning building looking for someone needlessly.
5. Have a fire extinguisher in the house and car.
6. Have escape ladders for all windows higher than eight feet off the ground (especially for children).

During

1. If you are outside, do not return for anything.
2. Go to the nearest house or building and call your fire department by dialing 911. REPORT THE ADDRESS AND TYPE OF FIRE. LISTEN TO AND FOLLOW INSTRUCTIONS.
3. If you are inside and have time, make sure everyone is out.
4. If anyone else is home, report to the meeting place, then see that the telephone call to the fire department is made.
5. If you are in a closed room or office, do not open the door without first feeling it or the door knob. If it is warm or hot, do not open it, but unlock it to assist rescue or fire personnel.
6. If there is smoke coming under the door, use clothes, sheets, etc. to stop the smoke from coming in.
7. If you are at home and there is a window stay close to the floor and exit through the window, using the escape ladder if necessary.
8. If you should catch on fire, do not run. Drop to the ground and start rolling over and over to smother the flames.
9. If you see someone on fire, use a coat or blanket, etc., not your bare hands to smother the flames.
10. Watch to see that children don't go back inside to rescue a pet or prized possession.
11. Turn off the gas and electricity, if possible, from the outside of the house.
12. In a public building, follow the established evacuation procedures.

After

1. Do not re-enter the building until appropriate authorities have given permission.
2. Plan and practice a family drill at least once a year.

FLOODING

Before the Flood

1. Know the elevation of your property in relation to flood plains, streams, and other waterways. Determine if your property may be flooded.
2. Make advance plans of what to do and where to go.
3. Store food, water and critical medical supplies (prescriptions, etc.).
4. Fill your car with gas in case you must evacuate.
5. Move furniture and essential items to higher elevation if time permits.
6. Have a portable radio and flashlights with extra batteries.
7. Open basement windows to equalize water pressure on foundations and walls.
8. Secure house and consider flood insurance.

Evacuation

1. Listen to local radio or TV for weather information.
2. If you are asked to evacuate, shut off main power switch, main gas valve and water valve.
3. Follow local evacuation plan and routes.
4. Do not attempt to drive over a flooded road, as it might be washed out. While you are on the road,
5. watch for possible flooding at bridges, dips and low areas.
6. Watch out for damaged roads, slides and fallen wires.
7. Drive slowly in water; use low gear.
8. If driving and vehicle stalls, abandon it immediately and seek higher ground.
9. Do not attempt to cross a stream on foot where water is above your knees.
10. Register at your designated evacuation center and remain at the evacuation center until
11. informed that you may leave.

After the Flood

1. Remain away from evacuated area until public health officials and building inspector have given approval.
2. Check for structural damage before entering.
3. Make sure electricity is off; watch for electrical wires.
4. Do not use an open flame as a light source because of possibility of escaping gas. Use flashlights. Beware of dangerous sparks.
5. Do not use food that has been contaminated by flood water. Test drinking water potability.

THUNDERSTORMS AND LIGHTNING

1. When a thunderstorm or lightning threatens, get inside a home or large building, or inside an all metal vehicle (not a convertible). Stay indoors and don't venture outside unless absolutely necessary.
2. Stay away from open doors and windows, fireplaces, radiators, stoves, metal pipes, sinks and plug-in appliances.
3. Don't use plug-in electrical equipment such as hair dryers, electric blankets or electric razors during the storm.
4. Except for emergencies, don't use the telephone during the storm. Lightning may strike telephone lines outside.
5. If outside, with no time to reach a safe building or an automobile, follow these rules:
   a) Do not stand underneath a natural lightning rod such as a tall, isolated tree in an open area.
   b) Avoid projecting yourself above the surrounding landscape, as you would do if you were standing on hilltop, in an open field, on the beach, or fishing from a small boat.
   c) Get out of the water and off small boats.
   d) Get away from tractors and other metal farm equipment.
   e) Stay away from wire fences, clotheslines, metal pipes, rails, exposed sheds or anything that is high that would conduct electricity. Some of these could carry electricity to you from some distance away.
   f) Don't use metal objects like fishing rods and golf clubs. Golfer's cleats shoes are particularly good lightning rods.
   g) Stay in your automobile if you are traveling. Automobiles offer excellent lightning protection.
   h) Get off and away from motorcycles, scooters, golf carts and bicycles.
   i) If no buildings are available, your best protection is a cave, ditch or canyon, or under head-high clumps of trees or shrubs.
   j) If only isolated trees are nearby, your best protection is to crouch in the open, keeping twice as far away from isolated trees as the trees are high.
   k) When you feel the electrical charge - if your hair stands on end or your skin tingles -lightning may be about to strike. Drop to the ground immediately.

First Aid

1. Persons struck by lightning receive a severe electrical shock and may be burned, but they carry no electrical charge and may be handled safely

2. A person "killed" by lightning can often be revived by prompt mouth-to-mouth resuscitation, cardiac massage and prolonged artificial respiration.
3. In a group struck by lightning, the apparently dead should be treated first; those who show vital signs will probably recover spontaneously, although burns and other injuries may require treatment.

WINTER STORMS

Before the Storm

1. Arrange for emergency heat supply in case of power failure.
2. Prepare automobile, battery-operated equipment, food, heating fuel and other supplies.
3. Prepare a winter survival kit. You should have the following items in your car:
   Blankets or sleeping bags, flares, high energy foods (candy, raisins, nuts, etc.) first aid kit, flashlights, extra shovel, windshield scraper, sack of sand.
4. Your car will help you keep warm, visible and alive should you be trapped in a winter storm. A lighted candle will help keep you from freezing, but you must remember to lave window open slightly for ventilation.
5. Keep car fuel tank above half full.

During and After the Storm

1. Dress warmly. Wear multiple layers of protective, loose-fitting clothing, scarves mittens and hoods. Cover the mouth and nose to protect lungs from extremely cold air.
2. Avoid travel, but if you become stranded, stay in your vehicle - keep it ventilated,bundle up, light an emergency candle for warmth, occasionally change positions andDON'T PANIC.
3. Avoid overexertion. Heart attacks are a major cause of deaths during and after winter storms. Shoveling snow or freeing stuck vehicles can be extremely hard work. Don't overdo it!
4. Beware of the chill factor if winds are present.
5. Be prepared for isolation at home. If you live in a rural area, make sure you can survive at home for a week or two in case a storm isolates you and makes it impossible for you to leave.

If a warning is issued, the Storm is Imminent, Know Winter Words of Warning

WATCH -A winter storm in approaching.

1. **FLURRIES** - Intermittent snowfall that may reduce visibility.
2. **SLEET** - Small particles of ice usually mixed with rain. If enough sleet accumulates on the ground, it will make the roads slippery.
3. **HEAVY SNOW** - when four or more inches are expected within a 12-hour period.
4. **FREEZING RAIN OR FREEZING DRIZZLE** - is forecast when expected rain is likely to freeze as soon as it strikes the ground, putting a coating of ice or glaze on roads and everything else that is exposed. If a substantial layer of ice is expected to accumulate from the freezing rain, an ICE STORM is forecast.
5. **A BLIZZARD** - the most dangerous of all winter storms. It combines cold air, heavy snow and strong winds that blow the snow about and may reduce visibility to only a few yards. Winds 35 mph. Temperature 20° F. or less.
6. **A SEVERE BLIZZARD WARNING** - means that a very heavy snowfall is expected,with winds of at least 45 mph or temperature of 10° or lower.

SUGGESTED MINIMUM NEEDS FOR A 72-HOUR PORTABLE KIT

Water: 1 Gallon (8 lbs.) per person per day for 3 days (8 drops chlorine bleach per gallon)

Food: Minimal or Noncook, Lightweight, Palatable,

Utensils Can Opener, Cooking and Eating

Clothing: 1 Change, Extra Shoes, Raingear, Adequate Winter Wear

Bedding: Sleeping Bags, Blankets

Personal Hygiene: Including Feminine Hygiene and Baby Items

Sanitation: Airtight Bucket or Porta-Pottie, Toilet Paper, Newspaper, Soap, Disinfectant, Trash Bags, Bleach, Towel

First Aid Kit: Personal Medications

Shelter: Tent or Tarp, Rope 1/4"x 36'

Tools: Pocket Knife, Small Tools, Ax, Pointed Shovel

Light: Flashlight, Batteries, Candles, Matches Communication:Radio, Batteries, 1 Whistle Per Person

Fuel: For Cooking, Light, Heat

Important Papers: Wills, Testaments, Stocks, Securities, Titles, Certificates, InsuranceCurrent Family Pictures, I.D. Cards and Tags, Inventory of Household Items, Pencil and Paper, Maps, Phone Numbers, Emergency Manual, Car Keys, House Keys, Books

Money: Cash and Charge

Remember:: Keep car gas tank at least half full!

RICHMOND CITY CORPORATION
ORDINANCE 2025-12

WHEREAS, the City Council of Richmond has the responsibility for the general welfare of the City; and

WHEREAS, such responsibility includes but is not limited to, establishment of best management practices; and

WHEREAS, management practices may evolve over the passage of time:

NOW THEREFORE, the City Council of Richmond City, County of Cache, State of Utah, hereby adopts, passes and publishes the following:

AN ORDINANCE AMENDING THE RICHMOND CITY MUNICIPAL CODE, TITLE 3-000 "MUNICIPAL GOVERNMENT", PARTS 3-110 "CAMPAIGN FINANCE DISCLOSURE", 3-111 "GENERAL", 3-112 "DEFINITIONS", 3-113 "FILING OF DISCLOSURE REPORTS", 3-114 "TIME OF FILING", 3-115 "CONTENTS OF STATEMENT", 3-116 "PUBLIC INFORMATION", 3-117 "PENALTY FOR NONCOMPLIANCE", ADDING PART 3-201 "SIX-MEMBER COUNCIL FORM OF MUNICIPAL GOVERNMENT", AMENDING PARTS 3-210 "ELIGIBILITY FOR ELECTIVE OFFICE", 3-220 "VACANCIES IN ELECTIVE OFFICE" , 3-221 "VACANCY IN OFFICE" AND 3-222 "VACANCY IN OFFICE OF MAYOR".

BE IT ORDAINED BY THE CITY COUNCIL OF RICHMOND CITY, CACHE COUNTY, UTAH AS FOLLOWS:

1. Sections shall be amended such that the highlighted areas below shall be added and the ~~strikeout~~ areas shall be deleted.

3-110 CAMPAIGN FINANCE DISCLOSURE IN MUNICIPAL ELECTION

See Utah Code Annotated 10-3-208 "Campaign finance disclosure in municipal election".

~~**3-111 GENERAL**~~

~~All candidates for elective municipal office shall comply with the campaign finance disclosure requirements set forth in this chapter.~~

~~**3-112 DEFINITIONS**~~

~~The following definitions shall be applicable to this Chapter:~~

~~A. "Candidate" shall mean any person who files a declaration of candidacy for an elective office of the City; or is nominated by a committee, party, or petition; or received contributions or made expenditures or consents to another person receiving contributions or making expenditures with a view to bringing about such person's nomination or election to such office; or causes or allows on his/her behalf, any written material or advertisement to be printed published, broadcast, distributed or disseminated which indicates an intention to seek such office.~~
~~B. "Contribution" shall mean monetary and non-monetary contributions such as in-kind contributions and contributions of tangible things but shall not include personal services provided without compensation by individuals volunteering their time on behalf of a candidate.~~
~~C. "Election" shall mean both primary and final elections.~~
~~D. "Expenditure" shall mean a purchase, payment, distribution, loan, advance, deposit or gift of money or anything of value made for the purpose of influencing the nomination or election of any candidate.~~

~~3-113 FILING OF DISCLOSURE FORMS~~

~~Each candidate for elective office who either receives $750.00 or more in campaign contributions or spends $750.00 or more in campaign expenses shall file with the City Recorder dated and signed financial reports which comply with this chapter. Forms shall be made available by the City. Other forms in substantially the same format are also acceptable.~~

~~3-114 TIME OF FILING~~

~~The reports required by this chapter shall be filed at least seven (7) days before both the primary and general elections and at least once within thirty (30) days following the final election. A candidate losing in the primary election shall file the final report within thirty (30) days of the date of the primary election.~~

~~3-115 CONTENTS OF STATEMENT~~

~~A. The statements filed seven (7) days before an election shall include:~~
~~1. A list of each contribution of more than $50.00 received by the candidate, and the name of the donor,~~
~~2. An aggregate total of all contributions of $50.00 or less received by the candidate; and~~
~~3. A list of each expenditure for political purposes made during the campaign period as of ten (10) days before the date of the election, and the recipient of each expense.~~
~~B. The statement filed thirty (30) days after an election shall include:~~
~~1. A list of each contribution of more than $50.00 received after the cutoff date for the statement filed seven (7) days before an election, and the name of the donor;~~
~~2. A total of all contributions of $50.00 or less received by the candidate after the cutoff date for the statement filed seven (7) days before an election;~~
~~3. A list of all expenditures for political purposes made by the candidate after the cutoff date for the statement filed seven (7) days before an election, and the recipient of each expense.~~
~~C. All contributions and expenditures related to the candidate's candidacy should be accounted for between the pre-election and post-election statement.~~

~~3-116 PUBLIC INFORMATION~~

~~The statements required by this chapter shall be public documents and shall be available for public inspection and copying during regular business hours. Appropriate costs may be assessed pursuant to the provisions of Government Records Access and Management Act.~~

~~3-117 PENALTY FOR NONCOMPLIANCE~~

~~Any candidate who fails to comply with the provisions of this chapter is guilty of an infraction.~~

3-201 SIX-MEMBER COUNCIL FORM OF MUNICIPAL GOVERNMENT

See Utah Code Annotated 10-3b "Forms of Municipal Government".

The six-member form of government consists of five (5) city council members and a mayor.

3-210 ELIGIBILITY FOR ELECTIVE OFFICE

~~See U.C.A. § 10-6-6.~~

See Utah Code Annotated 10-3-301 "Notice – Eligibility and residency requirements for elected municipal office – Mayor and recorder limitations".

3-220 VACANCIES IN ELECTIVE OFFICE

See Utah Code Annotated 20A-1-510 “Midterm vacancies in municipal offices”.

~~**3-221 VACANCY IN COUNCIL**~~

~~See U.C.A. § 10-6-22.~~

~~**3-222 VACANCY IN OFFICE OF MAYOR**~~

~~See U.C.A. § 10-6-23.~~

2. Should any section, clause, or provision of this Ordinance be declared by a court of competent jurisdiction to be invalid, in whole or in part, the same shall not affect the validity of the Ordinance as whole, or any other part thereof.

3. All ordinances, and the chapter, clauses, sections, or parts thereof in conflict with provisions of this ordinance are hereby repealed, but only insofar as is specifically provided for herein.

4. This ordinance shall become effective after the required public hearing and upon its posting as required by law.

THIS ORDINANCE shall be attached as an amendment to the Richmond City Municipal Code above referred to.

ADOPTED AND PASSED by the Richmond City Council on this 16th day of October, 2025.

RICHMOND CITY CORPORATION

____
Paul J. Erickson, Mayor

ATTEST:

____
Justin B. Lewis, City Recorder